Bachelor of Technology (Electronics & Communication Engineering)
Scheme of Studies/Examination
Semester III

S.No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule (Marks)				Duration of Exam(Hrs)
						Major Test	Minor Test	Practical (Major Test)	Total	
1	AS-201	Applied Mathematics-III	3:1:0	4	3.5	75	25	0	100	3
2	ECE-201	Signals& Systems	3:1:0	4	3.5	75	25	0	100	3
3	ECE-203	Electronic Devices	4:0:0	4	4	75	25	0	100	3
4	ECE-205	Network Analysis & Synthesis	4:0:0	4	4	75	25	0	100	3
5	ECE-207	Digital Electronics	3:1:0	4	3.5	75	25	0	100	3
6	ECE-209	Analog Communication	4:0:0	4	4	75	25	0	100	3
7	ECE-211	Signals & Systems Lab	0:0:3	3	1.5	0	40	60	100	3
8	ECE-213	Digital Electronics Lab	0:0:3	3	1.5	0	40	60	100	3
9	ECE-215	Analog Communication lab	0:0:3	3	1.5	0	40	60	100	3
		Total		**33**	**27.0**	**450**	**270**	**180**	**900**	
10	*MPC-201	Environmental Studies	3:0:0	3	0	75	25	0	100	3

* MPC-201 is a mandatory course which will be a non credit subject and student has to get pass marks in order to qualify for the Degree award.

Bachelor of Technology(Electronics & Communication Engineering)

Scheme of Studies/Examination

Semester IV

S.No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule(Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical (Major Test)	Total	
1	AS-206	Numerical Analysis	4:0:0	4	4	75	25	0	100	3
2	ECE-202	Data Structures & Algorithms	3:1:0	4	3.5	75	25	0	100	3
3	ECE-204	Electronic Measurement & Instruments	4:0:0	4	4	75	25	0	100	3
4	ECE-206	Electromagnetic Theory	3:1:0	4	3.5	75	25	0	100	3
5	ECE-208	Analog Electronics	3:1:0	4	3.5	75	25	0	100	3
6	ECE-210	Computer Architecture & Organization	3:0:0	3	3	75	25	0	100	3
7	ECE-212	Data Structures Lab	0:0:3	3	1.5	0	40	60	100	3
8	ECE-214	Electronic Measurement & Instruments Lab	0:0:3	3	1.5	0	40	60	100	3
9	ECE-216	Analog Electronics lab	0:0:3	3	1.5	0	40	60	100	3
		Total		**32**	**26**	**450**	**270**	**180**	**900**	
10	*MPC 202	Energy Studies	3:0:0	3	0	75	25		100	3

* MPC-202isamandatory course which will be a non credit subject and student has to get pass marks in order to qualify for the Degree award.

Bachelor of Technology(Electronics& Communication Engineering)
Scheme of Studies/Examination
Semester V

S.No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule (Marks)				Duration of Exams (Hrs)
						Major Test	Minor Test	Practical (Major Test)	Total	
1	ECE - 301	Microprocessors &	3:1:0	4	3.5	75	25	0	100	3
2	HS-303	Business Intelligence & Entrepreneurship	4:0:0	4	4	75	25	0	100	3
3	ECE-303	Antenna & Wave Propgation	3:1:0	5	3.5	75	25	0	100	3
4	ECE-305	VLSI Technology	4:0:0	4	4	75	25	0	100	3
5	CSE-309	Essentials of Information Theory	4:0:0	4	4	75	25	0	100	3
6	ECE-307	Control Systems Engg	4:1:0	5	4.5	75	25	0	100	3
7	ECE-309	Microprocessors &	0:0:3	3	1.5	0	40	60	100	3
8	ECE-311	Design Automation Lab	0:0:3	3	1.5	0	40	60	100	3
9	ECE-313	Antenna & Wave Propagation Lab	0:0:3	3	1.5	0	40	60	100	3
10	ECE-315*	Personality & Soft Skills Development	2:0:0	2	2	0	100	0	100	3
		Total		**37**	**30**	**450**	**370**	**180**	**1000**	

* The student will be evaluated on the basis of technical seminar and technical writing/reading skills for1credit each

Bachelor of Technology(Electronics & Communication Engineering)
Scheme of Studies/Examination
Semester VI

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule(Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical (Major Test)	Total	
1	ECE-302	Digital Signal Processing	4:1:0	5	4.5	75	25	0	100	3
2	ECE-304	Digital Design Using Verilog	3:1:0	4	3.5	75	25	0	100	3
3	ECE-306	Digital Communication	4:1:0	5	4.5	75	25	0	100	3
3	HS-201	Fundamentals of	4:0:0	4	4	75	25	0	100	3
5	ECE-308	Computer Communication Network	4:0:0	4	4	75	25	0	100	3
6	ECE-310	Digital Signal Processing lab	0:0:3	3	1.5	0	40	60	100	3
7	ECE-312	Digital Design Using Verilog Lab	0:0:3	3	1.5	0	40	60	100	3
8	ECE-314	Digital Communication lab	0:0:3	3	1.5	0	40	60	100	3
9	ECE-316*	Personality & Soft Skills Development 2	2:0:0	2	2	0	100	0	100	3
		Total		**33**	**27**	**375**	**345**	**180**	**900**	

* The student will be evaluated on the basis of technical seminar and technical group discussions for1crediteach

Bachelor of Technology (Electronics & Communication Engineering)
Scheme of Studies/Examination
Semester
VII

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule(Marks)				Duration of Exam(Hrs)
						Major Test	Minor Test	Practical (Major Test)	Total	
1	ECE-401	Micro controller & Embedded Systems Design	3:0:0	3	3	75	25	0	100	3
2	ECE-403	Digital Image Processing	4:0:0	4	4	75	25	0	100	3
4	ECE-405	Power Electronics	3:0:0	3	3	75	25	0	100	3
4		Core Elective -I**	3:0:0	3	3	75	25	0	100	3
5		Core Elective -II**	3:0:0	3	3	75	25	0	100	3
6	ECE-407	Microcontroller & Embedded Systems Design Lab	0:0:3	3	1.5	0	40	60	100	3
7	ECE-409	Digital Image Processing Lab	0:0:3	3	1.5	0	40	60	100	3
8	ECE-411***	Project-1	0:0:10	10	5	0	100	100	200	3
9	ECE-413*	Industrial Case Studies 1	2:0:0	2	2	0	100	0	100	
		Total		**34**	**26**	**375**	**405**	**220**	**1000**	

*Theperformanceofthestudentwillbeevaluatedbythepresentationdeliveredandthereportsubmittedbythestudentrelatedtoindustrial/Researchproblems &its suggested solutions.

** The students should select two departmental electives subjects from the list of core elective subjects.

***Theprojectshouldbeinitiatedbythestudentinthe7thsemesterbeginningandwillbeevaluatedIntheendofthesemesteronthebasisof a presentation and Report.

Bachelorof Technology (Electronics &Communication Engineering)

Scheme of Studies/Examination

SemesterVIII

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule(Marks)				Duration of Exam(Hrs)
						Major Test	Minor Test	Practical (Major Test)	Total	
1	ECE-402	Wireless & Mobile Communication	4:0:0	4	4	75	25	0	100	3
2	ECE-404	Microwave Engineering	3:0:0	3	3	75	25	0	100	3
3		Core Elective -III**	3:0:0	3	3	75	25	0	100	3
4		Core Elective -IV**	3:0:0	3	3	75	25	0	100	3
5	ECE-406 ***	Project-II	0:0:14	14	7	0	100	100	200	3
6	ECE-408	Wireless & Mobile Communication lab	0:0:3	3	1.5	0	40	60	100	3
7	ECE-410	Microwave Engineering Lab	0:0:3	3	1.5	0	40	60	100	3
8	ECE-412*	Seminar & Report Writing	2:0:0	2	2	0	100	0	100	3
		Total		**35**	**25**	**300**	**380**	**220**	**900**	
9	ECE-440****	General Fitness & Professional Aptitude							100	3

* The performance of the student will be evaluated by the presentation delivered and the report submitted by the student related to Industrial/Research problems &its suggested solutions.

** The students should opt two departmental electives subjects from the list of core elective subjects.

***Theprojectshouldbeinitiatedbythestudentincontinuationofthe7thsemesterandwillbeevaluatedIntheendofthesemesteronthebasisof a presentation and Report.

****A viva of the students will be taken by external examiner (Principal/Director/Professor/or any senior Person with Experience more than10 years)at the end of the semester and grades will be given according to the grade chart.

S. No.	Core Electives-7thSem.		S. No.	Core Electives-8thSem.	
1	ECE-415	Advance Digital Communication	1	ECE-414	DSP Processor
2	ECE-417	Nano Electronics	2	ECE-416	Mobile Communication Networks
3	ECE-419	Optical Communications	3	ECE-418	MEMS
4	ECE-421	Adaptive Signal Processing	4	ECE-420	Transducers & Its Applications
5	ECE-423	Satellite Communication	5	ECE-422	Radar Engineering
6	ECE-425	Digital VLSI Design	6	ECE-424	High Frequency Circuit and Systems
7	ECE-427	Analog CMOS IC Design	7	ECE-426	Biomedical Signal Processing
8	ECE-429	Consumer Electronics	8	ECE-428	Multimedia Communications
9	ECE-431	Robotics	9	ECE-430	Mixed VLSI Design
10	ECE-433	Non-Conventional Energy Resources	10	ECE-432	Micro strip Antenna
11	ECE-435	Micro strip line Analysis	11	ECE-434	Strategic Electronics
12	ECE-437	Software Defined Radios	12	ECE-436	Cognitive Radios

AS-201	APPLIEDMATHEMATICS-III						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 hrs**
Purpose	To acquaint the students with the basic use of PDE,LinearProgrammingproblems,Fourierseriesandtransforms,Complexva						
Course Outcomes							
CO1	Thissectionisconcernedmainlywith Fourierseries.However,theunderlyingideascanalsobeextendedtononperiodicphenomena.ThisleadstoFourierintegralsandtransformswhichareverymuchusefulinsolvingtheinitialandboundaryvalueproblems.						
CO2	Studentswilllearnabouttheformationandsolutionthepartialdifferentialequations.FirstorderPDEofanydegreebyusingCharpit'smethodwillbediscussedindetails.Inaddition,howtosolvehomogeneouslinearPDEwithconstantcoefficientsandvariableseparablemethodandLPPwillbe covered under this section.						
CO3	Complexanalysisisconcernedwithgeneralizationofthefamiliarrealfunctionsofcalculusandtheirdetailedknowledgeisanabsolutenecessityinpracticalworktosolveengineeringproblems.						
CO4	Probability theory provides models of probability distributions (theoretical models of the observable reality involving chance effects) to be tested by statistical methods which has various engineering applications, for instance, in testing materials, control of production processes, robotics, and automatization in general, production planning and so on.						

UNIT-I

Fourier Analysis **(11hrs)**

Fourier series: Euler'sformulae, Orthogonality conditions for the Sine and Cosine functions, Dirichlet's conditions, Fourier expansion of functions having points of discontinuity, Change of interval, Odd and even functions, Half-range series.

FourierTransforms: Fourierintegrals,Fouriertransforms,FourierCosineandSinetransforms,PropertiesofFouriertransforms,Convolutiontheorem,Parseval'sidentity,Fouriertransformsofthederivativeofafunction,Applicationoftransformstoboundaryvalueproblems(Heat conduction and vibrating string).

UNIT-II

Partial Differential Equations and LPP **(11hrs)**

FormationandSolutionsofPDE,Lagrange'sLinearPDE,Firstordernon-linearPDE,Charpit's method, Homo generous linear equations with constant coefficients,Method of separation of variables.

Solution of linear programming problems: using Graphical and Simplex methods.

UNIT-III

Theory ofComplexVariables **(12 hrs)**

A review of concept of functions of complex variable, Limit, continuity, differentiability and analyticity of a function. Basic elementary complex functions (exponential functions, trigonometric & Hyperbolic functions, logarithmic functions) Cauchy-Riemann Equations.

Lineintegralincomplexplane,definitionofthecomplexlineintegral,basicproperties,Cauchy'sintegralt heorem,andCauchy'sintegralformula,briefofTaylor's,Laurent'sandResiduetheorems(withoutproofs).

UNIT-IV

Probability theory: (11hrs)

Areviewofconceptsofprobabilityandrandomvariables:definitionsofprobability,additionrule,con ditionalprobability,multiplicationrule,ConditionalProbability,Mean,median,modeandstandarddevi ation,Bayes'Theorem,Discreteandcontinuousrandomvariables,probabilitymass,probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function.

Standard Distributions: Binomial, Poisson and Normal distribution.

References Books:

1. E. Kreyszig:Advanced Engineering Mathematics,WileyIndia.
2. B.V.Ramana: Engineering Mathematics,TataMcGraw Hill.
3. R.K.Jain, S.R.K.Iyengar:Advanced Engineering Mathematics,Taylor & Francis.
4. Murray R Spiegel :Schaum's Outline of Complex Variables, McGraw Hill Professional.
5. MichaelD.Greenberg:AdvancedEngineeringMathematics,PearsonEducation,PrenticeHall.

Note: TheExaminerswillsetninequestions:firstquestionwillbeshortanswertype(covering the entire syllabus)and another eight questions will be set taking two questions from each unit. Students will have to attempt five questions in all; first question will be compulsory and other four questions, selecting one from each unit. All questions will carry equal marks.

ECE-201	Signals and Systems						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**0**	**3.5**	**75**	**25**	**100**	**3 Hr.**
Purpose	**Tofamiliarizethestudentswiththebasicconceptsofsignalsandsystems,Randomvariables,discretisationofanalogsignals, fourier series, fourier transform and La place transform.**						
Course Outcomes							
CO1	**Introduceandclassifysignalsandsystemsbasedontheirproperties.**						
CO2	**Tounderstand the basicconcepts of randomvariables and Lineartimeinvariantsystems.**						
CO3	**Familiarizationwiththesamplingprocessandspectralanalysisofsignalsusingfourierseries.**						
CO4	**Applytransformtechniquestoanalyzecontinuous-timeanddiscrete-timesignalsandsystems**						

Unit-I

IntroductiontoSignals: Continuousanddiscretetimesignals,deterministicandstochasticsignals,periodicandaperiodicsignals,evenandoddsignals,energyandpowersignals,exponentialandsinusoidalsignalsandsingularfunctions.Signalrepresentationintermsofsingularfunctions,orthogonalfunctions andtheirusein signalrepresentation

IntroductiontoSystems: Linearandnon-linearsystems,timeinvariantandtimevaryingsystems,lumpedanddistributedsystems,deterministicandstochasticsystems,casualandnon-causalsystems,analoganddiscrete/digitalmemoryand memorylesssystems.

Unit-II

RandomVariables: IntroductiontoRandomVariables,pdf,cdf,moments,distributions,correlationfunctions.

LinearTimeInvariantSystems:Introductiontolineartimeinvariant(LTI)systems,propertiesofLTIsystems,convolutionintegral,convolutionsum,causalLTIsystemsdescribedbydifferentialanddifferenceequations.Conceptofimpulseresponse

Unit-III

DiscretisationofAnalogSignals: Introduction to sampling,samplingtheorem anditsproof.Effectofundersampling,reconstruction of asignalfromsampledsignal.

FourierSeries:Continuoustimefourierseries(CTFS),PropertiesofCTFS,Convergenceoffourierseries,DiscretetimeFourierSeries(DTFS),PropertiesofDTFS**,**FourierseriesandLTIsystem,Filtering.

Unit-IV

FourierTransform: ContinuousTimeFourierTransform(CTFT),PropertiesofCTFT,Systemscharacterized bylinearconstant-coefficientdifferentialequations.

Discretetimefouriertransform(DTFT),Propertiesof DTFT,Duality,Systemscharacterized byLinearconstantcoefficientdifferenceequations.

LaplaceTransform:Introduction toLaplacetransform,Regionofconvergenceforlaplacetransform,Inverselaplacetransform,Propertiesoflaplacetransform,AnalysisandcharacterizationofLTIsystemsusinglaplacetransform,Systemfunctionalgebraandblockdiagramrepresentations,Unilateral laplacetransform.

TextBooks:

1. AlanV.Oppenheim,AlanS.Willsky,S.HamidNawab,SignalsandSystems,PrenticeHallIndia, 2nd Edition, 2009

ReferenceBooks:

1. SimonHaykins– “Signal&Systems”, WileyEastern
2. TarunKumarRawat, Signalsand Systems , OxfordUniversityPress.

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ECE -203	ElectronicDevices						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**75**	**25**	**100**	**3 Hr.**
Purpose	**Tofamiliarizethestudentswiththevariouselectronicdevicessuchasvarious types ofdiodes,BJT's, FET's and regulatedpowersupplies.**						
CourseOutcomes							
CO1	**Tounderstandtheconceptofcarriertransportphenomenainsemiconductorsand variousdiodessuch as p-n junctiondiode,tunneldiode andschottkydiodes.**						
CO2	**TounderstandthedetailedconceptofBJT'sandcalculationofparametersof transistorsusingdifferentmodels.**						
CO3	**Describethecharacteristics&parameters ofFET's andMOSFET's.**						
CO4	**Tounderstandthe conceptofdifferenttypesofregulatedpowersupplies.**						

Unit-I

CarrierTransportPhenomena:CarrierDrift,CarrierDiffusion,HallEffect,MobilityandResistivity.GenerationandRecombinationofcarriers,Fermienergylevel,itspositionanditsvariationwithdopingconcentration.**PNJunction**:BasicStructure,BuiltinpotentialBarrier,ElectricField,Spacechargewidth,Junctioncapacitances:Depletion&DiffusionCapacitance,Smallsignalmodelof PNJunctionDiode.TunnelDiode,Schottky Diode**.**

Unit-II

BipolarJunctionTransistor: Basicprincipleofoperation,ForwardActivemode&othermodes.NonIdealEffects:BaseWidthModulation,CurrentCrowding,HighInjection.Ebers-MollModel,FrequencyLimitationsofBJT'S,HybridPiModel,Introductionto H-Parameters,HetrojunctionBipolarTransistors.

Unit-III

FieldEffectDevices:JFETconcepts,BasicOperation,Internalpinchoffvoltage,Pinchoffvoltage,IdealDCcurrentvoltagerelationship,Transconductance,Channellengthmodulation,velocitysaturationeffects,Small SignalModel&FrequencyLimitations.TwoTerminalMOS structure,Energybanddiagrams,Depletionlayerthickness,CapacitanceVoltageRelationship,BasicMOSFEToperation,SmallSignalModel.

Unit-IV

RegulatedPowerSupplies:Voltage Regulation,Zenerdiodeshuntvoltageregulator,TransistorseriesandTransistorshuntvoltageregulator,ControlledTransistor VoltageRegulator,Op-AmpSeriesvoltageregulator,Completepowersupplyand SMPS.

TextBooks:

1. D.A.Neamen,DhrubesBiswasSemiconductorPhysicsandDevices(IRWIN),McGrawHillHigher Education,4th Edition
2. B.G.Streetman,SolidStateElectronicDevices,PrenticeHallof India, NewDelhi,1995.

ReferenceBooks:

1. E S.Yang,MicroelectronicDevices,McGrawHill,Singapore, 1988.
2. A.S. SedraandK.C. Smith,MicroelectronicCircuits,Saunder'sCollegePublishing, 1991.
3. Millman&Halkias:IntegratedElectronics,TMH.
4. Boylestad&Nashelsky:ElectronicDevices&Circuit Theory,PHI.

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ECE-205	NetworkAnalysis and Synthesis						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**75**	**25**	**100**	**3 Hr.**
Purpose	**Tofamiliarizethestudentswiththeconceptsoftopology,transientanalysis,networkmodeling,filtersandmethodsofnetworkanalysisandsynthesisforsolvingsimpleand complexcircuits.**						
CourseOutcomes							
CO1	**Tounderstandtheconceptofnetworktopologiesandthenetworkanalysisinthetimedomainforsolvingsimpleand complexcircuits.**						
CO2	**Describethecircuitelementmodels,networkanalysisusingLaplacetransformand timedomainbehaviorfromthe pole-zeroplots.**						
CO3	**Describethecharacteristics&parameters oftwoportnetworks.**						
CO4	**Tounderstandthe conceptoffilters andsynthesisof one portnetwork.**						

Unit-I

Introduction: Principlesofnetworktopology,graphmatrices,NetworkAnalysis(Time-Domain):SingularityFunctions,Source-FreeRC,RL,SeriesRLC,ParallelRLCcircuits,Initial&FinalConditions,Impulse& Step Response ofRC,RL,SeriesRLC,ParallelRLCcircuits.

Unit-II

NetworkAnalysis(usingLaplaceTransform): CircuitElementModels,TransientResponseofRC,RL,RLC Circuitstovariousexcitationsignalssuchasstep,ramp,impulseandsinusoidalexcitationsusingLaplacetransform.

NetworkFunctions: TerminalpairsorPorts,Networkfunctionsforone-portandtwo-portnetworks,polesandzerosofNetworkfunctions,RestrictionsonpoleandzeroLocationsfordrivingpointfunctionsandtransferfunctions.

Unit-III

CharacteristicsandParametersofTwoPortNetworks: Relationshipoftwo-portvariables,short-circuitadmittanceparameters,opencircuitimpedanceparameters,transmissionparameters,hybridparameters,relationshipsbetweenparametersets,Inter-connection oftwoportnetworks.

Unit-IV

TypesofFiltersandtheirCharacteristics: Filterfundamentals,constant-kandm-derivedlow-passand high-passfilters.

NetworkSynthesis: Causality&Stability,HurwitzPolynomials,Positiverealfunctions,Synthesisofone portnetworks withtwokind of elements.

TextBooks:

1. FundamentalsofElectricCircuits:CharlesK.Alexander,MatthewN.O.Sadiku,McGrawHillEducation
2. NetworkAnalysis: M.E.VanValkenburg, PHI

ReferenceBooks:

1. Circuits& Networks:Sukhija&Nagsarkar,OxfordHigherEducation.
2. NetworkAnalysis& Synthesis:F.F.Kuo,JohnWiley.
3. BasicCircuitTheory:DasoerKuh,McGrawHillEducation.
4. CircuitAnalysis:G.K.Mithal;KhannaPublication

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ECE-207	DigitalElectronics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**0**	**3.5**	**75**	**25**	**100**	**3 Hr.**
Purpose	**TofamiliarizethestudentswiththeconceptsofDigitalElectronicscoveringthecontentsof digitaltechniques,logicgates&logicfamiliesetc.**						
CourseOutcomes							
CO1	**Students willbe ableto design aminimum circuit foranyfunction**						
CO2	**Studentswillbeabletoanalyzevariouslogicfamiliesavailabletodesigndigitalcomponents**						
CO3	**Studentswillbe able todesignstatemachinecircuitsusingsequentialandcombinationalcircuits**						
CO4	**Students willbe ableto understand thebasics ofvarious PLD's.**						

Unit-I

IntroductiontoDigitalTechniques: DigitalSystems;Logiccircuits,Analysis,designandimplementationofdigitalsystems,NumberSystemsandCodes-Positionalnumbersystem;Binary,octalandhexadecimalnumbersystems;Methodsofbaseconversions;Binary,octalandhexadecimalarithmetic;Representationofsignednumbers;Fixedandfloatingpointnumbers;Binarycodes:BCDcodes,Excess-3,Graycodes;Errordetectionandcorrectioncodes-paritycheckcodesandHammingcode.

CombinatonialDesignusingGates: CombinatonialLogicSystems:Definitionandspecification;Truthtable;Basiclogicoperationandlogicgates.Basicpostulatesandfundamentaltheoremsof Booleanalgebra;Standardrepresentationoflogicfunctions:SOPandPOSforms;SimplificationofswitchingfunctionsusingK-mapandQuine-McCluskeytabularmethods;SynthesisofcombinationallogiccircuitsusingAOI,NAND,NORand othercombinationof otherlogicfunctions.

Unit-II

Logicfamilies: Introductiontodifferentlogicfamilies;OperationalcharacteristicsofBJTinsaturationandcut-offregions;OperationalcharacteristicsofMOSFETasswitch;TTLinverter-circuitdescriptionandoperation;CMOSinverter-circuitdescriptionandoperation;StructureandoperationsofTTL,CMOSandECLgates;Electricalcharacteristicsoflogicgates–logiclevelsandnoisemargins,fan-out,propagationdelay,transitiontime,powerconsumptionandpower-delayproduct;interfacingofTTLand CMOSfamilies.

CombinationaldesignusingMSTdevices: Encoders,Decoders,multiplexers,demultiplexersandtheiruseaslogicelements;Paritycircuitsandcomparators;Arithmeticmodules-adders,subtractors,BCD arithmeticcircuits.

Unit-III

Sequentialcircuits: Definitionofstatemachines,statemachineasasequentialcontroller;Basicsequentialcircuits-latchesandflip-flops:SR-latch,D-latch,Dflip-flop,JKflip-flop,Tflip-flop;Timinghazardsandraces;AnalysisofstatemachinesusingDflip-flopsandJKflip-flops;Designofstatemachines-statetable,stateassignment,transition/excitationtable,excitationmapsandequations,logicrealization;

Statemachinedesign:Designing state machine using ASM charts, Designing state machine using state diagram, Design of registers, counters-asynchronous and synchronous, up/down counter, Ringand Johns on counters.

Unit-IV

Memory–Organization,FunctionalDiagram,Memoryoperations,Classificationofsemiconductormemories,ReadandWriteMemories,ROM,ProgrammableLogicDevices-PLAs,PALsandtheirapplications,GenericArraylogicdevices,SequentialPLDsandtheirapplications;Introductiontofieldprogra

mmablegatearrays(FPGAs)andASICS.

TextBooks:

1. G.K.Kharate:DigitalElectronics,1st edition,Oxforduniversitypress,2010

ReferenceBooks:

1. M.M.ManoandM.D.Ciletti:Digitaldesign4thedition,PrinteceHall.2006
2. R.P.Jain:ModernDigitalElectronics, 3rd edition,TMH.2003
3. A.A.Kumar:Fundamentalsof digital circuits,2nd edition,Printece HallofIndia
4. A.P.Malvinoand D.P.Leach:Digitalprinciples andapplications,6th edition,TMH,2008
5. Z.Kohavi,Switchingand FiniteAutomataTheory,McGrawHill,1970.

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ECE-209	**AnalogCommunication**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**75**	**25**	**100**	**3 Hr.**

Purpose	Tofamiliarizethestudentswiththeconceptsofbasiccommunicationsystemsandvarious noisesinthatsystem,differentanalogmodulationtechniquesandalsoAM&FMtransmis sion&receptionwithvariouspulsetechniques.
CourseOutcomes	
CO1	Tounderstandtheconceptofbasiccomm.Systemandvarioustypesofnoiseandanalogmo dulationtechniques.
CO2	Tounderstandthe conceptofAMtransmission&reception.
CO3	Tounderstandthe conceptof FM transmission&reception.
CO4	TounderstandtheconceptofSSBtransmission&receptionandanalogpulsetechniques.

Unit-I

CommunicationSystemsandNoise: Constituentsofcommunicationsystem,Modulation,Bandwidthrequirement,Noise,Classif icationofnoise,Resistornoise,Multipleresistornoisesources,Networkwithreactiveelements,NoiseTemperature,Noisebandwidt h,Noisefigure,itscalculationandmeasurement,Bandpassnoiserepresentation,Noisecalculation in CommunicationSystems,NoiseinAmplitudeModulatedSystem,Noiseinanglemodulatedsystems,SNRcalculationforAMand FM.

AnalogModulationTechniques:Theoryofamplitudemodulation,AMpowercalculations,AMmodulationwithacomplexwave, Conceptsofanglemodulation,Theoryoffrequencymodulation,MathematicalanalysisofFM,SpectraofFMsignals,NarrowbandF M,WidebandFM,Phasemodulation,PhasemodulationobtainedfromfrequencyModulation,ComparisonofAM,FM&PM.

Unit-II

AMTransmission: GenerationofAmplitudeModulation,Lowlevelandhighlevelmodulation,BasicprincipleofAMgeneration,S quarelawmodulation,Amplitudemodulationinamplifiercircuits,Vanderbijlmodulation,SuppressedcarrierAMgeneration(Balan cedModulator)ringModulator,ProductModulator/balanced Modulator.

AMReception: TunedRatioFrequency(TRF)Receiver,SuperheterodyneReceiver,RFAmplifier,ImageFrequencyRejection,Ca scadeRFAmplifier,FrequencyConversionandMixers,Tracking&andAlignment,IFAmplifier,AMdetector,AMdetectorwithAG C,Distortionindiodedetectors,Doublehetro-
dynereceiver,AMreceiverusingaphaselockedloop(PLL),AMreceivercharacteristics.

Unit-III

FMTransmission:FMallocationstandards,GenerationofFMbydirectmethod,Varactordiode
Modulator,IndirectgenerationofFM,TheArmstrongmethodRCphaseshiftmethod,Frequencystabilizedreactance FM transmitter,FMstereo transmitter,Noisetriangle.

FMReception: DirectmethodsofFrequencydemodulation,Travisdetector/frequencydiscrimination(Balancedstopdetector),Fo sterseelayofphasediscriminator,Ratiodetector,IndirectmethodofFM

demodulation,FMdetectorusingPLL,Pre-emphasis/de-
emphasis,Limiters,TheFMreceiver,RFAmplifier,FMstereoreceiver,Square,Triangular,SinusoidalFMgenerationVoltagecontro lledoscillator.

Unit-IV

SSBTransmission: Introduction,AdvantagesofSSBTransmission,GenerationofSSB,TheFiltermethodThePhaseShiftMethod, TheThirdMethod,AMCompatibleSSBModulation,PilotCarrierSSB,IndependentSide-bandSystems(ISB),VestigialSide-
bandModulation(VSB),VSB-SC,ApplicationofAMand FM inTVtransmission.

SSBReception:SSBProductDemodulator,BalancedModulatorasSSBDemodulator,PilotCarrierSSBReceiver,SSBDoubleSuper-hetrodyneReceiver,CompatibleSSB(CSSB)Receiver,ISB/SuppressedCarrierReceiver,ModernCommunicationReceiver.

AnalogPulseModulation: Introduction,Pulseamplitudemodulation(PAM),NaturalPAMFrequencySpectraforPAM,PAMTime MultiplexingFlat-topPAM,PAMModulatorCircuit,DemodulationofPAMSignals,PulseTimeModulation(PTM),PulseWidthModulation(PWM), Pulse PositionModulation(PPM),PPMDemodulator,

TextBooks:

1. Proakis, J.G. andSalehi, M., FundamentalsofCommunicationSystems,Dorling Kindersley(2008)2nd ed.
2. MithalGK, RadioEngineering,KhannaPub.

ReferenceBooks:

1. Taub, H., Principles ofCommunicationSystems,McGraw-Hill(2008)3rded.
2. Haykin, S., CommunicationSystems,JohnWilley(2009)4thed
3. Kennedy,G.,ElectronicCommunicationSystems,McGraw-Hill(2008)4thed.

Note:Question paper template will be provided to the paper setter.

ECE-211	Signals and SystemsLab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical (MajorTest)**	**Practical (MinorTest)**	**Total**	**Time**
0	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hr.**
CourseOutcomes							
CO1	**Tounderstandthe basicconceptsofMATLAB**						
CO2	**Toexploreproperties ofvarioustypesofsignalsandsystems.**						
CO3	**Tovisualize the relationshipbetweencontinuousanddiscretefouriertransforms.**						
CO4	**Tounderstandthe conceptofsampling intimeandfrequencydomain.**						

List ofExperiments:

1) To demonstratesomesimple signal.

2) Toexploretheeffectoftransformationofsignalparameters(amplitude-scaling,time-scalingand time-shifting).

3) Toexplorethevariouspropertiesoftheimpulsesignals.

4) To visualizethecomplexexponentialsignaland realsinusoids.

5) Toidentifya givensystem as linearornon-linear.

6) Toexplorethe timevariance andtimeinvariancepropertyof a givensystem.

7) Toexplorecausalityandnon-causalitypropertyof asystem.

8) To visualizetherelationshipbetweenthecontinuous-timeFourierseriesand Fouriertransformof a signal.

9) To visualizetherelationshipbetweenthediscrete-timeFourierseriesandFouriertransformof a signal.

10) Tovisualizetherelationshipbetweencontinuous-timeanddiscrete-timeFouriertransformof a signals.

11) To demonstratethe timedomainsamplingof bandlimitedsignals(Nyquist theorem).

12) To demonstratethe timedomainsamplingof non-bandlimitedsignalsandantialiasingfilter.

13) To demonstratethesignalreconstructionusingzero-orderhold andfirst-orderholdfilters.

14) To demonstratethesamplingin frequencydomain(DiscreteFourierTransform).

15) To demonstratethespectral analysisusingDiscreteFourierTransform.

17) To demonstratetheconvolutionandcorrelationof twocontinuous-timesignals.

18) To demonstratetheconvolutionandcorrelationof twodiscrete-timesignals.

ECE-213	**DigitalElectronicsLab**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical (MajorTest)**	**Practical (MinorTest)**	**Total**	**Time**
0	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hr.**

CourseOutcomes	
CO1	**Tounderstandthe conceptof TTLgatessuch asAND,OR,NANDetc.**
CO2	**Tostudy andverifyvariouscombinationalcircuitssuch asmultiplexers,Comparatorsetc.**
CO3	**Tounderstandthe conceptofsequentialcircuits such asflipflops, countersetc.**
CO4	**Todesignthestatemachineof fourstates andto study a sequencedetector.**

List ofExperiments:

1. StudyofTTLgatesAND,OR,NOT,NAND,NOR,EX-OR,EX-NOR.
2. Design andrealize a givenfunctionusingK-Mapsandverifyitsperformance.
3. Toverifythe operationof MultiplexerandDemultiplexer.
4. Toverifythe operationof 2 bitComparatorusinggates.
5. Toverifythetruthtableof S-R,J-K,T, D Flip-flops.
6. Toverifythe operationof Bi-directionalshiftregister.
7. Todesign and verifytheoperationof3-bitasynchronouscounter.
8. Todesign and verifytheoperationofasynchronous Up/downcounterusingJ-KFFs.
9. Design astatemachineof 4 states.
10. Todesign a sequencedetector.

ECE-215	**AnalogCommunicationLab**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical (MajorTest)**	**Practical (MinorTest)**	**Total**	**Time**
0	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hr.**
CourseOutcomes							
CO1	**Tostudy variousmodulationtechniquesofAmplitudemodulationandalsodemodulation.**						
CO2	**Tostudy thegenerationtechniquesofSSBandDSBSCmodulation**						
CO3	**TounderstandtheconceptofPLL,itscapturerangeandfrequencymultiplierusingPLL.**						

List ofExperiments:

1. i)TostudyDoubleSidebandAmplitudeModulationanddetermineits modulationfactorand powerin sidebands.
   ii) Tostudyamplitudedemodulation bylineardiodedetector.
2. i)TostudyFrequencyModulation anddetermineitsmodulationfactor.
   ii) TostudyPLL565asfrequencydemodulator
3. TostudySamplingand reconstructionofpulseamplitudemodulationsystem.
4. Tostudythe Sensitivitycharacteristicsofsuperhetrodynereceiver.
5. Tostudythe Selectivitycharacteristicsofsuperhetrodynereceiver.
6. Tostudythe Fidelitycharacteristicsofsuperhetrodynereceiver.
7. i)TostudyPulseAmplitudeModulation
   a) Usingswitchingmethod
   b) Bysample andholdcircuit.

ii) TodemodulatetheobtainedPAMsignalbyIInd orderLowpassfilter.

8. TostudyPulseWidthModulation /Demodulation.
9. TostudyPulse PositionModulation/Demodulation.
10. Tostudyactivefilters(Low-pass,High-pass,Band-pass, Notch filter).

MPC-201	**EnvironmentalStudies(B.Tech.All BranchesSemester–III/IV)**						
Lecture	**Tutorial**	**Practical**	**Credit**	**MajorTest**	**MinorTest**	**Total**	**Time**
3	**-**	**-**	**0**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**Tolearn the multidisciplinarynature,scope and importanceofEnvironmentalStudies**						
CourseOutcomes							
CO1	**Basicconceptsof Variouskinds ofMicroscopy andCentrifugationTechniques**						
CO2	**TolearnthetheoreticalandpracticalaspectsofElectrophoresis and ChromatographyTechniques**						
CO3	**TolearntheconceptsofdifferentkindsofSpectroscopyandColourimetry**						

CO4	Tounderstandthe conceptofradioisotopetechniques and theirapplicationsinresearch

UNIT1

Themultidisciplinarynatureofenvironmentalstudies.Definition,ScopeandImportance.Needforpublicawareness.NaturalResources:RenewableandNon-RenewableResources:Naturalresourcesand associatedproblems.

(a) ForestResources:Useandover-exploitation,deforestation,casestudies.Timbereztraction,mining,dams and theireffectsonforestsandtribalpeople.
(b) WaterResources-Useandover-utilizationofsurfaceandgroundwater,floods,drought,conflictsoverwater,dams-benefitsandproblems.
(c) MineralResources-Useand exploitation,environmentaleffectsof extractingand usingmineralresources,casestudies.
(d) FoodResources-WorldFoodProblems,changescausedbyagricultureandovergazing,effectsofmodernagriculture,fertilizer-pesticideproblems,waterlogging,salinity,casestudies.
(e) EnergyResources-Growingenergyneeds,renewableandnon-renewableenergysources,useof alternate energysources.Casestudies.
(f) LandResources-Landasaresource,land,degradation,maninducedlandslides,soilerosionand desertification.

Roleofanindividualinconservationofnaturalresources.Equitableuseofresourcesforsustainablelifestyle.

UNIT II

Ecosystem-
Conceptofanecosystem.Sturctureandfunctionofanecosystem.Producers,consumersanddecomposers.Energyflowintheecosystem.EcologicalSuccession.FoodChains,foodwebsandecologicalpyramids.Introduction,types,characteristicfeatures,structureandfunctionofthefollowingecosystem-

a. ForestEcosystem
b. GrasslandEcosystem
c. DesertEcosystem
d. AquaticEcosystems(ponds,streams,lakes,rivers,oceans,esturaries

FieldWork.Visittoalocalareatodocument Environmentassets-river/forest/grassland/hill/mountain.Visitto a localpollutedsite- Urban/Rural

Industrial/Agricultural.Studyofcommonplants,insectsandbirds.Studyofsimpleecosystems-pond,river,hill,slopesetc.(Fieldworkequalto 5lecturehours).

UNITIII

Biodiversityanditsconservation.Introduction,Definition:genetic,speciesandecosystemdiversity.Biogeographicalclassificationof India.Valueofbiodiversity:consumptiveuse,productiveuse,social,ethical,aesthetica ndoptionvalues.Biodiversityofglobal,Nationalandlocallevels.Indiaasamega-diversitynationHotspotsofBiodiversity.Threatstobiodiversity:Habitatloss,poachingofwildlife,man-wildlifeconflicts.Endangeredandendemicspeciesof India.ConservationofBiodiversity- In situ and Ex-Situconservationof biodiversity.

EnvironmentalPollutionDefiinitiom.Cause,effectsandcontrolmeasuresof-(a)AirPollution(b)WaterPollution(c)SoilPollution(d)MarinePollution(e)NoisePollution(f)ThermalPollution(g)NuclearHazards
Solidwastemanagement-cause,effectsandcontrolmeasuresofurbanandindustrialwastes.Roleofanindividualinpreventionofpollution.Pollutioncasestudies.Disastermanagement:floods,earthquake,cycloneandlandslides

UNITIV

SocialIssuesandtheEnvironment.Fromunsustainabletosustainabledevelopment.Urbanproblemsrelatedtoenergy.Waterconservation,rainwaterharvesting,watershedmanagement.Resettlementandrehabilitationofpeople:Itsproblemsandconcerns.CaseStudies.Environmentalethics-issuesandpossiblesolutions.Climatechange,globalwarming,acidrain,ozonelayerdepletion,nuclearaccidentsandholocaust.Casestudies.WastelandReclamation.Consumerismandwasteproducts.EnvironmentProtectionAct.Air(PreventionandControlofPollution)Act.Water(PreventionandControlofPollution)Act.WildlifeProtectionAct.ForestConservationAct.Issuesinvolvedinenforcementofenvironmentallegislation.Public Awareness.HumanpopulationandtheEnvironment.Populationgrowth,variationamomgnations.Population explosion-FamilyWelfareProgramme.Enviromments ndhumanhealth.Humanrights.ValueEducation.HIV/AIDS,Womenand ChildWelfare.RoleofInformationTechnologyin Environmentand HumanHealth.CaseStudies.

TextBooks

1. EnvironmentalStudies-DeswalandDeswal.DhanpatRai&Co.
2. EnvironmentalScience&EngineeringAnandan,P.and Kumaravelan,R.2009. ScitechPublications(India)Pvt.Ltd.,India
3. EnvironmentalStudies.DanielsRanjitR.J.and Krishnaswamy. 2013.Wiley India.
4. EnvironmentalScience-Botkin and Keller.2012.Wiley ,India

AS-206	NUMERICAL ANALYSIS						
Lecture	**Tutorial**	**Practical**	**Credit**	**MajorTest**	**MinorTest**	**Total**	**Time**
4	**0**	**0**	**4**	**75**	**25**	**100**	**3hrs**
Purpose	Toacquaintthestudentswiththecompleteproceduretonumericallyapproximatethesolutionfordifferentkindsofproblemsoccurinscience,engineeringandtechnologywhoseexactsolutionisdifficulttofind.						
CourseOutcomes							
CO1	Inthissectionstudentwilllearnthemethodstofindtherootsofnonlinear(algebraicortranscendental)equations,andeigenvalueproblemofamatrixthatcanbeobtainednumericallywhereanalyticalmethodsfailtogivesolution.						
CO2	Studentswilllearntosolvealargesystemoflinearequationsandmatrixinversionbyvariousnumericalmethodsandtechniques.						
CO3	Discussiononinterpolationwillbeusefulinconstructingapproximatepolynomialtorepresentthehugeamountsofexperimentaldata,andtofindtheintermediatevalues.Numericaldifferentiationandintegrationfindapplicationwhenthefunctionintheanalyticalformistoocomplicatedorthehugeamountsofdataaregivensuchasseriesofmeasurements,observationsorsomeotherempiricalinformation.						
CO4	Sincemany physicallaws arecouchedinterms ofrateof change of one/twoormoreindependentvariables,mostoftheengineeringproblemsarecharacterizedintheformofeithernonlinearordinarydifferentialequationsorpartialdifferentialequations.Themethodsintroducedinthesolutionofordinarydifferentialequationswillbeusefulinattemptingmanyengineeringproblem.						

UNIT- I

SolutionofAlgebraicandTranscendentalEquationandEigenValueProblem: Solutionofalgebraicandtranscendentalequationbythemethodofbisection,themethodoffalseposition,Newton-RaphsonmethodandGraeffe'sRootsquaringmethod.Eigenvalueproblembypowermethod andJacobimethod.

UNIT-II

SolutionofSystemofEquationsandMatrixInversion:Solutionoflinearalgebraicequation: GausseliminationandGauss-Jordanmethods-MethodofTriangularizationandCrout'sreduction.Iterativemethods:Gauss-Jacobi,Gauss-SeidelandRelaxationmethods.MatrixinversionbyGauss-Jordanelimination,Crout's, Doolittleand CholeskiMethods.

UNIT-III

Interpolation: FiniteDifferences,Relationbetweenoperators-InterpolationbyNewton'sforwardandbackwarddifferenceformulaeforequalintervals.Newton'sdivided differencemethodandLagrange'smethodforunequalintervals.GaussCentraldifferenceformulae,BesselandStirlingformulae.

Numericaldifferentiation:Newton'sforwarddifferenceformulatocomputederivatives,Newton'sbackwarddifferenceformulatocomputederivatives,DerivativesusingCentraldifferenceformulae,to findthe maxima and minima ofa tabulatedfunction.

NumericalIntegration:byNewton'sCotesformulae,TrapezoidalandSimpson's1/3rdand3/8thrules,Romberg method.

UNIT-IV

SolutionofOrdinaryDifferentialEquation: Singlestepmethods:Taylorseriesmethod,Picard'smethodofsuccessiveapproximation,Euler,ModifiedEuler'sandImprovedEulermethods,RungeKuttamethodoffourthorderonly.Multistepmethods:MilneandAdams–Bashforthmethods.

Curvefitting: Introduction,PrincipleofLeastsquares,MethodofLeastsquares,Fittingofastraightline,parabolaand exponentialfunctions.

ReferencesBooks:

- M.K.Jain,SRKIyengarandR.K.Jain,NumericalMethodsForScientific&Engg6e,NewAgeInternational(P) Ltd(2008),ISBN-13:978-8122420012.

- KendallE.Atkinson,AnIntroductionto NumericalAnalysis,Wiley;2 edition,(January17,1989), ISBN-10:0471624896 , ISBN-13:978-0471624899.
- S. C. Chapraand Raymond PCanale,NumericalMethodsforEngineers,TataMcGrawHill,IndianEdition.
- JamesScarborough,NumericalMathematicalAnalysis,Oxford& IBH PublishingCo.Pvt.Ltd (1950),ISBN10:0009780021, ISBN-13:978-0009780021.
- C.F.GeraldandO.P.Wheatley,AppliedNumericalAnalysis,AddisonWesley;7edition(2003), ISBN-13:978-0321133045.

AdditionalReadings:

- S.S.Sastry,IntroductoryMethods ofNumericalAnalysis,PrenticeHallofIndiaPvt. Ltd.(2007),ISBN-13:978-8120327610.
- BabuRam,NumericalMethods,Pearson,ISBN 978-8-317-3221-2.
- P.Thangaraj, ComputerOriented NumericalMethods,PHI,ISBN978-81-203-3539-4.

Note: TheExaminerswillsetninequestions:firstquestionwillbeshortanswertype(coveringtheentiresyllabus)andanothereightquestionswillbesettakingtwoquestionsfromeachunit.Studentswillhavetoattemptfiveques tionsinall;firstquestionwillbecompulsoryandotherfourquestions,selectingonefromeach unit.Allquestionswillcarryequalmarks.

ECE-202	Data Structures & Algorithms						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**0**	**3.5**	**75**	**25**	**100**	**3 Hr.**
Purpose	**TofamiliarizethestudentswiththeconceptsofCbasics,andbasicalgorithmsusingdatastructuressuchassearchingandsorting,operationsoflinkedlistsandbasicsoftrees and graphs.**						
Course Outcomes							
CO1	**Studentswillbeabletorecall'C'basicsanddesignbasicalgorithmsusingvarious data structures**						
CO2	**Students will be able to design implement various searching and sorting algorithms on arrays.**						
CO3	**Students will be able to use pointers to perform various operations of linked lists**						
CO4	**Students willbe ableto understand thebasics oftrees andGraphs.**						

Unit-I

Overviewof'C': History,Charactersusedin'C",Data Types,'C'Tokens,Structuresof'C'program,Operators and Expressions,Flow of Control,I/O functions,Arrays,Structures,userdefineddatatypes**Introduction:**Overview,ConceptofDataStructures,DesignofsuitableAlgorithm,Algorithmanalysis

Unit-II

Arrays-SearchingandSorting: Introduction,1-Darrays-addressinganelementinanarray,arraytraversal,insertionanddeletion,Multi-Darrays,representationofarraysinphysicalmemory,applicationofarrays,Searchingalgorithms:linearsearch,binarysearch.Sortingalgorithms:selectionsort,insertionssort,bubblesort,shellsort,mergesort,radixsort(AlgorithmandAnalysis).

StacksandQueues: Stacksoperations,ApplicationsofStacks–ArithmeticoperationsusingInfixtoprefixandpostfixnotations,theirconversionandevaluation,Queuesoperations,Circular,Priorityqueueand Deque.

Unit-III

Pointers: Introduction,Pointervariables,pointersandarrays,array ofpointer,pointersandstructures,Dynamicallocation

LinkedLists: Introduction,linkedlists,operationsonlinkedlists(Creation,Traversing,Searching,InsertionandDeletion),Circularanddoublylinkedlist,LinkedStacksandLinkedQueues,Comparisonofsequentialandlinkedstorage.

Unit-IV

Trees: BinaryTrees,representationoftrees(Linearandlinked),Traversalofbinarytrees.Typesofbinarytrees:Expressiontree,Binarysearchtree, Heaptree,threadedbinarytrees.

Graphs: Introduction,Graphterminology,variousrepresentationsofGraphs,operations:Insertion,Deletionandtraversal.

TextBooks:

1. DataStructuresusingCby A. K. Sharma , PearsonPublication
2. Theory&Problems ofDataStructuresbyJr. SymourLipschetz,Schaum'soutlinebyTMH.

ReferenceBooks:

1. DataStructuresusingCby A. M.Tenenbaum,Langsam, MosheJ.Augentem,PHIPub
2. DataStructures andprogram designinCbyRobertKruse,PHIExpertDataStructureswith CbyR.B. Patel

Note:Questionpapertemplatewillbeprovided tothepaper setter.

ECE-204	Electronic Measurement and Instruments						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**0**	**4**	**75**	**25**	**100**	**3 Hr.**
Purpose	**TofamiliarizethestudentswiththeconceptsofElectronicsMeasurementslikemeasurementofvoltage,current&resistanceetc.**						
CourseOutcomes							
CO1	**Studentswilllearnthetechniquesofmeasurementofresistanceusingdifferentbridges**						
CO2	**ACBridges&VoltageIndicating&RecordingDeviceswillbeintroducedtothestudents**						
CO3	**Studentswillbeabletorecognizethefunctioningofdifferent Analog&DigitalInstruments**						
CO4	**Transducers& DataAcquisitionSystemswillbeintroducedtothe students**						

Unit-I

MeasurementandError: Functionalelementsandgeneralizedconfigurationofameasuring Instrument,Characteristicsof instruments,errorsin measurements andtheirstatisticalanalysis.

MeasurementofResistance: Wheatstonebridge,Carey-FosterBridge,Kelvindoublebridge,MeasurementofInsulationresistance.

Unit-II

A-C Bridges: MaxwellInductancebridge.MaxwellInductanceCapacitanceBridge,Anderson'sBridge,Hay'sBridge,De-Sauty'sBridge,Schering'sbridge andWein'sbridge.

VoltageIndicatingandRecordingDevices: AnalogvoltmetersandPotentiometers,Selfbalancingpotentiometerand X-Yrecorders,Galvanometers-Oscillographs,Cathode-RayOscilloscopes,MagneticTapeRecorders.

Unit-III

ElectronicInstruments: Waveanalyzer,Distortionmeter:Q-meter.MeasurementofOp-Ampparameters.

DigitalInstruments: DigitalIndicatingInstruments,Comparisonwithanalogtype,digitaldisplaymethods,digitalmethodsoftime and frequencymeasurements,digitalvoltmeters.

Unit-IV

Transducers: ClassificationofTransducers,StrainGauge,DisplacementTransducers-CapacitiveTransducers,LVDT,Piezo-electricTransducers,TemperatureTransducers–resistancethermometer,Thermocouples andThermistors,Liquidlevel measurementLowpressure(vacuum)measurement.

DataAcquisitionSystems: AtoDandDtoAconverters,AnalogandDigitalDataAcquisitionSystems,Multiplexing,SpatialEncoders,Telemetry.

TextBook:

1. ACourseinElectricalandElectronicsMeasurementsandInstrumentation:A.K.Sawhney;DhanpatRai&Sons.

ReferenceBooks:

1. ElectronicsInstrumentationandMeasurementTechniques:CooperW.D&HelfrickA.D.;PHI DoeblinE.O.,MeasurementSystems:Application&Design, McGrawHill.

Note:Questionpapertemplatewillbe provided tothepaper setter.

ECE-206	ElectromagneticTheory						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**0**	**3.5**	**75**	**25**	**100**	**3 Hr.**
Purpose	**TofamiliarizethestudentswiththeconceptsofElectric&MagneticFieldsandmakethem understandthephenomenonofpropagationofelectromagnetic waves.**						
CourseOutcomes							
CO1	**Basicsofelectrostaticsincludingdielectricproperties willbecovered.**						
CO2	**Basicsofmagneto-staticsand Maxwell'sequationswillbecovered.**						
CO3	**FundamentalsofUniformplanewaves and theirpropagationin differentmediumswillbecovered.**						
CO4	**FundamentalsofTransmissionLinesanddifferentmodesofwavepropagationinwaveguideswillbecovered.**						

Unit-I

ElectricFieldandCurrent: IntroductiontoVectors:Addition,Subtraction,Multiplication&Differentiation.CoordinateSystems:Rectangular,Cylinderical&Spherical.Coulomb'slaw.ElectricFieldIntensity,ElectricPotential,FieldofaLineCharge,FieldofaSheetofCharge,ElectricFluxDensity,ElectricDipole,CurrentDensity,ContinuityofCurrent,Gauss'sLawandApplications,ElectricFieldBehaviourinDielectrics,BoundaryConditionsatInterfacebetweenTwoDielectrics,MethodofImages,CapacitanceofTwoWireLine,Poisson'sandLaplace’sEquations,UniquenessTheorem.

Unit-II

MagneticFieldandMaxwellEquations: Biot-SavartLaw.Ampere's law, MagneticVectorpotentials,Forceonamovingcharge,DifferentialCurrentElement,ForceandTorqueonaClosedCircuit,MagneticBoundaryConditions,theMagneticCircuit,Faraday'sLaw,Maxwell's EquationsinPointandIntegralformforFreespace,GoodConductors&LossyDielectricforSinusoidal TimeVariations&StaticFields,Retardedpotentials.

Unit-III

TheUniform Plane Wave: Plane Waves&its Properties,WaveEquationfor Free Space andConductingMedium,PropagationofPlaneWavesinLossyDielectrics,GoodDieletrics&GoodConductors.ThePoyntingVectorandPowerconsiderations,SkinEffect,ReflectionofUniformPlane Waves(Normal&ObliqueIncidence).

Unit-IV

TransmissionLinesandWaveguides: TheTransmissionLineEquations,GraphicalMethods,Smithchart,Time-domainandFrequency-domainAnalysis,ReflectioninTransmissionLines,SWR.TE,TM,TEMwaves,TEandTMmodesin RectangularandCircularWaveguides,Cut-off&GuidedWavelength,WaveImpedanceandCharacteristicImpedance,DominantModes,Power Flowinwaveguides,ExcitationofWaveguides,DielectricWaveguides.

TextBooks:

1. Hayt W H.,EngineeringElectromagnetics,TataMcGrawHill, 6th Edition.

ReferencesBooks:

1 JordanEC&BalmainKG,ElectromagneticWavesandRadiatingSystems,PHI.2 David K. Chang,FieldandWavesElectromagnetics,AddisonWesley.

Note:Questionpapertemplatewillbe provided tothepaper setter.

ECE-208	AnalogElectronics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hr.**
Purpose	**Tofamiliarizethestudentswiththeconceptsofvariousmodelsof BJT's and FET's, multistageamplifiers, conceptoffeedbackanditstopologies, oscillators and detail ofoperationalamplifierswithitsapplications.**						
CourseOutcomes							
CO1	**TounderstandtheconceptofvariousamplifiersusingBJTandFETandvarioustransistor models**						
CO2	**Describethefrequencyresponseofmultistageamplifiersandthedetailedconceptof feedbacktopologies.**						
CO3	**TounderstandtheconceptofBarkhausencriteriaofoscillationandvariousRCand LC oscillators andtheirfrequencyofoscillation.**						
CO4	**TounderstandtheconceptofOperationalamplifieranditsvariousapplicationssuch ascurrentmirror,Schmitttriggerandvariousop-ampparameters.**						

Unit-I

AmplifierModels:Voltageamplifier,currentamplifier,trans-conductanceamplifierandtrans-resistanceamplifier.BiasingschemesforBJTandFETamplifiers,biasstability,variousconfigurations(suchas CE/CS,CB/CG,CC/CD)andtheirfeatures,smallsignalanalysis,lowfrequencytransistormodels,estimationo fvoltagegain,inputresistance,outputresistanceetc.,designprocedureforparticularspecifications,low frequencyanalysisof multistageamplifiers.

Unit-II

TransistorFrequencyResponse: Highfrequencytransistormodels,frequencyresponseofsinglestageandm ultistageamplifiers,cascodeamplifier.Variousclassesofoperation(ClassA,B,AB,C etc.),theirpowerefficiencyand linearityissues.
FeedbackTopologies: Voltageseries,currentseries,voltageshunt,currentshunt,effectoffeedbackongain,ba ndwidthetc.,calculationwithpracticalcircuits,conceptofstability,gainmarginandphasemargin.

Unit-III

Oscillators: Reviewofthebasicconcept,Barkhausencriterionforoscillators,typeof RCoscillators :RCphaseshiftoscillator,Wienbridgeoscillator,LCoscillators:Hartleyoscillator,Collpitoscillator , Clapposcillator,555Timerasa monostableand astablemultivibrator.

Unit-IV

Op-AmpApplications:Schmitttriggeranditsapplications.Currentmirror:Basictopologyanditsvariants,V-Icharacteristics,outputresistanceandminimumsustainablevoltage(VON),maximumusableload.Differenti alamplifier:Basicstructureandprincipleofoperation,calculationofdifferentialgain,commonmodegain,CM RRandICMR.OP-AMPdesign:designofdifferentialamplifierfora givenspecification,designofgainstages and outputstages.

TextBooks:

1. ElectronicDevicesand Circuits byMillman and Halkias,McGrawHills, NewDelhi

ReferenceBooks:

1. OperationalAmplifiersandLinearIntegratedCircuitsbyRamakantAGayakwad,PHI.
2. A.S. Sedra &K.C.Smith,MicroelectronicsCircuits,OxfordUniversityPress
3. RobertL. Boylestad& LouisNashelsky,ElectronicDevices& CircuitTheory,Pearson

Note:Questionpapertemplatewillbe provided tothepaper setter.

ECE-210	ComputerArchitecture &Organization						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hr.**
Purpose	**Tofamiliarizethestudentswiththeconceptsofbasicstructureofcomputerhardware&software,Control&processordesignandmemory&systemorganisation.**						
CourseOutcomes							
CO1	**Tounderstandthe conceptofbasicsofcomputerhardware& software**						
CO2	**Tounderstandthe conceptofcontroldesign&processordesign**						
CO3	**Tofamiliarizewiththeconceptofvariousmemorysystems.**						
CO4	**Tofamiliarizewiththeconceptofsystemorganisation.**						

Unit-I

Basic Structure of Computer Hardware and Software :Introduction to basic computer architecture register transfer,bus and memory transfers, arithmetic, logic and shift microoperations.
CentralProcessingUnit: Introduction,generalregisterorganization,stackorganization,instructionformats,addressingmodes,datatransferandmanipulation,programcontrol,RISC, MacrosandSubroutines.

Unit-II

ControlDesign: Microprogrammedcontrol,controlmemory,addresssequencing,microprogramexample,designofcontrolunit,HardwiredControl:designmethods,MultiplierControlUnit,CPUControlunit.
ProcessorDesign: Decimalarithmeticunit–
BCDadder,BCDsubtraction,decimalarithmeticoperations,ALUdesign,Forms of ParallelprocessingclassificationofParallelstructures,ArrayProcessors,Structure of general purpose Multiprocessors.

Unit-III

MemoryOrganization:
Memoryhierarchy,mainmemory,auxillarymemory,associativememory,cachememory,virtualmemory,memorymanagement,hardwaremultiprocessorarchitecturesandtheircharacteristics,interconnectionstructures,Randomaccessmemories:semiconductorRAMS,Serial–accessMemories – Memoryorganization,MainMemoryAllocation.

Unit-IV

SystemOrganization:
PipelineandVectorProcessing:Parallelprocessing,pipelining,arithmeticpipeline,instructionpipeline,RISCpipeline,vectorprocessing,arrayprocessors,Input-outputOrganisation:Peripheraldevices,input-outputinterface,asynchronousdatatransfer,modesoftransfer,priorityinterrupt,DMA,IOPserialcommunication.

TextBooks:

1. Morris Mano,“Computer SystemArchitecture”,PHI.
2. J.F.Heys,“Computer Organization and Architecture”,TMH.

Reference Books:

1. J.HennessyandD.Patterson,ComputerArchitectureAQuantitativeApproach,3rdEd,MorganKaufmann, 2002.

Note:Questionpapertemplatewillbe provided tothepaper setter.

E-212	DataStructuresLab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical (MajorTest)**	**Practical (MinorTest)**	**Total**	**Time**
0	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hr.**

CourseOutcomes	
CO1	**Studentswillbeabletorecall'C'basicsanddesignbasicalgorithmsusingvariousdata structures**
CO2	**Studentswillbe able to designimplementvarioussearchingand sortingalgorithmson arrays.**
CO3	**Students willbe ableto usepointers to performvariousoperationsoflinkedlists**
CO4	**Students willbe ableto understand thebasics oftrees and Graphs.**

List ofExperiments:

1. Writea programto printa2D array.
2. Writea programto findthefactorialofan n^{th}numberusingrecursion.
3. Writea programto printFibonaccisequence.
4. Usingclock()functionoftime.hheaderfile,comparethetimingsoflinearsearchandbinarysearchforan 1D arrayof 1000elements
5. Compare thetimings ofthefollowingsortingalgorithm
    a. Bubblesort
    b. Selectionsort
    c. Insertionsort
6. Implementstacksusingarrays forthefollowinguser definedfunctions
    a. Size ofstack
    b. Numberof elements inthestack
    c. Pop withunderflow check
    d. Push withoverflow check
7. Implementqueuesusingarrays forthefollowinguser definedfunctions
    a. Size ofqueue
    b. Numberof elements inthequeue
    c. Insertan elementwithoverflow check
    d. Delete anelementwithunderflow check
8. Implementlinkedlistforthefollowinguser definedfunctions
    a. Create a nodeandInsertanelement
    b. Delete anelementanditsnode
    c. Find thelocation ofa givenvalue
    d. Printthelistinforwardorreverseorder
9. Traversea treeand printtheelements in
    a. Preorder
    b. Postorder
    c. In order
10. Traversea graphand printtheelementsusing
    a. Depthfirst search
    b.Breadthfirst search

ECE-214	Electronic Measurement and InstrumentsLab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical (MajorTest)**	**Practical (MinorTest)**	**Total**	**Time**
0	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hr.**
CourseOutcomes							
CO1	**Tomeasurethe unknowninductance andcapacitanceusingvariousAC bridges.**						
CO2	**Tomeasurethe unknownfrequencyusingdifferent frequencybridges.**						
CO3	**TounderstandtheconceptofcaliberationofenergymeterandB-Hcurveofdifferentmagneticmaterials.**						
CO4	**Tounderstandtheconceptconversionofvoltmeterintoammeterusingpotentiometer.**						

List ofExperiments:

1. To measuretheunknownInductanceintermsof capacitanceand resistanceby using Maxwell'sInductancebridge.
2. To measureunknownInductanceusingHay'sbridge.
3. To measureunknowncapacitanceofsmallcapacitorsbyusingSchering'sbridge.
4. To measure3-phasepowerwith2-Wattmetermethodforbalancedandunbalancedbridge.
5. To measureunknowncapacitanceusingDe-Sauty'sbridge.
6. To measureunknownfrequencyusingWein'sfrequencybridge.
7. To measureunknown lowresistance byKelvin'sDoublebridge.
8. Totestthe soilresistanceusingMeggar(Ohmmeter).
9. TocalibrateEnergy meterusingstandardEnergy meter.
10. To plottheB-H curve ofdifferentmagneticmaterials.
11. TocalibratetheVoltmeterusingCromptonPotentiometer.
12. ToconverttheVoltmeterintoAmmeterusingPotentiometer.
13. Insulationtestingof cablesusingDigitalInsulationTester.

ECE-216	AnalogElectronics Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical (MajorTest)**	**Practical (MinorTest)**	**Total**	**Time**
0	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hr.**
CourseOutcomes							
CO1	**Todesignand calculatethe gain, frequencyresponseetc ofthevariousconfigurationoftransistoramplifier.**						
CO2	**DescribethefrequencyresponseofandtesttheperformanceofvariousLCandRC oscillators.**						
CO3	**Tounderstandanddesignthevariousapplicationsof555timersuchasastableand monostablemultivibrator.**						

List ofExperiments:

1. ToDesigna simplecommonemitter(CE)amplifierCircuitusingBJTandfinditsgainandfrequencyresponse.

2. ToDesignadifferentialamplifierusingBJTandcalculateitsgainandfrequencyresponse

3. TodesignRCcoupledSinglestageBJTamplifieranddeterminationofthegain,frequencyresponse,inputan doutputimpedances.

4. Todesign a BJTEmitterfolloweranddetermination ofthe gain,inputand outputimpedances .

5. Todesign andtesttheperformance ofBJT-RC PhaseshiftOscillatorforf0≤10KHz.

6. Todesign andtesttheperformance ofBJT– HartleyOscillatorsfor RFrangef0≥100KHz.

7. Todesign andtestthe performance ofBJT– ColpittOscillatorsforRFrangef0≥100KHz.

8. Todesign an astablemultivibratorusing555 timer.

9. Todesign a monostablemultivibratorusing555 timer.

10. TodesignSchmitttriggerusingop-amp and verifyitsoperationalcharacteristics.

MPC-202	EnergyStudies(B.TechAllBranchesSemesterIII/IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**MajorTest**	**MinorTest**	**Total**	**Time**
3	**-**	**-**	**0**	**75**	**25**	**100**	**3**
Purpose	**Tomakethestudentsconversantwiththebasicsconceptsand conversionofv**						
CourseOutcomes							
CO1	**AnoverviewaboutEnergy , EnergyManagement,Audit andtariffs**						
CO2	**Understandthe Layoutandworking ofConventionalPowerPlants**						
CO3	**Understandthe Layoutandworking ofNonConventionalPowerPlants**						
CO4	**TounderstandtheroleofEnergyinEconomicdevelopmentand EnergyScenarioin India**						

UNIT-I

Introduction:Typesofenergy,Conversionofvariousformsofenergy,ConventionalandNon-conventionalsources, Needfor Non-ConventionalEnergybased powergeneration.
EnergyManagement: GeneralPrinciplesofEnergy Management,EnergyManagementStrategy.
EnergyAudit& Tariffs: Need,Types,Methodology andApproach.

UNIT-II

ConventionalEnergysources: Selectionofsite**,**workingofThermal,Hydro,NuclearandDieselpowerplantsandtheirschematicdiagrams& theircomparativeadvantages-disadvantages.

UNIT-III

NonConventionalEnergysources: Basicprinciple,siteselectionandpowerplantlayoutofSolarenergy,photovoltaictechnologies,PVSystemsandtheircomponents,powerplantlayoutofWindenergy,layoutof Bioenergy plants ,Geothermal energy plants and tidal energy plants.

UNIT-IV

EnergyScenario:Layoutofpowersystem,RoleofEnergyinEconomicdevelopment,energydemand,availability andconsumption,CommercialandNon-commercialenergy,Indianenergyscenario,longtermenergyscenario,energypricing,energysectorreformsin India,energystrategyforthefuture.

TextBooks:

1. EnergyStudies-Wiley andDreamtech India
2. Soni, Gupta,Bhatnagar:ElectricalPowerSystems– DhanpatRai&Sons
3. NEDCAP: Non ConventionalEnergyGuide Lines
4. G.D.Roy:Nonconventionalenergysources
5. BHKhan:NonConventionalenergyresources-McGrawHill
6. MeinelABandMeinalMP, Addison Applie
7.
8. d SolarEnergy-Wesley Publications
7. GeorgeSutton:Direct EnergyConversion-McGraw

Bachelor of Technology (Computer Science & Engineering)										
Scheme of Studies/Examination										
Semester III										
S. No.	**Course No.**	**Subject**	**L:T:P**	**Hours/Week**	**Credits**	**Examination Schedule (Marks)**				**Duration of Exam (Hrs)**
						Major Test	**Minor Test**	**Practical**	**Total**	
1	HS-201	Fundamentals of Management	3:0:0	3	3.0	75	25	0	100	3
2	CSE-201	Discrete Structures	3:1:0	4	3.5	75	25	0	100	3
3	CSE-203	Data Structures	3:1:0	4	3.5	75	25	0	100	3
4	CSE-205	Data Base Management Systems	3:1:0	4	3.5	75	25	0	100	3
5	CSE-207	Digital Electronics	3:1:0	4	3.5	75	25	0	100	3
6	CSE-209	Programming Languages	3:1:0	3	3.5	75	25	0	100	3
7	CSE-211	Data Structures Lab	0:0:3	3	1.5	0	40	60	100	3
8	CSE-213	Digital Electronics Lab	0:0:3	3	1.5	0	40	60	100	3
9	CSE-215	Database Management Systems Lab	0:0:3	3	1.5	0	40	60	100	3
		Total		**31**	**25**	**450**	**270**	**180**	**900**	
10	MPC 202	Energy Studies*	3:0:0	3		75	25	0	100	3

*MPC-202 is a mandatory course which will be a non credit subject and student has to get pass marks in order to qualify for the Degree award

Bachelor of Technology (Computer Science & Engineering)

Scheme of Studies/Examination

Semester IV

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	AS-201	Mathematics-III	3:1:0	4	3.5	75	25	0	100	3
2	CSE-202	Object Oriented Programming	3:1:0	4	3.5	75	25	0	100	3
3	CSE-204	Internet Fundamental	3:0:0	3	3.0	75	25	0	100	3
4	CSE-206	Digital Data Communication	3:1:0	4	3.5	75	25	0	100	3
5	CSE-208	Microprocessor & Interfacing	3:1:0	4	3.5	75	25	0	100	3
6	CSE-210	Operating System	3:1:0	4	3.5	75	25	0	100	3
7	CSE-212	Object Oriented Programming Lab	0:0:3	3	1.5	0	40	60	100	3
8	CSE-214	Microprocessor Lab	0:0:3	3	1.5	0	40	60	100	3
9	CSE-216	Internet Lab	0:0:3	3	1.5	0	40	60	100	3
		Total		**32**	**25.0**	**450**	**270**	**180**	**900**	
10	MPC 201	Enviornment Studies*	3:0:0	3		75	25		100	3

*MPC-201 is a mandatory course which will be a non credit subject and student has to get pass marks in order to qualify for the Degree award

Bachelor of Technology (Computer Science & Engineering)

Scheme of Studies/Examination
Semester-V

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	CSE 301	Automata Theory	3:1:0	4	3.5	75	25	0	100	3
2	CSE 303	Computer Networks	3:1:0	4	3.5	75	25	0	100	3
3	CSE 305 N	Design and Analysis of algorithms	3:1:0	4	3.5	75	25	0	100	3
4	CSE 307	Computer oraganisation and Architecture	3:1:0	4	3.5	75	25	0	100	3
5	CSE 309	Essential of Information Technology	3:1:0	4	3.5	75	25	0	100	3
6	CSE 311	Computer Networks Lab	0:0:3	3	1.5	0	40	60	100	3
7	CSE 313	Design and Analysis of algorithms Lab	0:0:3	3	1.5	0	40	60	100	3
8	CSE 315	Advance of Information Technology Lab	0:0:3	3	1.5	0	40	60	100	3
9	CSE 317	Seminar	0:0:2	2	1	0	40	60	100	
10	CSE 319	Technical Communication and Soft Skills Lab	0:0:2	2	1	0	40	60	100	3
11	CSE 321	Industrial Training (Viva-Voce)*					40	60	100	
		Total		**33**	**24.0**	**375**	**365**	**360**	**1100**	

*** 4-6 weeks hand on training to be done after IVth Semester Exams**

Bachelor of Technology (Computer Science & Engineering)

Scheme of Studies/Examination

Semester VI

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	CSE 302	Compiler Design	3:1:0	4	3.5	75	25	0	100	3
2	CSE 304	Simulation & Modellinig	3:1:0	3	3.5	75	25	0	100	3
3	CSE 306	Mobile Computing	3:1:0	4	3.5	75	25	0	100	3
4	CSE 308	Computer Graphics and Animation	3:1:0	4	3.5	75	25	0	100	3
5	CSE 310	Software Engineering	3:1:0	4	3.5	75	25	0	100	3
6	CSE 312	Computer Graphics Lab	0:0:3	3	1.5	0	40	60	100	3
7	CSE 314	Simulation Lab	0:0:3	3	1.5	0	40	60	100	3
8	CSE 316	Software Engineering Lab	0:0:3	3	1.5	0	40	60	100	3
		Total		**28**	**22**	**375**	**245**	**180**	**800**	

Bachelor of Technology (Computer Science & Engineering)

Scheme of Studies/Examination

Semester VII

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule (Marks)			Duration of Exam (Hrs)	
						Major Test	Minor Test	Practical	Total	
1	CSE 401	Unix & Linux Programming	4:0:0	4	4.0	75	25	0	100	3
2	CSE 403	Web Technology	4:0:0	4	4.0	75	25	0	100	3
3	HS 401	Entrepreneurship	4:0:0	4	4.0	75	25	0	100	3

4	PE-I	Elective* – I	3:0:0	3	3.0	75	25	0	100	3
5	PE-II	Elective* – II	3:0:0	3	3.0	75	25	0	100	3
6	CSE 405	Web Technology Lab	0:0:2	2	1	0	40	60	100	3
7	CSE 407	Project-1**	0:0:8	8	4	0	100	100	200	3
8	CSE 409	Computer Hardware & Troubleshooting Lab	0:0:2	2	1	0	40	60	100	3
9	CSE 411	Seminar	0:0:2	2	1	0	100	0	100	
10	CSE 413	Industrial Training (Viva-Voce)***					40	60	100	
		Total		**32**	**25.0**	**375**	**445**	**280**	**1100**	

Code	**PE-I**	**Code**	**PE-II**
CSE-415	Object Oriented Software Engineering	CSE-421	Agile Software Engineering
CSE-417	Big Data and Analytics	CSE-423	Parallel Computing
CSE-419	Cryptography & Information Security	CSE-425	Expert Systems

*The students will chose any two departmental electives courses out of the given elective list in VII Semester

**Project should be initiated in 7th semester beginning, and should be completed by the end of 8th semester with good Report and power-point Presentation etc.

*** 4-6 weeks hand on training to be done after VIth Semester Exams

Bachelor of Technology (Computer Science & Engineering)

Scheme of Studies/Examination

Semester VIII

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	CSE 402	Neural Networks & Fuzzy Logic	4:0:0	4	4.0	75	25	0	100	3
2	PE-III	Elective* – III	4:0:0	4	4.0	75	25	0	100	3
3	PE-IV	Elective* - IV	4:0:0	4	4.0	75	25	0	100	3
4	CSE 404	Mobile Apps Development	4:0:0	4	4.0	75	25	0	100	3
5	CSE 406	Mobile Apps Development Lab	0:0:3	3	1	0	40	60	100	3
6	CSE 408	Project-II	0:0:16	16	8	0	100	100	200	3
		Total		**35**	**25.0**	**300**	**240**	**160**	**700**	
7	CSE 410	General Fitness & Professional Aptitude**					100		100	

Code	PE-III	Code	P-IV
CSE-412	Software Project Management	CSE-418	Cloud Computing
CSE-414	Cycber Security	CSE-420	Graph theory
CSE-416	Data Mining	CSE-422	Natural Language Programming

*The students will chose any two departmental electives courses out of the given elective list in VIII Semester.

** CSE 410 will be non credit subject and only grade will be awarded to student based on his/her performance in the examination.

Bachelor of Technology (Computer Science & Engineering)										
Scheme of Studies/Examination										
Semester III										
S. No.	**Course No.**	**Subject**	**L:T: P**	**Hours/Week**	**Credits**	**Examination Schedule (Marks)**				**Duration of Exam (Hrs)**
						Major Test	**Minor Test**	**Practical**	**Total**	
1	HS-201	Fundamentals of Management	3:0:0	3	3.0	75	25	0	100	3
2	CSE-201	Discrete Structures	3:1:0	4	3.5	75	25	0	100	3
3	CSE-203	Data Structures	3:1:0	4	3.5	75	25	0	100	3
4	CSE-205	Data Base Management Systems	3:1:0	4	3.5	75	25	0	100	3
5	CSE-207	Digital Electronics	3:1:0	4	3.5	75	25	0	100	3
6	CSE-209	Programming Languages	3:1:0	3	3.5	75	25	0	100	3
7	CSE-211	Data Structures Lab	0:0:3	3	1.5	0	40	60	100	3
8	CSE-213	Digital Electronics Lab	0:0:3	3	1.5	0	40	60	100	3
9	CSE-215	Database Management Systems Lab	0:0:3	3	1.5	0	40	60	100	3
		Total		**31**	**25**	**450**	**270**	**180**	**900**	
10	MPC 202	Energy Studies*	3:0:0	3		75	25	0	100	3

*MPC-202 is a mandatory course which will be a non credit subject and student has to get pass marks in order to qualify for the Degree award

HS-201	FUNDAMENTALS OF MANAGEMENT						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**-**	**3.0**	**75**	**25**	**100**	**3**
Purpose	**To make the students conversant with the basics concepts in management thereby leading to nurturing their managerial skills**						
COURSE OUTCOMES							
CO1	**An overview about management as a discipline and its evolution**						
CO2	**Understand the concept and importance of planning and organizing in an organization**						
CO3	**Enabling the students to know about the importance of hiring and guiding the workforce by understanding the concept of leadership and communication in detail**						
CO4	**To understand the concept and techniques of controlling and new trends in management**						

UNIT-1

Introduction to Management: Meaning, Definition, nature, importance & Functions, Management as Art, Science & Profession- Management as social System, Concepts of management-Administration

Evolution of Management Thought: Development of Management Thought- Scientific management, Administrative Theory of Management, Bureaucratic Organization, Behavioral approach (Neo Classical Theory): Human Relations Movement; Behavioral Science approach; Modern approach to management – Systems approach and contingency approach.

UNIT-II

Planning: nature, purpose and functions, types of plans, planning process, Strategies and Policies: Concept of Corporate Strategy, formulation of strategy, Types of strategies, Management by objectives (MBO), SWOT analysis, Types of policies, principles of formulation of policies

4. Organizing: nature, importance, process, organization structure: Line and Staff organization, Delegation of Authority and responsibility, Centralization and Decentralization, Decision Making Process , Decision Making Models, Departmentalization: Concept and Types (Project and Matrix), formal & informal organizations

UNIT-III

Staffing: concept, process, features; manpower planning; Job Analysis: concept and process; Recruitment and selection: concept, process, sources of recruitment; performance appraisal, training and development

Directing: Communication- nature, process, formal and informal, barriers to Effective Communication, Theories of motivation-Maslow, Herzberg, Mc Gregor ; Leadership – concept and theories, Managerial Grid, Situational Leadership. Transactional and Transformational Leadership

UNIT-IV

Controlling: concept, process, types, barriers to controlling, controlling Techniques: budgetary control, Return on investment, Management information system-MIS , TQM-Total Quality Management, Network Analysis- PERT and CPM.

Recent Trends in Management: -

Social Responsibility of Management–Management of Crisis, Total Quality Management, Stress Management, ., Concept of Corporate Social Responsibility (CSR) and business ethics.

Functional aspects of business: Conceptual framework of functional areas of management- Finance; Marketing and Human Resources

Text books

1. Management Concepts - Robbins, S.P; Pearson Education India
2. Principles of Management - Koontz & O'Donnel; (McGraw Hill)

Recommended books

1. Business Organization and Management – Basu ; Tata McGraw Hill
2. Management and OB-- Mullins; Pearson Education
3. Essentials of Management – Koontz, Tata McGraw-Hill
4. Management Theory and Practice – Gupta, C.B; Sultan Chand and Sons, new Delhi
5. Prasad, Lallan and S.S. Gulshan. Management Principles and Practices. S. Chand & Co. Ltd., New Delhi.
6. Chhabra, T.N. Principles and Practice of Management. Dhanpat Rai & Co., Delhi.

7. Organizational behavior – Robins Stephen P; PHI.

CSE-201	Discrete Structures						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**
Purpose	**To provide the conceptual knowledge of Discrete structure.**						
Course Outcomes							
CO 1	**To study various fundamental concepts of Set Theory and Logics.**						
CO 2	**To study and understand the Relations, diagraphs and lattices.**						
CO 3	**To study the Functions and Combinatorics.**						
CO 4	**To study the Algebraic Structures.**						

Unit 1 Set Theory & Logic

Fundamentals - Sets and subsets, Venn Diagrams, Operations on sets, Laws of Set Theory, Power Sets and Products, Partition of sets, The Principle of Inclusion- Exclusion.

Logic : Propositions and Logical operations, Truth tables, Equivalence, Implications, Laws of Logic, Normal forms, Predicates and quantifiers, Mathematical Induction.

Unit 2: Relations, diagraphs and lattices

Product sets and partitions, relations and diagraphs, paths in relations and diagraphs, properties of relations, equivalence and partially ordered relations, computer representation of relations and diagraphs, manipulation of relations, Transitive closure and Warshall's algorithm, Posets and Hasse Diagrams, Lattice.

Unit 3 Functions and Combinatorics

Definitions and types of functions: injective, subjective and bijective, Composition, identity and inverse, Review of Permutation and combination-Mathematical Induction, Pigeon hole principle, Principle of inclusion and exclusion, Generating function-Recurrence relations.

Unit 4: Algebraic Structures

Algebraic structures with one binary operation - semi groups, monoids and groups, Product and quotient of algebraic structures, Isomorphism, homomorphism, automorphism, Cyclic groups, Normal sub group, codes and group codes, Ring homomorphism and Isomorphism**.**

Books:

- Elements of Discrete Mathematics C.L Liu, 1985, Reprinted 2000, McGraw Hill
- Discrete mathematical structures by B Kolman RC Busby, S Ross PHI Pvt. Ltd.
-

Reference:

- Discrete Mathematical Structures with Applications to Computer Science , by Tremblay J.P, and Manohar R., McGraw Hill Book Company, 1975, International Edition, 1987.
- Discrete and Combinatorial mathematics ", Ralph P., Grimaldi, Addison-Wesley Publishing Company, Reprinted in 1985.
- Discrete Mathematics and its Applications ", Kenneth H.Rosen, McGraw Hill Book Company, 1999. Sections: 7.1 to 7.5.
- Discrete Mathematics for computer scientists and Mathematicians, Joe L. Mott, Abraham

CSE-203	Data Structures						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hour**
Purpose	**To introduce the principles and paradigms of Data Structures for design and implement the software systems logically and physically**						
Course Outcomes (CO)							
CO 1	**To introduce the basic concepts of Data structure, basic data types ,searching and sorting based on array data types.**						
CO 2	**To introduce the structured data types like Stacks and Queue and its basic operations's implementation.**						
CO 3	**To introduces dynamic implementation of linked list.**						
CO 4	**To introduce the concepts of Tree and graph and implementation of traversal algorithms.**						

Unit-1

Introduction to Data Structures, Data Types, Built in and User Defined Data Structures, Applications of Data Structure, Algorithm Analysis, Worst, Best and Average Case Analysis, Notations of Space and Time Complexity,
Arrays, One Dimensional Arrays, Two Dimensional Arrays and Multi-Dimensional Arrays, Sparse Matrices, Storage Class, Basics of Recursion.
Searching from array using Linear and Binary Searching Algorithm, Sorting of array using Selection, Insertion, Bubble, Radix Algorithm

Unit-2

Stacks: Definition, Implementation of Stacks and Its Operations, Evaluation of Infix, prefix and Postfix Expression, Inter-conversion of Infix Expression, Prefix and Post-Fix Expression, Implementation of Merge Sort and Quick Sort Algorithm.
Queues: Definition, Sequential Implementation of Linear Queues and Its Operations, Circular Queue and Its Implementation, Priority Queues and Its Implementation, Applications of queues.

Unit-3

Linked Lists: Dynamic Implementations, Need of Dynamic Data Structures, Single Link List and Its Dynamic Implementation, Traversing, Insertion, Deletion Operations on Single Link Lists. Comparison between Static and Dynamic, Implementation of Linked List. Dynamic Implementation of Stacks and Queues.
Circular Link Lists and Doubly Link List, Dynamic Implementation of Primitive Operations on Doubly Linked Lists and Circular Link List.

Unit-4

Trees: Definition, Basic Terminology, Binary Tree, External and Internal Nodes, Static and Dynamic Implementation of a Binary Tree, Primitive Operations on Binary Trees, Binary Tree Traversals: Per-Order, In-Order And Post-Order Traversals. Representation of Infix, Post-Fix and Prefix Expressions using Trees.
Introduction to Binary Search Trees: B trees, B+ trees, AVL Trees, Threaded Binary trees, Balanced Multi-way search trees, Implementation of Heap Sort Algorithm.
Graphs: Basic Terminology, Definition of Undirected & Directed Graphs, Memory Representation of Graphs, Minimum-Spanning Trees, Warshal Algorithm, Graph Traversals Algorithms: Breadth First and Depth First,.

Text Book:

- Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH
- Fundamentals of Data structures by Ellis Horowitz & Sartaj Sahni, Pub, 1983,AW

References:

- Shukla, Data Structures using C++, Wiley India
- Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low Priced Edition.
- Fundamentals of computer algorithms by Horowitz Sahni and Rajasekaran.
- Data Structures and Program Design in C by Robert Kruse, PHI,
- Shukla, Data Structures using C++, Wiley India
- Introduction to Computers Science -An algorithms approach , Jean Paul Tremblay, Richard B. Bunt, 2002, T.M.H.
- Data Structure and the Standard Template library – Willam J. Collins, 2003, T.M.H

CSE-205	DATA BASE MANAGEMENT SYSTEMS						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hour**
Purpose	**To familiarize the students with Data Base Management system**						
Course Outcomes							
CO 1	To provide introduction to relational model.						
CO 2	To learn about ER diagrams.						
CO 3	To understand about Query Processing and Transaction Processing.						
CO 4	To understand about the concept of functional dependencies.						
CO 5	To learn the concept of failure recovery.						
CO 6	To understand the concurrency control.						

UNIT I

INTRODUCTION Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS.

Entity-Relationship Model: Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

UNIT II

THE RELATIONAL DATA MODEL & ALGEBRA

Relational Model: Structure of relational Databases, Relational Algebra, Relational Calculus, introduction to Views, updates on views

SQL and Integrity Constraints: Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Sub queries, Database security application development using SQL, Stored procedures and triggers.

UNIT III

Relational Database Design:

Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF

Internals of RDBMS:

Physical data structures, Query optimization: join algorithm, statistics and cost base optimization. Transaction processing, Concurrency control and Recovery Management: transaction model properties, state serializability, lock base protocols, two phase locking.

UNIT IV

FAILURE RECOVERY AND CONCURRENCY CONTROL

Issues and Models for Resilient Operation -Undo/Redo Logging-Protecting against Media Failures.

CONCURRENCY CONTROL: Serial and Serializable Schedules-Conflict Serializability –Enforcing Serializability by Locks-Locking Systems with Several Lock Modes-Concurrency Control by Timestamps, validation.

TRANSACTION MANAGEMENT: Serializability and Recoverability-View, Serializability-Resolving Deadlocks-Distributed Databases: Commit and Lock

Text Books;

1. Ramez Elmasri , Shamkant B. Navathe ,"Fundamentals of Database systems", Pearson
2. Korth, Silberschatz, Sudarshan: database concepts, MGH,

Reference Books:

1. R. Ramakrishnan and J. Gehrks database management system; MGH, International edition,
2 C. J. Date, data base systems: 7th edition, Addison Wesley, Pearson Education,
Chakrabarti, Advance database management systems , Wiley Dreamtech

CSE-207	Digital Electronics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hour**
Purpose	**To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.**						
Course Outcomes							
CO 1	**To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions**						
CO 2	**To introduce the methods for simplifying Boolean expressions**						
CO 3	**To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits**						
CO 4	**To introduce the concept of memories and programmable logic devices.**						

UNIT I MINIMIZATION TECHNIQUES AND LOGIC GATES

Minimization Techniques: Boolean postulates and laws - De-Morgan's Theorem, Principle of Duality, Boolean expression - Minimization of Boolean expressions, Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), Karnaugh map Minimization - Don't care conditions, Quine - McCluskey method of minimization.

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR- Implementations of Logic Functions using gates, NAND-NOR implementations - Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics, Tristate gates.

UNIT II COMBINATIONAL CIRCUITS

Design procedure - Half adder, Full Adder, Half subtractor, Full subtractor , Parallel binary adder, parallel binary Subtractor, Fast Adder, Carry Look Ahead adder, Serial Adder/Subtractor, BCD adder, Binary Multiplier, Binary Divider, Multiplexer/ De-multiplexer, decoder, encoder, parity checker, parity generators, code converters, Magnitude Comparator.

UNIT III SEQUENTIAL CIRCUITS

Latches, Flip-flops - SR, JK, D, T, and Master-Slave - Characteristic table and equation, Application table, Edge triggering, Level Triggering, Realization of one flip-flop using other flip-flops, serial adder/subtractor, Asynchronous Ripple or serial counter, Asynchronous Up/Down counter, Synchronous counters, Synchronous Up/Down counters, Programmable counters, Design of Synchronous counters: state diagram, State table, State minimization, State assignment, Excitation table and maps-Circuit implementation, Modulo-n counter, 555 Timer, Registers - shift registers, Universal shift registers, Shift register counters, Ring counter, Shift counters, Sequence generators.

UNIT IV MEMORY DEVICES

Classification of memories - ROM: ROM organization, PROM, EPROM, EEPROM, EAPROM, RAM: - RAM organization - Write operation, Read operation, Memory cycle, Timing wave forms, Memory decoding, memory expansion, Static RAM Cell, Bipolar RAM cell, MOSFET RAM cell structure, Dynamic RAM cell structure, Programmable Logic Devices - Programmable Logic Array (PLA), Programmable Array Logic (PAL), Implementation of PLA, PAL using ROM. Introduction to Field Programmable Gate Arrays (FPGA).

TEXT BOOKS

1. Donald P. Leach and Albert Paul Malvino, Digital Principles and Applications, 8th Edition, TMH, 2003.M.

2. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.

REFERENCES

1. A.K. Maini, Digital Electronics, Wiley India

2. John F. Wakerly, Digital Design, Fourth Edition, Pearson/PHI, 2006

2. John. M Yarbrough, Digital Logic Applications and Design, Thomson Learning, 2002.

3. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 3rd Edition., Vikas Publishing House Pvt. Ltd, New Delhi, 2006

4. William H. Gothmann, Digital Electronics, 2nd Edition, PHI, 1982.

5. Thomas L. Floyd, Digital Fundamentals, 8th Edition, Pearson Education Inc, New Delhi, 2003

6. Donald D. Givone, Digital Principles and Design, TMH, 2003.

CSE-209	Programming Languages						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hour**
Purpose	To introduce the principles and paradigms of programming languages for design and implement the software intensive systems.						
Course Outcomes (CO)							
CO 1	To introduce the basic concepts of programming language, the general problems and methods related to syntax & semantics.						
CO 2	To introduce the structured data objects, subprograms and programmer defined data types.						
CO 3	To outline the sequence control and data control.						
CO 4	To introduce the concepts of storage management using programming languages.						

Unit-I: Introduction, Syntax and Semantics

Introduction: A brief history, Characteristics of a good programming language, Programming language translators compiler & interpreters , Elementary data types – data objects, variable & constants, data types, Specification & implementation of elementary data types, Declarations, type checking & type conversions, Assignment & initialization, Numeric data types, enumerations, Booleans & characters.

Syntax & Semantics: Introduction, general problem of describing syntax, formal method of describing syntax, attribute grammar dynamic semantic.

Unit-II: Structured data objects, Subprograms and Programmer Defined Data Types

Structured data objects: Structured data objects & data types, specification & implementation of structured data types, Declaration & type checking of data structure, vector & arrays, records Character strings, variable size data structures, Union, pointer & programmer defined data objects, sets, files.

Subprograms and Programmer Defined Data Types: Evolution of data type concept abstraction, encapsulation & information hiding, Subprograms, type definitions, abstract data types, over loaded subprograms, generic subprograms.

Unit–III: Sequence Control and Data Control

Sequence Control: Implicit & explicit sequence control, sequence control within expressions, sequence control within statement, Subprogram sequence control: simple call return, recursive subprograms, Exception & exception handlers, co routines, sequence control. Concurrency – subprogram level concurrency, synchronization through semaphores, monitors & message passing

Data Control: Names & referencing environment, static & dynamic scope, block structure, Local data & local referencing environment, Shared data: dynamic & static scope, Parameter & parameter transmission schemes.

Unit-IV: Storage Management and Programming Languages

Storage Management: Major run time elements requiring storage, programmer and system controlled storage management & phases, Static storage management, Stack based storage management, Heap storage management, variable & fixed size elements.

Programming Languages: Introduction to procedural, non-procedural, structured, logical, functional and object oriented programming language, Comparison of C & C++ programming languages.

Text Books:

1. Terrence W. Pratt, Marvin V. Zelkowitz, Programming Languages Design & Implementation, Pearson.
2. Allen Tucker & Robert Noonan, Programming Languages–Principles and Paradigms, Tata McGraw-Hill, 2009.

Reference Books:

1. Ellis Horowitz, Fundamentals of Programming Languages, Galgotia Publications, 2010.
2. C. Ghezzi, Programming Languages Concepts, Wiley Publications, 2010.

CSE-211	Data Structures Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**3**	**1.5**	**40**	**60**	**100**	**3**
Purpose	**To introduce the principles and paradigms of Data Structures for design and implement the software systems logically and physically**						
Course Outcomes (CO)							
CO 1	**To introduce the basic concepts of Data structure, basic data types, searching and sorting based on array data types.**						
CO 2	**To introduce the structured data types like Stacks and Queue and its basic operation's implementation.**						
CO 3	**To introduces dynamic implementation of linked list.**						
CO 4	**To introduce the concepts of Tree and graph and implementation of traversal algorithms.**						

1. Write a program for Binary serach methods.
2. Write a program for insertion sort, selection sort and bubble sort.
3. Write a program to implement Stack and its operation.
4. Write a program for quick sort.
5. Write a program for merge sort.
6. Write a program to implement Queue and its operation.
7. Write a program to implement Circular Queue and its operation.
8. Write a program to implement singly linked list for the following operations: Create, Display, searching, traversing and deletion.
9. Write a program to implement doubly linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.
10. Write a program to implement circular linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.
11. Write a program to implement insertion, deletion and traversing in B tree

NOTE:
At least seven experiments are to be performed from above list and the concerned institution as per the scope of the syllabus may set remaining eight.

CSE-213	Digital Electronics Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**3**	**1.5**	**40**	**60**	**100**	**3**
Purpose	**To learn the basic methods for the design of digital circuits and systems.**						
Course Outcomes							
CO 1	**To Familiarization with Digital Trainer Kit and associated equipment.**						
CO 2	**To Study and design of TTL gates**						
CO 3	**To learn the formal procedures for the analysis and design of combinational circuits.**						
CO 4	**To learn the formal procedures for the analysis and design of sequential circuits**						

LIST OF EXPERIMENTS:

1. Familiarization with Digital Trainer Kit and associated equipment.
2. Study of TTL gates AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
3. Design and realize a given function using K-Maps and verify its performance.
4. To verify the operation of Multiplexer and De-multiplexer.
5. To verify the operation of Comparator.
6. To verify the truth table of S-R, J-K, T, D Flip-flops.
7. To verify the operation of Bi-directional shift register.
8. To design and verify the operation of 3-bit asynchronous counter.
9. To design and verify the operation of asynchronous Up/down counter using J-K FFs.
10. To design and verify the operation of asynchronous Decade counter.
11. Study of TTL logic family characteristics.
12. Study of Encoder and Decoder.
13. Study of BCD to 7 segment Decoder.

NOTE:

At least ten experiments are to be performed from above list and the concerned institution as per the scope of the syllabus may set remaining five.

CSE-215	DATABASE MANAGEMENT SYSTEMS LAB						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
-	**-**	**3**	**1.5**	**40**	**60**	**100**	**3**
Purpose	**To familiarize the students with the basics of Operating Systems**						
Course Outcomes							
CO1	To understand basic DDL commands						
CO 2	To learn about DML and DCL commands						
CO 3	To understand the sql queries using SQL operators						
CO 4	To understand the concept of relational algebra						
CO5	To learn various queries using date and group functions						
CO6	To understand the nested queries						
CO7	To learn view, cursors and triggers.						

1. Write the queries for Data Definition Language (DDL) in RDBMS.
2. Write the queries for Data Manipulation Language (DML) in RDBMS.
3. Write the queries for Data Control Language (DCL) in RDBMS.
4. Write SQL queries using logical operations (=,,etc)
5. Write SQL queries using SQL operators
6. Write SQL query using character, number, date and group functions
7. Write SQL queries for relational algebra
8. Write SQL queries for extracting data from more than one table
9. Write SQL queries for sub queries, nested queries
10. Concepts for ROLL BACK, COMMIT & CHECK POINTS
11. Create VIEWS, CURSORS and TR
12. High level language extension with Cursors.
13. High level language extension with Triggers.
14. To study the concept of Procedures and Functions..

MPC-202	ENERGY STUDIES						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**		
3	**-**	**-**	**0**	**75**	**25**		
Purpose	**To make the students conversant with the basics concepts and conversion of various form of Energy**						
Course Outcomes							
CO1	**An overview about Energy , Energy Management, Audit and tariffs**						
CO2	**Understand the Layout and working of Conventional Power Plants**						
CO3	**Understand the Layout and working of Non-Conventional Power Plants**						
CO4	**To understand the role of Energy in Economic development and Energy Scenario in India**						

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy, Conventional and Non-conventional sources, Need for Non-Conventional Energy based power generation.
Energy Management: General Principles of Energy Management, Energy Management Strategy.
Energy Audit: Need, Types, Methodology and Approach.

UNIT-II

Conventional Energy sources: Selection of site**,** working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages- disadvantages.

UNIT-III

Non-Conventional Energy sources: Basic principle, site selection of Solar energy power plant, photovoltaic technologies, PV Systems and their components, Wind energy power plant , Bio energy plants ,Geothermal energy plants and tidal energy plants. MHD

UNIT-IV

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.

References:

1. Energy Studies-Wiley Dream tech India.
2. Non-conventional energy resources- Shobhnath Singh, Pearson.
3. Soni,Gupta,Bhatnagar: Electrical Power Systems – DhanpatRai& Sons
4. NEDCAP: Non Conventional Energy Guide Lines
5. G.D. Roy :Non conventional energy sources
6. B H Khan :Non Conventional energy resources - McGraw Hill
7. Meinel A B and Meinal M P,Addison:Applied Solar Energy- Wesley Publications
7. George Sutton: Direct Energy Conversion -McGraw

Bachelor of Technology (Computer Science & Engineering)										
Scheme of Studies/Examination										
Semester IV										
S. No.	**Course No.**	**Subject**	**L:T:P**	**Hours / Week**	**Credits**	**Examination Schedule (Marks)**				**Duration of Exam (Hrs)**
						Major Test	**Minor Test**	**Practical**	**Total**	
1	AS-201	Mathematics-III	3:1:0	4	3.5	75	25	0	100	3
2	CSE-202	Object Oriented Programming	3:1:0	4	3.5	75	25	0	100	3
3	CSE-204	Internet Fundamental	3:0:0	3	3.0	75	25	0	100	3
4	CSE-206	Digital Data Communication	3:1:0	4	3.5	75	25	0	100	3
5	CSE-208	Microprocessor & Interfacing	3:1:0	4	3.5	75	25	0	100	3
6	CSE-210	Operating System	3:1:0	4	3.5	75	25	0	100	3
7	CSE-212	Object Oriented Programming Lab	0:0:3	3	1.5	0	40	60	100	3
8	CSE-214	Microprocessor Lab	0:0:3	3	1.5	0	40	60	100	3
9	CSE-216	Internet Lab	0:0:3	3	1.5	0	40	60	100	3
		Total		**32**	**25.0**	**450**	**270**	**180**	**900**	

10	MPC 201	Enviornment Studies*	3:0:0	3		75	25		100	3

*MPC-201 is a mandatory course which will be a non credit subject and student has to get pass marks in order to qualify
for the Degree award

AS-201	Mathematics-III						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**
Purpose	**To provide the conceptual knowledge of Engineering mathematics**						
Course Outcomes							
CO 1	**To study various fundamental concepts of Fourier series and Fourier Transformation.**						
CO 2	**To study and understand the functions of a complex variables.**						
CO 3	**To study the Probability Distributions.**						
CO 4	**To study the linear programming problem formulation.**						

UNIT – I

Fourier series: Euler's Formulae, Conditions for Fourier expansions, Fourier expansion of functions having points of discontinuity, change of interval, Odd & even functions, Half-range series.

Fourier Transforms: Fourier integrals, Fourier transforms, Fourier cosine and sine transforms. Properties of Fourier transforms, Convolution theorem, Perseval's identity, Relation between Fourier and Laplace transforms, Fourier transforms of the derivatives of a function, Application to boundary value problems.

UNIT-II

Functions of Complex Variables: Functions of a complex variable, Exponential function, Trigonometric, Hyperbolic and Logarithmic functions, limit and continuity of a function, Differentiability and analyticity.

Cauchy-Riemann equations, Necessary and sufficient conditions for a function to be analytic, Polar form of the Cauchy-Riemann equations, Harmonic functions, Application to flow problems, Conformal transformation, Standard transformations (Translation, Magnification & rotation, inversion & reflection, Bilinear).

UNIT-III

Probability Distributions : Probability, Baye's theorem, Discrete & Continuous probability distributions, Moment generating function, Probability generating function, Properties and applications of Binomial, Poisson and normal distributions.

UNIT-IV

Linear Programming : Linear programming problems formulation, Solution of Linear Programming Problem using Graphical method, Simplex Method, Dual-Simplex Method.

Text Book

1. Higher Engg. Mathematics: B.S. Grewal
2. Advanced Engg. Mathematics: E. Kreyzig

Reference Book

1. Complex variables and Applications: R.V. Churchil; Mc. Graw Hill
2. Engg. Mathematics Vol. II: S.S. Sastry; Prentice Hall of India.
3. Operation Research: H.A. Taha
4. Probability and statistics for Engineer: Johnson. PHI.

CSE-202	Object Oriented Programming						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hour**
Purpose	**To introduce the principles and paradigms of Object Oriented Programming Language for design and implement the Object Oriented System**						
Course Outcomes (CO)							
CO 1	**To introduce the basic concepts of object oriented programming language and the its representation**						
CO 2	**To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.**						
CO 3	**To introduce polymorphism, interface design and overloading of operator.**						
CO 4	**To handle backup system using file, general purpose template and handling of raised exception during programming**						

Unit–1

Introduction to C++, C++ Standard Library, Illustrative Simple C++ Programs. Header Files, Namespaces, Application of object oriented programming.

Object Oriented Concepts, Introduction to Objects and Object Oriented Programming, Encapsulation, Polymorphism, Overloading, Inheritance, Abstract Classes, Accessifier (public/ protected/ private), Class Scope and Accessing Class Members, Controlling Access Function, Constant, Class Member, Structure and Class

Unit-2

Friend Function and Friend Classes, This Pointer, Dynamic Memory Allocation and Deallocation (New and Delete), Static Class Members, Constructors, parameter Constructors and Copy Constructors, Deconstructors,

Introduction of inheritance, Types of Inheritance, Overriding Base Class Members in a Derived Class, Public, Protected and Private Inheritance, Effect of Constructors and Deconstructors of Base Class in Derived Classes.

Unit-3

Polymorphism, Pointer to Derived class, Virtual Functions, Pure Virtual Function, Abstract Base Classes, Static and Dynamic Binding, Virtual Deconstructors.

Fundamentals of Operator Overloading, Rules for Operators Overloading, Implementation of Operator Overloading Like <<,>> Unary Operators, Binary Operators.

Unit-4

Text Streams and binary stream, Sequential and Random Access File, Stream Input/ Output Classes, Stream Manipulators.

Basics of C++ Exception Handling, Try, Throw, Catch, multiple catch, Re-throwing an Exception, Exception specifications.

Templates: Function Templates, Overloading Template Functions, Class Template, Class Templates and Non- Type Template arguments.

Text Books:

- Object Oriented Programming in Turbo C++ by Robert Lafore, 1994, The WAITE Group Press.
- The complete reference C ++ by Herbert shieldt Tata McGraw Hill

References Books

- Shukla, Object Oriented Programming in c++, wiley india
- C++ How to Program by H M Deitel and P J Deitel, 1998, Prentice Hall
- Programming with C++ By D Ravichandran, 2003, T.M.H

CSE-204	Internet Fundamentals						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**-**	**3**	**75**	**25**	**100**	**3**
Purpose	**To provide the conceptual knowledge of Internet and methodologies used in web and secure internet communication and networking.**						
Course Outcomes							
CO 1	**To study various fundamental concepts of Internetworking techniques with their characteristics.**						
CO 2	**To study and understand the requirements for world-wide-web formats and techniques.**						
CO 3	**To study the E-mail functioning and basics of HTML, XML and DHTML languages.**						
CO 4	**To study the functioning of Servers and Privacy and Security related mechanisms.**						

UNIT-1 : THE INTERNET

Introduction to networks and internet, history, Internet, Intranet & Extranet, Working of Internet, Internet Congestion, internet culture, business culture on internet. Collaborative computing & the internet. Modes of Connecting to Internet, Internet Service Providers(ISPs), Internet address, standard address, domain name, DNS, IP.v6.Modems, Speed and time continuum, communications software; internet tools.

UNIT-II : WORLD WIDW WEB

Introduction, Miscellaneous Web Browser details, searching the www: Directories search engines and meta search engines, search fundamentals, search strategies, working of the search engines, Telnet and FTP, HTTP, Gophar Commands, TCP/IP. Introduction to Browser, Coast-to-coast surfing, hypertext markup language, Web page installation, Web page setup, Basics of HTML & formatting and hyperlink creation.Using FrontPage Express, Plug-ins.

UNIT-III : INTERNET PLATEFORM AND MAILING SYSTEMS

Introduction, advantages and disadvantages, User Ids, Pass words, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, MIME types, Newsgroups, mailing lists, chat rooms, secure-mails, SMTP, PICO, Pine, Library cards catalog, online ref. works.

Languages: Basic and advanced HTML, Basics of scripting languages – XML, DHTML, Java Script.

UNIT-IV : SERVERS

Introduction to Web Servers: PWS, IIS, Apache; Microsoft Personal Web Server. Accessing & using these servers.

Privacy and security topics: Introduction, Software Complexity, Attacks, security and privacy levels, security policy, accessibility and risk analysis, Encryption schemes, Secure Web document, Digital Signatures, Firewalls, Intrusion detection systems

Text Book:

- Internet & World Wide Programming, Deitel,Deitel & Nieto, 2012, Pearson Education
- Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp, TMH- 2012

Reference Books:

- Complete idiots guide to java script,. Aron Weiss, QUE, 2013
- Network firewalls, Kironjeet syan -New Rider Pub.2014
- Networking Essentials – Firewall Media.Latest-2015
- www.secinf.com
- www.hackers.com
- Alfred Glkossbrenner-Internet 101 Computing MGH, 2013

CSE-206	Digital Data Communication						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**
Purpose	**To provide the conceptual knowledge of data preparation and signal transmission methodologies used in data communication and networking.**						
Course Outcomes							
CO 1	**To study various analog communication techniques and with their characteristics.**						
CO 2	**To study and understand the requirements for analog/digital data to analog/digital signal conversion techniques.**						
CO 3	**To study the error and flow control techniques in communication and networking.**						
CO 4	**To study the concept of multiplexing and applied multiple access techniques specially in satellite communication.**						

UNIT-1

MODULATION TECHNIQUES

Basic constituents of Communication Systems need of modulation, Amplitude modulation, spectrum of AM wave, modulation index, DSBSC modulation, SSB Modulation, vestigial side band modulation.

ANGLE MODULATION: Frequency and Phase Modulation, spectrum of FM Wave, modulation index and Bandwidth of FM Signal, NBFM and WBFM.

UNIT-II

DATA ENCODING

Digital data, Digital signals: Encoding schemes: NRZ-L, NRZ-I, Manchester-Diff-Manchester-encoding,Pseudoternary-Bipolar-AMI,B8ZS- HDB3 – Evaluation factors-Digital data, analog signals: Encoding Techniques –ASK-FSK-PSK-QPSK-Performance comparison-Analog data, digital signals: Quantization- Sampling theorem-PCM-Delta modulation-Errors- comparison- Analog Data, analog signals: Need for modulation -0 Modulation methods – Amplitude modulation- Angle modulation- Comparison.

UNIT-III

DIGITAL DATA COMMUNICATION TECHNIQUES

Asynchronous and synchronous transmission –Error Detection techniques: Parity checks – Cycle redundancy checks-Checksum-Error Correcting codes: Forwards and backward error corrections, Transmission media. Communication Topologies.

DTE & DCE interface: Characteristics of DTE-DCE interface. Interfaces: Rs-232-C, Rs-449/422, A/423-A.

UNIT-IV

SATELITE COMMUNICATION

Multiplexing: Advantages – Types of Multiplexing – FDM – Synchronous TDM – Statistical TDM or Asynchronous TDM, Study of their characteristics.

Satellite Communication Systems: Satellite parameters and configurations – Capacity allocation, Frequency Division FDMA; Time Division TDMA- Fixed assigned multiple access (FAMA), Demand assign multiple access (DAMA) – The concept of spread spectrum: FHSS, DSSS – CDMA – Transmission and reception.

TEXT BOOKS

1. Forouzen, “Data Communication & Networking”,Tata Mcgraw Hill
2. Proakin, “Digital Communications”,Mc Graw Hill.
3. W. Stalling, “Wireless Communication and Networks” Pearson.

REFERENCES

1. Stallings, “Data & computer Communications”,PHI.
2. Roden, “Digital & Data Communication Systems”,PHI.
3. Irvine, Data communications & Networks An engineering approach, wiley india

CSE-208	Microprocessor & Interfacing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**
Purpose	**To learn the architecture and programming of Intel family microprocessors and its interfacing.**						
Course Outcomes							
CO 1	**To study the Architecture of 8085 microprocessors**						
CO 2	**To learn the architecture 8086 Microprocessor and its interfacing to memories**						
CO 3	**To learn the instruction set of 8086 Microprocessor and assembly language programming of 8086 Microprocessor.**						
CO 4	**To learn interfacing of interrupts, basic I/O and DMA with 8086 Microprocessor**						

Unit I

Evolution of Microprocessor, Introduction to 8085 - 8085 architecture - Pin Details - Addressing Modes -Instruction Set and Assembler Directives, Instruction Timing Diagram.

UNIT-II

8086 CPU ARCHITECTURE: 8086 Block diagram; description of data registers, address registers; pointer and index registers, PSW, Queue, BIU and EU. 8086 Pin diagram descriptions. Generating 8086 CLK and reset signals using 8284. WAIT state generation. Microprocessor BUS types and buffering techniques, 8086 minimum mode and maximum mode CPU module. MAIN MEMORY SYSTEM DESIGN: Memory devices, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode. Address decoding techniques. Interfacing SRAMS; ROMS/PROMS. Interfacing and refreshing DRAMS.

UNIT-III

8086 INSTRUCTION SET: Instruction formats, addressing modes, Data transfer instructions, string instructions, logical instructions, arithmetic instructions, transfer of control instructions; process control instructions; Assembler directives.

8086 PROGRAMMING TECHNIQUES: Writing assembly Language programs for logical processing, arithmetic processing, timing delays; loops, data conversions.

UNIT-IV

BASIC I/O INTERFACE: Parallel and Serial I/O Port design and address decoding. Memory mapped I/O Vs Isolated I/O Intel's 8255 and 8251- description and interfacing with 8086. ADCs and DACs, - types, operation and interfacing with 8086. Interfacing Keyboards, alphanumeric displays, multiplexed displays, and stepper motor, optical encoder with 8086.

INTERRRUPTS AND DMA: 8086 Interrupt mechanism; interrupt types and interrupt vector table. Applications of interrupts, Intel's 8259. DMA operation. Intel's 8237.

Text Books:

- Barry B. Brey, "The Intel Microprocessor8086/8088, 80186", Pearson Education, Eighth Edition, 2009
- D.V. Hall, Microprocessors and Interfacing, McGraw Hill 2nd ed.

Reference Books:

- Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI,2005
- Kenneth Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC", Cengage Learning, Indian Edition, 2008
- Kip Irvine, "Assembly language for IBM PC", PHI, 2nd Edition, 1993
- Peter Abel, "Assembly language programming", Pearson Edu,5th Edition,2002
- Uffenback, "The 8086 Family Design" PHI, 2nd Edition.
- Walter A Triebel and Avtar Singh; The 8088 and 8086 Microprocessors, Programming, Interfacing, Software, Hardware and Applications, Fourth Edition, Pearson Education.

CSE-210	OPERATING SYSTEMS						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**
Purpose	**To familiarize the students with the basics of Operating Systems**						
Course Outcomes							
CO1	**To understand the structure and functions of Operating system.**						
CO 2	**To learn about processes, threads and scheduling algorithms.**						
CO 3	**To understand the principle of concurrency.**						
CO 4	**To understand the concept of deadlocks.**						
CO5	**To learn various memory management schemes.**						
CO6	**To study I/O management and file systems.**						
CO7	**To study the concept of protection and security.**						

UNIT 1

Introduction: Introduction to OS. Operating system functions, Different types of O.S.: batch process, multi-programmed, time-sharing, real-time, distributed, parallel.

System Structure: Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

UNIT II

CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms, algorithm evaluation, multi-processor scheduling.

Threads: overview, benefits of threads, user and kernel threads.

Process Management: Concept of processes, process states, process control, co-operating processes, inter-process communication.

Process Synchronization: background, critical section problem, critical region, synchronization hardware, Classical problems of synchronization, semaphores.

UNIT III

Deadlocks: Concept of deadlock, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Memory Management: background, logical vs. physical address space, contiguous memory allocation, paging, segmentation, segmentation with paging. Concept of fragmentation.

Virtual Memory: background, demand paging, concept of page replacement, page replacement algorithms , allocation of frames, thrashing.

UNIT IV

File Systems: file concept, file organization and access methods, allocation methods, directory structure, free-space management

I/O Management: I/O hardware, polling, interrupts, DMA, kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation)

Disk Management: disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability, disk Performance parameters

Protection & Security:

Goals of protection and security, security attacks, authentication, program threats, system threats, threat monitoring.

Case studies: UNIX file system, Windows file system

Text Books:

1. Operating Systems : Internals and Design Principles, William Stallings, Pearson
2. Operating System Concepts", Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne, Wiley

Reference books:

1. Operating systems: a concept based approach", Dhananjay M. Dhamdhere, McGraw Hill .
2. Operating Systems Design and Implementation" ,(Prentice Hall Software Series) Andrew S Tanenbaum and Albert S Woodhull

3. Taub & Schilling, Principles of Communication Systems, TMH.
4. Mithal G K, Radio Engineering, Khanna Pub.
5. Sirnon Haykin, Communication Systems, John Wiley

CSE-212	Object Oriented Programming Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**3**	**1.5**	**40**	**60**	**100**	**3 Hour**
Purpose	**To introduce the principles and paradigms of Object Oriented Programming Language for design and implement the Object Oriented System**						
Course Outcomes (CO)							
CO 1	**To introduce the basic concepts of object oriented programming language and the its representation**						
CO 2	**To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.**						
CO 3	**To introduce polymorphism, interface design and overloading of operator.**						
CO 4	**To handle backup system using file, general purpose template and handling of raised exception during programming**						

Q1. Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power ( ) that takes a double value for n and an int value for p, and returns the result as double value. Use a default argument of 2 for p, so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function.

Q2. A point on the two dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinates. Write a program that uses a structure called point to model a point. Define three points, and have the user input values to two of them. Then set the third point equal to the sum of the other two, and display the value of the new point. Interaction with the program might look like this:

Enter coordinates for P1: 3 4
Enter coordinates for P2: 5 7
Coordinates of P1 + P2 are : 8, 11

Q3. Create the equivalent of a four function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding, subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally it should display the result. When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be 'Y' or 'N'. Some sample interaction with the program might look like this.

Enter first number, operator, and second number: 10/ 3
Answer = 3.333333
Do another (Y/ N)? Y
Enter first number, operator, second number 12 + 100
Answer = 112
Do another (Y/ N) ? N

Q4. A phone number, such as (212) 767-8900, can be thought of as having three parts: the area code (212), the exchange (767) and the number (8900). Write a program that uses a structure to store these three parts of a phone number separately. Call the structure phone. Create two structure variables of type phone. Initialize one, and have the user input a number for the other one. Then display both numbers. The interchange might look like this:

- Enter your area code, exchange, and number: 415 555 1212
- My number is (212) 767-8900
- Your number is (415) 555-1212

Q5. Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe a DM object or DB objects, depending on the units in which the results are required. The display should be in the format of feet and inches or metres and cenitmetres depending on the object on display.

Q6. Create a class rational which represents a numerical value by two double values- NUMERATOR &

DENOMINATOR. Include the following public member Functions:

- constructor with no arguments (default).
- constructor with two arguments.

- void reduce( ) that reduces the rational number by eliminating the highest common factor between the numerator and denominator.
- Overload + operator to add two rational number.
- Overload >> operator to enable input through cin.
- Overload << operator to enable output through cout.

Write a main ( ) to test all the functions in the class.

Q7. Consider the following class definition

```
class father {
protected : int age;
public;
father (int x) {age = x;}
virtual void iam ( )
{ cout < < "I AM THE FATHER, my age is : "<< age<< end1:}
};
```

Derive the two classes son and daughter from the above class and for each, define iam ( ) to write our similar but appropriate messages. You should also define suitable constructors for these classes. Now, write a main ( ) that creates objects of the three classes and then calls iam ( ) for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam ( ) through the pointer to demonstrate polymorphism in action.

Q8. Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name (a string of 30 or lesser no. of characters) and marks.

Q9. A hospital wants to create a database regarding its indoor patients. The information to store include

a) Name of the patient
b) Date of admission
c) Disease
d) Date of discharge

Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the database. Create a derived class to store the age of the patients. List the information about all the to store the age of the patients. List the information about all the pediatric patients (less than twelve years in age).

Q10. Make a class **Employee** with a name and salary. Make a class **Manager** inherit from **Employee**. Add an instance variable, named department, of type string. Supply a method to **to String** that prints the manager's name, department and salary. Make a class **Executive** inherits from **Manager**. Supply a method **to String** that prints the string **"Executive"** followed by the information stored in the **Manager** superclass object. Supply a test program that tests these classes and methods.

Q11. Imagine a tollbooth with a class called toll Booth. The two data items are a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar ( ), increments the car total but adds nothing to the cash total. Finally, a member function called displays the two totals. Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the ESC kay should cause the program to print out the total cars and total cash and then exit.

Q12. Write a function called reversit ( ) that reverses a string (an array of char). Use a for loop that swaps the first and last characters, then the second and next to last characters and so on. The string should be passed to reversit ( ) as an argument. Write a program to exercise reversit ( ). The program should get a string from the user, call reversit ( ), and print out the result. Use an input method that allows embedded blanks. Test the program with Napoleon's famous phrase, "Able was I ere I saw Elba)".

25

Q13. Create some objects of the string class, and put them in a Deque-some at the head of the Deque and some at the tail. Display the contents of the Deque using the forEach ( ) function and a user written display function. Then search the Deque for a particular string, using the first That ( ) function and display any strings that match. Finally remove all the items from the Deque using the getLeft ( ) function and display each item. Notice the order in which the items are displayed: Using getLeft ( ), those inserted on the left (head) of the Deque are removed in "last in first out" order while those put on the right side are removed in "first in first out" order. The opposite would be true if getRight ( ) were used.

Q14. Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as

current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed.
Create a class account that stores customer name, account number and type of account. From this derive the classes cur_acct and sav_acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks:

a) Accept deposit from a customer and update the balance.
b) Display the balance.
c) Compute and deposit interest.
d) Permit withdrawal and update the balance.
e) Check for the minimum balance, impose penalty, necessary and update the balance.
f) Do not use any constructors. Use member functions to initialize the class members.

Q15. Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data( ) to initialize baseclass data members and another member function display_area( ) to compute and display the area of figures. Make display_area ( ) as a virtual function and redefine this function in the derived classes to suit their requirements. Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively and display the area.
Remember the two values given as input will be treated as lengths of two sides in the case of rectangles and as base and height in the case of triangles and used as follows:
Area of rectangle = x * y
Area of triangle = ½ * x * y

CSE-214	Microprocessor Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**3**	**1.5**	**40**	**60**	**100**	**3 Hour**
Purpose	**Write the efficient Assembly Language Program for different problem statements and implement different system interfacing.**						
Course Outcomes							
CO 1	**Understanding different steps to develop program such as Problem definition, Analysis, Design of logic, Coding, Testing, Maintenance (Modifications, error corrections, making changes etc.)**						
CO 2	**To be able to apply different logics to solve given problem.**						
CO 3	**To be able to write program using different implementations for the same problem**						
CO 4	**Use of programming language constructs in program implementation**						

Write an Assembly Language Program to

1. Add / Sub two 16 bit numbers.
2. Find sum of series of numbers.
3. Multiply two 16 bit unsigned/ signed numbers.
4. Divide two unsigned/ signed numbers (32/16 , 16/8, 16/16, 8/8)
5. Add / Sub / multiply / Divide two BCD numbers.
6. Find smallest/ largest number from array of n numbers.
7. Arrange numbers in array in ascending/ descending order.
8. Perform block transfer data using string instructions / without using string instructions.
9. Compare two strings using string instructions / without using string instructions.
10. Display string in reverse order, string length, Concatenation of two strings.
11. Convert Hex to Decimal, Decimal to Hex.
12. To find 1's and 2's complement of a number.

CSE-216	Internet Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**3**	**1.5**	**40**	**60**	**100**	**3 Hour**
Purpose	**Learn the internet and design different web pages using HTML and installation of different MODEMS.**						
Course Outcomes							
CO 1	**Understanding different PC software and their applications**						
CO 2	**To be able to learn HTML.**						
CO 3	**To be able to write Web pages using HTML.**						
CO 4	**To be able to install modems and understand the e-mail systems.**						

PC Software: Application of basics of MS Word 2000, MS Excel 2000, MS Power Point 2000, MS Access 2000, HTML

1. To prepare the Your Bio Data using MS Word
2. To prepare the list of marks obtained by students in different subjects and show with the help of chart/graph the average, min and max marks in each subject.
3. Prepare a presentation explaining the facilities/infrastructure available in your college/institute.
4. Design Web pages containing information of the Deptt.

HTML Lists:

1. Create a new document that takes the format of a business letter. Combine <P> and <BR> tags to properly separate the different parts of the documents. Such as the address, greeting, content and signature. What works best for each?
2. Create a document that uses multiple <BR> and <P> tags, and put returns between <PRE> tags to add blank lines to your document see if your browser senders them differently.
3. Create a document using the <PRE>tags to work as an invoice or bill of sale, complete with aligned dollar values and a total. Remember not to use the Tab key, and avoid using emphasis tags like <B> or <EM> within your list.
4. Create a seven-item ordered list using Roman numerals. After the fifth item, increase the next list value by 5.
5. Beginning with an ordered list, create a list that nests both an unordered list and a definition list.
6. Use the ALIGN attribute of an <IMG> tags to align another image to the top of the first image.. play with this feature, aligning images to TOP, MIDDLE and BOTTOM.
7. Create a 'table of contents' style page (using regular and section links) that loads a different document for each chapter or section of the document.

Internet:

1. Instilling internet & external modems, NIC and assign IP address.
2. Study of E-mail system.
3. Create your own mail-id in yahoo and indiatimes.com.
4. Add names (mail-id's) in your address book, compose and search an element.

MPC-201	ENVIRONMENTAL STUDIES						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**-**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To learn the multidisciplinary nature, scope and importance of Environmental Studies**						
Course Outcomes							
CO1	**Basic concepts of Various kinds of Microscopy and Centrifugation Techniques**						
CO2	**To learn the theoretical and practical aspects of Electrophoresis and Chromatography Techniques**						
CO3	**To learn the concepts of different kinds of Spectroscopy and Colourimetry**						
CO4	**To understand the concept of radioisotope techniques and their applications in research**						

UNIT 1

The multidisciplinary nature of environmental studies. Definition, Scope and Importance. Need for public awareness. Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

(a) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber eztraction, mining, dams and their effects on forests and tribal people.
(b) Water Resources- Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
(c) Mineral Resources- Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
(d) Food Resources- World Food Problems, changes caused by agriculture and over gazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
(e) Energy Resources- Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
(f) Land Resources- Land as a resource, land, degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyle.

UNIT II

Ecosystem-Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological Succession. Food Chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem-

a. Forest Ecosystem
b. Grassland Ecosystem
c. Desert Ecosystem
d. Aquatic Ecosystems(ponds, streams, lakes, rivers, oceans, estuaries

Field Work. Visit to a local area to document Environment assets-river/forest/grassland/hill/mountain. Visit to a local polluted site- Urban /Rural Industrial/Agricultural. Study of common plants, insects and birds. Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

UNIT III

Biodiversity and its conservation. Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity of global, National and local levels. India as a mega-diversity nation Hot spots of Biodiversity. Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts. Endangered and endemic species of India. Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

Environmental Pollution Definition. Cause, effects and control measures of- (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards

Solid waste management- cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides

UNIT IV

Social Issues and the Environment. From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns. Case Studies. Environmental ethics-issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland Reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public Awareness. Human population and the Environment. Population growth, variation among nations. Population explosion-Family Welfare Programme. Environment and human health. Human rights. Value Education. HIV/AIDS, Women and Child Welfare. Role of Information Technology in Environment and Human Health. Case Studies.

Text Books

1. Environmental Studies- Deswal and Deswal. Dhanpat Rai & Co.
2. Environmental Science & Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India
3. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
4. Environmental Science- Botkin and Keller. 2012. Wiley , India

Bachelor of Technology (Biotechnology Engineering)
Credit-Based
SCHEME OF STUDIES/EXAMINATIONS
Semester – III

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	BT-201	Cell Biology	3	1	0	4	3.5	75	25	0	100	3
2	BT-203	Microbiology	3	1	0	4	3.5	75	25	0	100	3
3	BT-205	Biochemistry	4	0	0	4	4.0	75	25	0	100	3
4	BT-207	Genetics	3	1	0	4	3.5	75	25	0	100	3
5	HS-201	Fundamentals of Management	3	0	0	3	3.0	75	25	0	100	3
6	BT-209	Cell Biology & Genetics Lab	0	0	3	3	1.5	0	40	60	100	3
7	BT-211	Microbiology Lab	0	0	3	3	1.5	0	40	60	100	3
8	BT-213	Biochemistry Lab	0	0	3	3	1.5	0	40	60	100	3
		Total	**15**	**4**	**9**	**28**	**22.0**	**375**	**245**	**180**	**800**	
9	MPC-202	Energy Studies*	3	0	0	3		75	25	0	100	3

**MPC-202 is a mandatory course and student has to get passing marks in order to qualify for the award of degree*

Bachelor of Technology (Biotechnology Engineering)
Credit-Based
SCHEME OF STUDIES/EXAMINATIONS
Semester – IV

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	BT-202	Molecular Biology	4	0	0	4	4.0	75	25	0	100	3
2	BT-204	Immunology	3	1	0	4	3.5	75	25	0	100	3
3	BT-206	Bio-analytical Techniques	3	1	0	4	3.5	75	25	0	100	3
4	BT-208	Industrial Microbiology & Enzyme Technology	3	1	0	4	3.5	75	25	0	100	3
5	AS-202	Organic Chemistry	3	1	0	4	3.5	75	25	0	100	3
6	BT-212	Molecular Biology Lab	0	0	3	3	1.5	0	40	60	100	3
7	BT-214	Immunology Lab	0	0	3	3	1.5	0	40	60	100	3
8	BT-216	Bio-analytical Techniques Lab	0	0	3	3	1.5	0	40	60	100	3
9	BT-218	Industrial Microbiology Lab	0	0	3	3	1.5	0	40	60	100	3
		Total	**15**	**5**	**12**	**32**	**24.0**	**375**	**285**	**240**	**900**	
10	MPC-201	Environmental Studies*	3	0	0	3		75	25	0	100	3

**MPC-201 is a mandatory course and student has to get passing marks in order to qualify for the award of degree*
Note:*All the students have to undergo 4-6 weeks industrial training after IVth semester and it will be evaluated in Vth semester.*

Bachelor of Technology (Biotechnology Engineering)
Credit-Based
SCHEME OF STUDIES/EXAMINATIONS
Semester – V

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	BT-301	Recombinant DNA Technology	4	0	0	4	4.0	75	25	0	100	3
2	BT-303	Bioreactor Analysis & Design	3	0	0	3	3.0	75	25	0	100	3
3	BT-305	Bioprocess Engineering	3	1	0	4	3.5	75	25	0	100	3
4	BT-307	Downstream Processing	3	1	0	4	3.5	75	25	0	100	3
5	BT-309	Molecular Diagnostic Techniques & Healthcare Biotechnology	3	1	0	4	3.5	75	25	0	100	3
6	CSE-309	Essentials of Information Technology	3	0	0	3	3.0	75	25	0	100	3
7	BT-313	Recombinant DNA Technology Lab	0	0	3	3	1.5	0	40	60	100	3
8	BT-315	Fermentation & DSP Lab	0	0	3	3	1.5	0	40	60	100	3
9	BT-317	Diagnostic Techniques Lab	0	0	3	3	1.5	0	40	60	100	3
10	CSE-315	Information Technology Lab	0	0	2	2	1.0	0	40	60	100	3
11	BT-319	Industrial Training (Viva-Voce)*	0	0	2	2		0	40	60	100	
		Total	**18**	**6**	**13**	**35**	**26.0**	**450**	**350**	**300**	**1100**	

**The performance of the student will be evaluated after the presentation delivered and the report submitted by him/her related to*
Industrial training undertaken after IVth semester.

Bachelor of Technology (Biotechnology Engineering)
Credit-Based
SCHEME OF STUDIES/EXAMINATIONS
Semester – VI

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	BT-302	Microbial Biotechnology	3	1	0	4	3.5	75	25	0	100	3
2	BT-304	Plant Biotechnology	3	1	0	4	3.5	75	25	0	100	3
3	BT-306	Animal Biotechnology	3	0	0	3	3.0	75	25	0	100	3
4	BT-308	Principles of Biostatistics	3	0	0	3	3.0	75	25	0	100	3
5	BT-310	Environmental Biotechnology	3	1	0	4	3.5	75	25	0	100	3
6	BT-312	Food Biotechnology	3	0	0	3	3.0	75	25	0	100	3
7	HS-303	Business Intelligence & Entrepreneurship	4	0	0	4	4.0	75	25	0	100	3
8	BT-314	Animal Cell Culture Lab	0	0	3	3	1.5	0	40	60	100	3
9	BT-316	Plant Cell Culture Lab	0	0	3	3	1.5	0	40	60	100	3
10	BT-318	Food & Environmental Biotechnology Lab	0	0	3	3	1.5	0	40	60	100	3
		Total	**18**	**5**	**9**	**34**	**28.0**	**525**	**295**	**180**	**1000**	

Note:*All the students have to undergo 4-6 weeks industrial training after VIth semester and it will be evaluated in VIIth semester.*

Bachelor of Technology (Biotechnology Engineering)
Credit-Based
SCHEME OF STUDIES/EXAMINATIONS
Semester – VII

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	BT-401	Bioinformatics	3	1	0	4	3.5	75	25	0	100	3
2	BT-403	Pharmaceutical Biotechnology	3	1	0	4	3.5	75	25	0	100	3
3		DEC -I*	3	1	0	4	3.5	75	25	0	100	3
4		DEC -II*	3	1	0	4	3.5	75	25	0	100	3
5	BT-405	Virology	3	0	0	3	3.0	75	25	0	100	3
6	BT-407	Bioinformatics Lab	0	0	4	4	2.0	0	40	60	100	3
7	BT-409	Seminar	0	0	2	2	1.0	0	100	0	100	
8	BT-411	Project-I**	0	0	8	8	4.0	0	100	100	200	
9	BT-413	Industrial Training (Viva-Voce)***	0	0	2	2			40	60	100	
		Total	**15**	**4**	**16**	**35**	**24.0**	**375**	**405**	**220**	**1000**	

** The students should select two Departmental Elective Courses (DEC) from the following list.*

Course No.	**DEC-I**	**Course No.**	**DEC-II**
BT-415	Biosensor and Bioinstrumentation	BT-423	Advanced Management Information System and Information Technology
BT-417	Biochips and Microarray Technology	BT-425	Behavioural Neuroscience
BT-419	Nano-Biotechnology	BT-427	Herbal Drug Technology
BT-421	Stem Cell Technology	BT-429	Human Genetics and Human Genome

***The project should be initiated by the students in the beginning of VIIth semester and will be evaluated at the end of the semester on the basis of a presentation and report.*
****The performance of the student will be evaluated after the presentation delivered and the report submitted by the student related to Industrial training undertaken after VIth semester.*

Bachelor of Technology (Biotechnology Engineering)
Credit-Based
SCHEME OF STUDIES/EXAMINATIONS
Semester – VIII

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	BT-402	Biocatalys is& Biotransformation	4	0	0	4	4.0	75	25	0	100	3
2		DEC -III*	3	1	0	4	3.5	75	25	0	100	3
3		DEC -IV*	3	1	0	4	3.5	75	25	0	100	3
4	BT-404	Bioethics, IPR and Biosafety	3	0	0	3	3.0	75	25	0	100	3
5	BT-406	Professional Practice & Communication Skills Lab	0	0	2	2	1.0	0	40	60	100	3
6	BT-408	Advanced Techniques in Biotechnology Lab	0	0	2	2	1.0	0	40	60	100	3
7	BT-410	Project-II	0	0	16	16	8.0	0	100	100	200	3
		Total	**12**	**3**	**20**	**35**	**24.0**	**300**	**280**	**220**	**800**	
8	BT-412	General Proficiency**							100	0	100	0

**The student should select two Departmental Elective Courses (DEC) from the following list.*

Course No.	DEC-III	Course No.	DEC-IV
BT-414	Metabolic Engineering and Metabolomics	BT-422	Developmental Biology
BT-416	Molecular Modeling and Drug Design	BT-424	Protein Engineering
BT-418	Cancer Biology	BT-426	Biomaterial Technology
BT-420	Plant Physiology and Biotechnology	BT-428	Food Process Engineering

***BT-412 is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.*

BT-201	CELL BIOLOGY (B.Tech. Biotechnology Semester III)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To familiarize the students with the basics of Cell Biology.**						
Course Outcomes							
CO1	**Students will learn basic principles of cell biology especially the structure and functions of Biological Membranes.**						
CO2	**Students will come to know about various cellular organelles and their integrated functioning. Will be able to learn basic knowledge of concepts that leads to development of life and different processes related to these developments.**						
CO3	**This unit will enable the students to learn the concept of inhibition and activation of biological phenomenon by simple methods.**						
CO4	**Students will be able to use simple methods of engineering and mathematics like using graphs and osmotic diffusion and many more like that to solve scientific biological aspects. They will be able to gain knowledge of different factors affecting the normal functioning of muscular and nervous system.**						

UNIT I

1. Cell: An introduction, classification of organisms by cell structure, cytosol, compartmentalization of eukaryotic cells, cell fractionation.

2. Cell membrane and permeability: Chemical components of biological membranes, organization and fluidity of membrane components, the membrane as a dynamic entity, cell signaling, cell recognition and membrane transport.

UNIT II

3. Cytoskeleton and cell motility: Structure and functions of microtubules, microfilaments, intermediate filaments.

4. Structure and Functions of Cellular Organelles: Endoplasmic reticulum, golgi complex, lysosomes, vacuoles and microbodies, ribosomes,mitochondria,plastids**.**

UNIT III

5. Nucleus: Structure, cell-cycle (interphase and M phases), regulation of cell cycle.

6. Extracellular matrix: Composition, molecules that mediate cell adhesion, membrane receptors for extracellular matrix macromolecules, regulation of receptor expression and function.

UNIT IV

7. Muscle contraction: Different muscle types in the body, structural proteins of muscles, energetics and regulation of muscle contraction.

8. Neurons and neurotransmission: Resting potential, action potential, synaptic transmission, neurotransmitters and receptors, the generation of action potential by sensory stimuli and mechanism of nerve-impulses.

Text Books:

1. Cell Biology: Organelle structure and function, Sadava, D E.(2004) Panima pub., New Delhi.

References Books:

1. Molecular Biology of cell, 4th ed. Alberts, Bruce (*et. al)(2002)* Garland Science Publishing, New York..
2. Cell Biology- Smith and Wood by Chapman and Hall.
3. Cell and Molecular Biology, 8th ed. Robertis, EDP De and Robertis, EMF De (2002) Lippincot Williams and Wilkins Pvt. Ltd.,(International Student Edition) Philadelphia.
4. Molecular Cell Biology 4th ed. Lodish, Harvey and .Baltimore, D(2000) W.H. freeman & Co. New York

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

BT-203	MICROBIOLOGY (B.Tech. Biotechnology Semester III						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To familiarize the students with the basic of Microbiology**						
Course outcome							
CO1	**Student to learn the history and classification of microbiology**						
CO2	**To learn microbial nutrition and various microbiological techniques**						
CO3	**Able to understand microbial growth and Genetics**						
CO4	**Student will able to know about various microbial diseases and fermentation products**						

UNIT - I

1. History and scope of Microbiology: Development of Microbiology, various branches of microbiology and applications of microbiology.
2. Classification of Microorganisms:Microbial Taxonomy- criteria used including molecular approaches. Microbial phylogeny and current classification of bacteria.

UNIT - II

3. Microbial Diversity: Morphology and cell structure of major groups of microorganisms e.g. bacteria. fungi, algae, protozoa and viruses.
4. Cultivation and microbial nutrition of Microorganism: Methods of isolation, purification and preservation. Pure culture technique and sterilization methods.Requirement for C, N, S and growth factors.Nutritional categories of microorganisms.

UNIT - III

5. Microbial Growth and Metabolism: Growth curve (normal and biphasic) and generation time. Measurement of growth.Synchronous, batch and continuous cultures.Metabolic pathways- catabolic, anabolic and amphibolic.Microbial fermentation and its types.
6. Microbial Genetics: Transposable elements, Bacterial plasmids. Bacterial recombination: transformation, transduction and conjugation. Formation of endospores and mechanism of sporulation.

UNIT - IV

7. Environmental microbiology: Normal and contaminating microflora of water, soil and air. Methods to study water and air pollution.Major water, air and soil borne microbial diseases.
8. Food Microbiology: Definition, important fermented foods and beverages: An overview (curd, cheese, beer, wine). Factors effecting spoilage of food and food preservation methods. Methods to study food quality,

Text Book:

1. Microbiology 5th Edition. Prescott, L.M.; Harley, J.P. and Klein, D.A.(2003) McGraw Hill, USA.
2. Microbiology. Pelczar Jr., M.J.; Chan, E.C.S. and Krieg, N.R. (1993) Tata McGraw Hill, New Delhi.

References Books:

3. Modern Food Microbiology. Jay, J.M. (1996) CBS Publishers and Distributors, New Delhi.
4. Food Microbiology 2nd ed, Adam, M. R. and Moss (2003) Panima Pub, New Delhi.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

BT-205	BIOCHEMISTRY(B.Tech. Biotechnology Semester III)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**-**	**-**	**4**	**75**	**25**	**100**	**3 Hrs**
Purpose	**To introduce the students with basics of Biochemistry**						
Course Outcomes							
COI	**The students will be able to understand the structure and functions of carbohydrates and proteins**						
COII	**The students will be able to learn structure and functions of lipid and nucleic acids along with basic concepts of enzymes**						
COIII	**The students will be able to write major pathways of carbohydrates and lipid metabolism**						
CO IV	**To make the students understand synthesis and degradation of pyrimidine nucleotides**						

UNIT – I

1.**Amino acids & Proteins –**Structure and properties of amino acids. Essential and non-essential amino acids.Peptide bonds.Types of proteins and their classification.Forces stabilizing protein structure and shape. Different levels of structural organization of proteins
2.**Carbohydrates-Structure and functions:** Structures and properties of monosaccharides, oligosaccharides and polysaccharides. Ring structure and mutarotation. Homo- andhetero-polysaccharides. Mucopolysaccharides

UNIT – II

3.**Lipids-Structure and functions:** Classification of lipids and their general functions. Essential fatty acids.Hydrolysis of fats, Saponification value, Rancidity of fats, Iodine number and Acid value.Cholesterol-its structure and biological functions.
4.**Nucleic Acids-Structure and functions:** Structure and properties of purine and pyrimidine basis. Nucleosides and nucleotides.Biologically important nucleotides.
5.**Enzymes:** Nomenclature and classification of Enzymes. Activation energy and rate of reaction.Basic concept of holoenzymes, apoenzymes, cofactors, coenzymes, prosthetic groups, metalloenzymes, Definitions of enzyme activity, specific activity and enzyme specificity.Enzyme inhibition and concept of allostery. Michaelis-Menten equation.

UNIT-III

6. **Integration of metabolisim** – Basic concepts and importance of metabolism
7 **Carbohydrate Metabolism:** Glycolysis and TCA cycle. Pentose phosphate pathway and its significance.Gluconeogenesis pathway.Biosynthesis of lactose, sucrose and starch.Glycogenolysis, glycogenesis and control of glycogen metabolism.Maintenance of blood glucose level.Energetics and regulation of carbohydrate metabolism.Glyoxylate cycle.
8. **Lipid Metabolism:** Beta -oxidation of saturated fatty acids, oxidation of unsaturated and odd carbon fatty acids. Kitogenesis and its importance.Degradation of triacylglycerols by lipases.Biosynthesis, elongation and desaturation of saturated fatty acids.Biosynthesis of triacylglycerols, phospholipids and cholesterol.

UNIT –IV

9.**Amino Acid Metabolism:** General reactions of amino acids metabolism- transamination, oxidative and non-oxidative deamination and decarboxylation. General pathways of amino acids degradation.Urea cycle and its regulations.

10.**Nucleic Acid Metabolism:** Catabolism, *de novo*-biosynthesis and salvage pathway . Formation of deoxyribonucleotides. Importance of nucleotides

11. **Mitochondrial oxidative phosphorylation:** Mitochondrial electron transport chain. Hypotheses of mitochondrial oxidative phosphorylation.Inhibitors and uncouplers of oxidative phosphorylation.

Text Books

1Biochemistry, 4th edition, by L. Stryer (1995). W.H. Freeman & Co. NY

2 Lehninger: Principles of Biochemistry, 3rd edition, by David L. Nelson and M.M. Cox (2000) Maxmillan/ Worth publishers

References Books:

1.Biochemistry, 4th edition, by G. Zubay (1998). Wm.C. Brown Publishers.

2.Biochemistry, 2nd edition, by Laurence A. Moran, K.G. Scrimgeour, H. R. Horton, R.S. Ochs and J. David Rawn (1994), Neil Patterson Publishers Prentice Hall.

3.Biochemistry, 2nd edition, by R.H. Garrett and C.M. Grisham (1999) . Saunders college Publishing, NY.Sons, NY.

4.Fundamentals of Biochemistry by Donald Voet and Judith G Voet (1999) , John Wiley & Sons, NY

5.Harper's Biochemistry, 25th edition, by R.K. Murray, P.A. Hayes, D.K. Granner, P.A. Mayes and V.W. Rodwell (2000). Prentice Hall International.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

BT-207	GENETICS(B.Tech. Biotechnology Semester III)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To familiarize the students with theoretical and practical aspects of Genetics**						
Course Outcomes							
CO1	**Students will be able to implicate simple mathematical calculations like ratios, probability, and sum and product rules to biological phenomenon. They can identify the complex phenomenon and can formulate the already existing to develop solutions for different biological aspects.**						
CO2	**Covers the harmful and beneficial factors included in the mutations concept which in turn have hazardous impact on environment.**						
CO3	**This unit will enable the students to apply simple mathematical calculations to natural biological phenomenon as in gene mapping and they will be able to develop new software's which can solve these phenomenon**						
CO4	**Students will be able to use derivation and integration phenomenon along with mathematical calculation to solve inheritance pattern in general which can be applied to solve scientific biological aspects.**						

UNIT -I

1. Principles of Heredity and Variation: Mendel and his experiments, monohybrid crosses, incomplete dominance and codominance, dihybrid crosses, multiple alleles(blood group systems), epistasis, lethal genes. Probability in prediction and analysis of genetic data.Pedigree analysis.

2. Genes and Chromosomes: General features of chromosomes, cell division, sexual reproduction. Chromosomal theory of inheritance, sex determination.Sex-linked, sex-limited and sex-influenced inheritance.Variation in chromosome number and structure.

UNIT- II

3. Molecular organization of chromosomes: Genome size and evolutionary complexity, supercoiling of DNA, structure of bacterial chromosome, structure of eukaryotic chromosome.

4. Gene Mutation and DNA Repair: Classification of mutations, spontaneous mutations, induced mutations, application of induced mutations, detection of mutations, site-directed mutagenesis, mechanisms of DNA repair.

UNIT - III

5. Gene Linkage and Chromosome Mapping: Linkage and recombination of genes in a chromosome, crossing over and genetic mapping, gene mapping by 2-point and three point test crosses.

6. Somatic Cell Genetics : Somatic cell hybrids production and gene mapping.

UNIT - IV

7. Population Genetics and Evolution : Allele frequencies and genotype frequencies, random mating and Hardy-Weinberg principle. Inbreeding. Genetics and evolution (Mutation and migration, natural selection, random genetics drift).

8. Quantitative Genetics : Quantitative inheritance, causes of variation.

Text Books:

1. Basic Genetics. (2000) Miglani, G.S., Narosa Publishing House, New Delhi.
2. Fundamentals of Genetics. Singh,B.D., KalyaniPublishers,New Delhi.

References Books:

2. Genetics: Analysis of Genes and Genomes.5th edition (2001) Hartl, D.L. and Jones, E.W., Jones and Bartlet Publishers, Boston.
3. Genetics. 5th edition (1998) Russell, P.J., Addison Wesley Longman, Inc., California.
4. Genetics: Analysis and Principles. (1999) Brooker, R.J. McGraw Hill, New York.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

HS-201	FUNDAMENTALS OF MANAGEMENT (B Tech All Branches Semester III/IV)						
Lecture	**Tutorial**	**Practical**	**Credits**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To make the students conversant with the basics concepts in management thereby leading to nurturing their managerial skills**						
Course Outcomes							
CO1	**An overview about management as a discipline and its evolution**						
CO2	**Understand the concept and importance of planning and organizing in an organization**						
CO3	**Enabling the students to know about the importance of hiring and guiding the workforce by understanding the concept of leadership and communication in detail**						
CO4	**To understand the concept and techniques of controlling and new trends in management**						

UNIT-1

1. Introduction to Management: Meaning, Definition, nature, importance & Functions, Management as Art, Science & Profession- Management as social System, Concepts of management-Administration

2. Evolution of Management Thought: Development of Management Thought- Scientific management, Administrative Theory of Management, Bureaucratic Organization, Behavioral approach (Neo Classical Theory): Human Relations Movement; Behavioral Science approach; Modern approach to management – Systems approach and contingency approach.

UNIT-II

3. Planning: nature, purpose and functions, types of plans, planning process, Strategies and Policies: Concept of Corporate Strategy, formulation of strategy, Types of strategies, Management by objectives (MBO), SWOT analysis, Types of policies, principles of formulation of policies

4. Organizing: nature, importance, process, organization structure: Line and Staff organization, Delegation of Authority and responsibility, Centralization and Decentralization, Decision Making Process , Decision Making Models, Departmentalization: Concept and Types (Project and Matrix), formal & informal organizations

UNIT-III

5. Staffing: concept, process, features; manpower planning; Job Analysis: concept and process; Recruitment and selection: concept, process, sources of recruitment; performance appraisal, training and development

6. Directing: Communication- nature, process, formal and informal, barriers to Effective Communication, Theories of motivation-Maslow, Herzberg, McGregor ; Leadership – concept and theories, Managerial Grid, Situational Leadership. Transactional and Transformational Leadership.

UNIT-IV

7. Controlling: concept, process, types, barriers to controlling, controlling Techniques: budgetary control, Return on investment, Management information system-MIS , TQM-Total Quality Management, Network Analysis- PERT and CPM.

8. Recent Trends in Management: -

Social Responsibility of Management–Management of Crisis, Total Quality Management, Stress Management, ., Concept of Corporate Social Responsibility (CSR) and business ethics.

Functional aspects of business: Conceptual framework of functional areas of management-Finance; Marketing and Human Resources

Text books

3. Management Concepts - Robbins, S.P; Pearson Education India
4. Principles of Management - Koontz &O'Donnel; (McGraw Hill)

Recommended books

8. *Business Organization and Management* – Basu ; Tata McGraw Hill
9. Management and OB-- Mullins; Pearson Education
10. Essentials of Management – Koontz, Tata McGraw-Hill
11. Management Theory and Practice – Gupta, C.B; Sultan Chand and Sons, new Delhi
12. Prasad, Lallan and S.S. Gulshan. *Management Principles and Practices.* S. Chand & Co. Ltd., New Delhi.
13. Chhabra, T.N. *Principles and Practice of Management*. DhanpatRai& Co., Delhi.
14. Organizational behavior – Robins Stephen P; PHI.

BT-209	CELL BIOLOGY & GENETICS LAB(B.Tech. Biotechnology Semester III)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical (Major Test)**	**Total**	**Time**
-	**-**	**3**	**1.5**	**40**	**60**	**100**	**3 Hrs**
Purpose	**To learn workingofinstruments and their principles to study of biological phenomenon.**						
Course Outcomes							
CO1	**Students will be able to operate compound microscope.**						
CO2	**Preparation of temporary and permanent slides will be known by students.**						
CO3	**Students will come to know about the procedure of isolation of different organelles of the cell by means of techniques of Centrifugation on the basis of density gradient.**						
CO4	**Students will learn Techniques of DNA extraction and its analysis of Quantity and Quality.**						

LABORATORY EXPERIMENTS

1. Study of different types of microscope.
2. Microscopy: Structure of Prokaryotic and eukaryotic cell, Fixation,Microtomy. Histology of various organ systems (Nervous, digestion, reproductive, respiratory and circulatory system).
3. Mitochondrial staining & enzyme localization (Histochemistry&immunohistochemistry) Cell division in onion root tip.
4. Cell division in insect gonads/flower bud.
5. Isolation of Chloroplasts/ Mitochondria from Plants.
6. Fluorescence labeling of cellular organelles.
7. Isolation of DNA and study of its denaturation spectrophotometrically&viscometrically.

Reference books:

1. Principles and techniques of Practical Biochemistry: K. Wilson and J. Walker (1994), Cambridge University Press, Cambridge.
2. Introductory practical Biochemistry by S.K. Sawhney and Randhir Singh (2000), Narosa Publishing House, New Delhi.
3. An introduction to Practical Biochemistry by David T. Plummer (1988), McGraw- Hill, Book company, UK.

BT-211	MICROBIOLOGY LAB (B.Tech. Biotechnology Semester III)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical (Major Test)**	**Total**	**Time**
-	**-**	**3**	**1.5**	**40**	**60**	**100**	**3 Hrs**
Purpose	**To learn the practical aspects of Microbiology**						
Course Outcomes							
CO1	**Students will be able to operate microscopes and staining methods**						
CO2	**Learning of Culture Media Preparation for Microbial Growth**						
CO3	**Students will learn Pure Culture Techniques for maintenance and preservation of microbes.**						
CO4	**Students will learn various aspects of Biochemical Tests used in Microbial Taxonomy**						

LABORATORY EXPERIMENTS

1. Microscopy: Use of microscopes, microscopic examination of microorganisms.
2. Micrometry: Microscopic measurement of microorganisms.
3. Staining methods.
4. Preparation of culture media.
5. Isolation and enumeration of microorganisms from different sources.
6. Pure culture techniques- Streak plate, pour plate, spread plate.
7. Measurements of growth and study of effect of various factors on growth of microorganisms- temperature, pH, salt concentration, U.V and R.H.
8. Biochemical tests useful in bacterial taxonomy.
9. Water Microbiology- BOD, multiple-tube fermentation test.
10.Milk Microbiology- SPC, testing the quality of milk.

TextReferences Books:

1. Experiments in Microbiology, Plant Pathology and Biotechnology. 4th Edition.Aneja, K.R. (2003)New Age International Publishers, New Delhi**.**
2. Microbiology- a laboratory manual. 4th edition.Cappuccino J. and Sheeman N. (2000) Addison Wesley, California.
3. Environmental Microbiology – A Laboratory Manual Pepper. I.L.; Gerba, C.P. and Brendecke, J.W.(1995) Academic Press, New York.

BT-213	BIOCHEMISTRY LAB (B.Tech. Biotechnology Semester III)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical (Msjor Test)**	**Total**	**Time**
-	**-**	**3**	**1.5**	**40**	**60**	**100**	**3 Hrs**
Purpose	**To learn the practical aspects of Biochemistry**						
Course Outcomes							
CO1	**Students will be able to learn qualitative and quantitative estimation of biomolecules**						
CO2	**Learning of various Enzyme Assays**						
CO3	**Students will learn effect of environmental factors on enzyme activity**						
CO4	**Students will learn Biochemical Tests used in Clinical Biochemistry**						

LABORATORY EXPERIMENTS

1. Qualitative tests for amino acids, proteins, Lipids and carbohydrates.
2. Quantitative estimation of proteins, Lipids and carbohydrates.
3. Assay of any commonly occurring enzyme.
4. Effect of pH, temperature, enzyme concentration and protein denaturation on an enzyme activity.
5. Determination of K_m and V_{max} of any commonly occurring enzyme.
6. Biochemical analysis of urine and blood(pH, Uric acid, creatinine, proteins and carbohydrates).

Text/ Reference Books:

1. Principles and techniques of Practical Biochemistry: K. Wilson and J. Walker (1994), Cambridge University Press, Cambridge.
2. Introductory practical Biochemistry by S.K. Sawhney and Randhir Singh (2000), Narosa Publishing House, New Delhi.
3. An introduction to Practical Biochemistry by David T. Plummer (1988), McGraw- Hill, Book company, UK.

MPC-202	ENERGY STUDIES (B.Tech All Branches Semester III/IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**75**	**25**	**100**	**3**
Purpose	**To make the students conversant with the basics concepts and conversion of various form of Energy**						
Course Outcomes							
CO1	**An overview about Energy , Energy Management, Audit and tariffs**						
CO2	**Understand the Layout and working of Conventional Power Plants**						
CO3	**Understand the Layout and working of Non Conventional Power Plants**						
CO4	**To understand the role of Energy in Economic development and Energy Scenario in India**						

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy,Conventional and Non-conventional sources, Need for Non-Conventional Energy based power generation.

Energy Management: General Principles of Energy Management, Energy Management Strategy.

Energy Audit: Need, Types, Methodology and Approach.

UNIT-II

Conventional Energy sources: Selection of site**,** working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages-disadvantages.

UNIT-III

Non Conventional Energy sources: Basicprinciple, site selection of Solar energy power plant, photovoltaic technologies, PV Systems and their components, Wind energypower plant , Bio energy plants ,Geothermal energy plantsand tidal energy plants.MHD

UNIT-IV

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.

References:

8. Energy Studies-Wiley Dream tech India.
9. Non-conventional energy resources- Shobhnath Singh, Pearson.
10. Soni,Gupta,Bhatnagar: Electrical Power Systems – DhanpatRai& Sons
11. NEDCAP: Non Conventional Energy Guide Lines
12. G.D. Roy :Non conventional energy sources
13. B H Khan :Non Conventional energy resources - McGraw Hill
14. Meinel A B and Meinal M P,Addison:Applied Solar Energy- Wesley Publications
8. George Sutton: Direct Energy Conversion -McGraw

BT-202	MOLECULAR BIOLOGY (B.Tech. Biotechnology Semester IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**-**	**-**	**4**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To familiarize the students with Basic and Applied Concepts of Molecular Biology**						
Course Outcomes							
CO1	**Introduction to Basic structure of DNA RNA , about their hereditary role Periodicity of DNA**						
CO2	**To impart basic concept of DNA replication process and regulation**						
CO3	**Basic knowledge of Transcription of DNA in Prokaryotes and Eukaryotes Control of transcription**						
CO4	**Knowledge of Translation in Prokaryotes and Eukaryotes Splicing**						

UNIT- I

1.Genes : DNA/RNA as the genetic material. Double helical structure of DNA.Types of DNA.Super coiling and periodicity of DNA.Linking number of DNA.Nature of multiple alleles, Cis- acting sites and Trans–acting molecules.Euchromatin and heterochromatin.Nucleosomes.Organelle DNA- Mitochondrial and chloroplast DNA.

2. From Genes to Genomes : exons and introns, repetitive and non –repetitive DNA, C-value paradox.

3. DNA Replication : Origin of DNA replication. Bacterial and eukaryotic replicons.DNA polymerases.Mechanism and regulation of DNA replication in prokaryotes and eukaryotes.

UNIT - II

4. Transcription: Various RNA species and their properties- tRNA as an adapter and turnover of mRNA.

a) **Transcription in Prokaryotes:** RNA polymerases. Mechanism of transcription- initiation, elongation and termination.Role of sigma factor in transcription.

b) **Transcription in Eukaryotes:** RNA Polymerases. Downstream and upstream promoters. Techniques to define promoters- foot printing experiment. Mechanism of transcription.Interaction of upstream factors with basal apparatus.Role of enhancers.Post-transcriptional modifications of various RNA species.Transcription in mitochondria and chloroplast.

c) **The Operon:** Positive and negative control of transcription, repressor-inducer complex, catabolite repression and attenuation.

d) **Regulation of Transcription:** DNA binding domains- zinc finger motif, helix loop helix, leucine zippers and homeodomains. Demethylation and gene regulation.

UNIT -III

5. Genetic Code: Evidence for triplet code. Properties of genetic code, Wobble hypothesis.Mitochondrial genetic code. Suppressor tRNAs.

6. Protein Synthesis : Structure of prokaryotic and eukaryotic ribosomes and their role in protein synthesis. Mechanism of initiation, elongation and termination of protein synthesis.Regulation of translation in prokaryotes and eukaryotes. Post translational modifications of proteins.

7. Protein folding : Role of molecular chaperones.

UNIT –IV

8. Nuclear Splicing : Lariat formation, Sn RNAs, cis-splicing and trans-splicing reactions. Catalytic RNA- Ribozymes- Ribonuclease P, small RNAs, group I &II introns.

Text/Reference Books :

1. Genes XI Lewin, Benjamin(2013)OUP, Oxford.
2. Genomes,2nded, Brown, T. A.(2002) John Wiley and sons ,Oxford
3. Molecular biology of cell 4thed Alberts, Bruce; Watson,J D(2002) Garland Science Publishing, New York.
4. Molecular cell biology 4th edLodish, Harvey and. Baltimore,D(2000) W.H. Freeman and Co., New York
5. Cell and Molecular Biology 8th ed, Robertis, EDP De &Robertis, EMF De(2002) lippincott Williams & Wilkins international student edition, Philadelphia.
6. Essentials of Molecular Biology 4th ed, Malacinski, G. M. (2003) Jones &Bartlet Publishers, Boston
7. Cell and Molecular Biology: concepts and experiments 3rd ed Karp, Gerald(2002) John Wiley and sons, New York.
8. The Cell-a molecular approach, 3rd ed Cooper, G M&Hausman, R E(2004) ASM Press, Washington D C

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

BT-204	IMMUNOLOGY (B.Tech. Biotechnology Semester IV)						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	1	-	3.5	75	25	100	3 Hrs.
Purpose	To learn the role of various components of Immune System and their response against various diseases						
Course Outcomes							
CO1	Basic concepts of cells and organs related to immune system. Basic Concepts related to Antigen and Antibody						
CO2	To learn the formation, maturation and functions of B cells & T cells						
CO3	To learn the concepts of various Immunological techniques and understanding various Effector Reponses of body against an infection						
CO4	To understand the immunological reasons behind various Diseases						

UNIT – I

1. Introduction to immune system: Innate and acquired immunity, cells and organs of immune System- B-Lymphocytes and T-Lymphocytes, primary and secondary lymphoid organs, humoral and cell mediated immune response.
2. Immune System: Antigens. Immunoglobulins- structure and function, antigenic Determinants (isotype, allotype, idiotype).Monoclonal antibodies.Hybridoma technology.Antibody Engineering.

UNIT –II

3. Antibody Diversity: Organization and e
xpression of immunoglobulin genes, generation of Antibody diversity, class switching.
4. Generation of B-Cell and T-Cell Responses: Major histocompatibility complex. Antigen Processing and presentation.
5. Cell mediated immunity: T-cell receptor, T-cell maturation, activation and differentiation.

UNIT –III

6. Immunological techniques: Immunoprecipitin reactions, agglutination reactions, complement tests, ELISA, RIA, Immunofluorescence.
7. Immune effector responses: Cytokines. Complement system.

UNIT - IV

8. Immune System in Health and Disease: Hypersensitive reactions. Auto immunity and immune response to infectious diseases. Tumor immunity. Immune response to transplants. Vaccines.

Text Book:

1. Kuby's Immunology, 5th ed. Goldsby, R A. Kindt, T.J, Osborne, B.A.(2003) W. H. Freeman and company, New York.

Reference Books

1. Essential Immunology, 10th edRoitt, Ivon; Delves, Peter (2001) Blackwell Scientific Publications Oxford.

2. Fundamentals of Immunology: Paul W.E. (Eds.) Raven Press, New York. 3. Immunology by Presscot.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

BT-206	BIOANALYTICAL TECHNIQUES (B.Tech. Biotechnology Semester IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To learn the role of various components of Immune System and their response against various diseases**						
Course Outcomes							
CO1	**Basic concepts of Various kinds of Microscopy and Centrifugation Techniques**						
CO2	**To learn the theoretical and practical aspects of Electrophoresis and Chromatography Techniques**						
CO3	**To learn the concepts of different kinds of Spectroscopy and Colourimetry**						
CO4	**To understand the concept of radioisotope techniques and their applications in research**						

UNIT- I

1. Microscopy: Light, electron (scanning and transmission), phase contrast, fluorescence microscopy, atomic force microscopy, freeze-fracture techniques, specific staining of organelles or marker enzymes.

2. Centrifugation: Techniques and their applications, differential centrifugation, zonal, density gradient and ultracentrifugation techniques.

UNIT- II

3. Electrophoresis: Paper and gel electrophoresis, immunoelectrophoresis, isoelectric focussing, two-dimensional electrophoresis.

4. Chromatography: Paper, TLC, adsorption, partition, ion-exchange, reverse phase, gel filtration, affinity, gas chromatography, High Pressure Liquid Chromatography (HPLC).

UNIT- III

5. Spectrophotometry: Basic concepts and brief description of applications of UV/visible, IR, NMR, ESR, fluorescence, Raman. Mass spectroscopy (LC-MS, MALDI-TOF, ES-MS) X-ray diffraction (diffraction by fibrous proteins, globular proteins and molecular crystals), CD and ORD.

6. Calorimetry: Differential scanning calorimetry, titration calorimetry.

UNIT- IV

7. Radioisotope Techniques: Nature of radioactivity, properties of α, β and γ-rays, measurement of radioactivity, use of radioisotopes in research, *In vivo* and *in vitro* labelling techniques, double labelling, instruments for monitoring radioactivity, quenching, internal standard, channel ratio, external standard ratio, emulsion counting, radioactive decay, autoradiography, radio-immunoassay.

Text/ References Books:

1. Biological Spectroscopy: Campbell and Durek
2. Physical Biochemistry, 2nd edition, by D Friefelder (1983). W.H. Freeman & Co., U.S.A.
3. Introduction to instrumental analysis: Robert D. Braun (1987) McGraw Hill International Editions, Chemistry Series.
4. Analytical Chemistry for technicians : John Kenkel (1994), Lewis Publishers. Boca Raton.
5. Principles and techniques of Practical Biochemistry: K. Wilson and J. Walker (1994), Cambridge University Press, Cambridge.
6. Biophysical Chemistry: Principles and Techniques, 2nd edition by A. Upadhyay, K. Upadhyay and N. Nath. (1998). Himalaya Publishing House, Delhi.
7. Physical Biochemistry, 2nd edition, by K. E. VanHolde (1985), Prentice Hall Inc, New Jersey.

Note: The Examiner will be given the question paper template and will have to set the question paper

according to the template provided along with the syllabus.

BT-208	INDUSTRIAL MICROBIOLOGY AND ENZYME TECHNOLOGY (B.Tech. Biotechnology Semester IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To learn the role of various components of Immune System and their response against various diseases**						
Course Outcomes							
CO1	**Basic concepts of Various kinds of Microscopy and Centrifugation Techniques**						
CO2	**To learn the theoretical and practical aspects of Electrophoresis and Chromatography Techniques**						
CO3	**To learn the concepts of different kinds of Spectroscopy and Colourimetry**						
CO4	**To understand the concept of radioisotope techniques and their applications in research**						

UNIT- I

1. Industrial Microbiology: Introduction, objectives and scope**.**
2. Fermentation Technology: Principle, range and component of fermentation processes. Types of fermentation.Purification of fermentation products.
3. Industrially important microbes: Sources, isolation, screening, preservation and maintenance of industrially important microorganisms. Improvement of industrially important microorganisms, selection of mutants, use of rDNA technology.

UNIT - II

4. Process technology for the Production of various Products: Primary metabolites (ethanol, acetone, butanol, citric acid, vinegar). Production of alcoholic beverages (wine and beer).
5. Microbial production of industrial enzymes: Cellulase, amylase and protease.
6. Production of secondary metabolites: Antibiotics (*e.g.* penicillin, streptomycin and tetracycline)

UNIT - III

7. Vaccines: Types of vaccines and their production
8. Biopesticides: Characteristics of biopesticides. Important biopesticides- Bt-toxin, Kasugamycin, Beauverin, Devine and Collego
9. Microbial protein: Quorn
10. Biofuels and biofertilizers:Basic concepts and important types of biofuels and biofertilizers

UNIT – IV

11. Enzymes: Nomenclature and Classification of enzymes. Mechanism of enzyme action, acid base catalysis, covalent catalysis proximity and orientation effects.Mechanism of action of selected enzymes- chymotrypsin, lysozyme and ribonuclease.Purification of enzymes.Immobilized enzymes.Stability of enzymes- enzyme stabilization by selection and protein engineering.Application of enzymes in industry, analytical purposes and medical therapy.

Text

1. A Textbook of Basic and Applied Microbiology. Aneja, K. R., Jain, P. and Aneja, R. (2008). New Age International Publishers, New Delhi

Reference Books:

1. Industrial Microbiology.Casida Jr., L.E. (1968) New Age International (P)Ltd. New Delhi.
2. Prescott & Dunn's Industrial Microbiology. Ed. E.G. Reed (1987).CBS Publishers, New Delhi.
3. Biotechnology: A Textbook of Industrial Microbiology 2nd Edition. Crueger, W. and Crueger, A. (2000) Panima Publishing Corporation, New Delhi.
4. Enzymes: Biochemistry, Biotechnology, Clinical chemistry. Palmer, T. (2000) Horwood publishing Colphon.
5. Process engineering in biotechnology. Jackson, A.T. (1991) Prentice Hall.
6. Manual of Industrial Microbiology and Biotechnology 2nd Edition. Ed. Arnold L. Demain and Julian E. Davies (1999) ASM Press Washington D.C.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

AS-202	ORGANICCHEMISTRY (B.Tech. Biotechnology Semester IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3Hrs**
Purpose	**To impart the students the basics knowledge of organic chemistry required in biotechnology**						
Course Outcomes							
CO1	**Introduction of nomenclature and general organic reactions**						
CO 2	**Regarding chemical bonding and stereochemistry of organic compounds**						
CO 3	**Certain general mechanism of acid derivatives and biopolymers**						
CO 4	**Concept based knowledge of reducing agents**						

UNIT-I

IUPAC Nomenclature: Systematic IUPAC nomenclature of alkenes, alkynes, cycloalkanes, aromatics, bicyclic and polyfunctional organic compounds. Bond line notation **Types of Organic Reactions**: Substitution, Addition, Elimination reactions. WangerMeerwin rearrangement reaction.**Hyperconjugation**: concept and consequences, **Mole concept**

UNIT-II

Bonding: Hydrogen bonding- Nature, type, stability and its importance in organic compounds. pπ-dπbonding.**Tautomerism**-Concept, Ring-chain tautomerism, Ring-chain isomerism, properties and reactions of keto-enoltautomers.**Stereo Chemistry**: Classification of stereomers, diastereomers, separation of enantiomers, absolute configuration (R & S), projection formulae, stereochemistry of compounds containing two asymmetric C- atoms, stereochemistry of biphenyls. Geometrical isomerism-concept, E & Z nomenclature.**Important processes and their application**: alkylation, acylation, halogenations, dehydration, condensation and cyclisation.

UNIT –III

Acid Derivatives: Acid catalyzed and base catalyzed hydrolysis of esters and acid amides, ammonolysis and alcoholysis of esters, acid halides and acid anhydrides. **Polymers**: Classification of polymers. Tacticity and functionality,.Epoxy resins, Biomedical polymers:-silicone rubber, polyurethanes & their applications

UNIT –IV

Reducing Agents:Their applications in Organic Chemistry with special emphasis on $LiAlH_4$, $NaBH_4$, $Pt/Ni/H_2$, $Metal/NH_3$ Solution, Hydroboration and Tri-n-butyl tin hydride. **Peptide Bond Synthesis** :

Protection of N-terminal and C-terminal of amino acids, formation of peptide bond, solid phase peptide synthesis., concept of solvent extraction and crystallization

Text/Reference Books:

1. Organic Chemistry V1:6th ed. Finar,I L(2003) Pearson Education, Delhi
2. Organic Chemistry V2:5th ed. Finar,I L(2003) Pearson Education, Delhi.
3. Organic Chemistry 6th ed. Morrison,R&Boyd,T.(2003) Pearson Education, Delhi.
4. Organic Chemistry. Paula YurkanisBruice; Pearson Education, Delhi.
5. Principle of Organic Synthesis. Richard Norman and James M Coxon.
6. Organic Chemistry:Reactions& Reagents,37th ed. Aggarwal (2003) Goel Publishing House,Meerut.
7. Organic Analytical Chemistry. Jagmohan (2003) Narosa pub. New Delhi.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

BT-212	MOLECULAR BIOLOGY LAB (B.Tech. Biotechnology Semester III)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical (Major Test)**	**Total**	**Time**
-	**-**	**3**	**1.5**	**40**	**60**	**100**	**3 Hrs**
Purpose	**To learn the practical aspects of Molecular Biology**						
Course Outcomes							
CO1	**Students will be able to learn Isolation of DNA from Prokaryotic and Eukaryotic Cells**						
CO2	**Learning of Gel Electrophoresis for separation of DNA, RNA and Proteins**						
CO3	**Students will learn the technique of PCR Amplification of Nucleic Acids**						
CO4	**Students will learn Restriction Mapping of Plasmid DNA**						

LABORATORY EXPERIMENTS

1. Isolation of genomic DNA from eukaryotic cells.
2. Isolation of RNA from eukaryotic cells.
3. Isolation of proteins from eukaryotic cells.
4. Isolation of genomic DNA from prokaryotic cells.
5. Isolation of plasmid DNA from Prokaryotic cells.
6. Restriction mapping of plasmid DNA:This experiment involves single and double digestion of the plasmid with restriction enzymes.
7. Gel electrophoretic separation of DNA and molecular wt. determination.
8. Gel electrophoretic separation of RNA.
9. Gel electrophoretic separation of proteins.
10. Transblot analysis of DNA.
11. Gel Extraction of DNA.
12. PCR amplification of DNA: Visualization by gel electrophoresis.

Reference Book:

1. Molecular Cloning – A laboratory manual: 3rd Edition Vol. 1-3. Sambrook J and Russell D.W. (2001). Cold Spring Harbor laboratory Press, New York.

BT-214	IMMUNOLOGY LAB (B.Tech. Biotechnology Semester III)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical (Major Test**	**Total**	**Time**
-	**-**	**3**	**1.5**	**40**	**60**	**100**	**3 Hrs**
Purpose	**To learn the practical aspects of Immunology**						
Course Outcomes							
CO1	**Students will be able to learn Routine Techniques in handling laboratory animals**						
CO2	**Learning of techniques for purification of immunoglobulins**						
CO3	**Students will learn the technique of Immunoprecipitation and Agglutination**						
CO4	**Students will learn the principles of ELISA**						

LABORATORY EXPERIMENTS

1. Routine techniques in handling laboratory animals: feeding, cleaning and bleeding procedure for mice and rabbit.

2. Surgical removal of lymphatic organs from mice.

3. Preparation and administration of antigens, following immunization protocols.

4. To bleed rabbits for the generation of antibodies.

5. Purification of immunoglobulins.

6. Isolation and purification of lymphocytes from mouse.

7. Immunoprecipitation techniques

8. Agglutination techniques

9. ELISA

Reference Books:

1. Using Antibodies: A Laboratory Manual. Harlow &Lane(1998) Cold Spring Harbor Lab Press.

2. Immunological Techniques Made Easy. Cochet, et al.(1998)Wiley Publishers,Canada.

BT-216	BIOANALYTICAL TECHNIQUES LAB (B.Tech. Biotechnology Semester IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical (Msjor Test)**	**Total**	**Time**
-	**-**	**3**	**1.5**	**40**	**60**	**100**	**3 Hrs**
Purpose	**To learn the Bioanalytical Techniques used in the field of Biotechnology**						
Course Outcomes							
CO1	**Students will learn Separation of Biomolecules by Chromatography**						
CO2	**Learning of techniques for partial purification of enzymes**						
CO3	**Students will learn molecular weight determination of Proteins**						
CO4	**Students will learn the technique of cell fractionation**						

LABORATORY EXPERIMENTS

1. Verification of Beer-Lambert's law.
2. Separation of amino acids/ sugars by paper chromatography.
3. Extraction of lipids from tissues and their separation using TLC.
4. Partial purification of an enzyme by ammonium sulphate fractionation, Ion exchange and gel filtration chromatography of proteins.
5. Determination of molecular weight of an enzyme by gel filtration.
6. Separation of proteins by SDS-PAGE.
7. Cell fractionation

Reference Books:

1. Principles and techniques of Practical Biochemistry: K. Wilson and J. Walker (1994), Cambridge University Press, Cambridge.
2. Introductory practical Biochemistry by S.K. Sawhney and Randhir Singh (2000), Narosa Publishing House, New Delhi.
3. An introduction to Practical Biochemistry by David T. Plummer (1988), McGraw- Hill, Book company, UK.

BT-218	INDUSTRIAL MICROBIOLOGY LAB (B.Tech. Biotechnology Semester IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical (Major Test)**	**Total**	**Time**
-	**-**	**3**	**1.5**	**40**	**60**	**100**	**3 Hrs**
Purpose	**To learn the Practical Aspects of Industrial Microbiology**						
Course Outcomes							
CO1	**Learning of Sterilization Techniques used in Microbiology Lab**						
CO2	**Learning of Identification of industrially important microorganisms**						
CO3	**Students will learn production of antibiotics and enzymes from microbes**						
CO4	**Students will learn determination of microbial cell growth**						

LABORATORY EXPERIMENTS

1. Sterilization Techniques (Media, air & water)
2. Construction of various fermenters (bioreactors)
3. Identification of industrially important microorganisms e.g. molds, yeasts and bacteria.
4. Production of various products in the lab. Alcohol, wine, cellulase, protease and bread.
5. Isolation of antibiotic producing microorganisms from the soil.
6. Penicillin production and testing of antimicrobial activity.
7. Isolation of streptomycin-resistant mutants by replica plating method.
8. Isolation of UV induced auxotrophic mutants.
9. Testing of microbial enzyme activity in the lab.
10. Determination of cell growth.
11. Production of organic acids (Citric and lactic) by microorganisms.
12. Production of industrially important enzymes (protease, amylase) by microorganisms.

Reference Books:

1. Experiments in Microbiology, Plant Pathology and Biotechnology. Aneja, K.R.(2003) 4th Edition. New Age International Publishers, New Delhi.
2. Fermentations & Biochemical Hand Book: Principles, Process Design and Equipment. HC Vogel and Noyes(1983).
3. Microbiology Labortary Manual. Cappuccino, J. and Sheeman, N.(2000), 4th Edition, Addison Wesley, California.
4. Manual of Industrial Microbiology and Biotechnology. 2nd Edition. Ed. Arnold L. Demain and Julian E. Davies (1999) ASM Press Washington D.C.

MPC-201	ENVIRONMENTAL STUDIES (B.Tech. All Branches Semester –III/IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**-**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To learn the multidisciplinary nature, scope and importance of Environmental Studies**						
Course Outcomes							
CO1	**Basic concepts of Various kinds of Microscopy and Centrifugation Techniques**						
CO2	**To learn the theoretical and practical aspects of Electrophoresis and Chromatography Techniques**						
CO3	**To learn the concepts of different kinds of Spectroscopy and Colourimetry**						
CO4	**To understand the concept of radioisotope techniques and their applications in research**						

UNIT 1

The multidisciplinary nature of environmental studies.Definition, Scope and Importance. Need for public awareness. Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

(g) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber eztraction, mining, dams and their effects on forests and tribal people.
(h) Water Resources- Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
(i) Mineral Resources- Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
(j) Food Resources- World Food Problems, changes caused by agriculture and overgazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
(k) Energy Resources- Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
(l) Land Resources- Land as a resource, land, degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyle.

UNIT II

Ecosystem-Concept of an ecosystem.Sturcture and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the ecosystem.Ecological Succession.Food Chains, food webs and ecological pyramids. Introduction, types,characteristic features, structure and function of the following ecosystem-

a. Forest Ecosystem
b. Grassland Ecosystem
c. Desert Ecosystem
d. Aquatic Ecosystems(ponds, streams, lakes, rivers, oceans, esturaries

Field Work. Visit to a local area to document Environment assets-river/forest/grassland/hill/mountain.Visit to a local polluted site- Urban /Rural Industrial/Agricultural. Study of common plants, insects and birds. Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

UNIT III

Biodiversity and its conservation. Introduction, Definition: genetic, species and ecosystem diversity.

Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity of global, National and local levels. India as a mega-diversity nation Hot spots of Biodiversity. Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts. Endangered and endemic species of India.Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

Environmental Pollution Defiinitiom. Cause, effects and control measures of- (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards

Solid waste management- cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides

UNIT IV

Social Issues and the Environment.From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns. Case Studies.Environmental ethics-issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.Wasteland Reclamation.Consumerism and waste products.Environment Protection Act.Air (Prevention and Control of Pollution) Act.Water (Prevention and Control of Pollution) Act.Wildlife Protection Act.Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public Awareness. Human population and the Environment.Population growth, variation amomg nations. Population explosion-Family Welfare Programme. Enviromments nd human health.Human rights.Value Education.HIV/AIDS, Women and Child Welfare.Role of Information Technology in Environment and Human Health.Case Studies.

Text Books

1. Environmental Studies- Deswal and Deswal. Dhanpat Rai & Co.
2. Environmental Science & Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India
3. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
4. Environmental Science- Botkin and Keller. 2012. Wiley , India

Bachelor of Technology (Mechanical Engineering) CREDIT BASED
KURUKSHETRA UNIVERSITY KURUKSHETRA
Scheme of Studies/Examination
Semester III

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	AS-201	Applied Mathematics-III	3:1:0	4	3.5	75	25	0	100	3
2	ME-201	Basic Thermodynamics	3:1:0	4	3.5	75	25	0	100	3
3	ME-203	Mechanics of solids-I	3:1:0	4	3.5	75	25	0	100	3
4	ME-205	Machine Drawing	2:0:3	5	3.5	75	25	0	100	4
5	ME-207	Kinematic of Machines	3:1:0	4	3.5	75	25	0	100	3
6	ME-209	Material Science	4:0:0	4	4.0	75	25	0	100	3
7	ME-211	Kinematic of Machines Lab	0:0:2	2	1.0	0	40	60	100	3
8	ME-213	Material Science Lab	0:0:2	2	1.0	0	40	60	100	3
9	ME-215	Mechanics of SolidsLab	0:0:3	3	1.5	0	40	60	100	3
		Total		**32**	**25**	**450**	**270**	**180**	**900**	
10	MPC-201	Environmental Studies*	3:0:0	3	-	75	25	0	100	3

*Paper MPC-201 is a mandatory course which will be non-credit subject and student has to get pass marks in order to qualify the semester

Bachelor of Technology (Mechanical Engineering) CREDIT BASED

KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme of Studies/Examination

Semester IV

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	HS-201	Fundamentals of Management	3:0:0	3	3.0	75	25	0	100	3
2	ME-202	Production Technology-I	4:0:0	4	4.0	75	25	0	100	3
3	ME-204	Steam Generation & Power	3:1:0	4	3.5	75	25	0	100	3
4	ME-206	Mechanics of solids-II	3:1:0	4	3.5	75	25	0	100	3
5	ME-208	Fluid Mechanics	4:1:0	5	4.5	75	25	0	100	3
6	ME-210	Dynamics of Machines	4:0:0	4	4.0	75	25	0	100	3
7	ME-212	Fluid Mechanics Lab	0:0:2	2	1.0	0	40	60	100	3
8	ME-214	Dynamics of machines lab	0:0:2	2	1.0	0	40	60	100	3
9	ME-216	Steam Generation & Power Lab	0:0:2	2	1.0	0	40	60	100	3
10	ME-218	Production Technology Lab	0:0:3	3	1.5	0	40	60	100	3
		Total		**33**	**27.0**	**450**	**310**	**240**	**1000**	
11	MPC-202	Energy Studies*	3:0:0	3	-	75	25		100	3

*Paper MPC-202 is a mandatory course which will be non-credit subject and student has to get pass marks in order to qualify the semester.

NOTE- 6 weeks hands on training to be done after IVth Semester Exams. Marks will be allotted after training report evaluation in 5th Semester.

Bachelor of Technology (Mechanical Engineering) (Credit Based)

KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme of Studies/Examination

Semester V

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	ME 301	I.C. Engine & Gas Turbine	3:1:0	4	3.5	75	25	0	100	3
2	ME 303	Fluid Machines	3:1:0	4	3.5	75	25	0	100	3
3	ME 305	Heat Transfer	3:1:0	4	3.5	75	25	0	100	3
4	ME 307	Industrial Engineering	3:1:0	4	3.5	75	25	0	100	3
5	ME 309	Machine Design – 1	2:0:4	6	4.0	75	25	0	100	3
6	ME 311	Production Technology-II	4:0:0	4	4.0	75	25	0	100	3
7	ME 313	I.C. Engine Lab	0:0:2	2	1.0	0	40	60	100	3
8	ME 315	Fluid Machines Lab	0:0:2	2	1.0	0	40	60	100	3
9	ME 317	Heat Transfer Lab	0:0:2	2	1.0	0	40	60	100	3
10	ME 319	Industrial Training (Viva-Voce)					40	60	100	
		Total		**32**	**25.0**	**450**	**310**	**240**	**1000**	

Bachelor of Technology (Mechanical Engineering) (Credit Based)

KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme of Studies/Examination

Semester VI

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	ME-302	Refrigeration and air conditioning	3:1:0	4	3.5	75	25	0	100	3
2	ME-304	Mechanical vibration & Tribology	3:1:0	4	3.5	75	25	0	100	3
3	ME-306	Operation Research	3:1:0	4	3.5	75	25	0	100	3
4	CSE 209	Essentials of IT	3:1:0	4	3.5	75	25	0	100	3
5	ME-308	Computer aided design and manufacturing	4:0:0	4	4.0	75	25	0	100	3
6	ME-310	Machine design-II	2:0:4	6	4.0	75	25	0	100	4
7	ME-312	Refrigeration and air conditioning lab	0:0:2	2	1.0	0	40	60	100	3
8	ME-314	Tribology and Mechanical vibration lab	0:0:2	2	1.0	0	40	60	100	3
9	ME-316	Computer aided design and manufacturing lab	0:0:2	2	1.0	0	40	60	100	3
		Total		**32**	**25**	**450**	**270**	**180**	**900**	

NOTE- 6 weeks hands on training to be done after 6thSemester Exams. Marks will be allotted after training report evaluation in 7th Semester.

Bachelor of Technology (Mechanical Engineering) (Credit Based)

KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme of Studies/Examination

Semester VII

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	ME-401	Measurement and control	4:0:0	4	4.0	75	25	0	100	3
2	ME-403	Mechatronics	4:0:0	4	4.0	75	25	0	100	3
3	HS-301	Entrepreneurship	3:0:0	3	3.0	75	25	0	100	3
4	CE-I	Core Elective - I*	4:0:0	4	4.0	75	25	0	100	3
5	CE-II	Core Elective - II*	3:0:0	3	3.0	75	25	0	100	3
6	ME-405	Measurement & Control Lab	0:0:2	2	1.0	0	40	60	100	3
7	ME-407	Mechatronics Lab	0:0:2	2	1.0	0	40	60	100	3
8	ME-409	Project-1**	0:0:8	8	4.0	0	100	100	200	
9	ME-411	Industrial Training (Viva-voce)					40	60	100	
10	ME-413	Seminar-I	0:0:2	2	1.0		50	50	100	
		Total		**32**	**25.0**	**375**	**395**	**330**	**1100**	

*The students will chose any two departmental electives courses out of the given elective list in VII Sem.

**Project-1 is to be submitted in the 7th semester itself. Project-I should not be related to Project-II unless it involves large amount of work, time and effort.

Course No.	Core Elective - I (CE-I)	Course No.	Core Elective - II (CE-II)
ME-415	Non-Conventional Machining	ME-427	Finite Element Methods in Engineering
ME-417	Soft Computing Techniques	ME-429	Advanced Manufacturing Technology
ME-419	Non-Destructive Evaluation & Testing	ME-431	Robotics: Mechanics and Control
ME-421	Design and Optimization	ME-433	Simulation of Mechanical Systems
ME-423	Computational Fluid Dynamics	ME-435	Control Engineering
ME-425	Fundamental of gas dynamics	ME-437	Environmental Pollution and Abatement

Bachelor of Technology (Mechanical Engineering) (Credit Based)

KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme of Studies/Examination

Semester VIII

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of Exam. (Hrs.)
						Major Test	Minor Test	Practical	Total	
1	ME-402	Automobile Engineering	4:0:0	4	4.0	75	25	0	100	3
2	CE-III	Core Elective* – III	4:0:0	4	4.0	75	25	0	100	3
3	CE-IV	Core Elective* - IV	4:0:0	4	4.0	75	25	0	100	3
4	ME-404	Power Plant Engineering	4:0:0	4	4.0	75	25	0	100	3
5	ME-406	Quality Assurance & Reliability	4:0:0	4	4.0	75	25	0	100	3
6	ME-408	Automobile Engineering Lab	0:0:2	2	1.0	0	40	60	100	3
7	ME-410	Project-II	0:0:10	10	5.0		100	100	200	
8	ME-412	Seminar-II	0:0:2	2	1.0	0	100	0	100	
		Total		**34**	**27.0**	**300**	**340**	**160**	**900**	

*The students will chose any two Departmental Elective courses out of the given elective list in VIII Sem.

Project-I should not be related to Project-II unless it involves large amount of work, time and effort.

Course No.	Core Elective - III (CE-III)	Course No.	Core Elective - IV (CE-IV)
ME-414	Smart Materials,structures& devices	ME-426	Manufacturing Management
ME-416	Lubrication Technology	ME-428	Design of Pressure Vessels and Piping
ME-418	'Energy Management	ME-430	Concurrent Engineering
ME-420	Waste Heat Recovery System	ME-432	Industrial Combustion
ME-422	Foundry Engineering	ME-434	Metal Forming and Finishing
ME-424	Ergonomics in Design	ME-436	Air Craft and Rocket Propulsion

AS-201	APPLIED MATHEMATICS-III(B Tech All Branches Semester III/IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**4**	**75**	**25**	**100**	**3 hrs**
Purpose	To acquaint the students with the basic use of PDE, Linear Programming problems, Fourier series and transforms, Complex variables and Probability.						
Course Outcomes							
CO1	This section is concerned mainly with Fourier series. However, the underlying ideas can also be extended to nonperiodic phenomena. This leads to Fourier integrals and transforms which are very much useful in solving the initial and boundary value problems.						
CO 2	Students will learn about the formation and solution the partial differential equations. First order PDE of any degree by using Charpit's method will be discussed in details. In addition, how to solve homogeneous linear PDE with constant coefficients and variable separable method and LPP will be covered under this section.						
CO 3	Complex analysis is concerned with generalization of the familiar real functions of calculus and their detailed knowledge is an absolute necessity in practical work to solve engineering problems.						
CO 4	Probability theory provides models of probability distributions(theoretical models of the observable reality involving chance effects) to be tested by statistical methods which has various engineering applications, for instance, in testing materials, control of production processes, robotics, and automatization in general, production planning and so on.						

UNIT-I

Fourier Analysis

Fourier series: Euler's formulae, Orthogonality conditions for the Sine and Cosine function, Dirichlet's conditions, Fourier expansion of functions having points of discontinuity, Change of interval, Odd and even functions, Half-range series.

Fourier Transforms: Fourier integrals, Fourier transforms, Fourier Cosine and Sine transforms, Properties of Fourier transforms, Convolution theorem, Parseval's identity, Fourier transforms of the derivative of a function, Application of transforms to boundary value problems (Heat conduction and vibrating string).

UNIT-II

Partial Differential Equations and LPP

Formation and Solutions of PDE, Lagrange's Linear PDE, First order non-linear PDE, Charpit's method, Homogeneous linear equations with constant coefficients, Method of separation of variables.

Solution of linear programming problems: using Graphical and Simplex methods.

UNIT-III

Theory of Complex Variables

A review of concept of functions of a complex variable, Limit, continuity, differentiability and analyticity of a function. Basic elementary complex functions (exponential functions, trigonometric & Hyperbolic functions, logarithmic functions) Cauchy-Riemann Equations.

Line integral in complex plane, definition of the complex line integral, basic properties, Cauchy's integral theorem, and Cauchy's integral formula, brief of Taylor's, Laurent's and Residue theorems (without proofs).

UNIT-IV

Probability theory:

A review of concepts of probability and random variables: definitions of probability, addition rule, conditional probability, multiplication rule, Conditional Probability, Mean, median, mode and standard deviation, Bayes' Theorem, Discrete and continuous random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function.

Standard Distributions: Binomial, Poisson and Normal distribution.

References Books:

1. E. Kreyszig : Advanced Engineering Mathematics, Wiley India.
2. B. V. Ramana: Engineering Mathematics, Tata McGraw Hill.
3. R.K. Jain, S.R.K. Iyengar: Advanced Engineering Mathematics, Taylor & Francis.
4. Murray R Spiegel: Schaum's Outline of Complex Variables,McGraw Hill Professional.
5. Michael D. Greenberg: Advanced Engineering Mathematics, Pearson Education, Prentice Hall.

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

Unit-I
Basic

	B.Tech. (3rd semester) Mechanical Engineering						
ME-201	**BASIC THERMODYNAMICS**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs.)**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**
Purpose	The objective of this course is to make the students aware of Energy, Entropy, Equilibrium, various laws of thermodynamics and relations. The course will help the students to build the fundamental concepts in order to solve engineering problems.						
Course Outcomes							
CO 1	State the thermodynamic system, properties and equilibrium. Describe the ideal and real gas laws.						
CO 2	Analyze and solve the first and second law of thermodynamics problems.						
CO 3	Define entropy and its change for different processes and also solve entropy problems.						
CO 4	Describe the Availability and unavailability for steady and unsteady flow processes. Also understand the concept of irreversibility.						
CO 5	Solve the problems related to Steam and plot the processes on H-S and T-S diagram. Understand thermodynamics relations.						

Concepts: Thermodynamics: Macroscopic and Microscopic Approach, Thermodynamic Systems, Surrounding and Boundary, Thermodynamic Property – Intensive and Extensive, Thermodynamic Equilibrium, State, Path, Process and Cycle, Quasi-static, Reversible and Irreversible Processes, Working Substance. Concept of Thermodynamic Work and Heat, Equality of Temperature, Zeroth Law of Thermodynamic and its utility.
Ideal and Real Gases: Concept of an Ideal Gas, Basic Gas Laws, Characteristic Gas Equation, Avagadro's law and Universal Gas Constant, P-V-T surface of an Ideal Gas. Vander Waal's Equation of state, Reduced Co-ordinates, Compressibility factor and law of corresponding states. Mixture of Gases, Bass, Mole and Volume Fraction, Gibson Dalton's law, Gas Constant and specific Heats, Entropy for a mixture of Gases.

Unit II

First Law of Thermodynamics: Energy and its Forms, Energy and 1st law of Thermodynamics, Internal Energy and Enthalpy, 1st Law Applied to Non-Flow Process, Steady Flow Process and Transient Flow Process, Throttling Process and Free Expansion Process. Numericals
Second Law Of Thermodynamics: Limitations of First Law, Thermal Reservoir Heat Source and Heat Sink, Heat Engine, Refrigerator and Heat Pump, Kelvin- Planck and Clausius Statements and Their Equivalence, Perpetual Motion Machine of Second Kind. Carnot Cycle, Carnot Heat Engine and Carnot Heat Pump, Carnot's Theorem and its Corollaries, Thermodynamic Temperature Scale, Numericals

Unit III

Entropy: Clausius Inequality and Entropy, Principle of Entropy Increase, Temperature-Entropy Plot, Entropy Change in Different Processes, Introduction to Third Law of thermodynamics. Availability, Irreversibility and Equilibrium: High and Low Grade Energy, Availability and Unavailable Energy, Loss of Available Energy Due to Heat Transfer Through a Finite Temperature Difference, Availability of a Non-Flow or Closed System, Availability of a Steady Flow System, Helmholtz and Gibb's Functions, Effectiveness and Irreversibility. Numericals.

Unit IV

Pure Substance: Pure Substance and its Properties, Phase and Phase Transformation, Vaporization, Evaporation and Boiling , Saturated and Superheat Steam, Solid – Liquid – Vapour Equilibrium, T-V, P-V and P-T Plots During Steam Formation, Properties of Dry, Wet and Superheated Steam, Property Changes During Steam Processes, Temperature – Entropy (T-S) and Enthalpy – Entropy (H-S) Diagrams, Throttling and Measurement of Dryness Fraction of Steam. Numericals.

Thermodynamic Relations: T-Ds Relations, Enthalpy and Internal Energy as a Function of Independent Variables, Specific Heat Capacity Relations, Clapeyron Equation, Maxwell Relations.

Text Books:

1. Engineering Thermodynamics – C P Arora, Tata McGraw Hill
2. Engineering Thermodynamics – P K Nag, Tata McGraw Hill

Reference Books:

1. Thermal Science and Engineering – D S Kumar, S K Kataria and Sons
2. Engineering Thermodynamics -Work and Heat transfer – G F C Rogers and Maghew Y R Longman

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

	B.Tech. 3rd Semester Mechanical Engineering						
ME-203	**MECHANICS OF SOLIDS-I**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs.)**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**
Purpose	The objective of this course is to make the students aware of Stress, Strain and deformation of solids with the applications to beams, shafts and column and struts. The course will help the students to build the fundamental concepts in order to solve engineering problems.						
Course Outcomes							
CO1	Apply fundamental principles of mechanics & principles of equilibrium to simple and practical problems of engineering, determine centroid and moment of inertia of a different geometrical shape and able to understand its importance. Explain the basic concepts of stress and strain and solve the problems						
CO 2	Determine and calculate the values of principal stresses. Express the concept of shear force and bending moment of beams. Construct shear force and bending moment diagram for beams.						
CO 3	Express the concept of torsion of circular shaft and able to solve the problems on torsion of circular shaft. Illustrate and the solve the problems on bending and shear stresses on beams						
CO 4	Solve the problems on column and strut and Derive the derivations and solve the problems on slope and deflection.						

Unit-I

Introduction: Force, types of forces, Characteristics of a force, System of forces, Composition and resolution of forces, forces in equilibrium, principle and laws of equilibrium, Free body diagrams, Lami's Theorem, equations of equilibrium, Concept of center of gravity and centroid, centroid of various shapes: Triangle, circle, semicircle and trapezium, theorem of parallel and perpendicular axes, moment of inertia of simple geometrical figures, polar moment of inertia. Numerical Problems

Simple stresses & strains : Concept & types of Stresses and strains, Polson's ratio, stresses and strain in simple and compound bars under axial loading, stress strain diagrams, Hooks law, elastic constants & their relationships, temperature stress & strain in simple & compound bars under axial loading, Numerical problems.

Unit-II

Principle stresses: Two dimensional systems, stress at a point on a plane, principal stresses and principal planes, Mohr's circle of stresses, Numerical

Shear Force & Bending Moments : Definitions, SF & BM diagrams for cantilevers, simply supported beams with or without over-hang and calculation of maximum BM & SF and the point of contraflexture under (i) concentrated loads, (ii) uniformly distributed loads over whole span or a part of it, (iii)combination of concentrated loads and uniformly distributed loads, (iv) uniformly varying loads and (v) application of moments, relation between the rate of loading, the shear force and the bending moments, Numerical Problems.

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Unit-III

Torsion of circular Members: Derivation of equation of torsion, Solid and hollow circular shafts, tapered shaft, stepped shaft & composite circular shafts, Numerical problems.

Flexural and shear stresses – Theory of simple bending, Assumptions, derivation of equation of bending, neutral axis, determination of bending stresses, section modulus of rectangular & circular (solid & hollow), I,T,

Angle, channel sections, composite beams, shear stresses in beams with derivation, shear stress distribution across various beam sections like rectangular, circular, triangular, I, T, angle sections. combined bending and torsion, equivalent torque,. Numerical problems.

Unit-IV

Columns & Struts: Column under axial load, concept of instability and buckling, slenderness ratio, derivation of Euler's formula for crippling load for columns of different ends, concept of equivalent length, eccentric loading, Rankine formulae and other empirical relations, Numerical problems.

Slope & Deflection : Relationship between bending moment, slope & deflection, moment area method, method of integration, Macaulay's method, calculations for slope and deflection of (i) cantilevers and (ii) simply supported beams with or without overhang under concentrated load, Uniformly distributed loads or combination of concentrated and uniformly distributed loads, Numerical problems.

Text Books:

1. Strength of Materials – R.K. Rajput, Dhanpat Rai & Sons.
2. Strength of Materials – Sadhu Singh, Khanna Publications.
3. Strength of Materials – R.K. Bansal, Laxmi Publications.

Reference Books:

1. Strength of Materials – Popov, PHI, New Delhi.
2. Strength of Materials – Robert l. Mott, Pearson, New Delhi
3. Strength of Material – Shaums Outline Series – McGraw Hill
4. Strength of Material – Rider – ELBS

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

	B.Tech. 3rd Semester Mechanical Engineering						
ME-205	**MACHINE DRAWING**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs.)**
2	**0**	**3**	**3.5**	**75**	**25**	**100**	**4**
Purpose	To understand how different parts are assembled for an assembly.						
Course Outcomes							
CO1	Student gets aware about surface finish of the finished surface. Students also understand the gears, pulleys, and types of welded joints.						
CO 2	Student gets aware about the free hand drawings of the different joints.						
CO 3	Student gets aware about how different parts are assembled for an assembly.						

NOTE:

(1) In the semester examination, the examiner will set two questions from each unit. The students have to attempt three questions taking one from each unit.

(2) The questions from Unit I and Unit II will carry 20 marks each. Question from Unit III will carry 60 marks.

Unit-I

Introduction to BIS Specification SP: 46 – 1988 Code of engineering drawing –Limits, fits and Tolerance (Dimensional and Geometrical tolerance), Surface finish representation.

Gear: Gear terminology, conventional representation of gears.

Pulleys: fast and loose pulleys, rope pulleys, V belt pulleys.

Welded Joint

Unit-II

Dimensioning, Sectioning.

Coupling: protected unprotected flange coupling, flexible coupling,

Crankshaft: overhung, disc of crank, Built up crank.

Cotter: sleeve and cotter, spigot and socket, Gib and cotter.

Knuckle joint, Connecting rod, Riveted Joint.

Unit-III

Assembly drawing with sectioning, bill of materials,

Assemblies: Lathe Tail stock, machine vice, pedestal bearing, drill jig and milling jig.

Text Books:

1. Machine Drawing by N D Bhat and V M Panchal, Charotar Publishing House
2. A Text Book of Machine Drawing: P S Gill , Pub.: S K Kataria & Sons
3. A Text Book of Machine Drawing: Dr. R.K Dhawan, Pub.: S.Chand

Reference Books :

1. A Text Book of Machine Drawing : Laxmi narayana and Mathur, Pub. : M/s. Jain Brothers, New Delhi.
2. Machine drawing : N Sidheshwar, P Kannaieh V V S Sastry, Pub.: Tata Mc Graw –Hill Publishing Ltd.
3. Machine drawing : R B Gupta Satya Prakashan

Note: Some of the exercises may be done on AUTOCAD Software.

	B.Tech. 3rd Semester Mechanical Engineering						
ME-207	**KINEMATIC OF MACHINES**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs.)**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**
Purpose:	**To understand construction and working of various types of Mechanisms.**						
Course Outcomes							
CO1	**To understand the basic components and layout of linkages in the assembly of a system / machine**						
CO 2	**To understand the principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.**						
CO 3	**To understand the motion mechanisms with lower pairs and the mechanisms used in automobile.**						
CO 4	**To understand the motion resulting from a belt and chain drives systems and study cam mechanisms for specified output motions**						

UNIT-I

Introduction to Mechanisms and Kinematics:
Introduction, Machines and Mechanisms, Kinematics, Mechanism Terminology, Kinematic Diagrams, Kinematic Inversion, **Mobility:** Gruebler's Equation, Actuators and Drivers, **Commonly Used Links and Joints:** Eccentric Crank, Pin-in-a-Slot Joint, Screw Joint,**Special Cases of the Mobility Equation:** Coincident Joints, Exceptions to the Gruebler's equation, Idle Degrees of Freedom, **The Four-Bar Mechanism:** Grashof 's Criterion , Double Crank, Crank-Rocker, Double Rocker, Change Point Mechanism, Triple Rocker, **Slider-Crank Mechanism, Special Purpose Mechanisms: S**traight-Line Mechanisms, Parallelogram Mechanisms, Quick-Return Mechanisms, Scotch Yoke Mechanism, **Problems**

UNIT-II

Velocity determination: Kennedy's Space and body centroids, Relative velocity methods, Instantaneous center method,
Acceleration determination: Four link Mechanism, Acceleration of Intermediate and Offset points, Slider Crank Mechanism, Coriolis Acceleration components, Crank and slotted lever mechanism, Klein's and other constructions.
Kinematics Synthesis of Mechanisms: Number Synthesis, Frudenstein's equation, Chebyshev spacing of precisions points, Two and three position synthesis of four bar mechanisms and slider crank mechanisms, Overlay method, Bloch method and transmission angle.

UNIT-III

Mechanisms with Lower Pairs: Pantograph, straight-line motion mechanisms: accurate straight line motion mechanisms (Peaucellier, Hart and Scott Russell mechanism), approximate straight-line motion mechanisms (Grasshopper, Watt, Tchebicheff mechanism)
Intermittent motion mechanisms, Parallel linkages, Engine pressure Indicators (Simplex Crosby, Thomson)
Automobile steering gear mechanisms: Fundamental equation for correct steering, Davis and Ackerman steering gear,Hooke's joint (universal coupling), Double hooke's joint,**Friction:**Types of friction, Laws of dry friction, Motion along inclined plane Screw threads, Wedge, screw jack, pivots and collars.

UNIT-IV

Cams and Followers: Introduction, Classification of Followers, Classification of Cams, Terms used in Radial cams, Motion of the Follower,
Displacement, Velocity and Acceleration Diagrams when (i) the Follower Moves with Uniform Velocity (ii) the Follower Moves with Simple Harmonic Motion. (iii) the follower Moves with Uniform Acceleration and

Retardation, Cycloidal Motion, Construction of Cam Profiles, Cams with Specified Contours, Tangent Cam with Reciprocating Roller Follower, Circular Arc Cam with Flat-faced Follower.

Belt and Chain Drives: Open and crossed belt drives, velocity ratio, slip, material for belts, crowning of pulleys, lawof belting, types of pulleys, length of belts ratio of tensions, centrifugal tension, power transmitted by belts, initial tension, creep, chain drive, chain length, classification of chains

Suggested reading:

1. Theory of machines: S. S. Rattan, Tata McGraw Hill Publications
2. Theory of Machines and Mechanisms.:Uicker, J.J., Pennock G.R and Shigley, J.E.,3rd Edition, Oxford University Press, 2009.
3. Machines and mechanisms, Applied kinematic analysis by David h. Myszka, Prentice hall
4. Theory of Machines, V. P. Singh, Dhanpat Rai & Co. Pvt. Ltd., Delhi.
5. Mechanism synthesis and analysis: A.H. Soni, McGraw Hill Publications.
6. Mechanism: J.S. Beggs.
7. Mechanics of Machines: P.Black, Pergamon Press.
8. Theory of Machines: P.L.Ballaney, Khanna Publisher
9. "Theory of Machines:Thomas Bevan,", 3rd Edition, CBS Publishers and Distributors, 2005.

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

	B.Tech. 3rd Semester Mechanical Engineering						
ME-209	**MATERIAL SCIENCE**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs.)**
4	**0**	**-**	**4.0**	**75**	**25**	**100**	**3**
Purpose:	To understand internal structure and properties relationship of different types of materials.						
Course Outcomes							
CO1	To understand the Crystal structures and deformation mechanism in various materials.						
CO 2	To study various types of phase diagrams, TTT curve and Iron carbon diagram. To learn about different heat treatment processes.						
CO 3	To learn about the structure properties and applications of Ceramics, composites , polymers and some of the advanced materials.						
CO 4	To study various types of characterization techniques and to learn about failure mechanisms like Creep and Fatigue.						

UNIT-I

Crystallography: Review of Crystal Structure, Space Lattice, Crystal Planes and Directions, Co-ordination Number, Number of Atoms per Unit Cell, Atomic Packing Factor; Numerical Problems Related to Crystallography.

Imperfection in Metal Crystals: Crystal Imperfections and their Classifications, Point Defects, Line Defects, Edge & Screw Dislocations, Surface Defects, Volume Defects, Effects of Imperfections on Metal Properties.

Deformation of Metal: Elastic and Plastic Deformation, Mechanism of Plastic Deformation, Twinning, Conventional and True Stress Strain Curves for Polycrystalline Materials, Yield Point Phenomena, Strain Ageing, Work Hardening, Bauschinger Effect, Recovery, Re-Crystallization and Grain Growth..

UNIT-II

Phase Diagrams: Alloy Systems, Solid solutions, Hume Rothery's Rules, Phase Diagrams, Gibbs Phase Rule, TTT curve, The Lever Rule, binary phase diagrams, intermediate phases, intermetallic compounds, Applications of Phase Diagrams, Phase Transformation, Micro constituents of Fe-C system, Allotropic Forms of Iron, iron-iron carbide phase diagram, Modified Iron Carbon Phase Diagrams,

Heat treatment: Heat treatment of steels, Annealing, Normalising, Hardening, Tempering, Case Hardening, Surface Hardening, Ageing, Austempering and Martempering, Mass Effect, Equipment for Heat Treatment, Major Defects in Metals or Alloys due to faulty Heat treatment, recovery, recrystallization and grain growth. Microstructure,properties and applications of ferrous and non-ferrous alloys.

UNIT-III

Ceramics, Polymers and Composites:

Ceramics:

Structure, properties, processing and applications of traditional and advanced ceramics.

Polymers:

Classification, polymerization, structure and properties, additives for polymer products, processing and applications.

Composites: Properties and applications of various composites.

Advanced Materials:
Smart materials exhibiting ferroelectric, piezoelectric, optoelectric, semiconductingbehaviour, Aerogels, photoconductivity and superconductivity, nanomaterials, biomaterials, super alloys, shapememory alloys, Liquid crystals,Carbon Nanotubes, Graphene and Fullerenes.

UNIT-IV

MaterialsCharacterization Techniques:
Characterization techniques such as, scanning electronmicroscopy, transmission electron microscopy, atomic force microscopy, scanningtunnelling microscopy, atomic absorption spectroscopy, differential scanning calorimetry.

Failure of Materials:
Fatigue:Fatigue fracture, fatigue failure, Mechanism of Fatigue Failure, Design for Fatigue, Fatigue Life calculations, Fatigue Tests, Rotating Beam Fatigue Test, Wohler Fatigue Test, Theories of Fatigue, Corrosion Fatigue,
Creep: Creep Curve, Creep Curve equations, Types of Creep, Factors affecting Creep, Mechanism of Creep, Creep Resistant Material, Creep Fracture, Creep Test, Stress Rupture test,

Text Books:

1. Material Science by S.L. Kakani, New Age Publishers.
2. The Science and Engineering of Materials, Donald R. Askeland , Chapman & Hall.
3. Fundamentals of Material Science and Engineeringby W. D. Callister, Wiley.
4. Fundamental of Light Microscopy and Electronic Imaging by Douglas B. Murphy, Kindle Edition 2001
5. Materials Science and Engineering, V. Raghvan
6. Phase Transformation in Metals and Alloys, D. A. Porter & K. E. Easterling
7. Material Science by Narula, TMH
8. Physical Methods for Metal Characterization, Pej Flewitt , Institutue of Physics Pub.
9. Robert Cahn Concise Encyclopedia of Materials Characterization, Second Edition: 2nd Edition (Advances inMaterials Science and Engineering) Elsevier Publication 2005.

Note:
The examiner will set question paper in two parts.
Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.
Part B will have two sections.
Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B
Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

	B.Tech. (Third semester) Mechanical Engineering							
ME-211	**KINEMATIC OF MACHINES LAB.**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time (Hrs.)**
-	**-**	**2**	**1**	**-**	**40**	**60**	**100**	**3**
Purpose:	To make students understand various kinds of mechanisms working around in industries and routine life.							
Course outcomes								
CO1	To learn about various types of basic mechanisms & their applications.							
CO 2	To learn about complex mechanisms practically used in machines.							
CO 3	To learn about steering mechanism used in automobiles							
CO 4	To learn about the working of various joints like Hooke's joint.							

List of experiments

1. To Study of the inversions of the single slider crank mechanism.
2. To verify the law of moment using Bell- crank lever.
3. To determine velocity & acceleration of slider in slider-crank mechanism and plot the following:
   a. θ v/s x (displacement of slider)
   b. θ v/s velocity and
   c. θ v/s acceleration.

   Compare the values of velocities & acceleration with those obtained theoretically.(Assume ω=I rad/sec.)**.**
4. To determine experimentally the ratio of the cutting time to idle time (cutting stroke to idle stroke) of the crank and slotted lever (QRM)/ Whitworth and compare the result to theoretical values plot the following
   a. θ v/s X (displacement of slider).
   b. θ v/s velocity.
   c. θ v/s Acceleration and to compare the values of velocities

   (Take angles θ =45˚, 90˚, 135˚, 225˚, 270˚ &335˚, ω = 1 rad/s)
5. To determine the displacement, velocities, & accelerations of the driven shaft of a Hooke's joint for a constant speed of the driver shaft.
6. To study various types of steering mechanisms.
7. To determine the value of coefficient of friction between the screw and nut of the jack, while:
   a. Raising the load
   b. Lowering the load
8. To draw experimentally a curve of the follower-displacement v/s cam-angle. Differentiate the above curve to get velocity and acceleration plot and compare the values with those obtained analytically
9. To determine the coefficient of friction between belt and pulley and plot a graph between $\log_{10} T_1/T_2$ v/s, θ.
10. To determine the value of coefficient of friction for a given pair of surfaces using friction apparatus.
11. To find out experimentally the coriolis component of acceleration and compare

with theoretical values.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

	B.Tech. (3rd semester) Mechanical Engineering							
ME-213	**MATERIAL SCIENCE LAB**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time (Hrs.)**
-	**-**	**2**	**1**	**-**	**40**	**60**	**100**	**3**

Purpose	To make the students aware of material structure and properties of material using different experiments.
Course Outcomes	
CO1	Ability to design and conduct experiments, acquire data, analyze and interpret data
CO 2	Ability to determine the grain size and strain hardening phenomenon in different metals by means of experiments.
CO 3	Ability to learn about stress concentration factor and microstructures of different materials.
CO 4	To learn about heat treatment processes through experiments.
CO d5	Ability to perform Fatigue and creep test on different materials.

List of Experiments:

1. To study crystal structures with the help of models.
2. To study crystal imperfections with the help of models.
3. Determination of grain size for a given specimen
4. To determine the stress concentration factor at a geometricaldiscontinuity
5. To observe and learn about the strain hardening effect inmetals.
6. Comparative study of microstructures of different specimens of different materials (Mild steel, Gray C.I., Brass, Copper, Aluminium etc.)
7. To prepare a small specimen and mount it using hot mounting press.
8. To harden and temper a given steel specimen.
9. To anneal a given hardened steel specimen.
10. To analyse microstructure of quench hardened steel specimen.
11. To perform Fatigue test on fatigue testing machine.
12. To perform Creep test on creep testing machine.

Note: Students have to perform at least 8 experiments out of mentioned above.

	B.Tech. (3rd semester) Mechanical Engineering							
ME-215	**MECHANICS OF SOLIDS LAB**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time (Hrs.)**
-	**-**	**3**	**1.5**	**-**	**40**	**60**	**100**	**3**
Purpose	To make the students aware of different properties of material using different experiments.							
Course Outcomes								
CO1	Ability to design and conduct experiments, acquire data, analyze and interpret data							
CO 2	Ability to determine the behavior of ferrous metals subjected to normal and shear stresses by means of experiments.							
CO 3	Ability to determine the behavior of structural elements, such as bars subjected to tension, compression, shear, bending, and torsion by means of experiments.							
CO 4	Physical insight into the behavior materials and structural elements, including distribution of stresses and strains, deformations and failure modes.							
CO5	Write individual and group reports: present objectives, describe test procedures and results, synthesize and discuss the test results.							

List of Experiments:

1. To study the Brinell hardness testing machine & perform the Brinell hardness test.
2. To study the Rockwell hardness testing machine & perform the Rockwell hardness test.
3. To study the Vickers hardness testing machine & perform the Vickers hardness test.
4. To study the Erichson sheet metal testing machine & perform the Erichson sheet metal test.
5. To study the Impact testing machine and perform the Impact tests (Izod & Charpy).
6. To study the Universal testing machine and perform the tensile, compression & bending tests.
7. To perform the shear test on UTM.
8. To study the torsion testing machine and perform the torsion test.
9. To draw shear Force, Bending Moment Diagrams for a simply Supported Beam under Point and Distributed Loads.
10. To prepare the composite specimen using hot compression molding machine and test on UTM.
12. To view and measure the principal stress components and directions of principal stresses by the photo elastic method using 12" Diffused Light Research Polariscope.

. **Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.**

MPC-201	ENVIRONMENTAL STUDIES(B.Tech. All Branches Semester –III/IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**-**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To learn the multidisciplinary nature, scope and importance of Environmental Studies**						
Course Outcomes							
CO1	**Basic concepts of Various kinds of Microscopy and Centrifugation Techniques**						
CO2	**To learn the theoretical and practical aspects of Electrophoresis and Chromatography Techniques**						
CO3	**To learn the concepts of different kinds of Spectroscopy and Colourimetry**						
CO4	**To understand the concept of radioisotope techniques and their applications in research**						

UNIT 1

The multidisciplinary nature of environmental studies. Definition, Scope and Importance. Need for public awareness. Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

(m) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber eztraction, mining, dams and their effects on forests and tribal people.

(n) Water Resources- Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(o) Mineral Resources- Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(p) Food Resources- World Food Problems, changes caused by agriculture and overgazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(q) Energy Resources- Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

(r) Land Resources- Land as a resource, land, degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyle.

UNIT II

Ecosystem-Concept of an ecosystem.Structure and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the ecosystem.Ecological Succession.Food Chains, food webs and ecological pyramids. Introduction, types,characteristic features, structure and function of the following ecosystem-

e. Forest Ecosystem
f. Grassland Ecosystem
g. Desert Ecosystem
h. Aquatic Ecosystems(ponds, streams, lakes, rivers, oceans, estuaries

Field Work. Visit to a local area to document Environment assets-river/forest/grassland/hill/mountain.Visit to a local polluted site- Urban /Rural Industrial/Agricultural. Study of common plants, insects and birds. Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

UNIT III

Biodiversity and its conservation. Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity of global, National and local levels. India as a mega-diversity nation Hot spots of Biodiversity. Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts. Endangered and endemic species of India.Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

Environmental Pollution Definition. Cause, effects and control measures of- (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards

Solid waste management- cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides

UNIT IV

Social Issues and the Environment.From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns. Case Studies.Environmental ethics-issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.Wasteland ReclamationConsumerism and waste products.Environment Protection Act.Air (Prevention and Control of Pollution) Act.Water (Prevention and Control of Pollution) Act.Wildlife Protection Act.Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public Awareness. Human population and the Environment.Population growth, variation among nations. Population explosion-Family Welfare Programme. Environment and human health.Human rights.Value Education.HIV/AIDS, Women and Child Welfare.Role of Information Technology in Environment and Human Health.Case Studies.

Text Books

5. Environmental Studies- Deswal and Deswal. Dhanpat Rai & Co.
6. Environmental Science & Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India
7. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
8. Environmental Science- Botkin and Keller. 2012. Wiley, India

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

HS-201	FUNDAMENTALS OF MANAGEMENT(B Tech All Branches Semester III/IV)						
Lecture	**Tutorial**	**Practical**	**Credits**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To make the students conversant with the basics concepts in management thereby leading to nurturing their managerial skills**						
Course Outcomes							
CO1	**An overview about management as a discipline and its evolution**						
CO2	**Understand the concept and importance of planning and organizing in an organization**						
CO3	**Enabling the students to know about the importance of hiring and guiding the workforce by understanding the concept of leadership and communication in detail**						
CO4	**To understand the concept and techniques of controlling and new trends in management**						

UNIT-1

1. Introduction to Management: Meaning, Definition, nature, importance & Functions, Management as Art, Science & Profession- Management as social System, Concepts of management-Administration

2. Evolution of Management Thought: Development of Management Thought- Scientific management, Administrative Theory of Management, Bureaucratic Organization, Behavioral approach (Neo Classical Theory): Human Relations Movement; Behavioral Science approach; Modern approach to management – Systems approach and contingency approach.

UNIT-II

3. Planning: nature, purpose and functions, types of plans, planning process, Strategies and Policies: Concept of Corporate Strategy, formulation of strategy, Types of strategies, Management by objectives (MBO), SWOT analysis, Types of policies, principles of formulation of policies

4. Organizing: nature, importance, process, organization structure: Line and Staff organization, Delegation of Authority and responsibility, Centralization and Decentralization, Decision Making Process , Decision Making Models, Departmentalization: Concept and Types (Project and Matrix), formal & informal organizations

UNIT-III

5. Staffing: concept, process, features; manpower planning; Job Analysis: concept and process; Recruitment and selection: concept, process, sources of recruitment; performance appraisal, training and development

6. Directing: Communication- nature, process, formal and informal, barriers to Effective Communication, Theories of motivation-Maslow, Herzberg, McGregor ; Leadership – concept and theories, Managerial Grid, Situational Leadership. Transactional and Transformational Leadership.

UNIT-IV

7. Controlling: concept, process, types, barriers to controlling, controlling Techniques: budgetary control, Return on investment, Management information system-MIS , TQM-Total Quality Management, Network Analysis- PERT and CPM.

8. Recent Trends in Management: -

Social Responsibility of Management–Management of Crisis, Total Quality Management, Stress Management, Concept of Corporate Social Responsibility (CSR) and business ethics.

Functional aspects of business: Conceptual framework of functional areas of management- Finance; Marketing and Human Resources

Text books

1. Management Concepts - Robbins, S.P; Pearson Education India
2. Principles of Management - Koontz & O'Donnel; (McGraw Hill)

Recommended books

1. *Business Organization and Management* – Basu; Tata McGraw Hill
2. Management and OB-- Mullins; Pearson Education
3. Essentials of Management – Koontz, Tata McGraw-Hill
4. Management Theory and Practice – Gupta, C.B; Sultan Chand and Sons, new Delhi
5. Prasad, Lallan and S.S. Gulshan. *Management Principles and Practices.* S. Chand& Co. Ltd., New Delhi.
6. Chhabra, T.N. *Principles and Practice of Management*. DhanpatRai& Co., Delhi.
7. Organizational behaviour – Robins Stephen P; PHI.

Note:
The examiner will set question paper in two parts.
Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.
Part B will have two sections.
Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B
Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

	B.Tech. 4th Semester Mechanical Engineering						
ME-202	**PRODUCTION TECHNOLOGY- I**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs.)**
4	**0**	**-**	**4.0**	**75**	**25**	**100**	**3**
Purpose	To make student aware about various metal cutting tools, mechanism involved and machines used for metal cutting.						
Course Outcomes							
CO1	Learn about tool geometry and nomenclature, chip classification, metal cutting theories, tool life, geometry, surface finish etc.						
CO 2	Learn about cutting fluids and tool life, economics of metal machining.						
CO 3	Learn about milling and drilling machines.						
CO 4	Learn about specifications of various machine tools, metrology, surface finish and its measurements.						

UNIT-I

Geometry of Cutting Tools:

Introduction, Geometry of single point turning tools: Cutting edges, Rake and Clearance angles, Systems of description of tool geometry, Designation of tool geometry in Machine reference system, ORS system and NRS system

Geometry of Multi point cutting tools: Geometry of Milling cutters, Geometry of Drills

Mechanics of Metal cutting:

Cutting Tool Materials**,** Chip formation, Types of Chips, Chip control and chip breakers, orthogonal and oblique metal cutting, Chip thickness ratio, Velocity relationship in orthogonal cutting, Merchant's Analysis, Stress and Strain on the chip, Forces on single point cutting tool, Torque, heat produced, power and MRR equations, Use of Merchant's circle diagram in force analysis in orthogonal cutting for single point cutting tool. Popular theories on mechanics of metal cutting: Earnst Merchant Theory, Merchant theory, Stabler Theory, Lee and Shaffer's Theory. Factors affecting temperature in metal cutting,

UNIT-II

Cutting Fluids and Tool life:

Cutting fluids, Purpose, Properties, Types of lubricants, Types of cutting fluids, Tool Failure, Mechanisms of Tool wear, Tool Life, Factors affecting tool life. Taylor's Tool life equation

Economics of metal machining:

Cost Considerations in Manufacturing, Elements of Machining cost, Minimum cost per piece, Maximum Production rate, Optimum cutting speed and optimum tool life for minimum cost of production and maximum production rate, Machinability, Machinability Index, Improving Machinability, Measurement of cutting forces, Tool force Dynamometers, Numerical on Mechanics of Metal cutting and economics.

UNIT-III

Milling Process:

Milling Machine Operations performed on Milling machine, Parts of Milling Machine, Types of Milling machines, fundamentals of Milling process, Milling Cutters, Elements of Plain Milling cutter, Cutter Holing devices, Cutting speed , Feed and depth of cut, Force system in Miling, Dividing head or Indexing Head, Methods of Indexing

Drilling Machine:

Types of Drills, Drilling machine Types, Drilling machine operations,, Size of Drilling machine, Main parts of drilling machine, Force system in Drilling, Cutting speed, Feed and Depth of cut in drilling, MRR in drilling, Numerical Problems on Drilling.

UNIT-IV

Specification of Machine Tools:

Introduction, purpose of machine tool specifications, Methods of specification of conventional machine tools: specification of lathes, specification of drilling and boring machines, specification of shaper, planer and slotter machines, specification of milling machine, specification of gear teeth generating machines, specification of grinding machines.

Metrology

Measurements, Linear Measurement, Callipers, Vernier Calliper, Micrometer, Angular Measurement, Comparators-mechanical, electrical and optical,sine bar, auto-collimator,

Surface finish and its measurement, Surface Roughness Measurement methods, Factors affecting surface finish in machining, micro and macro deviation, specifying surface finish.

Suggested reading:

1. Machining and Machine Tools by A.B. Chattopadhyay, Wiley India.
2. Manufacturing Processes by J.P. Kaushish, PHI
3. Metrology & Measurement By Bewoor, McGraw Hill.
4. A Textbook of Production Technology by Dr P.C.Sharma, S.Chand pub.
5. Workshop Technology: B.S.Raghuwanshi, DhanpatRai Publications.
6. Production Technology: R.K.Jain, Khanna Publishers.
7. Machine Tools: Dr. R.Kesavan & B.Vijaya Ramnath, Laxmi Publications.
8. Machining and Machine Tools: A.B.Chattopadhyay, WILEY INDIA.

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

ME-204	B.Tech. 4th Semester Mechanical Engineering						
	STEAM GENERATION & POWER						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs.)**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**
Purpose:	To make student learn about basics of Thermal engineering, steam generation and applications.						
Course Outcomes							
CO1	Learn about boilers, types of boilers and accessories and mounting used on boilers.						
CO 2	Learn about simple and modified Rankine cycle and working of steam engine.						
CO 3	Learn about design and analysis of steam flow through steam nozzles. To learn about the working of different types of condensers.						
CO 4	Learn about working of Steam turbines and about design and analysis of the steam turbine.						

UNIT I

Introduction; classification of boilers; comparison of fire tube and water tube boiler; their advantages; description of boiler; Lancashire; locomotive; Babcock; Wilcox etc.; boiler mountings; stop valve; safety valve; blow off valve; feed check etc.; water level indicator; fusible plug; pressure gauge; boiler accessories; feed pump; feed water heater; preheater; superheater; economizer; natural draught chimney design; artificial draught; stream jet draught; mechanical draught; calculation of boiler efficiency and equivalent evaporation(no numerical problem)

UNIT II

Carnot cycle; simple and modified Rankine cycle; effect of operating parameters on rankine cycle performance; effect of superheating; effect of maximum pressure; effect of exhaust pressure; reheating and regenerative Rankine cycle; types of feed water heater; reheat factor; binary vapour cycle. Simple steam engine, compound engine; function of various components.

UNIT III

Function of steam nozzle; shape of nozzle for subsonics and supersonics flow of stream; variation of velocity; area of specific volume; steady state energy equation; continuity equation; nozzle efficiency; critical pressure ratio for maximum discharge; physical explanation of critical pressure; super saturated flow of steam; design of steam nozzle. Advantage of steam condensation; component of steam condensing plant; types of condensers; air leakage in condensers; Dalton's law of partial pressure; vacuum efficiency; calculation of cooling water requirement; air expansion pump.

UNIT IV

Introduction; classification of steam turbine; impulse turbine; working principal; compounding of impulse turbine; velocity diagram; calculation of power output and efficiency; maximum efficiency of a single stage impulse turbine; design of impulse turbine blade section; impulse reaction turbine; working principle; degree of reaction; parsons turbine; velocity diagram; calculation of power output; efficiency of blade height; condition of maximum efficiency; internal losses in steam turbine; governing of steam turbine.

Text Books :

1. Thermal Engineering – P L Ballaney, Khanna Publishers
2. Thermodynamics and Heat Engines vol II – R Yadav, Central Publishing House

Reference Books :

1. Applied Thermodynamics for Engineering Technologists – T D Eastop and

A. McConkey, Pearson Education

2. Heat Engineering – V P Vasandani and D S Kumar, Metropolitan Book Co Pvt Ltd.

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

	B.Tech. 4th Semester Mechanical Engineering						
ME-206	**MECHANICS OF SOLIDS-II**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs.)**
3	**1**	**-**	**3.5**	**75**	**25**	**100**	**3**

Purpose	The objective of this course is to show the development of strain energy and stresses in springs, pressure vessel, rings, links, curved bars under different loads. The course will help the students to build the fundamental concepts in order to solve engineering problems
Course Outcomes	
CO1	Identify the basics concepts of strain energy and various theories of failures and solve the problems
CO 2	Differentiate different types of stresses induced in thin pressure vessel and solve the problems. Use of Lame's equation to calculate the stresses induced in thick pressure vessel.
CO 3	Able to compute stresses in ring, disk and cylinder due to rotation. Classify the different types of spring and analyze the stresses produced due to loading
CO 4	Determine the stresses in crane hook, rings, chain link for different cross section and also the deflection of curved bars and rings. Analyze the stresses due to unsymmetrical bending and determine the position of shear centre of different section.

Unit-I

Strain Energy & Impact Loading: Definitions, expressions for strain energy stored in a bodywhen load is applied (i) gradually, (ii) suddenly and (iii) with impact, strain energy of beamsin bending, beam deflections, strain energy of shafts in twisting, energy methods indetermining spring deflection, Castigliano's theorem, Numerical.

Theories of Elastic Failure: Various theories of elastic failures with derivations and graphicalrepresentations, applications to problems of 2- dimensional stress system with (i) Combineddirect loading and bending, and (ii) combined torsional and direct loading, Numericals.

Unit-II

Thin Walled Vessels: Hoop & Longitudinal stresses & strains in cylindrical &spherical vessels & their derivations under internal pressure, wire would cylinders,Numericals.

Thick Cylinders & Spheres: Derivation of Lame's equations, radial & hoop stresses andstrains in thick, and compound cylinders and spherical shells subjected to internal fluid pressure only, hub shrunk on solid shaft, Numericals.

Unit-III

Rotating Rims & Discs: Stresses in uniform rotating rings & discs, rotating discs of uniform strength, stresses in (I) rotating rims, neglecting the effect of spokes, (ii) rotating cylinders, hollow cylinders & solids cylinders. Numericals.

Springs: Stresses in closed coiled helical springs, Stresses in open coiled helical spring subjected to axial loads and twisting couples, leaf springs, flat spiral springs, concentric springs, Numericals.

Unit-IV

Bending of Curved Bars : Stresses in bars of initial large radius of curvature, bars of initialsmall radius of curvature, stresses in crane hooks, rings of circular & trapezoidal sections,deflection of curved bars & rings, deflection of rings by Castigliano's theorem, stresses insimple chain link, deflection of simple chain links, Problems.

Unsymmetrical Bending: Introduction to unsymmetrical bending, stresses due to unsymmetrical bending, deflection of beam due to unsymmetrical bending, shear center for angle, channel, and I-sections, Numericals.

Text Books:

1. Strength of Materials – R.K. Rajput, Dhanpat Rai & Sons.
2. Strength of Materials – Sadhu Singh, Khanna Publications.
3. Strength of Materials – R.K. Bansal, Laxmi Publications.

Reference Books:

1. Strength of Materials – Popov, PHI, New Delhi.
2.Strength of Materials – Robert l. Mott, Pearson, New Delhi
3. Strength of Material – Shaums Outline Series – McGraw Hill
4. Strength of Material – Rider – ELBS

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

	B.Tech. 4th Semester Mechanical Engineering						
ME-208	**FLUID MECHANICS**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**1**	**-**	**4.5**	**75**	**25**	**100**	**3**
Purpose: To familiarize the students with the basic concepts of Fluid Mechanics.							
Course Outcomes:							
CO1	Understand the basic concepts of fluid and learn about fluid statics.						
CO2	Understand the basic concepts of fluid kinematics and analyse the laws of fluid dynamics and its applications.						
CO3	Analyse the laminar viscous flow and apply it to Poiseuille and Couette flow.						
CO4	Determine the major and minor losses through pipes and learn to draw the hydraulic gradient and total energy lines.						
CO5	Understand the concept of boundary layer and flow over bodies.						

Unit I

Fluid Properties: Concept of fluid and flow, ideal and real fluids, continuum concept, Properties of fluid: mass density, weight density, specific volume, specific gravity, viscosity, causes of viscosity, surface tension, capillarity, vapour pressure, compressibility and bulk modulus, Newtonian and non-Newtonian fluids.

Fluid Statics: Pressure, Pascal's law, hydrostatic law, pressure measurement, manometers, hydrostatic forces on submerged plane and curved surfaces, buoyancy, stability of floating and submerged bodies, liquids in relative equilibrium. Problems.

Unit II

Fluid Kinematics: Eulerian and Lagrangian description of fluid flow; types of fluid flows, stream, streak and path lines; acceleration of a fluid particle, flow rate and continuity equation, differential equation of continuity in cartesian and polar coordinates, rotation and vorticity, circulation, stream and potential functions, flow net. Problems.

Fluid Dynamics: Concept of system and control volume, Euler's equation, Bernoulli's equation and its practical applications, venturimeter, orificemeter, orifices, mouthpieces, Impulse momentum equation, kinetic energy and momentum correction factors. Problems.

Unit III

Viscous Flow: Flow regimes and Reynold's number, Navier-Stokes equation, relationship between shear stress and pressure gradient, flow of viscous fluids in circular pipe and between stationary and moving parallel plates, hydrodynamic lubrication, movement of piston in a dashpot, power absorbed in bearings. Problems.

Turbulent Flow Through Pipes: Transition from laminar to turbulent flow, Reynold's equation of turbulence, Shear stress in turbulent flow, Prandtl mixing length hypothesis, Major and minor losses in pipes, hydraulic gradient and total energy lines, series and parallel connection of pipes, branched pipes; equivalent pipe, power transmission through pipes, hydraulically smooth and rough pipes, velocity distribution in pipes, friction coefficients for smooth and rough pipes. Problems.

Unit IV

Boundary Layer Flow: Boundary layer concept, displacement, momentum and energy thickness, Blasius solution, von-Karman momentum integral equation, laminar and turbulent boundary layer flows, separation of boundary layer and its control.

Flow over Bodies: Drag and lift, friction and pressure drag, lift and drag coefficients, stream lined and bluff bodies, drag on a flat plate, drag on a cylinder and an airfoil, circulation and lift on a circular cylinder and an airfoil. Problems.

Reference and Text Books:

1. Introduction to Fluid Mechanics – R.W. Fox, Alan T. McDonald, P.J. Pritchard, Wiley Publications.
2. Fluid Mechanics – Frank M. White, McGraw Hill
3. Fluid Mechanics and Fluid Power Engineering – D.S. Kumar, S.K. Kataria and Sons
4. Fluid Mechanics – Streeter V L and Wylie E B, Mc Graw Hill
5. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som and G. Biswas, Tata McGraw Hill.
6. Mechanics of Fluids – I H Shames, Mc Graw Hill
7. Fluid Mechanics: Fundamnetals and Applications - Yunus Cengel and John Cimbala, McGraw Hill.
8. Fluid Mechanics: Pijush K. Kundu, Ira M. Cohen and David R. Rowling, Academic Press.

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

	B.Tech. 4th Semester Mechanical Engineering						
ME-210	**DYNAMICS OF MACHINES**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
4	**0**	**-**	**4.0**	**75**	**25**	**100**	**3**
Purpose	To familiarize the students with the effect of dynamic forces in various machines and vehicles.						
Course Outcomes:							
CO1	To study the effect of static and dynamic forces on the components of mechanisms						
CO2	To study the design and working of various gears and gear trains.						
CO3	To study the various types of brakes and dynamometers.						
CO4	To study the unbalanced forces and vibrations in various components of rotating and reciprocating machines.						
CO5	To study the gyroscopic effect in aeroplanes, ships, two and four wheelers.						

UNIT I

Static force analysis: Static equilibrium, Equilibrium of two and three force members,Members with two forces and a torque, Equilibrium of four force members, free body diagram, Principle of Superposition, static forces Analysis of four barmechanisms and slider crank mechanism,

Dynamic Force Analysis: D'Alembert's principle, Equivalent offset inertia force, Dynamic force analysis of four bar mechanism and slider crank mechanismEngine force analysis, Turning moment on crank shaft,Dynamic Equivalent systems, Inertia of connecting rods, Inertia force in reciprocating engines(Graphical and Analytical methods), Turning moment diagrams, fluctuation of energy, Flywheels, Flywheel dimensions, Punching Press.

UNIT II

Gears: Classification of gears, Gear terminology, Fundamental law of gearing, Forms of Teeth, Cycloidal and involutes profiles of gear teeth, Interchangeable Gears, path of contact, arc of contact, number of pairs of teeth in contact (Contact Ratio), Interference in inviolute gears, minimum number of teeth, undercutting,

Helical,Spiral,Bevel and worm & worm gears, Terminology, Efficiency

Gear trains: Simple, compound, reverted, Planetary or epicyclic gear trains, Analysis of Epicyclic Gear trains, Torques in epicyclic gear trains, Sun and Planet gear, Automotivetransmissions gear train. Differential.

UNIT III

Brakes: Types of brakes, Block and shoe brake, band brake, band and block brakes, internal expanding shoe brake, Effect of Braking.

Dynamometers: Types of Dynamometers, Pony and Rope Brake Dynamometer, Hydraulic Dynamometer, Belt Transmission Dynamometer, Epicyclic train Dynamometer,Bevis Gibson torsion dynamometer.

Governors: Types of Governors, Watt, Porter, Proell, Hartnell, Hartung, Wilson-Hartnell, Inertia Governors, Sensitiveness, Hunting, Isochronism, Stability of Governors, Effort and Power of a Governor, Controlling Force.

UNIT IV

Balancing of rotating masses: Static and Dynamic Balancing, Single Rotating mass, Many Masses rotating in same plane and in different planes. Analytical method for balancing of rotating masses.

Balancing of reciprocating masses: Reciprocating Engine, Partial Primary balance, Balancing of Multi-cylinder in line engines, Balancing of Radial Engines, Balancing of V-Engines, Balancing of Rotors

Gyroscope: Angular Velocity, Angular Acceleration, pitching and rolling, Gyroscopic couple and its effect on Aeroplanes,Naval ships, Stability of an automobile (2 & 4-wheeers), taking a turn, Gyroscopic effect in stone

crusher.

Suggested reading:

1. Theory of machines: S. S. Rattan, Tata McGraw Hill Publications.
2. Theory of Machines: V. P. Singh, Dhanpat Rai & Co. Pvt. Ltd.
3. Theory of machines: Kinematics and Dynamics by Sadhu Singh, Pearson Publications
4. Theory of Machines and Mechanisms.:Uicker, J.J., Pennock G.R and Shigley, J.E.,3rd Edition, Oxford University Press, 2009.
5. Mechanism synthesis and analysis: A.H. Soni, McGraw Hill Publications.
6. Mechanism: J.S. Beggs.
7. Mechanics of Machines: P.Black, Pergamon Press.
8. Theory of Machines: P.L.Ballaney, Khanna Publisher.

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

	B.Tech. 4th Semester Mechanical Engineering							
ME-212	**FLUID MECHANICS LAB**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
-	**-**	**2**	**1**	**-**	**40**	**60**	**100**	**3**
Purpose	To familiarize the students with the equipment and instrumentation of Fluid Mechanics.							
Course Outcomes :								
CO1	Operate fluid flow equipment and instrumentation.							
CO2	Collect and analyse data using fluid mechanics principles and experimentation methods.							
CO3	Determine the coefficient of discharge for various flow measurement devices.							
CO4	Calculate flow characteristics such as Reynolds number, friction factor from laboratory measurements.							
CO5	Identify and discuss foundation-level fluid phenomena including laminar to turbulent transition, turbulence etc.							
CO6	Measure pressure loss due to friction for pipe flow.							

List of Experiments:

1. To determine the meta-centric height of a floating body.
2. To determine the hydrostatic force and center of pressure on both a submerged or partially submerged plane surface and compare with the theoretical result.
3. To demonstrate the working of different pressure measuring devices.
4. To measure the pressure and pressure difference by pressure gauge, single column manometer, U-Tube manometer & Inclined tube manometer.
5. To verify the Bernoulli's Theorem.
6. To determine coefficient of discharge of an orifice meter.
7. To determine the coefficient of discharge of venturimeter.
8. To determine the coefficient of discharge of Notch (V and Rectangular types).
9. To determine the coefficient of discharge, contraction & velocity of an orifice.
10. To find critical Reynolds number for a pipe flow.
11. To determine the friction factor for the pipes.
12. To determine the minor losses due to sudden enlargement, sudden contraction and bends.
13. To show the velocity and pressure variation with radius in a forced vertex flow.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

	B.Tech. 4th Semester Mechanical Engineering							
ME-214	**DYNAMICS OF MACHINES LAB**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
-	**-**	**2**	**1**	**-**	**40**	**60**	**100**	**3**
Purpose	To familiarize the students with the equipment and instrumentation of Fluid Mechanics.							
Course Outcomes								
CO1	To learn about the working of Flywheel.							
CO2	To experimentally calculate Gyroscopic couple of a motorised gyroscope							
CO3	To learn about balancing of rotating mass.							
CO4	To learn about the working of various types of governors.							
CO5	To study various types of brakes used in automobiles.							

LIST OF EXPERIMENT

1. To determine experimentally, the moment of inertia of a flywheel and axle compare with theoretical values.
2. To find out critical speed experimentally and to compare the whirling speed of a shaft with theoretical values.
3. To find experimentally the Gyroscopic couple on motorized gyroscope and compare with applied couple.
4. To perform the experiment of balancing of rotating parts and finds the unbalanced couple and forces.
5. To determine experimentally the unbalance forces and couples of reciprocating arts.
6. To calculate the torque on a planet carrier and torque on internal gear using epicyclic gear train and holding torque apparatus.
7. To study the different types of centrifugal and inertia governors and demonstrate any one.
8. To study the automatic transmission unit.
9. To study the differential types of brakes.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

	B.Tech. 4th Semester Mechanical Engineering							
ME-216	**STEAM GENERATION AND POWER LAB**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time**
-	**-**	**2**	**1**	**-**	**40**	**60**	**100**	**3**
Purpose	To make the students aware of different boilers and steam turbines using different experiments.							
Course Outcomes								
CO1	Students will be able to collect broad knowledge of about the different boilers.							
CO 2	Students will be able to understand the working of the steam engine.							
CO 3	Ability to determine the power and efficiency of the steam turbine and cooling tower							
CO 4	Able to describe quantitatively the heat balance sheet of the boiler.							

List of Experiments:

1. To study the Babcock-Wilcox boiler (Model).
2. To study the locomotive boiler (Model).
3. To study the Lancashire boiler (Model).
4. To study the Nestler's boiler.(Model)
5. To study various parts of the vertical steam engine.
6. To prepare heat balance sheet for given boiler.
7. To find dryness fraction of steam by separating and throttling calorimeter.
8. To find power output & efficiency of a steam turbine.
9. To study cooling tower and find its efficiency.
10. To study the various mountings and accessories of a boiler
11. To study and find volumetric efficiency of a reciprocating air compressor.
12. To find the efficiency of condenser.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

	B. Tech. 4th Semester Mechanical Engineering							
ME-218	**PRODUCTION TECHNIOLOGY LAB**							
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time (Hrs.)**
-	**-**	**3**	**1.5**	**--**	**40**	**60**	**100**	**3**
Purpose:	To make the students understand the different types of machines in production industries and welding machines.							
Course outcomes:								
CO 1	To practice on Milling machine							
CO 2	To make gears and study grinders.							
CO 3	To study the working CNC machines.							
CO 4	To carry welding out using TIG/MIG Welding machine.							

List of Experiments:

1. Practice of slab milling on milling machine.
2. Practice of slotting on milling machine.
3. To cut gear teeth on milling machine using dividing head.
4. Introduction to gear hobber, demonstration of gear hobbing and practice.
5. Introduction to various grinding wheels and demonstration on the surface grinder.
6. Introduction to tool and cutter grinder and dynamometer.
7. Study the constructional detail and working of CNC lathes Trainer.
8. To carry out welding using TIG/MIG welding set.
9. Introduction, demonstration & practice on profile projector & gauges.
10. To make a component on lathe machine using copy turning attachment.
11. To cut external threads on a lathe.
12. To cut multi slots on a shaper machine.
13. To perform drilling and boring operation on a Component.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

MPC-201	ENERGY STUDIES(B.Tech All Branches Semester III/IV)						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**-**	**75**	**25**	**100**	**3**
Purpose	**To make the students conversant with the basics concepts and conversion of various form of Energy**						
Course Outcomes							
CO1	**An overview about Energy , Energy Management, Audit and tariffs**						
CO2	**Understand the Layout and working of Conventional Power Plants**						
CO3	**Understand the Layout and working of Non-Conventional Power Plants**						
CO4	**To understand the role of Energy in Economic development and Energy Scenario in India**						

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy,Conventional and Non-conventional sources, Need for Non-Conventional Energy based power generation.

Energy Management: General Principles of Energy Management, Energy Management Strategy.

Energy Audit: Need, Types, Methodology and Approach.

UNIT-II

Conventional Energy sources: Selection of site**,** working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages- disadvantages.

UNIT-III

Non-Conventional Energy sources: Basicprinciple, site selection of Solar energy power plant, photovoltaic technologies, PV Systems and their components, Wind energy power plant, Bio energy plants,Geothermal energy plantsand tidal energy plants.MHD

UNIT-IV

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.

References:

1. Energy Studies-Wiley Dream tech India.
2. Non-conventional energy resources- Shobhnath Singh, Pearson.
3. Soni, Gupta, Bhatnagar: Electrical Power Systems – Dhanpat Rai& Sons
4. NEDCAP: Non Conventional Energy Guide Lines
5. G.D. Roy :Non conventional energy sources
6. B H Khan :Non Conventional energy resources - McGraw Hill
7. Meinel A B and Meinal M P,Addison:Applied Solar Energy- Wesley Publications
7. George Sutton: Direct Energy Conversion –McGraw

Note:

The examiner will set question paper in two parts.

Part A which is compulsory will have 15 short answer type/ Multiple-choice questions of one mark each.

Part B will have two sections.

Section-I will have **eight** questions, two questions from each unit, each carrying **2.5 marks**. Students will have to attempt all questions from Section-I of Part-B

Section-II will have **eight** questions, two questions from each unit, each carrying **10 marks**. Students will have to attempt **four** questions out of these eight questions, selecting at least one question from each unit.

SCHEME

MASTER OF TECHNOLOGY IN
ELECTRONICS &COMMUNICATIONENGINEERING

SEMESTER-I	Subject	L	T	P	Total	Minor* Test	Major Test	Cr.	Duration of Exam (Hrs.)
MTECE-101A	Advanced Communication Systems	4	-	-	4	40	60	4	3
MTECE-102A	Advanced Digital Signal Processing	4	-	-	4	40	60	4	3
MTECE-103A	Antenna Theory and Design	4	-	-	4	40	60	4	3
MTECE-104A	Advanced Information Theory and Coding	4	-	-	4	40	60	4	3
MTECE-105A	VLSI Signal Processing	4	-	-	4	40	60	4	3
MTECE-106A	Antenna Design(Lab.)	-	-	3	3	40	60	1.5	3
MTECE-107A	Advanced Digital Signal Processing (Lab.)	-	-	3	3	40	60	1.5	3
					Total	**280**	**420**		
						700		**23**	

SEMESTER-II	Subject	L	T	P	Total	Minor* Test	Major Test	Cr.	Durati-on of Exam (Hrs.)
MTECE-201A	Advanced Image Processing	4	-	-	4	40	60	4	3
MTECE-202A	Advanced Wireless and Mobile Communication	4	-	-	4	40	60	4	3
MTECE-203A	Digital IC Design	4	-	-	4	40	60	4	3
MTECE-204A	Adaptive Filter Theory	4	-	-	4	40	60	4	3
MTECE-205A	Optical Networks	4	-	-	4	40	60	4	3
MTECE-206A	Image Processing (Lab.)	-	-	3	3	40	60	1.5	3
MTECE-207A	Wireless and Mobile Communication(Lab.)	-	-	3	3	40	60	1.5	3
					Total	**280**	**420**		
						700		**23**	

*AsperM.Tech.OrdinanceRules

SEMESTER-III	Subject	L	T	P	Total	Minor* Test	Major Test	Cr.	Durationof Exam(Hrs.)
-	Elective-I	4	-	-	4	40	60	4	3
-	Elective-II	4	-	-	4	40	60	4	3
MTECE-315A	Synopsis	-	-	-	-	100	-	10	3
					Total	**180**	**120**		
						300		**18**	

SEMESTER-IV		L	T	P	Total	Minor* Test	Major Test	Cr.	Durationof Exam(Hrs.)
MTECE-401A	Dissertation	-	-	-	-	100	200	18	3
						100	**200**		
					Total	**300**		**18**	

*AsperM.Tech.OrdinanceRules

Total No. of Credits- 82

LIST OFELECTIVE–I (ECE) for3rdSemester		
1.	MTEC-ELI-301A	RFMEMS for CommunicationEngineering
2.	MTEC-ELI-303A	AdvancedProcessorandEmbeddedSystems
3.	MTEC-ELI-305A	Digital Control Systems
4.	MTEC-ELI-307A	Advance Electronics Devices &Sensors
5.	MTEC-ELI-309A	Soft Computing
6.	MTEC-ELI-311A	AdvancedVerilogHDL
7.	MTEC-ELI-313A	Security,NetworksandCryptography

LIST OFELECTIVE–II (ECE) for3rdSemester		
1.	MTEC-ELII-302A	Bio-MedicalSignal Processing
2.	MTEC-ELII-304A	Detectionand Estimation Techniques
3.	MTEC-ELII-306A	WirelessSensorNetworks
4.	MTEC-ELII-308A	PatternRecognition
5.	MTEC-ELII-310A	Multimedia CommunicationSystems
6.	MTEC-ELII-312A	Qualityand ReliabilityofElectronic Systems
7.	MTEC-ELII-314A	Radar&SatelliteCommunicationSystems

Master of Technology(ELECTRONICS&COMMUNICATION)

ADVANCED COMMUNICATION SYSTEMS

Paper:MTECE-101A **L-T-P:4-0-0** **Duration of Exam: 3 Hr.**
Major Test Marks: 60 **Minor Test Marks: 40** **Credit: 4**

Unit-I

INTRODUCTIONTO COMMUNICATIONSIGNALS&SYSTEMS:- Characterizationof CommunicationSignalsandSystems:-RepresentationofBandpassSignalsandSystems,RepresentationofLinearBandpass Systems ,Response of aBandpass System toaBand passSignal,Representation of BandpassStationaryStochasticProcesses,SignalSpaceRepresentation,SignalSpaceConcepts,MemorylessModulation Methods,SpectralCharacteristicsofDigitallyModulatedSignals,PowerSpectraofLinearlyModulatedSignals.

Unit-II

OPTIMUMRECEIVERDESIGN:-OptimumReceiversfortheAdditiveWhiteGaussianNoiseChannel:-OptimumReceiverforSignalsCorruptedbyAWGN,CorrelationDemodulator,Matched-FilterDemodulator,PerformanceoftheOptimumReceiverforMemoryless,Modulation,ProbabilityofErrorforBinaryModulation,ProbabilityofErrorforM-aryOrthogonalSignals,ProbabilityofErrorforSimplexSignals,ProbabilityofErrorforM-aryBinary-CodedSignals,DifferentialPSK(DPSK)anditsPerformance,Comparison of Digital Modulation Methods

Unit-III

SYNCHRONIZATIONINTIMINGANDFREQUENCY:-SynchronizationTimingandFrequencyOffsetinOFDM,Synchronization&SystemArchitecture,TimingandFrameSynchronization,FrequencyOffsetEstimation,PhaseNoiseChannelEstimationandEqualization,Introduction,ChannelEstimation,CoherentDetection,Block-TypePilotArrangement,Comb-TypePilotArrangement,Non-coherentDetection,Performance,ChannelEstimationforMIMO-OFDM.Equalization,TimeDomainEqualization,EqualizationinDMT,DelayParameter,FrequencyDomainEqualization,EchoCancellation,OFDMbasedMultipleAccessTechniques,FDM/ Multiple Access, TDM/ Multiple Access,CDMA.

Unit-IV

OPTICALFIBERCOMMUNICATIONSYSTEM:-OpticalFiberCommunicationSystem:Telecommunication,localdistributionseries,computernetworkslocaldatatransmission&telemetry.Opticalnetworking:datacommunicationnetworks,networktopologies,DesignofLED'sforopticalfibercommunications,semiconductorLASERforopticalfiberCommunicationsystem,Liquidcrystaldevices;poroussiliconopticaldevices.

Text Books

1. ProakisJ.Digitalcommunications(4ed,MGH, 2001).
2. BernardSklar,Digital Communications FundamentalsandApplications,2ed,PearsonEducation.

Reference Books

1. Ahmad R. S. Bahai,Burton R. Saltzberg,MustafaErgen, Multi-carrier DigitalCommunications:TheoryandApplications of OFDM, Springer; 2ndedition(October7, 2004).
2. Edward A Lee&David G Messerschmitt:DigitalCommunication,3rd Ed; K
3. Senior J., opticalfibercommunications,principles&practice,PHI.
4. Keiser G., optical fibercommunications, McGraw-hill.
5. Gowar J., opticalcommunicationsystems, PHI

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ADVANCED DIGITALSIGNALPROCESSING

Paper:MTECE-102A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

ReviewofFilterconcepts-ReviewofdesigntechniquesandstructuresforFIRandIIRfilters,representationof numbers,quantization of filtercoefficients, round-off effects in digital filters.

Unit-II

MultirateDigitalSignalProcessing: Introduction,DecimationbyafactorD,InterpolationbyafactorI,samplingrateconversionbyrationalfactorI/D,implementationofsamplingrateconversion,multistageimplementationofsamplingrateconversion,samplingrateconversionofbandpasssignals,samplingrateconversionbyanarbitraryfactor,applicationofMultiratesignalprocessing,digitalfilterbank,two-channelquadrature-mirrorfilterbank, M-channel QMFbank.

Unit-III

WaveletTransform: Introductiontowavelettransform-ShortTimeFourierTransform(STFT),Wavelettransform,HaarwaveletandMultirateresolutionanalysis,Daubechieswavelet,someotherstandardwavelets,applications of wavelettransform.

Unit-IV

Power SpectrumEstimation: Estimation of spectrafromfinite-durationobservation of signals, non-parametricmethodsforpowerspectrumestimation,parametricmethodsforpowerspectrumestimation,filterbankmethods, Eigenanalysisalgorithms forspectrumestimation.

Text Books:

1. DigitalSignalProcessing:Principles,Algorithms,andApplications,4/e,Authors:JohnG.ProakisDimitris G ManolakisImprint : PearsonEducation
2. Digital Signal Processing, Authors,Oppenheim, Alan V,Schafer,RonaldW., PHI

Reference Books:

1. AdvancedDigitalSignalProcessing,Authors: Dr.Shaila D. Apte,Imprint: Wiley
2. Digital Signal Processing, 3/e, Authors:S.K.Mitra,Imprint : McGrawHill
3. DigitalSignal ProcessingandApplications with the TMS 320C6713 andTMS 320C6416 DSK,2/e,Authors: Rulph Chassaing,DonaldReay,Imprint : Wiley
4. Digital Signal Processing, Authors:Tarun KumarRawat,Imprint: Oxford
5. DigitalSignalProcessing,SpectralComputationandFilterDesign,Authors:CHI-TsongChen,IndianEdition,Imprint: Oxford
6. Theory andApplications of DigitalSignalProcessing,Authors:LawrenceR. Rabiner,BernardGold,Imprint:Prentice-Hall
7. Digital Signal Processing, Authors:ThomasJ.Cavicchi,Imprint: Wiley
8. ModernDigitalSignal Processing,Authors:V.Udayshankar,Imprint: PHI
9. DigitalSignalProcessingusingMATandWavelets,2/e,Authors:MichaelWeeks,Imprint:Jones&BartlettPublishers.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ANTENNA THEORY ANDDESIGN

Paper:MTECE-103A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

RadiationandAntennas:-
PerformanceparametersofAntenna:Radiationresistance,Powergain,Directivegain,Directivity,Half–PowerBeamwidth&Bandwidth,RadiationfromHertziandipole:Calculationoffieldstrengthatdifferentpointsinspherical coordinates&calculationofRadiationresistance,Radiationfromhalf-wavedipole:Calculationoffieldstrengthatdifferentpointsinsphericalcoordinates&calculationofRadiationresistance.

Unit-II

Analysisoflineararrays:-
VariousformsofAntennaArrays.AnalysisofArrayoftwopointsourceswithEqualamplitudeandsamephase,Equalamplitudeandoppositephase,Unequalamplitudeandanyphase.Calculationoffieldstrengthatdistantpointduetolinear arrayofN-Isotropicsources.CalculationofDirectionofPatternmaximum,Directionofpatternminimum,BeamwidthofMajorlobefor Broadside& EndfirearraysofNIsotropicsources.Multiplication of Pattern,Taperingofarrays,Binomial&Dolph-Chebychefarrays.

Unit-III

FrequencyIndependentAntennasandAntennaMeasurements:-
RumseysPrincipalforfrequencyindependentantenna,Frequencyindependentlogspiralantenna,FrequencyindependentLogPeriodicantenna,AntennaRanges,RadiationPatterns,GainMeasurements,DirectivityMeasurements,ImpedanceMeasurements,currentMeasurements,PolarizationMeasurements.

Unit-IV

AntennasforSpecialApplications:-Microstrippatchantennas-basicconfigurationandadvantages,radiationmechanism,basiccharacteristicsandfeeding techniques,broadbandingtechniques,microstriparrays,Antennasforbiomedical applications. Smartantennas formobile communications.Antenna for infrared detectors.

Text Books

1. John D. Krausand R.J.Marhetka — Antennas for AllApplications —, 3rd editionTataMcGrawHill, 2003.
2. Balanis. C.A , —AntennaTheoryAnalysis andDesign‖, 2ndedition JohnWiley&SonsInc., 2003.

Reference Books

1. S.N.Raju, — AntennaPropagation‖,Pearson Education, 1st edition 2005.
2. Collin and Zucker,Antenna Theory,Mc GrawHill

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ADVANCEDINFORMATIONTHEORYANDCODING

Paper:MTECE-104A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

InformationTheoryandSourceCoding: Introduction,UncertaintyandInformation,AverageMutualInformationandEntropy,InformationmeasuresforContinuousRandomVariables,SourceCodingTheorem,HuffmanCoding, Shannon-Fano-Elias Coding, and EntropyRate of aStochastic Process
ChannelCapacityandCoding: ChannelModels,Capacity,Coding,InformationCapacityTheorem,TheShannon limit, Channel capacityFor MIMO System.

Unit-II

LinearBlockCodes: IntroductiontoErrorCorrectingcodes,matrixdescription,Equivalentcodes,DecodingofLBC,SyndromeDecoding,ErrorProbabilityafterCoding,PerfectCodes,HammingCodes,LDPC,OptimalLinearCodes, Maximum Distance Separable Codes, Bounds on Minimum Distance SpaceTime Blockcodes.
CyclicCodes: Introduction,Polynomials,DivisionAlgorithmforPolynomials,GeneratingCycliccodes,Quasi-CycliccodesandShortenedCycliccodes,BurstErrorCorrection,FireCodes,GolayCodes,CyclicRedundancyCheckcodes, CircuitImplementation of Cyclic Codes,BCHCodes.

Unit-III

ConvolutionCodes: IntroductiontoConvolutionalCodes,TreeCodesandTrellisCodes,PolynomialDescriptionofConvolutionalCodes,DistanceNotionsforConvolutionalCodes,TheGeneratingFunction,MatrixDescriptionofConvolutional Codes,ViterbiDecodingofConvolutionalCodes,DistanceBoundsForConvolutionalCodes,PerformanceBounds,Turbo Codes,TurboDecoding,InterleaverDesignforTurboCodes.
TrellisCodeModulation: Introduction,TheconceptofCodedModulation,MappingbysetPartioning,Ungerboeck'sTCM DesignRules,TCMDecoder,PerformanceevaluationforAWGNChannel,Computationof dtree, TCM for fading Channels,Space TimeTrellis Codes.

Unit-IV

Cryptography: Introduction,Overview,operationsusedbyencryptionAlgorithms,SymmetricCryptography,DES,IDEA,RCCiphers,AsymmetricAlgorithms,RSA,PGP,Onewayhashing,EllipticCurvecryptography,QuantumCryptography,biometricEncryption,cryptanalysis

Text Books

1.InformationTheory, Codingand CryptographybyRanjanBose Publisher: TMH

Reference Books

1. Principlesof digitals communication: J. Dass, S.K.Malik &P.K.Chatterjee,1991.
2. Introductiontothetheoryof Errorcorrectingcodes:Vera Press,1992

MasterofTechnology(ELECTRONICS&COMMUNICATION)

VLSISIGNALPROCESSING

Paper:MTECE-105A	**L-T-P:4-0-0**	**DurationofExam: 3 Hr.**
Major TestMarks: 60	**Minor TestMarks: 40**	**Credit: 4**

Unit-I

Basics:-VectorQuantization,DecimatorandExpander,RepresentationsofDSPAlgorithms:BlockDiagrams,Signal-Flow-Graph,Data-FlowGraph, Dependence Graph.

IterationBound:-
DataFlowGraphRepresentations,LoopBoundandIterationBound,AlgorithmsforcomputingIterationBound:LongestPathMatrixAlgorithm,MinimumCycleMeanAlgorithm,IterationBoundof MultirateData-FlowGraphs.

Unit-II

PipeliningandParallelProcessing:-Cutset,Feed-ForwardCutset,PipeliningofFIRDigitalFilters:Data-BroadcastStructures,Fine-Grainpipelining,ParallelProcessing:DesigningaParallelFIRSystem,PipeliningandParallelProcessingforLowPower:PipeliningforLowPower,ParallelProcessingforLowPower,CombiningPipeliningand ParallelProcessing.

Retiming:-
QuantitativeDescriptionofRetiming,PropertiesofRetiming,SolvingSystemsofInequalities,RetimingTechniques:CutsetRetimingandPipelining,RetimingforClockPeriodMinimization,RetimingforRegister Minimization.

Unit-III

Unfolding:-
AlgorithmforUnfolding,PropertiesofUnfolding,CriticalPath,UnfoldingandRetiming,ApplicationsofUnfolding:SamplePeriodReduction,Word-LevelParallelProcessing,Bit-LevelParallelProcessing.

Folding:-FoldingTransformation,
RegisterMinimizationTechniques:LifetimeAnalysis,DataAllocationusingForward-BackwardRegisterAllocation,RegisterMinimizationinFoldedArchitectures:BiquadFilter,IIRFilter,FoldingofMultirateSystems.

Unit-IV

Bit-LevelArithmeticArchitectures:-ParallelMultiplicationwithSignExtension**,** Baugh-Wooley Multipliers, Parallel Multipliers with Modified Booth Recoding, Interleaved Floor-Planand Bit-PlanebasedDigitalFilters.

Computer Arithmetic:-Floating Point Numbers, Floating Point Addition, FloatingPointMultiplication,FloatingPointDivision,FloatingPointReciprocal,CORDICAlgorithm:Introduction,Modes,Architectures,Computation of special functions using CORDIC Algorithm(e.g.Trigonometric,Hyperbolic, Square Root etc.)**Text Books**

1. K. K.Parhi, VLSIDigital Signal ProcessingSystems, JohnWiley, 2010.
2. U. Meyer-Baese, DigitalSignal Processingwith FPGAs, Springer,2011

Reference Books

1. P.B.Denyerand D. Renshaw, VLSISignalProcessing, Addison-Wesely, 1986.
2. R.I. HartleyandK. K. Parhi, Digit-Serial Computation, Kluwer,1995
3. S.Y. Kung, H.J. White House, T. Kailath,"VLSIand ModernSignal Processing ",Prentice Hall, 1985.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ANTENNA DESIGN (Lab.)

Paper:MTECE-106A **L-T-P:0-0-3** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 1.5**

1. Constructionandanalysis of monopole antenna.
2. Constructionandanalysis of dipole antenna.
3. Constructionandanalysis ofyagi-udaantenna,
4. Constructionandanalysis of turnstileantenna,
5. Constructionandanalysis of parabolicantenna.
6. To studymicrowave bench and to find thefrequencygeneratedbythe Microwave source.
7. To findparameters ofmicrowave componentsbyusingmicrowave bench.
8. Constructionandanalysis of patchantenna.
9. Designing andanalysisofWaveguide for microwave applications.
10. Designandanalysis ofcirculator for microwave applications.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ADVANCED DIGITALSIGNALPROCESSING (Lab.)

Paper:MTECE-107A	**L-T-P:0-0-3**	**DurationofExam: 3 Hr.**
Major TestMarks: 60	**Minor TestMarks: 40**	**Credit: 1.5**

1. Write aprogram forcascade andparallelrealization of anFIR transfer function.
2. Write aprogram forcascade andparallelrealization of anIIRtransferfunction.
3. Write aprogram to design a ButterworthIIRBandPassFilter.
4. Writea program to design anFIRfilterusing variouswindow functions.
5. Write aprogram to implement the interpolation and decimation.
6. Write aprogram to design two channels QMFBank.
7. Write aprogram to compute theCWT.
8. Write aprogram to compute theDWT.
9. Writea program to design a waveletfilter.
10. Write aprogram to find the magnitude response of awavelet.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ADVANCEDIMAGE PROCESSING

Paper:MTECE-201A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

Introduction: Light,Brightnessadaptionanddiscrimination,Pixels,coordinateconventions,ImagingGeometry,Perspective Projection,Spatial Domain Filtering, sampling andquantization.
SpatialDomainFiltering: Intensitytransformations,contraststretching,histogramequalization,Correlationandconvolution,Smoothingfilters, sharpeningfilters,gradientandLaplacian.

Unit-II

FilteringintheFrequencydomain: HotellingTransform,2D-FourierTransformandproperties,FFT(DecimationinFrequencyandDecimationinTimeTechniques),Convolution,Correlation,2-Dsampling,Discrete CosineTransform, Frequencydomain filtering.
ImageRestoration: BasicFramework,InteractiveRestoration,Imagedeformationandgeometrictransformations,image morphing,Restorationtechniques,Noisecharacterization,Noiserestorationfilters,Adaptivefilters,Linear,Positioninvariantdegradations,EstimationofDegradationfunctions,Restorationfromprojections.

Unit-III

ImageCompression: Encoder-Decodermodel,Typesofredundancies,LossyandLosslesscompression,Entropyofaninformationsource,Shannon's1stTheorem,HuffmanCoding,ArithmeticCoding,GolombCoding,LZWcoding,TransformCoding,Sub-imagesizeselection,blockingartifacts,DCTimplementationusingFFT,Runlengthcoding,FAXcompression(CCITTGroup-3andGroup-4),Symbol-basedcoding,JBIG-2,Bit-planeencoding,Bit-allocation,ZonalCoding,ThresholdCoding,JPEG,Losslesspredictivecoding,Lossypredictive coding
WaveletbasedImageCompression:Expansionoffunctions,Multi-resolutionanalysis,Scalingfunctions,MRA refinementequation, Waveletseriesexpansion, Discrete Wavelet Transform (DWT), Continuous WaveletTransform,FastWaveletTransform,2-DwaveletTransform,JPEG-2000encoding,DigitalImageWatermarking.

Unit-IV

MorphologicalImageProcessing: Basics,SE,Erosion,Dilation,Opening,Closing,Hit-or-MissTransform,BoundaryDetection,Holefilling,Connectedcomponents,convexhull,thinning,thickening,skeletons,pruning,GeodesicDilation, Erosion, Reconstructionbydilation anderosion.
ImageSegmentation:
Boundarydetectionbasedtechniques,Point,linedetection,Edgedetection,Edgelinking,localprocessing,regionalprocessing,Houghtransform,Thresholding,IterativeThresholding,Otsu'smethod,Movingaverages,MultivariableThresholding, Region-basedsegmentation,Watershedalgorithm,Useofmotion in segmentation

Text Books

1. DigitalImage Processing, 3rdEdition, byRafaelC GonzalezandRichard EWoods. Publisher:PearsonEducation.

Reference Books

1. DigitalImage ProcessingbyS. Sridhar , Publisher: Oxford
2. Fundamentals ofDigitalImage Processing ByAnil K Jain. Publisher:Prentice Hall.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ADVANCED WIRELESS AND MOBILECOMMUNICATION

Paper:MTECE-202A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

INTRODUCTION:-IntroductiontoWirelessMobileCommunications,PersonalCommunicationServices(PCS):PCS architecture,Mobility,Typesofmobilewirelessservices/ systems-Cellular,WLL,Paging,Satellitesystems,Standards,management,Networkssignaling.WirelessTransmission-signalpropagation-spread spectrum - SatelliteNetworks-CapacityAllocation- FAMA-DAMA-MAC.

Unit-II

MOBILENETWORKS:-
Cellularconceptandfrequencyreuse,MultipleAccessSchemes,channelassignmentandhandoff,Interferenceandsystemcapacity,TrunkingandErlangcapacitycalculations;cellularconcept,spectralefficiency;CellularWirelessNetworks–GSM–Architecture–Protocols-ConnectionEstablishment -FrequentlyAllocation– Routing–Handover – Security-GPRA.

Unit-III

WIRELESSNETWORKS:-
Historyandevolutionofmobileradiosystems;GeneralPacketRadioServices(GPRS):GPRSarchitecture,GPRSNetworknodes,MobileDataCommunication:WirelessLAN-IEEE802.11:Standard–Architecture–Services;AdHocNetworks-HiperLAN-BlueTooth.Routing:MobileIP-DHCP-AdHoc Networks -Proactive andReactive RoutingProtocols-Multicast Routing.

Unit-IV

TRANSPORTANDAPPLICATIONLAYERS:-TCPoverAdhocNetworks–WAP–Architecture-WWWProgrammingModel– WDP– WTLS– WTP – WSP– WAE- WTAArchitecture – WML.

Text Books

1. —WirelessandmobileNetworksArchitecture,‖byLin&Chlamatac,WileyIndia,2001.
2. —Mobile&PersonnelcommunicationSystemsandServices‖,ByRajPandya,PrenticeHallIndia,2001.
3. —WirelessCommunication-Principlesandpractices,‖2nd Ed., Theodore S. Rappaport,PearsonEducation Pvt.Ltd, 2003.
4. —Mobilecommunications,‖JochenSchiller,PearsonEducationPvt.Ltd.,2002.
5. —TheWirelessApplicationProtocol,‖Singhal&Bridgmanet.al.,PearsonEducation,2004.

Reference Books

1. —PrinciplesofMobileComputing,‖2ndEd.,Hensmann,Merk,&Stober,SpringerInternationalEdition, 2003.
2. —AdHocWirelessNetworks:ArchitecturesandProtocols‖,1/eAuthors:C.SivaRamMurthy,B.S. Manoj
3. —ModernWirelessCommunications‖,1/eAuthors:SimonHaykin,MichaelMoher
4. —MobileComputing,‖Talukdar&Yaragal,TMH,2005.
5. —3GWirelessNetworks,‖Smith&Collins,TMH,2007.
6. KavehPahlavan,PrasanthKrishnamoorthy,—PrinciplesofWirelessNetworks‖,PHI/PearsonEducation, 2003.
7. WilliamStallings,—WirelesscommunicationsandNetworks‖,PHI/PearsonEducation,2002.
8. UweHansmann,LotharMerk,MartinS.NicklonsandThomasStober,—PrinciplesofMobilecomputing‖,Springer,Newyork,2003.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

DIGITALICDESIGN

Paper:MTECE-203A **L-T-P:4-0-0** **DurationofExam: 3**
Hr.Major TestMarks: 60 **Minor TestMarks:40** **Credit: 4**

Unit-I

Basics:-
IssuesinDigitalIntegratedCircuitDesign,QualityMetricsofaDigitalDesign,ManufacturingCMOSIntegratedCircuits,Introductiontodevices,TheDiode,TheMOS(FET)Transistor,Perspective:TechnologyScaling
DeviceModelsandCircuitSimulation: InterconnectParameters—Capacitance,Resistance,andInductance,Electrical WireModels,SPICE WireModels.

Unit-II

TheStaticCMOSInverter:Perspective,EvaluatingtheRobustnessoftheCMOSInverter,PerformanceofCMOSInverter,Power,Energy,andEnergy-Delay,TechnologyScalingand itsImpact on theInverter Metrics.**DesigningCombinationalLogicGatesinCMOS:**StaticCMOSDesign,DynamicCMOSDesign,HowtoChooseaLogicStyle, Gate Design in theUltra Deep-Submicron Era.

Unit-III

DesigningSequentialLogicCircuits: TimingMetricsforSequentialCircuits,ClassificationofMemoryElements,StaticLatchesandRegisters,DynamicLatchesandRegisters,PulseRegisters,Sense-AmplifierBasedRegisters,Pipelining: An approach to optimize sequentialcircuits, Non-Bistable Sequential Circuits.

Unit-IV

DesigningComplexDigitalIntegratedCircuits: Introduction,TheStandard-cellDesignApproach,Array-basedDesign, Configurable andReconfigurableDesign.
TimingIssuesinDigitalCircuits: Introduction-ClassificationofTimingApproaches,Synchronoussystems,Impactofclockvariationonperformance,ClockDistributionBasics, AsynchronousDesign,Asynchronous-synchronousInterface, Clock SignalGeneration

Text Books

1. DigitalIntegrated Circuits A DesignPerspective byRabey,Chandrakasan,Nikolic, PHI.
2. DigitalICDesignbyMartin, Oxford UniversityPress.

Reference Books

1. CMOS VLSIDesignbyWeste, Pearson.
2. Basic VLSI DesignbyDouglasA. Pucknell &Kamran Eshraghian, Pearson.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ADAPTIVEFILTERTHEORY

Paper:MTECE-204A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

Introduction:-
Varianceofarandomvariable,Estimation:GivenNoObservations,GivenDependentObservations,ComplexandVectorCases,NormalEquations,DesignExamples,LinearModelsandapplications.Minimum-Variance Unbiased Estimation and applications.

Steepest-DescentAlgorithms:-Steepest-DescentMethod,TransientBehavior,Iteration-DependentStep-Sizes, Newton's Method.

Unit-II

Stochastic-GradientAlgorithms:-LMSAlgorithmandapplications,NormalizedLMSAlgorithm,Non-BlindAlgorithms,BlindAlgorithmsandproperties,AffineProjectionAlgorithms,Ensemble-AverageLearningCurves.

Steady-StatePerformanceofAdaptiveFilters:-
PerformanceMeasures,StationaryDataModel,FundamentalEnergy-ConservationRelation,FundamentalVarianceRelation,Mean-SquarePerformanceofLMSandε-NLMS.

Unit-III

TrackingPerformanceofAdaptiveFilters:-Non-stationaryDataModel,FundamentalEnergy-ConservationRelation,FundamentalVarianceRelation,TrackingPerformance ofLMSand ε-NLMS.
TransientPerformanceofAdaptiveFilters:-DataModel,Data-NormalizedAdaptiveFilters,WeightedEnergy-ConservationRelation,WeightedVariance Relation,TransientPerformance ofLMSandε-NLMS.

Unit-IV

RecursiveLeast-Squares:-RLSAlgorithm,Exponentially-WeightedRLSAlgorithm,RLSArrayAlgorithms:Square-RootFactors,NormandAnglePreservation,MotivationforArrayMethods,RLSAlgorithm,InverseQR Algorithm, QR Algorithm, Extended QR Algorithm.

Text Books

1. —FundamentalsofAdaptiveFiltering‖byAliH.Sayed,JohnWileyandSons.
2. —AdaptiveFilterTheory‖byS.Haykin,PearsonIndia.

Reference Books

1. —AdaptiveFiltersTheoryandApplications‖,byB.Farhang-Boroujeny,JohnWileyandSons.
2. —LinearEstimation‖byKailath&Sayed,PHI
3. —AdaptiveFilters‖byAliH.Sayed,JohnWileyandSons.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

OPTICALNETWORKS

Paper:MTECE-205A	**L-T-P:4-0-0**	**DurationofExam: 3 Hr.**
Major TestMarks: 60	**Minor TestMarks: 40**	**Credit: 4**

Unit-I

IntroductionandChallenges:-
Advantagesofopticalnetwork,telecomnetworkoverviewandarchitecture,WDMopticalnetworks,WDMnetworkevolution,WDMnetworkconstruction,broadcastandselectopticalWDMnetwork,wavelengthroutedoptical WDMnetwork,Challengesofoptical WDMnetwork.Opticaltransmitters,semiconductorlaserdiode,photodetectors,tunableandfixedopticalfilters,channelequalizers,opticalamplifiers

Unit-II

SingleandMulti-hopNetworks:-Introductiontosingleandmulti-hopnetworks,Characteristicsofsingleandmulti-hopnetworks,experimentalsinglehopnetworks:LAMBDANET,STARNET,SONATA,Rainbow,experimental multi-hop networks:Shufflenet,De Bruijn Graph, Hypercube.

OpticalAccessNetwork:-
Introductiontoaccessnetwork,PON,EPONandWDNEPON:overview,principalofoperation,architecture;dynamicwavelengthallocation,gigabitEthernet,radiooverfibernetwork.OpticalMetroNetwork:Introductiontometronetwork,overviewoftrafficgroominginSONETring,trafficgroomingin WDM ring,Interconnected WDM networks,packetcommunication usingtunableWADM.

Unit-III

Opticalswitching:-
Opticalpacketswitchingbasics,slottedandunslottednetworks,headerandpacketformat,contentionresolutioninOPSnetworks,self-routing,examplesonOPSnodearchitecture,opticalburstswitching,signalingandroutingprotocolsforOBSnetworks,contentionresolutioninOPSnetworks,multicasting, implementation andapplication.

Unit-IV

Routingandwavelengthassignment:-Problemformulation,routingsub-problem:fixedrouting,adaptiverouting,fault tolerantrouting,wavelengthassignmentsub-problem, algorithms:simulatedannealing,flowdeviationalgorithm.

OpticalMulticastingandtrafficgrooming:-Introductiontomulticasting,Multicast-capableswitcharchitecture,unicast,broadcastandmulticasttraffic,trafficgroomingoverview,staticanddynamictraffic grooming.

Text Books

1. RajivRamaswamiandKumarN.Sivarajan,―OpticalNetworks:APracticalPerspective‖,Morgan Kauffman(ElsevierIndian Edition), Second Edition, 2004.
2. C.SivaRamMurthyandMohanGuruswamy,―WDMOpticalNetworks:Concepts,DesignsAndAlgorithms‖,PrenticeHallofIndia,2002.

ReferenceBooks

1. OpticalSwitching:TarekS.El.Bawab,Springer.
2. DataCommunicationbyBehrouzA, AForouzen,Mc-GrawHill,4th Edition

MasterofTechnology(ELECTRONICS&COMMUNICATION)
IMAGEPROCESSING (Lab.)

Paper:MTECE-206A **L-T-P:0-0-3** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 1.5**

1. Write aprogram (WAP)to implement point to pointtransformation on an image.
2. WAP to implementMorphologicaloperations onanimage.
3. WAP to implementHistogramequalization.
4. WAP to implementGeometricTransformations like rotation,scalingand translation.
5. WAP to implement 2-D FFT of animage.
6. WAP to implementfilteringin Spatial Domain.
7. WAP to implementfilteringin FrequencyDomain.
8. WAP to implementvarious edgedetectionalgorithms.
9. WAP to compute Entropyasa compressionmeasure.
10. WAP to implementDigitalWatermarking.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

WIRELESS AND MOBILECOMMUNICATION (Lab.)

Paper:MTECE-207A	**L-T-P:0-0-3**	**DurationofExam: 3 Hr.**
Major TestMarks: 60	**Minor TestMarks: 40**	**Credit: 1.5**

1. Introduction toLabVIEWwith its basic functions andstudyof modulation toolkit.
2. Studythe interfacingof hardware(USRP module)with the PC andconfiguringthe same.
3. Designand verifythe FSK modulator and demodulator.
4. Designand verifythe PSK modulator and demodulator.
5. Designand verifythe QAM modulatorand demodulator
6. Designand verifythe FM modulatorand demodulatorsound card usingUSRP.
7. Designand verifythe GPS modulator usingUSRP.
8. Designand verifythe GPS demodulator usingUSRP.
9. DemonstratestheuseoftheBluetoothfunctionstosetupdatatransferviaBluetoothbetweenaserverVIand aclientVI.
10. Designtwo-dimensional convolution to perform imageedge detection.

ELECTIVE– I

for

ECE-3rd Semester

MasterofTechnology(ELECTRONICS&COMMUNICATION)

RFMEMSFORCOMMUNICATIONENGINEERING

Paper:MTEC-ELI-301A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

WirelessSystems:-
Introduction,spheresofwirelessactivities,thehomeandoffice,thegroundfixed/mobileplatform,thespaceplatform,wirelessstandards,systemsandarchitectures,conceptualwirelesssystems,wirelesstransceiverwirelessappliancesenable ubiquitous connectivity.

Unit-II

Elements of RF Circuit Design:-Physical aspects of RF circuit design, skin effect, transmission lines on thin substrates,self-resonancefrequency,qualityfactorpackaging,practicalaspectsof RFcircuitdesign,DCbiasing,impedance mismatcheffects in RFMEMS.

Unit-III

RFMEMS:-RF MEMS,enabledcircuitelementsandmodels,RF/microwavesubstrateproperties,micromachined,enhancedelements,capacitors,inductors,varactors,MEMswitch,shuntMEMswitch,lowvoltagehingedMEMswitchapproaches,push-pullseriesswitch,folded-beamspringssuspensionseriesswitch,resonators-transmissionlineplanarresonators,cavityresonators,micromechanicalresonators,filmbulkacoustics waveresonators, MEMSmodeling- mechanicalmodeling,electromagnetic modeling.

NovelRFMEMS:-
NovelRFMEMS,enabledcircuits,reconfigurablecircuits,theresonantMEMSswitch,capacitors,inductors,tunableCPWresonator,MEMSmicro-switcharrays,reconfigurablecircuits,double,studtuner,Nth-stubtuner,filters,resonatortuningsystem,massivelyparallelswitchableRFfrontends,truedelaydigital phaseshifters, reconfigurableantennas, tunable dipole antennas,tunablemicrostrip patch-arrayantenna.

Unit-IV

Phaseshifters:-Fundamentals,X-bandRFMEMSphaseshifterforphasedarrayapplications,Ka-bandRFMEMSphaseshifterforradarsystemsapplications,Filmbulkacousticwavefilters,FBARfilterfundamentals,FBARfilterfor PCS applications, RFMEMS filters, A Ka-band millimeterwave Micromachined tunable filter,aHigh-Q8MHzMEMresonatorsfilter,RFMEMSOscillators-fundamentals,a14GHzMEMOscillator,aKa-Bandmicro machined cavityoscillator,a2.4GHzMEMS basedvoltagecontrolledoscillator.

Text Books

HectorJ.De,LosSantos,—RFMEMSCircuitDesignforWirelessCommunications‖,ArtechHouse,2002.

Reference Books

1. VijayK.Varadan,K.J.Vinoy,K.A.Jose,—RFMEMSandtheirApplications‖,JohnWileyandSons, Ltd.,2002.
2. GabrielM.Rebeiz,—RFMEMSTheory,Design&Technology‖,WileyInterscience,2002

Master of Technology (ELECTRONICS & COMMUNICATION)

ADVANCED PROCESS OR AND EMBEDDED SYSTEMS

Paper:MTEC-ELI-303A	**L-T-P:4-0-0**	**DurationofExam: 3 Hr.**
Major TestMarks: 60	**Minor TestMarks: 40**	**Credit: 4**

Unit-I

MicroprocessorArchitecture:-Instructionset–Dataformats–Instructionformats–Addressingmodes–MemoryHierarchy–registerfile–Cache–Virtualmemoryandpaging–Segmentation–Pipelining–Theinstructionpipeline–pipelinehazards–Instructionlevelparallelism–reducedinstructionset–Computerprinciples–RISCversusCISC–RISCproperties–RISCevaluation–On-chipregisterfilesversuscacheevaluation.

Unit-II

HighPerformanceCISCArchitecture:-PENTIUMThesoftwaremodel–functionaldescription–CPUpindescriptions–RISCconcepts–busoperations–Superscalararchitecture–pipelining–Branchprediction–Theinstructionandcaches–Floatingpointunit–protectedmodeoperation–Segmentation–paging–Protection–multitasking–Exceptionandinterrupts–Input/Output–Virtual8086model–Interruptprocessing–Instructiontypes–Addressingmodes–Processorflags–Instructionset–Basicprogrammingofthe Pentium Processor.

Unit III

HighPerformanceRISCArchitectureARM:-TheARMarchitecture–ARMorganizationandimplementation–TheARMinstructionset–Thethumbinstructionset–BasicARMAssemblylanguageprogram–ARMCPUcores.80196ARCHITECTURECPUoperation–Interruptstructure–Timers–HighSpeedInput/OutputPorts–I/OcontrolandStatusregisters–InstructionSet–AddressingModes–SimpleProgramming – Queues– TablesandStrings–Stack Memories–KeySwitch – Parsing.

Unit IV

MOTOROLA68HC11MicroControllers:-Instructionsandaddressingmodes–operatingmodes–Hardwarereset–Interruptsystem–ParallelI/Oports–Flats–Realtimeclock–Programmabletimer–pulseaccumulator–serialcommunicationinterface–A/Dconverter–hardwareexpansion–BasicAssemblyLanguage programming.

PICMicroControllerCPUArchitecture:- Instructionset– Interrupts – Timers – Memory– I/Oportexpansion– I2 C bus for peripheral chip access–A/D converter – UART.

Text Books

1. DanielTabak,―AdvancedMicroprocessors‖,McGrawHill.Inc.,1995.
2. JamesL.Antonakos,―ThePentiumMicroprocessor‖,PearsonEducation,1997.

Reference Books

1. SteaveFurber,―ARMsystem–on–chiparchitecture‖,AddisonWesley,2000.
2. John.B..Peatman,―DesignwithPICMicrocontroller‖,PearsonEducation,1988
3. Gene.H.Miller,―MicroComputerEngineering‖,PearsonEducation,2003.
4. JamesLAntonakos,―AnIntroductiontotheIntelfamilyofMicroprocessors‖,Pearson,1999.
5. BarryB.Brey,,―TheIntelMicroprocessorsArchitecture,ProgrammingandInterfacing‖,PHI,2002.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

DIGITALCONTROLSYSTEMS

Paper:MTEC-ELI-305A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

UNIT-I

IntroductionandModelingofDiscreteTimeSystem:-

Introduction,DiscreteTimeSystemRepresentation,MathematicalModelingofSamplingProcess,DataReconstruction.Re visitingZ-Transform,MappingS-domaintoZ-domain,PulseTransferFunction,PulseTransferFunctionofClosedLoopSystems,SampledSignalFlowGraph.

UNIT-II

StabilityAnalysisandTimeResponseofDiscreteTimeSystems:-
JuryStabilityTest,StabilityAnalysisusingBilinearTransformation.TransientandSteadyStateresponses,TimeResponse ParametersofPrototypeSecondorderSystem.RootLocusMethod,ControllerDesignUsingRootLocus.RootLocusbased ControllerDesignUsingMATLAB.

UNIT-III

DesignofSampledDataControlSystem:-NyquistStabilityCriterionBodePlot,Lag,LeadandLead-LagCompensatorDesignUsingBodePlot,DesignofDigitalControlSystemwithDeadbeatResponse,SampledData Control System with DeadbeatResponse.

UNIT-IV

DiscreteStateSpaceModel:-
IntroductiontoStateVariableModel,VariousCanonicalforms,CharacteristicEquation,StateTransitionMatrix,Solutiont oDiscreteStateEquation,Controllability,Observability,Stability,LyapunovStabilityTheoremPolePlacementbyStateFe edback,Fullorderobserver,ReducedOrderObserver,Output FeedbackDesign:Theoryandexamples,LQRDesign.

Text Books

1. BC Kuo, DigitalcontrolSystems, Oxford UniversityPress, 2/eIndian Edition, 2007.
2. K Ogata,Discrete TimeControl System,PrenticeHall, 2/e, 1995

Reference Books

1. M GopalDigital Control&State VariableMethods,Tata McGrawHill,2/e2003.
2. GFFraklin,JDPowell,MLWorkman,DigitalControlofDynamicSystemsAdisonWesley,PearsonEducation, 2014.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ADVANCEELECTRONICSDEVICES&SENSORS

Paper:MTEC-ELI-307A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

QuantumDevices:-QuantumElectronicdevices–Electronsinmesocopicstructures–Shortchannel,MOSTransistor–splitGateTransistor–Electronwavetransistor–Electronspintransistor–QuantumDotarray–Quantumcomputer-BitandQubit.CarbonNanotubebasedlogicgates,opticaldevices..Connectionwithquantum dots, quantumwires, and quantum wells.

Unit-II

TunnelingDevices:-Tunnelingelement–TunnelEffectandTunnelingElements-TunnelingDiode–ResonantTunnelingDiode–Three-TerminalResonateTunnelingDevices-TechnologyofRTD-DigitalcircuitsdesignbasedonRTDs-BasicsLogicCircuits–SingleElectronTransistor(SET)–Principle–CoulombBlockade-Performance–Technology-CircuitDesign-LogicandMemoryCircuits–SETadderasanExampleofaDistributedCircuit.

Unit-III

SuperconductingDevicesAndPhotonics:-Basics-Macroscopicmodel-SuperconductingswitchingDevices–Cryotron-JosephsonTunnelingDevices-Elementarycircuits–AssociativeorContent–AddressableMemory- SQUID – FluxQuantumdevice –LC–Gate– Magnetic FluxQuantum– QuantumcellularAutomata-QuantumcomputerwithSingleFluxdevices– SFQD- RSFQD – Application of superconductingdevices

Unit-IV

NanoSensors:-Microandnano-sensors,Fundamentalsofsensors,biosensor,microfluids,Packagingandcharacterizationofsensors,Methodofpackagingatzerolevel,dyelevelandfirstlevel.Sensorsforaerospaceanddefense:Accelerometer,PressureSensor,NightVisionSystem,Nanotweezers,nano-cuttingtools,Integrationofsensorwithactuatorsandelectroniccircuitry,MetalInsulatorSemiconductordevices,molecular electronics, information storage,molecularswitching, Schottkydevices

Text Bools:

1.K.Goser,P.GlosekotterandJ.Dienstuhl,―NanoelectronicsandNanosystems-FromTransistorstoMolecular QuantumDevices‖,Springer,2004.

Reference Books:

1.HerveRigneault,Jean-MichelLourtioz,ClaudeDelalande,ArielLevenson,―Nanophotonics‖,ISTE.
2.W.R.Fahrner,―NanotechnologyandNanoelectronics–Materials,DevicesandMeasurementTechniques‖ Springer,2006 13
3. Sensors:Micro&Nanosensors, SensorMarkettrends(Part 1&2)byH.Meixner.
4. Nanoscience&Technology:Novelstructure and phenomeabyPingSheng(Editor)
5. NanoEngineeringin Science&Technology: Anintroduction to the world of nanodesignbyMichael Rieth.
6. Tai–RanHsu,―MEMS&MicrosystemsDesignandManufacture‖,TataMcGraw-Hillpublication,2001.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

SOFTCOMPUTING

Paper:MTEC-ELI-309A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**
Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

UNIT-I

FuzzySetTheory:-IntroductiontoNeuro–FuzzyandSoftComputing –FuzzySets–BasicDefinitionandTerminology–Set-theoreticOperations–MemberFunctionFormulationandParameterization–FuzzyRulesandFuzzyReasoning–ExtensionPrincipleandFuzzyRelations–FuzzyIf-ThenRules–FuzzyReasoning–FuzzyInferenceSystems–MamdaniFuzzyModels–SugenoFuzzyModels–TsukamotoFuzzyModels–Input Space Partitioningand FuzzyModeling.

UNIT-II

Optimization:-Derivative-basedOptimization– Descent Methods –TheMethodofSteepestDescent–ClassicalNewton'sMethod–StepSizeDetermination–Derivative-freeOptimizationGeneticAlgorithms–SimulatedAnnealing– Random Search–DownhillSimplexSearch.

UNIT-III

NeuralNetworks:-SupervisedLearningNeuralNetworks–Perceptrons-Adaline–BackpropagationMutilayerPerceptrons–RadialBasisFunctionNetworks–UnsupervisedLearningNeuralNetworks–CompetitiveLearningNetworks–KohonenSelf-OrganizingNetworks–LearningVectorQuantization–HebbianLearning.

UNIT-IV

NeuroFuzzyModeling:-AdaptiveNeuro-FuzzyInferenceSystems–Architecture–HybridLearningAlgorithm–LearningMethodsthatCross-fertilizeANFISandRBFN–CoactiveNeuroFuzzyModeling–FrameworkNeuronFunctions forAdaptive Networks– NeuroFuzzySpectrum.

ApplicationsOfComputationalIntelligence:-PrintedCharacterRecognition–Inverse Kinematics Problems – Automobile Fuel EfficiencyPrediction– Soft ComputingforColor Recipe Prediction.

Text Books

J.S.R.Jang,C.T.SunandE.Mizutani,―Neuro-FuzzyandSoftComputing‖,PHI,2004

Reference Books

1. TimothyJ.Ross,―FuzzyLogicwithEngineeringApplications‖,McGraw-Hill,1997.
2. DavisE.Goldberg,―GeneticAlgorithms:Search,OptimizationandMachineLearning‖,AddisonWesley, N.Y., 1989.
3. S.RajasekaranandG.A.V.Pai,―NeuralNetworks,FuzzyLogicandGeneticAlgorithms‖,PHI,2003.
4. R.Eberhart,P.SimpsonandR.Dobbins,―ComputationalIntelligence-PCTools‖,APProfessional,Boston, 1996.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

ADVANCEDVERILOGHDL

Paper:MTEC-ELI-311A **L-T-P:4-0-0** **DurationofExam: 3**

Hr.Major TestMarks: 60 **Minor TestMarks:40** **Credit: 4**

Unit-I

OverviewofFPGA:-Overview of ageneralFPGA device,FPGALogicCellStructures,FPGAProgrammableInterconnect andI/O Ports,Overview of theXilinx Spartan3devices,Developmentflow.

Basics:-HDLbasedDesignFlow,Why Verilog,Top-DownandBottom-UpDesignMethodology,Differencesbetweenmodulesandmoduleinstances,PartsofSimulation,DesignBlocks,StimulusBlocks, BasicLexicalElements and Data Types, Operators.

Unit-II

CombinationalCircuit:-

Alwaysblockforacombinationalcircuit,Ifstatement,Casestatement,Routingstructureofconditionalcontrolconstructs,Generalcodingguidelinesforanalwaysblock,Parameterandconstant,TestBenchforcombinationalcircuits,Designexamples:Hexadecimaldigittoseven-segmentLEDdecoder,Sign-magnitudeadder,Barrelshifter.

SequentialCircuit:-

DFFandregister,SynchronousSystem,CodedevelopmentoftheFFandregister,Shiftregister,Binarycounter,TestBench forsequential circuits,LED time-multiplexingcircuit.

Unit-III

FSM:-MealyandMooreoutputs,FSMrepresentation,FSMcodedevelopment,Rising-edgedetector,Debouncingcircuit,Testingcircuit,Dual-edgedetector,AlternativeDebouncingcircuit,Parkinglotoccupancycounter.

FSMD:-

SingleRToperation,ASMDchart,Decisionboxwitharegister,DebouncingcircuitbasedonRTmethodology,Codewithexplicitdatapathcomponents,Codewithimplicitdatapathcomponents,Comparison,Testingcircuit.

Unit-IV

SelectedTopicsofVerilog:-Blockingversusnon-blockingassignment,Alternativecoding styleforsequentialcircuit,Useofthesigneddatatype,Useoffunctioninsynthesis,Additionalconstructsfortestbenchdevelopment.

Text Books

1. Michael D. Ciletti, AdvancedDigitalDesign withthe VerilogHDL, PearsonIndia.
2. PongP. Chu, FPGA PrototypingUsingVerilogExamples,John Wiley

Reference Books

1. SteveKilts, AdvancedFPGA Design, WileyInter-Science
2. Zainalabedin Navabi,VerilogDigitalSystemDesign,McGrawHill Edition
3. Samir Palnitkar,VerilogHDL,PearsonIndia

MasterofTechnology(ELECTRONICS&COMMUNICATION)

SECURITY,NETWORKSANDCRYPTOGRAPHY

Paper:MTEC-ELI-313A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**

Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

SymmetricCiphers:-Overview–classicalEncryptionTechniques–BlockCiphersandtheDataEncryptionstandard–IntroductiontoFiniteFields–AdvancedEncryptionstandard–ContemporarySymmetricCiphers–ConfidentialityusingSymmetric Encryption.

Unit-II

NetworkSecurityPractice:-AuthenticationApplications–Kerbors–X.509AuthenticationService–ElectronicmailSecurity–PrettyGoodPrivacy–S/MIME–IPSecurity architecture–AuthenticationHeader–EncapsulatingSecurityPayload– KeyManagement.

Unit-III

SystemSecurity:-Intruders–IntrusionDetection–PasswordManagement–MaliciousSoftware–Firewalls–FirewallDesignPrinciples– TrustedSystems.

Unit-IV

WirelessSecurity:-IntroductiontoWirelessLANSecurityStandards–WirelessLANSecurityFactorsandIssues.

Text Books

1. WilliamStallings,―CryptographyandNetworkSecurity–PrinciplesandPractices‖,PearsonEducation, 3rd Edition, 2003.
2. AtulKahate,―CryptographyandNetworkSecurity‖,TataMcGrawHill,2003.

Reference Books

1. BruceSchneier,―AppliedCryptography‖,JohnWileyandSonsInc,2001.
2. StewartS.Miller,―Wi-FiSecurity‖,McGrawHill,2003.
3. CharlesB.Pfleeger,ShariLawrencePfleeger,―SecurityinComputing‖,3rdEdition,PearsonEducation, 2003.

ELECTIVE– II

for

ECE-3rd Semester

MasterofTechnology(ELECTRONICS&COMMUNICATION)

BIO-MEDICALSIGNALPROCESSING

Paper:MTEC-ELII-302A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**

Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

Thenatureofbiomedicalsignals,reasonsforstudyingbiomedicalsignalprocessing,whatisasignal?,sometypicalsourcesof biomedicalsignals,continuous-timeanddiscrete-timesignals,assessingtherelationshipbetweentwosignals,whywedoprocesssignals?,typesofsignals:stochastic,fractalandchaotic,signalmodelingas aframeworkfor signalprocessing, noise.
Memoryandcorrelation,propertiesofoperatorsandtransformations,memoryinphysicalsystem,energyandpowersignals, theconcept of autocorrelation,auto-covarianceandautocorrelation forDT signals.

Unit-II

Theimpulseresponse,thoughtexperimentandcomputerexercise:glucosecontrol,convolutionfromofanLSIsystem,convolutionforcontinuous-timesystem,convolutionassignalprocessing,relationofimpulseresponsetodifferentialequation,convolutionasafiltering process,impulseresponsefornonlinearsystems,theglucosecontrolproblemrevisited.
Frequencyresponse,biomedicalexample(transducersformeasuringkneeangle),sinusoidalinputstoLTICsystems,generalizedfrequencyresponse,frequencyresponseofdiscrete-timesystems,seriesandparallelfiltercascades,idealfilters,frequencyresponse and nonlinear systems, otherbiomedical examples.

Unit-III

Responsesoflinearcontinuous-timefilterstoarbitraryinputs,introductoryexample,conceptualbasisoftheLaplacetransform,propertiesof(unilateral)Laplacetransforms,inverseLaplacetransform,transferfunctions,feedbacksystems, biomedical applications ofLaplace transform.
Modeling signalsassumsofdiscrete-timesinewaves,interactiveexample:periodicoscillationintheamplitudeofbreathing,discrete-timeFourierseries,Fouriertransformofdiscrete-timesignals,parseval'srelationforDTnon-periodicsignals,outputofanLSIsystem,relationofanDFSandDTFT,Windowing,Sampling,DiscreteFourier Transform(DFT),Biomedical application.

Unit-IV

NoiseremovalandsignalcompensationintroductoryexampleofLSIsystemsandZ-transform,propertiesofbilateralZ-transform,unilateralZ-transform,analyzingdigitalfilterusingZ-transform(DTtransferfunction),biomedicalapplicationofDTfilters,overview: designofdigitalfilters,IIRfilterdesign,biomedicalexampleofIIRfilterdesign,IIRfilterdesignbyminimizationofanerrorfunction,FIRfilterdesign, frequency-bandtransformation,biomedicalapplication of digitalfiltering.

Text Books:

1. Biomedical Signal Processingand Signal Modeling,*Authors* : EugeneN. Bruce,*Imprint* : WileyEdition.

Reference Books

1. Biomedical Signal Processing,Akay, Elsevier
2. Biomedical Signal Processing,Rakesh Kumar

MasterofTechnology(ELECTRONICS&COMMUNICATION)

DETECTIONANDESTIMATIONTECHNIQUES

Paper:MTEC-ELII-304A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**

Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

Introduction:-
Representationsandmodelsforrandomprocesses,ProbabilitySpaces,Randomvariables,distributionanddensityfunctions,expectation,conditionalprobability,Bayestheorem,GeneralGaussianmodels.

Hypothesistesting:-Binaryhypothesistesting,MAPcriteria,Bayesrisk,Neyman-Pearsontheorem,multiplehypothesistests,Performance ofBinaryReceiversin AWGN, SequentialDetectionandPerformance.

Unit-II

Signaldetectionwithrandomparameters:-
Detectionofknownsignalsinnoise,Matchedfilter,Performanceevaluations,CompositeHypothesisTesting,UnknownPhase,UnknownAmplitude,UnknownFrequency,White andColoredGaussian Noise for Continuous Signals, Estimator-Correlator.

Detectionofmultiplehypotheses:-BayesCriterion,MAPCriterion,M-aryDetectionUsingOtherCriteria,Signal-SpaceRepresentations,PerformanceofM-aryDetectionSystems,SequentialDetectionofMultipleHypotheses,Linearmodels,Rayleigh fadingsinusoid.

Unit-III

Fundamentalsofestimationtheory:-
FormulationoftheGeneralParameterEstimationProblem,RelationshipbetweenDetectionand Estimation Theory, Types of Estimation Problems.

PropertiesofEstimators:-Un-biasedness,efficiency,Criteriaforgoodestimators,Minimumvarianceunbiasedestimation,Cramer-Rao lower bound,asymptoticproperties.

Unit-IV

Parameterestimation:-Randomparameter,Bayesestimation,Meansquareerror(MSE),linearminimummean-squareestimates,linearsquareestimation,MaximumLikelihoodEstimation,LeastSquareEstimation,GeneralizedLikelihoodRatioTest,Linear minimum varianceestimator,BLUE.

Applications:-DetectionandEstimationinNon-GaussianNoiseSystems,CharacterizationofImpulsiveNoise,DetectorStructuresinNon-GaussianNoise,SelectedExamplesofNoiseModels,ReceiverStructures,andError-Rate Performance,Estimation of Non-GaussianNoiseParameters.

Text Books

1. HarryL. VanTrees,“Detection,Estimation,andModulationTheory, Part I,” JohnWiley&Sons, Inc. 2001.
2. A.PapolisandS.UnnikrishnaPillai,“Probability,RandomVariablesandstochasticprocesses”.TheMcGraw-Hill 2002.

Reference Books

1. StevenM.kay,“FundamentalsofStatisticalsignalprocessing,volume-1:Estimationtheory”. Prentice Hall1993.
2. StevenM.kay,“FundamentalsofStatisticalsignalprocessing,volume-2:Estimationtheory”. Prentice Hall1993.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

WIRELESSSENSORNETWORKS

Paper:MTEC-ELII-306A **L-T-P:4-0-0** **Duration of Exam: 3 Hr.**

Major Test Marks: 60 **Minor Test Marks: 40** **Credit: 4**

Unit I

Introduction Cellular and Ad Hoc Wireless Networks:-Applications of Ad Hoc Wireless Networks, Issues in AdHoc Wireless Networks: Medium Access Scheme – Routing – Multicasting – Transport Layer Protocols-PricingScheme-QualityofServiceProvisioning-SelfOrganization-Security-Addressing and Service Discovery Energy management-Scalability-Deployment Considerations, Ad Hoc Wireless Internet.

Unit II

SensorNetworks:-ComparisonwithAdhocwirelessnetworks-ChallengesforWSNs-DifferencebetweensensornetworksandTraditionalsensornetworks–TypesofApplications–EnablingTechnologiesforWirelessSensorNetworks–SingleNode Architectures–HardwareComponents–EnergyConsumptionofSensorNodes,Issues in Designing a Multicast Routing Protocol.

Unit III

SensorNetworkArchitecture:-DataDissemination-FloodingandGossiping-DatagatheringSensorNetworkScenarios–OptimizationGoalsandFiguresofMerit–DesignPrinciplesforWSNs-GatewayConcepts–Needfor gateway– WSN to Internet Communication– Internet to WSN Communication–WSN Tunneling.

MACProtocols:-MACProtocolsforSensorNetworks-LocationDiscovery-QualityofSensorNetworks-EvolvingStandards-OtherIssues-Lowdutycycleandwakeupconcepts-TheIEEE802.15.4MACProtocolsEnergyEfficiency-Geographic Routing Mobile nodes

Unit IV

RoutingProtocols:-

Flat,Locationbased,HierarchicalProtocol,DesignConstraintsforRoutinginWSN's,ClusteredArchitecture,LEACHProtocol,Hybridenergyefficientdistributedclustering,RoutingGossiping andAgentbasedUnicastForwarding-EnergyEfficientUnicast-BroadcastandMulticastGeographicRouting-Mobilenodes-Security-ApplicationSpecificSupport-Targetdetectionandtracking-Contour/edgedetection-FieldSampling.

Text Books

1. Ibrahiem M.M.ElEmary,S.Ramakrishnan,—Wireless Sensor Networks from Theory to Applications‖, CRC Press Taylor & Francis group, 2013
2. Holger Karland Andreas Wiilig, —Protocolsand ArchitecturesforWireless SensorNetworks‖ JohnWiley& SonsLimited 2008.

Reference Books

1. Wilson,—SensorTechnologyhandbook,‖Elsevierpublications2005.
2. AnnaHac—WirelessSensorNetworksDesign,‖JohnWiley&SonsLimitedPublications2003.
3. C.SivaRamMurthyandB.S.Manoj—AdHocWirelessNetworks,‖PearsonEdition2005.

MasterofTechnology(ELECTRONICS&COMMUNICATION)

PATTERNRECOGNITION

Paper:MTEC-ELII-308A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**

Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit–I

Introduction:- PolynomialCurve Fitting, Probabilitytheory,Model Selection, Curse of Dimensionality.**ProbabilityDistributions:-** BinaryandMultinomialVariables,GaussianDistribution,ExponentialFamily,Non parametricmethods

Unit–II

Linear Model for Regressions:- LinearBasisFunctionModels,TheBias-VarianceDecomposition,BayesianLinearRegression,BayesianModelComparison **LinearModelsforClassification:-** DiscriminantFunctions,ProbabilisticGenerativeModels,ProbabilisticDiscriminativeModels

Unit–III

MixtureModels and EM:- *K*-meansClustering,Mixtures of Gaussians An Alternative View of EM**ContinuousLatentVariables:-** PrincipalComponentAnalysis,ProbabilisticPCA,KernelPCA,NonlinearLatentVariableModels

Unit–IV

SparseKernelMachines:- Maximum MarginClassifiers- SVM, MulticlassSVM, RelevanceVectorMachines- RVM for regression,Analysis of sparsity, RVM forclassification

Text Book:

PatternRecognition andMachineLearningbyChristopherM. BishopPublisher:Springer

Reference Books

1. R.O.Duda,P.E.HartandD.G.Stork,PatternClassification, John Wiley, 2001.
2. Statisticalpattern Recognition; K. Fukunaga; Academic Press, 2000.
3. S.Theodoridis and K.Koutroumbas, PatternRecognition, 4th Ed., Academic Press, 2009.

Master of Technology (ELECTRONICS & COMMUNICATION)

MULTIMEDIA COMMUNICATION SYSTEMS

Paper:MTEC-ELII-310A **L-T-P:4-0-0** **Duration of Exam: 3 Hr.**

Major Test Marks: 60 **Minor Test Marks: 40** **Credit: 4**

Unit-I

MultimediaCommunications:-
IntroductionaboutMMC,Multimediainformationrepresentation,MultimediaApplications:InterpersonalApplications& Entertainmentapplications .Multimedia Storage Device.

Unit-II

Text&ImageCompression:-
Compressionprinciples,Textcompressioncodingtechniques,Stillimagecoding:JPEG,SequentialandProgressiveDCTbasedencodingalgorithms,Losslesscoding,GraphicsInterchangeFormat,Tagged image file format,Introductionto JPEG 2000.

Unit-III

AudioCompression:-
Digitalaudiorepresentationandprocessingtimedomainandtransformdomainrepresentations Transmission&processingofDigitalAudio,PredictiveDPCM,LinearPredictiveCoding,Psychoacousticmodel,perceptual coding, MPEG AudioCoder,MusicalInstrumentsynthesizers.

Unit-IV

VideoCompression:-
VideoCompressionprinciples,framesinvideoandtheirencoders,conceptofmotionestimationandcompensation,Content basedvideocoding,BlockdiagramofMPEG4videoencoderanddecoder,An overview of H.261 and H.263 video codingtechniques.

Text Books

1. FredHalsall, Multimedia Communications,Pearson.
2. Y.Q. Shi &H.Sun,Image andVideo Compression forMultimedia Engineering, CRC press, 2000

Reference Books

1. J.F.K Buford, Multimedia Systems, Pearson,2000
2. S.V.Raghavan&S. K. Tripathi , Networked Multimedia Systems,PrenticeHall,1998

MasterofTechnology(ELECTRONICS&COMMUNICATION)

QUALITYANDRELIABILITYOFELECTRONICSYSTEMS

Paper:MTEC-ELII-312A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**

Major Test Marks:60 **Minor Test Marks:40** **Credit: 4**

Unit-I

Introduction:-
Definitionofreliability,quality,availability,maintainability,typesoffailures,variousparametersofsystemeffectiveness,conceptoffailure
modes,differencebetweenMTTRandMTTF.Reliabilitymathematics:Classicalsettheory,Booleanalgebra,samplespace,definitionofprobability,basicpropertiesofprobability,conditionalprobability,andrandomvariables.Probabilitydistribution:Exponentialdistribution,gamma distribution, binomial distribution, normaldistribution andWeibulldistribution.

Unit-II

ReliabilityDataAnalysis:-
Thereliabilityfunction,bathtubcurve,datacollection,storage&recoveryofdata,componentreliabilityfromtestdata,linearhazard model&exponentialhazardmodel.SystemReliability:Systemswithcomponentsinseries,systemswithcomponentsinparallel,series–parallelsystems,Faulttreetechniques,K-out of m systems.

Unit-III

ElectronicsSystemReliability:-Reliabilityofelectroniccomponents,componenttypesandfailuremechanics,circuitandsystem aspects, reliabilityof electronicsystemdesign, parameter variationandtolerance.

Unit-IV

QualityManagementSystem&TQC:-
Qualitypolicy,cost&quality,conceptofTQM,managementofreliability&quality,elements of qualitysystems,essentialsteps in implementingqualitysystem forISO: 9000.**Text books:**

1. Practical ReliabilityEngineering/ PatrickD.T.,O'Connor/ John Wiley & Sons 4th edition).
2. ReliabilityEngineering/ E.Balagurusamy/ TataMcGraw-Hill.

Reference Books:

1. Qualitycontrol&Total qualityManagement / P.L.Jain/Tata McGraw-Hill.
2. Reliabilityand MaintainabilityEngineering/ Charles E. Ebeling/ TMH.

Masterof Technology (ELECTRONICS&COMMUNICATION)

RADARANDSATELLITECOMMUNICATIONSYSTEMS

Paper:MTEC-ELII-314A **L-T-P:4-0-0** **DurationofExam: 3 Hr.**

Major TestMarks: 60 **Minor TestMarks: 40** **Credit: 4**

Unit-I

RadarBasics:-
Introductiontoradar,radarblockdiagramandoperation,radarfrequencies,Applicationsofradar,Predictionofrangeperformance,minimumdetectablesignal,receivernoise,probabilitydensityfunction,SNR,Integrationofradarpulses,radarcross-sectionoftargets,PRFandrangeambiguities,transmitterpower,systemlosses.

Unit-II

CWandMTIRadar:-
DopplerEffect,CWradar,FMCWradar,multiplefrequencyCWradar.MTIradar,delaylinecanceller,rangegatedMTIradar,blind speeds,staggered PRF,limitationstotheperformanceofMTIradar,non-coherentMTIradar.
TrackingRadar:-Trackingradar:sequentiallobing,conicalscan,
monopulse:amplitudecomparisonandphasecomparisonmethods,Radarantennas.Radardisplays.Duplexer

Unit-III

BasicsOfSatteliteCommunication:-OrbitalaspectsofSatelliteCommunication:Introductiontogeo-synchronousandgeo-stationarysatellites,Kepler'slaws,locatingthesatellitewithrespecttotheearth,sub-satellitepoint,lookangles,mechanicsoflaunchingasynchronoussatellite,Orbitaleffects,Indianscenarioincommunicationsatellites.

Unit-IV

SatteliteCommunication with MultipleAccessTechniques:-Satellite sub-systems:AttitudeandOrbit controlsystems,Telemetry,Trackingandcommandcontrolsystem,Powersupplysystem,Spacecraftantennas,multipleaccesstechniques,comparisonofFDMA,TDMA,CDMA.

SatteliteLinks:-
Introductiontosatellitelinkdesign,basictransmissiontheory,systemnoisetemperatureandG/Tratio,designofdownlinkanduplink,designofsatellitelinksforspecifiedC/N,satellitedatacommunicationprotocols

Text Books

1. Merril.I. Skolnik,"*Introduction to Radar Systems*",2/e, MGH, 1981
2. TimothyPratt andCharlesBostian,"*Satellite Communications*", John Wiley,1986.

Reference Books

1. MarkA. Richards,James A. ScheerandWilliam A. Holm, "*Principlesof ModernRadar: BasicPrinciples,*"YesDee PublishingPvt.Ltd.,India, 2012.
2. ByronEdde,"*Radar:Principles, Technology, Applications*",Pearson, 2008.
3. DennisRoddy,"*Satellite Communications*",MGrawHill,Millan, 4th edition, 2013.

Scheme for the course of Master of Technology in Computer Engineering (Credit Based)

Semester-I

S. No.	Course No.	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs)	Credit
			L	T	P		Theory	Sessional	Practical	Total		
1	MTCOE-101	Advanced Computer Architecture	4	0	0	4	60	40	--	100	3	4
2	MTCOE-103	Advanced Computer Networks	4	0	0	4	60	40	--	100	3	4
3	MTCOE-105	Algorithm Analysis and Design	4	0	0	4	60	40	--	100	3	4
4	MTCOE-107	Distributed Operating Systems	4	0	0	4	60	40	--	100	3	4
5	MTCOE-109	Laboratory – I	0		4	4	--	50	50	100	3	2
6	MTCOE-111	Seminar	0	0	2	2	--	50	--	50	--	1
Total						22	240	260	50	550	-	19

Semester-II

S. No.	Course No.	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs)	Credit
			L	T	P		Theory	Sessional	Practical	Total		
1	*	Elective-I	4	0	0	4	60	40	--	100	3	4
2	MTCOE-202	Advanced Database Design	4	0	0	4	60	40	--	100	3	4
3	MTCOE-204	Object Oriented S/W System Design	4	0	0	4	60	40	--	100	3	4
4	MTCOE - 206	Mobile Ad-hoc and Wireless Sensor Networks	4	0	0	4	60	40	--	100	3	4
5	MTCOE - 208	Laboratory – II	0		4	4	--	50	50	100	3	2
6	MTCOE - 210	Seminar	0	0	2	2	--	50	--	50	--	1
Total						22	240	260	50	550		19

* Elective-I

MTCOE-230	Probability, Random Variables and Stochastic Processes
MTCOE-232	Embedded Systems
MTCOE-234	Data Mining

***At the end of the second semester candidates are required to do his/her Dissertation work in the identified area in consent of the Guide. Synopsis for the dissertation-I is to be submitted within one week of the beginning of IIIrd Semester**

Semester-III

S. No.	Course No.	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs)	Credit
			L	T	P		Theory	Sessional	Practical	Total		
1	**	Elective-II	4	0	0	4	60	40	--	100	3	4
2	MTCOE-301	Social Networks	4	0	0	4	60	40	--	100	3	4
3	MTCOE-303	Dissertation Part-I (to be continued in 4th Semester)	0	0	8	8	--	--	100	100	--	10
4	MTCOE-305	Laboratory-III	0	0	4	4	--	50	50	100	3	2
5	MTCOE-307	Seminar	0	0	2	2	--	50	--	50	--	1
Total						22	120	180	150	450		21

**Elective-II
MTCOE-331 Soft Computing
MTCOE-333 Digital Image Processing

Semester-IV

S. No.	Course No.	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs)	Credit
			L	T	P		Theory	Sessional	Practical	Total		
1	MTCOE-402	Dissertation Part-II (continued from the 3rd semester)	----	----	20	20	--	100	200	300	--	18
Total						20		100	200	300		1
Total Credit of All the Four Semesters							77					

***Each student is required to submit the Thesis (Dissertation-II) only after the acceptance/publication of two papers in a journal/International/National conference of repute like IEEE, Springer, Elsevier, ACM etc.**

Syllabus –I semester

MTC0E-101 Advanced Computer Architecture

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Parallel computer models:

The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

Program and network properties:

Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Unit 2

System Interconnect Architectures:

Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Advanced processors:

Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Unit 3

Pipelining:

Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

Memory Hierarchy Design:

Cache basics & cache performance, reducing miss rate and miss penalty, multilevel cache hierarchies, main memory organizations, design of memory hierarchies.

Unit 4

Multiprocessor architectures:

Symmetric shared memory architectures, distributed shared memory architectures, models of memory consistency, cache coherence protocols (MSI, MESI, MOESI), scalable cache coherence, overview of directory based approaches, design challenges of directory protocols, memory based directory protocols, cache based directory protocols, protocol design tradeoffs, synchronization,

Enterprise Memory subsystem Architecture:

Enterprise RAS Feature set: Machine check, hot add/remove, domain partitioning, memory mirroring/migration, patrol scrubbing, fault tolerant system.

Text Books:

- Kai Hwang, "Advanced computer architecture"; TMH. 2000
- D. A. Patterson and J. L. Hennessey, "Computer organization and design", Morgan Kaufmann, 2nd Ed. 2002

Reference Books:

- J.P.Hayes, "computer Architecture and organization"; MGH. 1998.
- Harvey G.Cragon,"Memory System and Pipelined processors"; Narosa Publication. 1998.
- V.Rajaranam & C.S.R.Murthy, "Parallel computer"; PHI. 2002.
- R.K.Ghose, Rajan Moona & Phalguni Gupta, "Foundation of Parallel Processing", Narosa Publications, 2003
- Kai Hwang and Zu, "Scalable Parallel Computers Architecture", MGH. 2001
- Stalling W, "Computer Organisation & Architecture", PHI. 2000
- D.Sima, T.Fountain, P.Kasuk, "Advanced Computer Architecture-A Design space Approach,"Addison Wesley,1997.
- M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing. 1998
- D.A.Patterson, J.L.Hennessy, "Computer Architecture :A quantitative approach"; Morgan Kauffmann feb,2002.
- Hwan and Briggs, " Computer Architecture and Parallel Processing"; MGH. 1999.

MTC0E-103 ADVANCED COMPUTER NETWORKS

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

MAC Protocols for high speed and wireless networks - IEEE 802.3 standards for fast Ethernet, gigabit Ethernet, 10G, and 100VG-AnyLAN, IEEE 802.11, 802.15, and 802.16 standards for Wireless PAN, LAN, and MAN

Unit 2

IPv6: IPv4 versus IPv6, basic protocol, Header- extensions and options, support for QoS, security, etc., neighbour discovery, auto-configuration, DHCPv6, IPv6 Routers and Routing.

Mobility in networks – Mobility Management: Cellular architecture, Mobility: handoff, types of handoffs; location management, HLR-VLR scheme, Mobile IP and IPv6.

Unit 3

IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc. IPsec protected channel service, virtual private network service, multiprotocol label switching, MPLS VPN

Traffic Types, TCP extensions for high-speed networks, transaction-oriented applications. Other improvements in TCP, Performance issues, TCP Congestion Control – fairness, scheduling and Delay modeling, QoS issues, differentiated services.

Unit 4

Network security at various layers. Security related issues in mobility. Secure-HTTP, SSL, Message digests, Key distribution protocols. Digital signatures, and digital certificates.

Books and References**:**

1. W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
2. G. R. Wright. TCP/IP Illustrated, Volume 2: The Implementation, Addison Wesley, 1995.
3. W. R. Stevens. TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP, and the Unix Domain Protocols, Addison Wesley, 1996.
4. W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
5. C. E. Perkins, B. Woolf, and S. R. Alpert. Mobile IP: Design Principles and Practices, Addison Wesley, 1997.
6. J.F. Kurose and K.W. Ross, Computer Networking – A Top-down Approach Featuring the Internet, Pearson Education, New Delhi, 2004.
7. N. Olifer & V. Olifer, Computer Networks: Principles, Technologies, and Protocols for network Design, Wiley-Dreamtech Low Price, New Delhi

MTCOE-105 Algorithm Analysis and Design

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction

Algorithm concepts, Analyzing and design, Pseudocode conventions, asymptotic efficiency of algorithms, asymptotic notations and their properties.

Analysis Techniques:

Growth Functions, Recurrences and Solution of Recurrence equation-, Amortized Analysis, Aggregate, Accounting and Potential Methods, Probabilistic analysis concepts, hiring problem and its probabilistic analysis, String Matching: naive string Matching, Rabin Karp, and String matching with finite Automata, KW and Boyer – Moore algorithm.

Unit 2

Number Theoretic Algorithms

Elementary notions, GCD, Modular Arithmetic, Solving modular linear equations, The chines remainder theorem, Powers of an element, RSA cryptosystem, Primality testing, Integer factorization, Polynomials. Huffman Codes: Concepts, construction, correctness of Huffman's algorithms; Representation of polynomials, DFT, FFT, Efficient implementation of FFT, Graph Algorithm, Bellman Ford Algorithm, Single source shortest paths in a DAG Johnson's Algorithm for sparse graph, Flow networks & Ford fulkerson Algorithm, Maximum bipartite matching.

Unit 3

Computational Geometry

Geometric structures using C++: Vectors, points, Polygons, Edges: Geometric Objects in space: Finding the intersection of a line & triangle, Finding star shaped polygons and convex hull using incremental insertion.

Unit 4

NP-completeness Concepts

Polynomial time verification, NP-completeness and reducibility, showing problems to be NP-complete like Clique problem, vertex cover problem etc. Approximation algorithms of these problems.

Reference Books

1. T. H Cormen, C E Leiserson. R L Rivest & C Stein, "Introduction to algorithms", 2nd Edition, PHI.
2. Michael J Laszio, "Computational Geometry and Computer Graphics in C++", PHI. India 1996.
3. Brassard, Bratley, "Fundamentals of algorithms", Prentice Hall of India.
4. Knuth, "The Art of Computer Programming", Vol I-III, Pearson Education.

MTCOE-107 Distributed Operating System

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction

Distributed system, goals, Hardware and Software concepts, Fundamental Issues in Distributed Systems, Distributed System Models and Architectures.

Communication in distributed systems: Layered protocols, client-server model. RPC, Group communication.

Unit 2

Synchronization in distributed Systems

Clock synchronization, Clock synchronization Algorithms, Mutual Exclusion and its algorithms, Election algorithms: Bully algorithm, Ring algorithm, Atomic transactions, Transaction models,

Deadlocks: Distributed deadlock detection and prevention.

Unit 3

Process management

Threads, System models, processor allocation, scheduling algorithms, fault tolerance, real-time distributed systems

Distributed File System

Design and implementation of distributed file system, scalability and mobility issues, fault tolerance.

Unit 4

Distributed Shared Memory

Shared memory, consistency models, Page-based distributed shared memory

Case Studies

AMOEBA,MACH

1. Distributed Operating Systems; Andrew S Tanenbaum, Pearson Ed. .
2. Distributed Systems :Concepts and Design; G Colouris, J Dollimore, T Kindberg 3/e Pearson Ed. 2002.
3. Principles of Distributed Systems, VK Garg, Kluwer Academic Publishers, 1996.
4. Distributed Systems and Algorithmic Approach by Su Kumar Boss, Chamal & Hall.
5. Principles of Distributed Computing by V K Garg, IEEE Press.
6. Distributed Computing by A D Kshem Kalyani & Mukesh Singha.
7. Distributed Algorithms by Nancy Lynch, Morgan Kaufmann Press.
8. Introduction to Distributed Algorithms by G Tel, Cambridge University.

MTCOE-109 Laboratory I

A set of fifteen programs will be designed to develop skills and familiarity with the majority of the following and the students will have to execute at least twelve programs out of them:
make, Lex, Yacc, Perl, Awk and other scripting languages, sockets and RPCs, XML, C#, Designing, testing and validation using Rational Suite.

Syllabus –II semester

MTCOE-202 Advanced Database Design

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction:

Overview of DBMS and its internal Architectural, Data Storage and representation in DBMS: Memory Hierarchy, Secondary storage mechanism and reliability improvement through mirroring and RAID, Recovery from disk crashes, Representing Relational data elements with records (fixed and variable) use of page and block formats, Heap, sorted and clustered file organization.

Unit 2

Indexing in DBMS:

Clustered, primary, secondary, dense and Sparse indexing, Hash and Tree based index structures, ISA and B+ tree data structures, bit map indexing, R-indexing.

Database Design:

Three steps of Conceptual, logical and Physical design, and methodology for design, Overview of E-R and Extended E-R Modeling and conversion to logical tables and normalization, Physical database design and tuning – overview of tasks involved and methodology, Guidelines for index selection, Clustering, Demoralization and view definitions, Tuning of Queries with Explain PLAN.

Unit 3 Query

Processing and Transaction management in DBMS:

Query processing architecture in DBMS, relational operations and implementation techniques, Algorithms for Selection, Projection and Join, Query optimization, Query tree and optimization using Relational equivalences, Transaction Management DBMS:Transaction and ACID Properties, schedules and serializability, Concurrency control techniques – locking timestamps and Optimistic Concurrency control, Concept of Recovery management, Buffer and Recovery management structures in DBMS, Deferred update and ARIES algorithm for recovery with an example.

Unit 4

Database Security:

Access Control mechanisms in DBMS, GRANT and REVOKE of VIEWS, Security for Internet applications through Encryption Firewalls, proxy servers, SSL and digital signatures.

Reference Books

1. Gracia-Mlina, Ullman and Widom, "Database System Implementation",(2001)-Pearson Education.
2. Connolly & Begg, "Database Systems", Third Edition (2002)- Pearson Publication.
3. Raghu Ramkrishnan & Gehrke**,** "Database Management Systems", Third Edition McGraw Hill Publications (2003).

MTCOE-204 Object Oriented S/W System Design

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction: Object-oriented Concepts, Object-oriented domain analysis, software reuse, software life cycle models, unified modeling language (UML).

Object-oriented methods (OOM): Overview, Goals, Concepts: Object analysis model, Information model. Behavior model, Process model, Requirements definition model, benefits and weaknesses.

Unit 2

Object-oriented software development methods: ObjectOry: System development and analysis, use cases, entities, interface objects, services and system design, advantages, Introduction to Object-oriented structured design and application examples.

Object-oriented Methodologies: Classification, Rumbaugh methodology, Jacobson methodology, Booch methodology, Responsibility-Driven design, Pun and Winder methodology, Shlaer/Mellor methodology.

Unit 3

Object-Oriented Design: Representation of design model, Identification o components, classes, inheritance and objects, Identification of software behavior, Suitability of Methodology for Object-Oriented Design (MOOD), Context of MOOD, A CASE environment for MOOD, MOOD tools.

Reusability and Life Cycle Issues: Reusability during Object-Oriented design, Object-Oriented software life cycle model, Software life cycle issues.

Unit 4

Software maintenance concepts: S/W maintenance process, Reverse engineering environment, Documentation for S/W maintenance, S/W configuration management and S/W maintenance models.

Object-Oriented Programming Languages: Simula, SmallTalk, Ada95, Object COBOL.

Books and References:

1. Object-Oriented Methods for Software Development, Jag Sodhi, Prince Sodhi, McGraw-Hill.
2. Object-Oriented Software: Design and Maintenance, Luiz Fernando Capretz, Miriam A M Captrez, World Scientific.
3. Ali Bahrami, Object Oriented Systems Development ,:McGraw Hill, 1999
.
4. Rumbaugh et.al.,Object Oriented Modeling and Design, PHI, 1997
.
5. Forouzan, Coombs and Fegan: Introduction to data Communications and Networks TMH, 1999.

6. William Stallings: Data and Computer Communications 5/e, PHI.

MTCOE-206 Mobile Ad hoc and Wireless Sensor Networks

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Mobile Ad hoc Networks (MANET) – Mobility Management, modeling distributed applications for MANET, MAC mechanisms and protocols.

Unit 2

MANET Routing Protocols: Ad hoc network routing protocols, destination sequenced distance vector algorithm, cluster based gateway switch routing, global state routing, fish-eye state routing, dynamic source routing, ad hoc on-demand routing, OLSR & TORA routing, location aided routing, zonal routing algorithm.

Unit 3

Ad hoc network security – Link layer, Network layer, Trust and key management.

Self policing MANET – Node Misbehaviour, secure routing, reputation systems.

Wireless Sensor Networks (WSN) – Design Issues, Clustering, Applications of

WSN.

Unit 4

MAC layer and routing protocols in WSN

Data Retrieval Techniques in WSN – Sensor databases, distributed query processing, Data dissemination and aggregation schemes, Operating Systems for WSN, Security issues in WSN.

Books and References:

1. C. Siva Ram Murthy & B.S. Manoj, Mobile Ad hoc Networks – Architectures & Protocols, Pearson Education, New Delhi, 2004
2. C M Cordeiro & D.P. Agrawal, Adhoc & Sensor Networks – Theory and Applications, ISBN 981- 256-682-1, World Scientific Singapore, 2006
3. C. S. Raghvendra, Wireless Sensor Networks, Springer-Verlag, 2006 (Available as E-Book at NIT Kurukshetra Purchased in 2006)

MTCOE-230 Probability, Random Variables and Stochastic Processes

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Probability Introduction: Introduction, Probability and Induction, Set Theory, Probability Space, Conditional Probability, Bernoulli Trials, Bernoulli's Theorem and Games of Chance.

Unit 2

The Concept of a Random Variable: Introduction, Distribution and Density Functions, Specific Random Variables, Conditional Distributions, Asymptotic Approximations for Binomial Random Variable, The Random Variable $g(\mathbf{x})$, The Distribution of $g(\mathbf{x})$, Mean and Variance, Moments, Characteristic Functions, Bivariate Distributions, One Function of Two Random Variables, Two Functions of Two Random Variables, Joint Moments, Joint Characteristic Functions, Conditional Distributions, Conditional Expected Values Mean Square Estimation Stochastic Convergence and Limit Theorems.

Unit 3

Stochastic Processes: Definitions, Systems with Stochastic Inputs, The Power Spectrum, Discrete-Time Processes, Random Walks, Poisson Points and Shot Noise, Modulation, Cyclostationary Processes, Bandlimited Processes and Sampling Theory.

Unit 4

Markov Chains and Queuing Theory: Introduction, Higher Transition Probabilities and the

Chapman–Kolmogorov Equation, Classification of States, Stationary Distributions and Limiting Probabilities, Transient States and Absorption Probabilities, Markov Processes, Queueing Theory, Networks of Queues / Problems.

Books

- Probability and Statistics with Reliability, Queuing, and Computer Science Applications, Trivedi Kishor Shridharbhai ,John Wiley and Sons.
- Probability, Random Variables and Stochastic Processes, A. Papoulis and S. Pillai, TMH.
- Probability & Statistics – for Engineers & Scientists, R. Walpole, R. Myers, S. Myers and K. Ye.

MTCOE-232 Embedded Systems

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction to embedded systems: Background and History of Embedded Systems, definition and Classification, Programming languages for embedded systems: desirable characteristics of programming languages for embedded systems, low-level versus high-level languages, main language implementation issues: control, typing. Major programming languages for embedded systems. Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

Unit 2

Processor and Memory Organization: Structural units in processor, Processor selection for an embedded system, Memory devices, Memory selection, Allocation for memory to program segments and blocks and memory map of a system, DMA, Interfacing processor. I/O Devices - Device I/O Types and Examples ? Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Device.

Unit 3

Microcontroller: Introduction to Microcontrollers, Evolution, Microprocessors vs. Microcontrollers, MCS-51 Family Overview, Important Features, Architecture. 8051 Pin Functions, Architecture, Addressing Modes, Instruction Set, Instruction Types.
Programming: Assembly Programming. Timer Registers, Timer Modes, Overflow Flags, Clocking Sources, Timer Counter Interrupts, Baud Rate Generation. Serial Port Register, Modes of Operation, Initialization, Accessing, Multiprocessor Communications, Serial Port Baud Rate.

Unit 4

Interrupts: Interrupt Organization, Processing Interrupts, Serial Port Interrupts, External Interrupts, Interrupt Service Routines. Microcontroller Specification, Microcontroller Design, Testing, Timing Subroutines, Look-up Tables, Serial Data Transmission.
Applications: Interfacing Keyboards, Interfacing Displays, Interfacing A/D and D/A Converters, Pulse Measurement, Loudspeaker Interface, Memory Interface.

Books and References:

1. John Catsoulis, "Designing Embedded Hardware", O'reilly
2. An Embedded Software Primer", David E. Simon, Pearson Education
3. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley & Sons, Inc
4. Karim Yaghmour, "Building Embedded Linux Systems", O'reilly
5. Michael Barr, "Programming Embedded Systems", O'reilly
6. Alan C. Shaw, "Real-time systems & software", John Wiley & sons, Inc.
7. Wayne Wolf, "Computers as Components", Harcourt India Pvt. Ltd.

MTCOE-234 Data Mining

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction

Data Mining, Functionalities, Data Mining Systems classification, Integration with Data Warehouse System, Data summarization, data cleaning, data integration and transformation, data reduction.

Data Warehouse

Need for Data Warehousing, Paradigm Shift, Business Problem Definition, Operational and Information Data Stores, Data Warehouse Definition and Characteristics, Data Warehouse Architecture and Implementation, OLAP.

Unit 2

Data Mining Primitives, Query Language and System Architecture, Concept Description, Data generalization, Analysis of attribute relevance, Mining descriptive statistical measures in large databases.

Unit 3

Mining association rules in large databases: Association rule mining, Mining single dimensional boolean association rules from transactional databases, mining multilevel association rules from transaction databases, Relational databases and data warehouses, correlation analysis, classification and prediction.

Unit 4

Introduction to cluster analysis, Mining complex type of data: Multidimensional analysis and descriptive mining of complex data objects, Spatial databases, Multimedia databases, Mining time series and sequence data, Mining text databases, Mining the World Wide Web, Applications and trends in data mining.

Books and References:

1. Data Mining : Concepts and Techniques; Jiawei Han and Micheline Kamber; Elsevier.
2. "Mastering Data Mining: The Art and Science of Customer Relationship Management", by Berry and Lin off, John Wiley and Sons, 2001.
3. "Data Ware housing: Concepts, Techniques, Products and Applications", by C.S.R. Prabhu, Prentice Hall of India, 2001.
4. "Data Mining: Concepts and Techniques", J.Han, M.Kamber, Academic Press, Morgan Kanfman Publishers, 2001.
5. "Data Mining", by Pieter Adrians, Dolf Zantinge, Addison Wesley 2000.
6. "Data Mining with Microsoft SQL Server", by Seidman, Prentice Hall of India,2001.

Syllabus –III semester

MTCOE-301 Social Networks

Lecture: 4 hrs, Total Marks: 100, Total credits: 4
Final Theory paper: 60 Marks, Time: 3 Hours
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 marks+ Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hour for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (compulsory) and four other questions, selecting one question from each unit.

Unit: I: Social Networks and Related Concepts

Introduction to Social Networks: Introduction, uses, examples and types of social networks, Social and economic networks, Opportunities and challenges in social networks, Social structure in social networks, Properties of social networks, algorithmic and economic aspects of social networks,
Social Network Data: Nodes, Edges, Relationship, Graphs, Samples and Boundaries, Formal methods, Adjacency Matrix for undirected and directed networked graphs and using matrices to represent social relations, Random graphs, Properties of random graphs, Percolations, Branching processes, Growing spanning tree in random graphs.
Level in Social Networks:
Ego networks, partial networks, complete or global networks, social networks methods including binary or valued, directed or undirected.

Unit: II Mining the Social Web

Mining Twitter: Fundamental Twitter Terminology, creating a Twitter API Connection, Exploring Trending Topics, searching for Tweets, extracting Tweets entities, analyzing Tweets and Tweet entities with frequency analysis, computing the lexical diversity of Tweets, Examining patterns in Retweets, Visualizing frequency data with histograms.
Mining Facebook: Understanding the social graph API, Understanding the open graph protocol, Analyzing social graph connections
Mining LinkedIn: Making LinkedIn API requests, Downloading LinkedIn connections as a CSV file, Clustering, normalizing data for analysis, measuring similarity, and clustering algorithms.

Unit: III Mining Web pages and Semantic Web

Mining Web pages: Scraping, Parsing and Crawling the Web, Discovering semantics by decoding syntax, Entity-Centric analysis: A paradigm shift, Quality of analytics for processing human language data.
Mining the Semantically Marked-Up Web: Microformats: Easy-to-implement Metadata, Semantics markup to semantic Web: A brief interlude, The semantic Web: An evolutionary revolution.
Social Network Analysis: Introduction, History, Metrics in social network analysis (Betweenness, Centrality, Equivalence relation, Centralization, Clustering coefficient and Structural cohesion).

Unit IV: Equivalence in Social Networks

Structural equivalence, Automorphic equivalence and Regular equivalence

Text Books:

1. Matthew A. Russell, “Mining the Social Web”, O'Reilly and SPD, Second edition New Delhi, 2013.
2. Hanneman, R. A., & Riddle, M., “Introduction to social network methods, Riverside, California: University of California, Riverside. Retrieved from http://faculty.ucr.edu/~hanneman/nettext/.
3. “Social network analysis: Theory and applications”. A free, Wiki Book available at: http://train.ed.psu.edu/WFED-543/SocNet_TheoryApp.pdf.

Reference Books:

1. Lon Safko, “The Social Media Bible: Tactics, Tools, and Strategies for Business Success”, Wiley 3rd Edition, 2012.
2. Peter K Ryan, “Social Networking”, Rosen Publishing Group, 2011.
3. John Scott, Peter J. Carrington, “Social Network Analysis”, SAGE Publishing Ltd., 2011.

MTCOE-331 Soft Computing

Final Theory paper: 60 Marks; Time: 3 Hrs Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit 2

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations, Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations, Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks, Applications.

Unit 3

Regression and Optimization : Least-Squares Methods for System Identification -System Identification: An Introduction, Basics of Matrix Manipulation and Calculus, Least-Squares Estimator, Geometric Interpretation of LSE, Recursive Least-Squares Estimator, Recursive LSE for Time-Varying Systems, An introduction to LSE for Nonlinear Models, Derivative-based Optimization-Descent Methods, The Method of Steepest Descent, Newton's Methods, Step Size Determination, Conjugate Gradient Methods, Analysis of Quadratic Case, Nonlinear Least-squares Problems, Incorporation of Stochastic Mechanisms, Derivative-Free Optimization.

Unit 4

Genetic Algorithm: An Overview of GA, GA operators, GA in problem solving, Implementation of GA.

Text Books:

1. "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R.G. Palmer, Addison-Wesley, California, 1991.
2. "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI, 1995.
3. "Neuro-fuzzy and Soft Computing", by J.-S. R. Jang, C.-T. Sun, and E. Mizutani, PHI.
4. "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.
5. "Soft computing and Intelligent System Design", F. O. Karray and C. de Silva, Pearson, 2009.

Reference:

1. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
2. "Neural Networks: Algorithms, Applications and Programming Techniques", Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

MTCOE-333 Digital Image Processing Lecture-4 hrs Total

Marks: 100. Total credits-4

Final Theory paper: 60 Marks; Time: 3 Hrs Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction And Digital Image Fundamentals: The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

Unit 2

Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods. **Image Enhancement in the Frequency Domain:** Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.

Unit 3

Image Restoration:A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations. **Image Compression:**Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.

Unit 4

Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation. **Representation and Description:** Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. **Object Recoginition:** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

Text Books:

1 Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education, 2004.
2 A.K. Jain, "Fundamental of Digital Image Processing", PHI, 2003.

Reference Books:

1 Rosefield Kak, "Digital Picture Processing", 1999.
2 W.K. Pratt, "Digital Image Processing", 2000.

DETAILED SCHEME FOR M.TECH BIOTECHNOLOGY
(CREDIT-BASED)
Semester-wise Scheduling of Courses
SESSION- 2015-2016
Semester - 1

Course No.	Paper Code	Course Title	Teaching Schedule L	P	Total Hrs	Credits	Minor test	Major test	Pract./ Viva	Total	Duration exam (hrs)
1.	MBT-101	Genomics and Proteomics	4	-	4	4	40	60	--	100	3
2.	MBT-103	Biomaterial Technology	4	-	4	4	40	60	--	100	3
3.	MBT-105	Advances in Bioprocess Engg.	4	-	4	4	40	60	--	100	3
4.	MBT-107	Microbial Diversity & Genomics	4	-	4	4	40	60	--	100	3
5.	MBT-109	Biophysical & Bioanalytical Techniques Lab	-	4x4	16	8	40	--	60	100	3
Total		*4 Lecture Courses, 1 Lab Course*	**16**	**16**	**32**	**24**	**200**	**240**	**60**	**500**	**-**

Semester II

Course No.	Paper Code	Course Title	Teaching Schedule L	P	Total Hrs	Credits	Minor test	Major test	Pract Viva	Total	Duration exam (hrs)
1.	MBT-202	Metabolic Engg.	4	-	4	4	40	60	--	100	3
2.		**Elective-I**	4	-	4	4	40	60	--	100	3
3.	MBT-204	Advances in Genetic Engg.	4	-	4	4	40	60	--	100	3
4.	MBT-206	Drug discovery & development	4	-	4	4	40	60	--	100	3
5.	MBT-208	Literature review & Project writing*	-	3	3	1.5	50	--	--	50	-
6.	MBT-210	Molecular Techniques Lab	-	3x3	9	4.5	40	--	60	100	3
7.	MBT-212	Seminar	2	-	2	2	50	--	--	50	-
Total		*4 Lecture Courses, 1 Lab Course*	**18**	**12**	**30**	**24**	**300**	**240**	**60**	**600**	**-**

***Review article to be submitted on the basis of literature surveyed followed by a Seminar clearly stating the objectives and the methodology to be opted to achieve the objectives.**

Elective-I

MBT-214 Advanced Environmental Biotechnology
MBT-216 Advanced Enzymology & EnzymeTechnology
MBT-218 Cell & Tissue Culture Technology

Semester III

Course No.	Paper Code	Course Title	Teaching Schedule			Credits	Minor test Marks	Major Test Marks	Practical/ Viva	Total marks	Duration of Exam (hrs)
			L	P	Total hrs						
1.		**Elective- II**	4		4	4	40	60	--	100	3
2.		**Elective- III**	4		4	4	40	60	--	100	3
3.	MBT-301	Professional Practice/ Comprehensive Theory & Viva-Voce	-	4	4	2	50	---	---	50	-
4.	MBT-303	Synopsis Seminar	2		2	2	100	--	--	100	-
5.	MBT-305	Dissertation* (to be contd. in IV sem.)	-	24	24	12	100	--	--	100	-
Total Marks		*2 Lecture Courses, 1 Professional practice, 1 Seminar, 1 Dissertation*	**10**	**28**	**38**	**24**	**330**	**120**	**---**	**450**	**-**

Elective-II

MBT-307 Nano Science & Nanotechnology
MBT-309 Advanced Medical Biotechnology
MBT-311 Advanced Industrial Biotechnology

Elective-III

MBT-313 Advanced Plant Biotechnology
MBT-315 Advanced Food Biotechnology
MBT-317 Advanced Animal Biotechnology

Semester IV

Course No.	Paper Code	Course Title	Teaching Schedule			Credits	Minor Test Marks	Major test Marks	Practical/ Viva	Total marks	Duration of exam (hrs)
			L	P	Total hrs						
1.	MBT-402	Dissertation* (to be contd. from III sem.)	-	40	40	20	100	---	200	300	-
2.	MBT-406	Dissertation Seminar	4		4	4	-	-	-	-	-
Total Marks		*1 Dissertation*	4	**40**	**44**	**24**	**100**	**---**	**200**	**300**	**-**

***A student will be allowed to submit M. Tech. Thesis (Dissertation) only after presenting one paper in a conference and another accepted/ published in a refereed journal.**

1st SEMESTER M. TECH. BIOTECHNOLOGY
GENOMICS AND PROTEOMICS
MBT-101

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**
Major Test- 60 Marks; **Time- 3Hrs**
Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performance/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

Unit I

Introduction: Structural organization of genome in Prokaryotes and Eukaryotes; Organelle DNA-mitochondrial, chloroplast; DNA sequencing principles and translation to large scale projects; NextGen sequence technology and applications. Recognition of coding and non-coding sequences and gene annotation; Tools for genome analysis- RFLP, DNA fingerprinting, RAPD, PCR,. DNA chips and their use in transcriptome analysis; Mutants and RNAi in functional genomics.

Unit II

Genome sequencing projects: Human, microbes, plants and animals; Accessing and retrieving genome project information from web; Identification and classification using molecular markers-16S rRNA typing/sequencing, EST and SNP's contigs; allele/gene mining; synteny and comparative genomics. Dart

Unit III

Proteomics: Protein analysis (includes measurement of concentration, amino acid composition, N-terminal sequencing); 2-D electrophoresis of proteins; Microscale solution isoelectric focusing; Peptide fingerprinting; Protein-protein interactions, Yeast two hybrid system. SAGE.

Unit IV

Genomic and Proteomic analysis: Metabolomics for elucidating metabolic pathways, Analysis of microarray data; Protein and peptide microarray-based technology; PCR-directed protein *in situ* arrays; Structural proteomics. Real Time PCR, Platform technologies for screening.

Text/References:

1. Voet D, Voet JG & Pratt CW, Fundamentals of Biochemistry, 2nd Edition. Wiley 2006
2. Brown TA, Genomes, 3rd Edition. Garland Science 2006
3. Campbell AM & Heyer LJ, Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition..
4. Primrose S & Twyman R, Principles of Gene Manipulation and Genomics, 7th Edition, Blackwell, 2006.
5. Glick BR & Pasternak JJ, Molecular Biotechnology, 3rd Edition, ASM Press, 1998.
6. Specific journals and published references.

1st SEMESTER M. TECH. BIOTECHNOLOGY
BIOMATERIAL TECHNOLOGY
MBT-103

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**
Major Test- 60 Marks; **Time- 3Hrs**
Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performance/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test
Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Introduction to biomaterials: Definition of biomaterials, History and current status of the field, Types of biomaterials, Important properties of biomaterials. Characterization techniques (X-ray diffraction, UV-VIS, IR and NMR Spectroscopy, Mass spectrometry, HPLC- Size exclusion chromatography).

UNIT II

Biomaterial degradation in Biological environment; Biodegadable materials: Ceramics and polymers; **Processing to improve biocompatibility**: sterilization and fixation.

Cell interactions with biomaterials: Introduction: Cell-surface interactions and cellular functions. Techniques: Assays to determine effects of cell-material interactions: Cytotoxicity assays, DNA and RNA assays and Protein production assays- Immunostaining.

UNIT III

Biomaterial implantation and Immune response to biomaterials. Undesired immune responses to biomaterials: innate vs. acquired responses to biomaterials and hypersensitivity reactions. Clinical signs of acute inflammation against biomaterials. *In vitro* assays for inflammatory response. Biomaterials and thrombosis: Tests for hemocompatability.

UNIT IV

Infection, tumorigenesis and calcification of biomaterials. Overview of potential problems with biomaterial implantation, steps to infection, techniques for infection experiments. Biomaterial related tumorigenesis, *In vitro* and *in vivo* models for tumorigenesis experiments, pathologic calcification of biomaterials and techniques for pathologic calcification experiments.

Text/References:

1. Temenoff, I.S. and Mikos, A.G. Biomaterials: The Intersection of Biology and Material Science. Pearson Education, India. 2009 Indian ed.
2. Ratledge C and Kristiansen B, Basic Biotechnology, Cambridge University Press, 2nd Edition, 2001.
3. J B Park, *Biomaterials - Science and Engineering,* Plenum Press, 1984.
4. Sujata V. Bhat, *Biomaterials,* Narosa Publishing House, 2002.
5. C.P.Sharma & M.Szycher, *Blood compatible materials and devices,* Technomic Publishing Co. Ltd., 1991.
6. Piskin and A S Hoffmann, *Polymeric Biomaterials* (Eds), Martinus Nijhoff Publishers. (Dordrecht. 1986)
7. Eugene D. Goldbera, *Biomedical Ploymers.*

1st SEMESTER M. TECH. BIOTECHNOLOGY
ADVANCES IN BIOPROCESS ENGINEERING
MBT-105

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**
Major Test- 60 Marks; **Time- 3Hrs**
Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test
Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

Unit I

Introduction to Bioprocess Engineering: **Historical development of bioprocessing technology**, processing and production of recombinant products. Immobilization of enzymes and cells; Batch and chemostat cultures; Computer simulations; Fed-batch and mixed cultures; Scale-up principles. Transport phenomenon in bioprocess systems.

Unit II

Kinetics of substrate utilization and product formation. Ideal reactors for kinetics measurements. **High performing reactors and industrial reactors**. Kinetics of balanced growth.. Structured kinetic models. Product formation kinetics. Segregated kinetic models of growth and product formation.

Unit III

Recovery and purification of fermentation products: Liquid-liquid extraction, cell disruption and isolation of non- secreted products, Lyophilization and Spray dryinggel filtration; ion-exchange chromatography; affinity chromatography; hydrophobic interaction chromatography: HPLC: Different modes of HPLC, isocratic and gradient operations, normal & reverse phase operations and detectors. Membrane based affinity separations; two-phase affinity partitioning; use of reverse micelles in protein separation; chiral separations; molecular imprinting.

Unit IV

Microbial strain improvement. Screening and isolation of microorganisms. Strain improvement for the selected organism: mutation and screening of improved cultures, random and strategic screening methods. Use of recombinant DNA technology, protoplast fusion techniques for strain improvement of primary and secondary metabolites. Production of recombinant molecules in heterologous system, problems associated with strain improvement, improvement of characters other than products and its application in the industry. Preservation of cultures after strain improvement program.

Texts/ References-

1. Biochemical Engineering fundamentals" by J E Bailey and D F Ollis, 2nd ed, McGraw-Hill .
2. "Principles of fermentation technology" by P F Stanbury and A Whitaker, Pergamon press.
3. "Principles of Cell Energetics" : BIOTOL series, Butterworth - Heinemann.
4. "Bioprocess Technology - Kinetics & Reactors" by A Moser, Springer-Verlag.
5. "Biotechnology" Vol.4 Meanning Modeling and Control Ed. K.Schugerl, VCH (1991).
6 **"Biotechnology" Vol.3 Bioprocessing Ed.G. Stephanopoulos, VCH (1991).**
7. "Biochemical Engineering and Biotechnology Handbook" by B.Atkinson&F.Mavituna, 2nd Ed. Stockton Press (1991).
8. Specific journals and published references.

1st SEMESTER M. TECH. BIOTECHNOLOGY
MICROBIAL DIVERSITY AND GENOMICS
MBT-107

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**
Major Test- 60 Marks; **Time- 3Hrs**
Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test
Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Microbial Evolution and Systematics. Early Earth and the origin and diversification of life. Microbial evolution and systematic. Bergey's Manual of Systematic Bacteriology. Archaea and Bacterial Domains- Overview. Bacterial Diversity: The phylogeny of bacteria. Phototrophic, Chemolithotrophic and Methanotrophic Proteobacteria. Aerobic and Facultatively Aerobic Chemoorganotrophic Proteobacteria. Morphologically unusual Proteobacteria. Delta and Epsilonproteobacteria.

UNIT II

Gram Positive Bacteria and Archaeal Diversity. Overview of Gram positive and other bacteria. Actinobacteria. Cyanobacteria and Prochlorophytes. Chlamydia. Planctomyces/ Pirellula. Verrucomicrobia. Flavobacteria. Cytophaga Group. Green Sulphur and Non-Sulphur Bacteria. Spirochetes. Dienococci. Hyperthermophilic Bacteria- Nitrospira and Deferribacter.

UNIT III

Archaeal Diversity. Phylogeny and general metabolism. Euryarchaeota. Crenarchaeota. Evolution and life at high temperature.

Eukaryotic and Viral Diversity. Phylogeny of Eukarya. Protists, Fungi, Unicellular Red and Green Algae. Viral Diversity. Viruses of Bacteria and Archaea. RNA and DNA viruses of Eukaryotes. Retroviruses and Hepadnaviruses.

UNIT IV

Microbial Genomics. Overview of microbial genomes. Prokaryotic genomes- Size and ORF contents, Bioinformatic analyses and gene distribution. Genomes of Eukaryotic organelles. Eukaryotic microbial genomes. Genome function and regulation. Microarrays and the transcriptome. Proteomics and Metabolomics.

Evolution of Genomes. Gene function, duplications and deletions. Mobile DNA-Transposons Insertion Sequences. Horizontal Gene Transfer and Genome Stability. Evolution of virulence- Pathogenicity Islands. Environmental Genomics. Detecting uncultured microorganisms. Viral genomes in nature.

Text/Reference Books

1. Madigan. M. T. 2008. Brock: Biology of Microorganisms. 12th Edition. Benjamin Cummings. California, USA.
2. Prescott, L. M., Harley, J. P. and Klein, D. A. 2007. Microbiology. 7th Edition. McGraw Hill, USA.
3. Atlas, R. M. and Bartha, R. 1997. Microbial Ecology: Fundamentals and Applications. Benjamin Cummings, California, USA.
4. Specific Journals and Published References

1st SEMESTER M. TECH. BIOTECHNOLOGY

BIOPHYSICAL AND BIOANALYTICAL TECHNIQUES LABORATORY MBT-109

Practical- 4x4= 16 Hrs **Total Marks: 100** **Total credits- 4**

Final practical exam: 60 Marks (Lab performance: 30 marks + Written exam: 20 marks + Viva Voce-cum-Laboratory Record: 10); Time: 3 Hrs

Minor Test: 40 marks (Class performance: 30 + Viva Voce: 10).

Note: A college must offer 70% of the below listed experiments. The remaining 30% experiments may be modified by college according to facilities available.

Objective

To provide hands on training on basic and advanced techniques.

Practical Exercises

1. Concept of pH, preparation of buffers, measurement of pH.
2. Centrifugation: Principle and technique.
3. Chromatographic techniques: TLC, Gel Filtration Chromatography, Ion exchange Chromatography, Affinity Chromatography.
4. Electrophoretic techniques - Agarose and PAGE (nucleic acids and proteins).
5. Dialysis and Concentration, Freeze drying, lyophilization.
6. Immunochemical techniques – general principles and applications of immunodiffusion, immunoelectrophoresis, radioimmunoassay, enzyme linked immunosorbent assay, fluorescence immunoassay.
7. Spectroscopy Concepts of spectroscopy, Visible and UV spectroscopy, Laws of photometry. Beer-Lamberts law, Principles and applications of colorimetry.
8. Electron microscopy Transmission and scanning, specific staining of biological materials.
9. Biosensors
10. Study of bio-reactors and their operations.
11. Experiments on microbial fermentation process.
12. Harvesting, purification and recovery of end products.

Text/ References-

1. Ausubel FM, Brent R, Kingston RE, Moore DD, Seidman JG, Smith JA & Struhl K. 2002. *Short Protocols in Molecular Biology*. John Wiley.

2. Kun LY. 2006. *Microbial Biotechnology*. World Scientific.

3. Sambrook J, Russel DW & Maniatis T. 2001. *Molecular Cloning: A Laboratory Manual*. Cold Spring Harbour Laboratory Press.

2nd SEMESTER M. TECH. BIOTECHNOLOGY
METABOLIC ENGINEERING
MBT-202

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**
Major Test- 60 Marks; **Time- 3Hrs**
Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test
Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Introduction: Identification of metabolic regulation. Basic concepts of Metabolic Engineering – Overview of cellular metabolism –Different models for cellular reactions, induction – Jacob Monod model and its regulation, Feedback regulation. Synthesis of Primary metabolites. Amino acid synthesis pathways and its regulation at enzyme level and whole cell level, Alteration of feedback regulation, Limiting accumulation of end products.

UNIT II

Biosynthesis of Secondary Metabolites. Regulation of secondary metabolite pathways, precursor effects, prophase, idiophase relationship, Catabolite regulation by passing control of secondary metabolism, producers and applications of secondary metabolites.
Bioconversions: Applications of Bioconversions, Factors affecting bioconversions, Specificity, Yields, Cometabolism, Product inhibition, mixed or sequential bioconversions, Conversion of insoluble substances.

UNIT III

Regulation of Enzyme Production. Strain selection, Genetic improvement of strains, Gene dosage, metabolic pathway manipulations to improve fermentation, Feedback repression, Catabolite repression, optimization and control of metabolic activities. The modification of existing - or the introduction of entirely new metabolic pathways
Metabolic flux. Integration of anabolism and catabolism, metabolic flux distribution analysis bioprocess, material balance, kinetic types, equilibrium reaction. Experimental determination method of flux distribution, Metabolic flux analysis and its applications,

UNIT IV

Metabolic engineering with Bioinformatics. Metabolic pathway modeling, Analysis of metabolic control and the structure metabolic networks, Metabolic pathway synthesis algorithms.
Applications of Metabolic Engineering. Application in pharmaceuticals, chemical bioprocess, food technology, agriculture, environmental bioremediation and biomass conversion.

Text/References-

1. Wang.D.I.C Cooney C.L., Demain A.L., Dunnil.P. Humphrey A.E. Lilly M.D., Fermentation and Enzyme Technology, John Wiley and sons 1980.
2. Stanbury P.F., and Whitaker A., Principles of Fermentation Technology, Pergamon Press, 1984.
3. Specific journals and published references.

2nd SEMESTER M. TECH. BIOTECHNOLOGY
ADVANCES IN GENETIC ENGINEERING
MBT-204

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**
Major Test- 60 Marks; **Time- 3Hrs**
Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test
Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

Unit I

Basics Concepts: DNA Structure and properties; Restriction Enzymes; DNA ligase, Klenow enzyme, T4 DNA polymerase, Polynucleotide kinase, Alkaline phosphatase; Cohesive and blunt end ligation; Linkers; Adaptors; Homopolymeric tailing; Labeling of DNA: Nick translation, Random priming, Radioactive and non-radioactive probes, Hybridization techniques: Northern, Southern and Colony hybridization, Fluorescence *in situ* hybridization; Chromatin Immunoprecipitation; DNA-Protein Interactions- Electromobility shift assay; DNaseI footprinting. Gene silencing techniques; Introduction to siRNA technology; Micro RNA.

Unit II

Cloning Vectors: Plasmids; Bacteriophages; M13 mp vectors; pUC 19 and pBluescript vectors, Phagemids; Lambda vectors; Insertion and Replacement vectors; EMBL; Cosmids; Artificial chromosome vectors (YACs; SACs); Animal Virus derived vectors-SV-40; adeno virus, vaccinia virus, bacculo & retroviral vectors; Expression vectors; pMal; GST; pET-based vectors; Protein purification; His-tag; GST-tag; MBP-tag etc.; Plant based vectors, Ti and Ri as vectors, Shuttle vectors, Construction of siRNA vectors.

Unit III

Cloning Methodologies : Insertion of Foreign DNA into Host Cells; Transformation; Construction of libraries; Isolation of mRNA and total RNA; cDNA and genomic libraries; Expression cloning; Jumping and hopping libraries; Southwestern and Farwestern cloning/ ligand blotting or West-Western; Protein-protein interactive cloning and Yeast two hybrid system; Phage display; Principles in maximizing gene expression; Differential gene expression and protein array.

Unit IV

PCR and Its Applications: Primer design; Fidelity of thermostable enzymes; DNA polymerases; Types of PCR - multiplex, nested, reverse transcriptase, real time PCR, touchdown PCR, hot start PCR, colony PCR, cloning of PCR products; PCR in molecular diagnostics: Viral and bacterial detection; RFLP, Oligo Ligation Assay (OLA), MCC (Mismatch Chemical Cleavage, ASA (Allele-Specific Amplification), PTT (Protein Truncation Test). LCR and Real Time PCR.

Sequencing methods; Enzymatic DNA sequencing; Chemical sequencing of DNA; Automated DNA sequencing; RNA sequencing; Chemical Synthesis of oligonucleotides;

Text/References:

1. S.B. Primrose, R.M. Twyman and R. W.Old; Principles of Gene Manipulation. 6th Edition, S.B.University Press, 2001.
2. Sambrook and D.W. Russel; Molecular Cloning: A LaboratoryManual, Vols 1-3, CSHL,2001.
3. Brown T A, Genomes, 3rd ed. Garland Science 2006
4. Selected papers from scientific journals.

2nd SEMESTER M. TECH. BIOTECHNOLOGY
DRUG DISCOVERY AND DEVELOPMENT
MBT-206

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**
Major Test- 60 Marks; **Time- 3Hrs**
Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test
Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Introduction to Drug Discovery and Development. Target discovery, Lead Optimization and validation strategies. Classification of Targets. Genomics (new target discovery.
Mechanism of Drug Actions: Inter and intramolecular interactions: Weak interactions in drug molecules; Chirality and drug action; Covalent, ion, ion-dipole, hydrogen bonding, C-H hydrogen bonding, dihydrogen bonding, van der waals interactions and the associated energies. Cation-and OH- interactions. Drug-receptor interactions, receptor theories and drug action; Occupancy theory, rate theory, induced fit theory, macromolecular perturbation theory, activation-aggregation theory. Topological and stereochemical consideration.

UNIT II

Rational Drug Design: Structure activity relationships in drug design, Molecular modeling, Molecular docking and dynamics, Electronic structure methods and quantum chemical methods, De novo drug design techniques and Informatics methods in drug design. Optmization of ADME characteristics and physicochemical properties. Drug Preformulation. Xenobiotic Drug Metabolism.

UNIT III

Clinical Research- definition and basic concept. Pharmacological Screening and Assays : General principles of screening, correlations between various animal models and human situations. Pharmacological screening models for therapeutic areas. Correlation between in-vitro and in-vivo screens; Special emphasis on cell-based assay, biochemical assay, radiological binding assay, high through put screening, specific use of reference drugs and interpretation of results.

UNIT IV

Introduction to Concept of Clinical Trials: Main features of clinical trials, including methodological and organizational considerations and the principles of trial conduct and reporting. Key designs surrounding design, sample size, delivery and assessment of clinical trials. Concept of Assisted Reproductive Technologies (Artificial Insemination, *In Vitro* Fertilziation, Gamete Intrafallopian Transfer and Zygote Intrafallopian Transfer), Gene Therapy- Concept and Applications. Concept of Eugenics.

Texts/References-

1. Hill, R. (2012). Drug Discovery and Development- Technology in Transition. 2nd Edition. Churchill Livingstone, London, UK.

2. Hinchliffe, A.(2003). Molecular Modelling for Beginners. John Wiley & Sons

3. Leach, AR (1996). Molecular Modelling: Principles and Applications. Longman.

2nd SEMESTER M. TECH. BIOTECHNOLOGY
LITERATURE REVIEW AND PROJECT WRITING
MBT-208

Practical- 3Hrs **Total Marks: 50** **Total credits- 1.5**

Minor Test: 50 marks (Relevance of topic & Subject Knowledge: 20 marks + Oral Presentation: 10 + Slide Preparation: 10 + Attendance: 10).

Review article to be submitted on the basis of literature surveyed followed by a Seminar clearly stating the objectives and the methodology to be opted to achieve the objectives.

2nd SEMESTER M. TECH.BIOTECHNOLOGY
MOLECULAR TECHNIQUESLABORATORY
MBT-210

Practical- 3x3= 9 Hrs **Total Marks: 100** **Total credits- 4.5**

Final practical exam: **60** Marks (Lab performance: 30 marks + Written exam: 20 marks + VivaVoce-cum-Laboratory Record: 10); Time: 3 Hrs
Minor Test:40 marks (Class performance: 30 + Viva Voce: 10).

Note: A college must offer 70% of the below listed experiments. The remaining 30% experiments may be modified by college according to facilities available.

Objective
To provide hands on training on basic and advanced techniques.

Practical Exercises
1. Extraction of DNA from clinical samples followed by agarose gel electrophoresis.
2. Extraction of double stranded genomic RNA from viral samples.
3. Polyacrylamide gel electrophoresis (PAGE) for detection of segmented genomic RNA.
4. Polymerase chain reaction for detection of pathogens in blood/and other clinical samples.
5. RT-PCR for detection of RNA.
6. Detection of food borne pathogenic organisms from food samples using PCR technology.
7. Restriction endonuclease profile analysis.
8. Isolation of plasmid DNA from bacteria.
9. Cloning of PCR products followed by nucleic acid sequencing.
10. Analysis of sequenced data.
11. RFLP and RAPD.
12. Southern hybridization/ Northern hybridization.
13. Microarray.

Text/ References-

1. Kun LY. 2006. *Microbial Biotechnology*. World Scientific.
2. Sambrook J & Russel DW. 2001. *Molecular Cloning: a Laboratory Manual*. Cold Spring Harbour Lab. Press.
3. Twyman RM. 2003. *Advanced Molecular Biology*. Bios Scientific.
4. Specific journals and published references.

2nd SEMESTER M. TECH. BIOTECHNOLOGY

SEMINAR

MBT-212

Lecture- 2 Hr **Total Marks: 50** **Total credits- 2**

Minor Test: 50 marks (Relevance of topic & Subject Knowledge: 15 marks + Oral Presentation: 15 + Slide Preparation: 10 + Attendance: 10).

2nd SEMESTER M. TECH. BIOTECHNOLOGY

ELECTIVE-I **ADVANCED ENVIRONMENTAL BIOTECHNOLOGY**

MBT-214

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**

Major Test- 60 Marks; **Time- 3Hrs**

Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

Unit- I

Introduction to Environment: Environment, pollutant and, environmental pollution (Water, soil and air) noise and thermal pollution, their sources and effects.

Role of Biotechnology in Environment Protection: Introduction and current status of biotechnology in environment protection and its future prospects.

Unit- II

Bioremediation : What is bioremediation? Types of bioremediation, bioaugmentation for bioremediation. Bioreactors for remediation processes. Applications of bioremediation.

Removal of Specific Pollutants: Sources of heavy metal pollution, microbial systems for heavy metal accumulation, biosorption, bioleaching.

Bioreactors for Waste Water Treatment: Periodic biological reactors, membrane bioreactors, use of immobilized enzymes and microbial cells.

Unit- III

Solid waste management: landfills, composting, earthworm treatment, recycling and processing of organic residues. **Biotechnology for Hazardous Waste Management** : Xenobiotic compounds, hazardous wastes, biodegradation of xenobiotics, biological detoxification, biotechnological management of hazardous wastes.

Restoration of degraded lands: Restoration through microorganisms, Casuarinas for tropical reforestation on adverse sites, development of stress tolerant plants, use of mycorrhizae in reforestation. Organic farming and use of microbes for improving soil fertility, reforestation of lands contaminated with heavy metals.

Unit- IV

Biotechnology for Waste Treatment of Food and Allied Industries: Biological treatment, methods, SCP and biomass from waste and distillery industry. **Novel Methods for Pollution Control:** Vermitechnology, waste water treatment using aquatic plants, root zone treatment. Aiming for biodegradable and ecofriendly products.

Microbiology and Biochemistry of Waste Water Treatment: Biological treatment, impact of pollutatnts on biotreatment, cell physiology and important microorganisms, plasmid borne metabolic activities, bioaugmentation, packaged microorganisms, use of genetically engineered organisms.

Text/References:

1. Waste water Engineering Treatment, Disposal and Reuse. Metcalf & Eddy (1991) McGraw Hill.
2. Environmental Biotechnology. Forster, C. F and. Wase, D. A. 1. (1987) Ellis Horwood Halsted Press.
3. New Processes of Waste water treatment and recovery. G. Mattock E.D. (1978) Ellis Horwood.
4. Biochemical Engineering Fundamentals 2nd ed. Bailey, 1. E. and Ollis, D. F. (1986) MacGraw Hill. New York.
5. Environmental Biotechnology. Jogdand, S.N. (1995) Himalaya Publishing House, New Delhi.
6. Standard Method for Examination of water & waste water 14th Ed. (1985) American Public Health Ass.
7. Environmental Biotechnology by Alan Scragg (1999); Longman.
8. An Introduction to Environmental Biotechnology by Milton Wainwright (1999): KluwerAcademic Press.
9. Specific journals and published references.

2nd SEMESTER M. TECH. BIOTECHNOLOGY

ELECTIVE-I ADVANCED ENZYMOLOGY AND ENZYME TECHNOLOGY

MBT-216

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**

Major Test- 60 Marks; **Time- 3Hrs**

Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

Unit I

Enzyme Kinetics. Overview of structural basis of enzyme action. Derivation & significance of Michealis-Menten rate expression for mono-substrate enzyme catalyzed reaction. Significance of K_m & V_{max}. Methods to obtain K_m & V_{max} . Effect of temperature on enzyme activity and stability and derivation of activation energy. Effect of pH on enzyme activity. Michealis pH functions and their significance.

Sigmoidal Kinetics Co-operativity phenomenon for protein ligand binding. Symmetric and Sequential models for the action of allosteric enzymes and their significance.

Unit II

Kinetics of Multisubstrate enzyme catalysed reactions. Classification of multi-substrate enzyme catalysed reactions into Ping Pong and Ordered (Sequential and Random) mechanisms with suitable examples. Derivation of rate of expression for Ping Pong, Bi-Bi reaction mechanism. Investigating the reaction mechanism by using the Initial velocity and Inhibition patterns derived from the rate expression of Ping-Pong, Bi Bi reaction mechanism. Cleland's rules to interpret multi-substrate reaction mechanisms. Differentiating between Ping Pong, Sequential and
Random Bi Bi reaction mechanisms by applying Cleland's rules.

Unit III

Nature of active site of enzymes & inhibitors. Nature of the active site/ centre of enzymes. Mechanisms of enzyme catalysis. Significance of trapping of enzyme-substrate complexes. Mechanism of action of standard enzymes such as Lysozyme, Ribonuclease, Chymotrypsin and Protein kinases. Abzymes. Multi-enzyme complexes & their significance. Classification of various inhibitors of enzyme activity with suitable examples of each class. Differentiating various types of inhibitors based on reaction mechanism and kinetics studies.

Unit IV

Regulation of Enzyme activities and application of \enzymes

Regulatory vs. Non-regulatory enzymes. Various mechanism of regulating the activities of enzymes. Immobilization of enzymes - Principle, techniques and its applications. Industrial and clinical applications of enzymes. Techniques for increasing enzyme efficiency and stability.

Text/ References-

1. Enzymes: Biochemistry Biotechnology and Clinical Chemistry by T. Palmer. Affiliated East-West Press Pvt. Ltd., New Delhi 1st edition 2004
2. Review of Enzyme Kinetics: Behaviour and analysis of rapid and steady state enzyme systems by I. H. Segel. New York: Wiley-Interscience.
3. Fundamentals of Enzymology by Nicholas C. Price and Lewis Stevens, Oxford Science Publications, 3rd Edition
4. Enzyme Structure and Mechanisms by Alan Fersht, W.M Freeman & Company, New York.
5. Specific journals and published references.

2nd SEMESTER M. TECH. BIOTECHNOLOGY

ELECTIVE-I CELL AND TISSUE CULTURE TECHNOLOGY

MBT-218 E

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**

Major Test- 60 Marks; **Time- 3Hrs**

Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Plant tissue culture: History of plant cell and tissue culture; Sterlization methods; Culture media; Various types of culture; callus, suspension, nurse, root, meristem, etc.; *In vitro* differentiation: organogenesis and somatic embryogenesis; Plant growth regulators: mode of action, effects on *in vitro* culture and regeneration. Molecular basis of plant organ differentiation.

UNIT II

Micropropagation. Anther and microspore culture; Somaclonal variation; *In vitro* mutagenesis; *In vitro* fertilization; *In vitro* germplasm conservation; Production of secondary metabolites; Synthetic seeds.

Embryo rescue and wide hybridization. Protoplast culture and regeneration. Somatic hybridization: protoplast fusion, cybrids, asymmetric hybrids, etc.

UNIT III

History, scope and prospect of animal cell culture. History of animal cell culture and development, Development of primary culture, Development of cell line by enzymatic disaggregation, Culture media and growth conditions. Cell type and characterization, origin of animal cell line, maintenance and characterization of different cell lines, Marker gene characterization.

UNIT IV

Growth and scale up. Cell growth characteristics and kinetics, Micro-carrier attached growth, Cell culture in continuous, perfusion and hollow fibre reactor, Mass transfer in mammalian cell culture. commercial scale production of animal cells, application of animal cell culture for *in vitro* testing of drugs, testing of toxicity of environmental pollutants in cell culture.

Text/ References-

1. Bhojwani SS. 1983. *Plant Tissue Culture: Theory and Practice*. Elsevier.
2. Christou P & Klee H. 2004. *Handbook of Plant Biotechnology*. John Wiley & Sons.
3. Dixon RA. 2003. *Plant Cell Culture*. IRL Press.
4. George EF, Hall MA & De Klerk GJ. 2008. *Plant Propagation by Tissue Culture*. Agritech Publ.
5. Gupta PK. 2004. *Biotechnology and Genomics*. Rastogi Publ.
6. Morgan, Animal Cell Culture- Biotol Series,1993.
7. Davis.J.M Basic Cell Culture Second Edition, Oxford University Press. (First Indian Edition, 2005.
8. Specific journals and published references.

3rd SEMESTER M. TECH. BIOTECHNOLOGY
PROFESSIONAL PRACTICE/ COMPREHENSIVE THEORY AND VIVA-VOCE
MBT-301

Practical- 4 hrs **Total Marks: 50** **Total credits- 2**
Minor Test: 50 marks (Viva-Voce: 20 + Written exam: 30).

3rd SEMESTER M. TECH. BIOTECHNOLOGY
SYNOPSIS SEMINAR
MBT-303

Lecture- 2 Hr **Total Marks: 100** **Total credits- 2**

Minor Test: 100marks.

The students are required to submit the Synopsis for the dissertation at the beginning of 3rd Semester.

3rd SEMESTER M. TECH. BIOTECHNOLOGY
DISSERTATION
MBT-305

Practical- 24 hrs **Total Marks: 100** **Total credits- 12**

Minor Test: 100 marks.

3rd SEMESTER M. TECH. BIOTECHNOLOGY

ELECTIVE II NANOSCIENCE AND NANOTECHNOLOGY

MBT-307

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**

Major Test- 60 Marks; **Time- 3Hrs**

Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Introduction of Nano Sceience and Nanotechnology. Introduction. History of Nano Science and Technology. Nanomaterials-Main component of Nano Science and Technology.

Structural, Chemical and Physical properties of Nanomaterials. Kubo theory. Size effects. Surface effects. Quantum and quantum tunneling effects.

UNIT II

Synthesis Techniques of Nanocrysatlline Materials. Introduction. Gas Phase Synthesis Techniques. Liquid Phase Synthesis Methods. Mechanical Synthesis. Techniques. Other related Methods. The Synthesis and Properties of Carbon Nanotubes.

Characteristics of Nanocrystalline Materials. Structures and Particle Size Analysis (SPM、EXAFS & HRTEM). Heat and Magnetic Properties (DSC & VSM or SQUID)

UNIT III

Nanocoating Technologies. Advantages of Nanocoating. Electrochemical Techniques. Surface treatment of nanocrystalline materials. Coating technologies.

Nanocomposites. Advantages of nanocomposites. Design concepts. Commercial example of WC/Co system.

UNIT IV

Applications of Nanotechnology. Commercial Trends of Nano applications. Nanobiomaterials. Electronic devices and materials. Textile Industries.Nanocoating and others.

Text/ Reference Books

1. Introduction to Nanotechnology. Charles P. Poole Jr., and Frank J. Owens, John Wiley & Sons, Inc., Hoboken, New Jersey, 2003.
2. NanoTechnology – An Introduction to Nanostructuring Techniques", Michael Köhler, and Wolfgang
   Fritzsche, Wiely-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2004.
3. National Nanotechnology Initiative: Leading to the Next Industrial Revolution", A Report by the Interagency Working Group on Nanoscience, Engineering and Technology, Committee on Technology National Science and Technology Council, U.S.A., February 2000, Washington D.C.
4. Nanostructured Science and Technology- R&D Status and Trends in Nanomaterials, Nanostructured Materials, and Nanodevices (A worldwide Study)", Edited by R.W., Siegel, E. Hu, M.C. Roco, WTEC, September 1999, Loyola College in Maryland, U.S.A.
5. Unbounding the future by K Eric Drexler, C.Pelerson, G.Pergamit Willaim Marrow and Company, 1993
6. Biological molecules in Nanotechnology By Stephen Lee and Lynn M Savage,2004
7. Nanotechnology By mark Ratner and Dan Ratner, Prentice Hall, 2005.
8. Specific journals and published references.

3rd SEMESTER M. TECH. BIOTECHNOLOGY

ELECTIVE II ADVANCED MEDICAL BIOTECHNOLOGY

MBT-309

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**

Major Test- 60 Marks; **Time- 3Hrs**

Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Therapeutic Aspects of Biomacromolecules: Introduction, Endogenous peptides and proteins, Modification of endogenous peptides and proteins.

Immune System: Overview, Antibody-mediated response, Vaccines, Cell- mediated immune response, Cancer immunotherapy.

UNIT II

Oligonucleotides: Overview, Gene therapy, Antisense therapy, Ribozyme.

Oligosaccharides: Introduction, Oligosaccharide synthesis, Heparin, Glycoproteins. Polysaccharide bacterial vaccines, Approaches to carbohydrate- based cancer vaccines.

UNIT III

Radiological Agents: Radiosensitizers and Radioprotective agents.

Cardiovascular Drugs: Myocardial infarction agents, Endogenous *vasoactive* peptides, Hematopoietic agents, Anticoagulants,.. antithrombotics and haemostatics

Chemotherapeutic Agents: Synthetic antibacterial agents, antifungal, anti- protozonal, Antihelminithic agents Antiameobic agents, Antiviral agents.

UNIT IV

Endocrine Drugs: Sex hormones and analogs, Agents affecting the immune response.

Drug Targeting: Basic concepts and novel advances, Brain-specific drug targeting strategies, Pulmonary drug delivery, Cell specific drug delivery.

Text/ References:-

1. Pharmaceutical Chemistry by Christine M. Bladon *John Wiley* & *Sons, Ltd.* (2002).
2. Burger's Medicinal Chemistry and Drug Discovery (5th edition) by Manfred E.,Wolff. A Wiley & Sons, Inc. (2000).
3. Drug Targeting Organ-Specific Strategies by Grietje Molema and Dirk K. F. Meijer. Wiley (2002).
4. Specific journals and published references.

3rd SEMESTER M. TECH. BIOTECHNOLOGY

ELECTIVE II ADVANCED INDUSTRIAL BIOTECHNOLOGY

MBT-311

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**

Major Test- 60 Marks; **Time- 3Hrs**

Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Microbial diversity and strategies for its recovery. Bioprospecting for novel compounds. Screening of microbial isolates for bioactivity. Cultivation of hyperthermophilic and extremely thermo acidophilic microorganisms. Instrumentation and monitoring of bioreactors. Culture and analysis using gel microdrops. Concepts of anaerobic fermentation and contract fermentations.

UNIT II

Experimental design for improvement in fermentation processes. Strain improvement by non-recombinant methods. Software applications in fermentation processes. Methods for biocatalysis and biotransformation. Downstream processing. Cell and enzyme immobilization. Introduction to bioprocess simulation. Quality assurance and quality control.

UNIT III

Introduction to genetic analysis of *Streptomyces* and *Bacillus* spp. using tools of recombinant DNA technology. Applications of rDNA technology in thermophiles. Design and assembly of polycistronic operons in *Escherichia coli. In vivo* folding of recombinant proteins in *E. coli.* Expression of G protein coupled receptors in microorganisms. Selection of suitable hosts for *E. coli* optimized for expression of proteins. Mechanism of mRNA degradation in bacteria and their implication for stabilization of heterologous transcripts. Filamentous fungi in industrial biotechnology. Genetics and genomics of *Saccharomyces cerevisiae* and *Zygosaccharomyces rouxii.*

UNIT IV

Methods for optimizing industrial enzymes. Metabolic pathway engineering of aromatic compounds and antibiotic biosynthesis. Cloning and analysis of genes for the biosynthesis of microbial secondary metabolites. Antibiotic resistance mechanisms of bacterial pathogens. Genetics of bacteriocins produced by Lactic acid bacteria and their use in novel industrial applications. Biomarkers and bioreporters to track microbes and monitor their gene expression. Biofilms and Biocorrosion. Future perspectives in industrial microbial technology.

Textbooks and Reference Books

1. Industrial Microbiology. Casida Jr. , L.E . (1968) New Age International (P)Ltd. New D elhi .

2. Prescott & Dunn's Industrial Microbiology. Ed. E. G. Reed (1987). CBS Publishers, New Delhi .

3. Biotechnology: A Textbook of Industrial Microbiology 2nd Edition. Crueger, W. and Crueger, A. (2000) Panima Publishing Corporation, New Delhi.

4. Demain, A.L. and Davies, 1.E. Manual ofIndustrial Microbiology and Biotechnology 2nd Ed. ASM Press, Washington DC.

3rd SEMESTER M. TECH. BIOTECHNOLOGY

ELECTIVE III ADVANCED PLANT BIOTECHNOLOGY

MBT-313

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**

Major Test- 60 Marks; **Time- 3Hrs**

Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Principles of plant breeding. Breeding methods for self and cross pollinated crops; Heterosis breeding; Limitations of conventional breeding; Aspects of molecular breeding.

Genetic Transformation of plants: *Agrobacterium-plant* interaction; Virulence; Ti and Ri plasmids; Opines and their significance; T-DNA transfer; Disarming the Ti plasmid *Agrobacterium-mediated* gene delivery; Co integrate and binary vectors and their utility; Direct gene transfer - PEG-mediated, electroporation, particle bombardmen; Screenable and selectable markers; Characterization of transgenics; Chloroplast & mitochondrial transformation; Marker-free methodologies; Gene targeting.

UNIT II

Molecular Mapping and Marker Assisted Selection (MAS). Quantitative and qualitative traits; MAS for genes of agronomic importance, e.g. insect resistance, grain quality and grain yield; Molecular polymorphism, RFLP, RAPD, STS, AFLP, SNP markers; Construction of genetic and physical map; QTL mapping and cloning.

UNIT III

Genetic Engineering for Plant Architecture and Metabolism. *Arabidopsis* in molecular biology. Forward and Reverse Genetic Approaches, isolation of promoters and other regulatory elements, Transcriptional and post-transcriptional regulation of gene expression, RNA interference, and gene silencing, Transcript and proteome analysis, transcript profiling in biological systems. Hormone regulatory pathways: Ethylene, Cytokinin, Auxin and ABA, SA and JA; Regulation of flowering: photoperiod, vernalization, circadian rhythms. ABC Model of Floral Development, Molecular basis of self incompatibility, Protein engineering; Seed storage proteins, Vitamins and other value addition compounds; Source-sink relationships for yield increase; Post-harvest bioengineering; Plant architecture.

UNIT IV

Biotic and Abiotic Stress Resistance/Tolerance and quality improvemrent. Bacterial resistance; Viral resistance; Fungal resistance; Herbicide resistance. Drought, salinity, thermal stress, flooding and submergence tolerance. **Plants as Bioreactors**: Concept of biofactories; Fermentation and production of industrial enzymes, vitamins, antibiotics and other biomolecules; Cell cultures for secondary metabolite production; Production of pharmaceutically important compounds; Bioenergy generation.

Texts/References:

I. Adrian Slater, Nigel Scott and Mark Fowler, Plant Biotechnology: The genetic manipulation of plants, I st Edition, Oxford University Press,2003
2. Chrispeels, MJ and Sadava, DE, Plants, Genes and Crop Biotechnology2003 2nd edition, American Society of Plant Biologists, Jones and Bartlett Publishers, USA
3. Arie Altman, Marcel Dekker, Inc. 2001 Agricultural Biotechnology
4. Biochemistry and Molecular Biology of Plants; Edited by Buchanan, Gruissem and Jones 2000, , American Society of Plant Biologists, USA
5. Edited by BR Jordan, 2nd Edition, The Molecular Biology and Biotechnology *of* Flowering, CABI, 2006.
6. Neil Wille, Phytoremediation: Methods and Reviews, 1st Edition, Humana Press, 2007.
7. Denis Murphy, Plant Breeding and Biotechnology: Societal Context and the Future of Agriculture, Cambridge University Press, 2007.
8. Specific journals and published references.

3rd SEMESTER M. TECH. BIOTECHNOLOGY

ELECTIVE III ADVANCED FOOD BIOTECHNOLOGY

MBT-315

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**
Major Test- 60 Marks; **Time- 3Hrs**

Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Status of food processing industry in India and abroad; prospects and constraints in development of Indian food industry. Introduction to human nutrition; Nutritive values of foods; Basal metabolic rate; Dietary requirements and deficiency diseases of different nutrients.

UNIT II

Newer concepts and developments in food processing.

Functional foods: Fat Replacers and Substitutes, Neutraceuticals, Probiotics. Nutritional significance: Role of nutraceutical / functional foods in cardiovascular health, diabetes, obesity, immunity, age related muscular degeneration, stress management. Food additives: stabilizers, emulsifiers, antioxidants, colouring agents, low calorie sweetners etc., Organic food.

UNIT III

Food Preservation : Principles of food preservation, Techniques of preservation: Low temperature preservation :cold storage, refrigeration and freezing . High Temperature preservation: Blanching, Pasteurization, Canning. Preservation by fermentation: curing and pickling. Dehydration and drying of food items: Various types of driers – Tray drier, roller drier, spray drier, freeze drier and solar drier, Preservation by radiation; : chemical preservatives, biopreservatives.

UNIT IV

Food Packaging: Functions of packaging; Type of packaging materials; Selection of packaging material for different foods; Methods of packaging. Types of Containers. Biodegradable materials and Coating for food packaging; Packaging regulations. Waste Disposal Methods from food industries: Biological composting, drying and incineration; Landfill digester, Vermicomposting pit, Biogas plant, Activated Sludge Process.

Text/References-

1. Fellows PJ. 2000. *Food Processing Technology: Principles and Practices.* 2nd Ed. CRCWoodhead Publ
2. Fennema CR. 1975. *Principles of Food Science.* Part n. *Physical Principles of Food Preservation.* Marcel Dekker.
3. Guy R. 2001. *Extrusion Cooking: Technologies and Applications.* CRCWoodhead Publ.

4. Norman W & Desrosier IN. 1987. *The Technology of Food Preservation*. 4th Ed. CBS Publ.
5. Penfield MP & Campbell AM. 1990. *Experimental Food Science.* 3rdEd. Academic Press.
6. Ramaswamy H & Marcotte M. 2006. *Food Processing: Principle and Application.* Taylor & Francis.
7. Vangarde JS & Woodburn M. 1994. *Food Preservation and Safety: Principles and Safety.* Iowa State University Press, Iowa.

3rd SEMESTER M. TECH. BIOTECHNOLOGY

ELECTIVE III ADVANCED ANIMAL BIOTECHNOLOGY

MBT-317

Lecture- 4Hrs **Total Marks- 100** **Total Credits- 4**

Major Test- 60 Marks; **Time- 3Hrs**

Minor Test- 40 marks= Sum of Two Best Minor Test- 30 Marks (I Minor Test- 15 Marks, II Minor Test- 15 marks, III Minor Test- 15 marks) + Class Performamce/Behaviour/Attendance- 10 Marks. Time 1 Hr for Each Minor Test

Note for Paper Setter- Nine questions will be set in all. Question 1, which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set sectionwise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (Compulsory) and four other questions, selecting one questions from each unit.

UNIT I

Vaccines & Diagnostics: Conventional methods of animal vaccine production, recombinant approaches to vaccine production, hybridoma technology, phage display technology for production of antibodies, antigen-antibody based diagnostic assays including radioimmunoassays and enzyme immunoassays, immunoblotting, nucleic acid based diagnostic methods, commercial scale production of diagnostic antigens and antisera, human and animal disease diagnostic kits, probiotics, application of cell culture technology in production of human and animal viral vaccines.

UNIT II

Reproductive Biotechnology: Structure of sperms and ovum. Cryopreservation of sperms, ova and embryos, artificial insemination, super ovulation, *in vitro* fertilization, culture of embryos, embryo transfer technology, embryo-spliting, embryo sexing, transgenic manipulation of animal embryos, Animal cloning, cloning for conservation of endangered species, Ethical, social and moral issues related to cloning, *in utero* testing of foetus for genetic defects, pregnancy diagnostic kits, anti-fertility animal vaccines.

UNIT III

Molecular approaches to breeding. Introduction to different breeds of domestic animals and poultry. Genetic characterization of livestock breeds, Marker assisted breeding of livestock, Introduction to animal genomics, Different methods for characterization of animal genomes, SNP, STR, QTL, RFLP, RAPD, genetic basis for disease resistance.

UNIT IV

Immunological and nucleic acid based methods for identification of animal species, detection of meat adulteration using DNA based methods, detection of food/feed adulteration with animal protein, identification of wild animal species using DNA based methods confiscated by anti-poaching agencies.

Text/ References-

1. Gordon I. 2005. *Reproductive Techniques in Farm Animals*. CABI. 46
2. Kindt TJ, Goldsby RA & Osbrne BA. 2007. *Kuby Immunology*. WH Freeman.
3. Kun LY. 2006. *Microbial Biotechnology*. World Scientific.
4. Levine MM, Kaper JB, Rappuoli R, Liu MA, Good MF. 2004. *New Generation Vaccines*. 3rd Ed. Informa Healthcare.
5. Lincoln PJ & Thomson J. 1998. *Forensic DNA Profiling Protocols*. Humana Press.
6. Portner R. 2007. *Animal Cell Biotechnology*. Humana Press.
7. Twyman RM. 2003. *Advanced Molecular Biology*. Bios Scientific

4th SEMESTER M. TECH. BIOTECHNOLOGY DISSERTATION
MBT-402

Practical-40 hrs **Total Marks: 300** **Total credits- 20**

Final practical/ Viva-Voce: 200 marks.
Minor Test: 100 marks

Scheme for the course of Master of Technology of Software Engineering (Credit Based)

Semester-I

S. No.	Course No.	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs)	Credit
			L	T	P		Theory	Sessional	Practical	Total		
1	MTSE-101	Introduction to Software Engg.	4	0	0	4	60	40	--	100	3	4
2	MTSE-102	Modelling and Simulation	4	0	0	4	60	40	--	100	3	4
3	MTSE-103	Algorithm Analysis and Design	4	0	0	4	60	40	--	100	3	4
4	MTSE-104	Object Oriented Software System Design	4	0	0	4	60	40	--	100	3	4
5	MTSE-105	Software Laboratory – I (based of MTSE-103 & 104)	0		4	4	--	50	50	100	3	2
6	MTSE-106	Seminar	0	0	2	2	--	50	--	50	--	1
Total						22	240	260	50	550	-	19

Semester-II

S. No.	Course No.	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs)	Credit
			L	T	P		Theory	Sessional	Practical	Total		
1	MTSE-201	Software Testing	4	0	0	4	60	40	--	100	3	4
2	MTSE-202	Software Risk Management	4	0	0	4	60	40	--	100	3	4
3	MTSE-203	Advance Database Design	4	0	0	4	60	40	--	100	3	4
4	MTSE-204	Software Project Management	4	0	0	4	60	40	--	100	3	4
5	MTSE-205	Software Laboratory – II (based on MTSE-201 & 203	0		4	4	--	50	50	100	3	2
6	MTSE-206	Seminar	0	0	2	2	--	50	--	50	--	1
Total						22	240	260	50	550		19

***At the end of the second semester candidates are required to do his/her Dissertation work in the identified area in consent of the Guide. Synopsis for the dissertation-I is to be submitted within one week of the beginning of IIIrd Semester**

Semester-III

S. No.	Course No.	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs)	Credit
			L	T	P		Theory	Sessional	Practical	Total		
1	MTSE-301	Social Networks	4	0	0	4	60	40	--	100	3	4
2	*	Elective-I	4	0	0	4	60	40	--	100	3	4
3	MTSE-303	Dissertation Part-I (to be continue in 4th Semester)	0	0	10	10	--	--	100	100	--	10
4	MTSE-304	Software Laboratory-III (based on MTSE-302)	0	0	4	4	--	50	50	100	3	2
5	MTSE-305	Seminar	0	0	2	2	--	50	--	50	--	1
Total						24	120	180	150	450		21

*****List of Elective Papers

MTSE - 306 Software Reliability
MTSE - 307 Parallel Computing
MTSE- 308 Soft Computing
MTSE -309 Data Mining

Semester-IV

S. No.	Course No.	Subject	Teaching Schedule			Hours/Week	Examination Schedule & Percentage Distribution				Duration of Exam (Hrs)	Credit
			L	T	P		Theory	Sessional	Practical	Total		
1	MTSE-401	Dissertation Part-II (continued from the 3rd semester)	--	--	20	20	--	100	200	300	--	18
Total						20		100	200	300		18
Total Credit of All the Four Semesters						**77**						

Note: Each student is required to submit the Thesis (Dissertation-II) only after the acceptance/publication of two papers in a journal/International/National conference of repute.

MTSE-101- Introduction to Software Engineering

Lecture- 4 hrs Total Marks: 100. Total credits- 4

Final Theory paper: 60 Marks; Time: 3 Hrs

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit-1

Principles and motivation: History, Definitions, why engineered approach to software development, Software Development Process Models from the point of view of technical development and project management: Waterfall, Rapid Prototyping, Incremental Development, Spiral Model, Emphasis on computer assisted environment.

Software development methods: Formal, semi-formal and informal methods, Requirements elicitation, Requirement specification, Data, functions and event based modeling, Some of the popular methodologies such as Yourdon's SAD, SSADM etc., CASE tools classification, features, strengths and weaknesses, CASE: CASE standards.

Unit-2

Software Project Management: Principles of Software Project Management, Organizational and team structure, Project planning, Project Initiation and Project Termination, Technical, Quality and Management plans, Project Control, Project Estimation methods, Function points and COCOMO.

Unit-3

Software Quality Management: Quality Control, Quality Assurance and Quality Standards with emphasis on ISO 9000, Functions of Software QA organization dose in Project, Interaction with developers, Quality plans, Quality assurance towards quality improvement, Role of independent Verification and Validation, Total Quality Management, SEI maturity model, Software metrics.

Unit-4

Configuration Management: Need for Configuration Management, Configuration Management functions and activities, Configuration Management Techniques, Examples and Case studies.

Software Engineering Standards: Government Standards, IEEE (and other professional bodies) standards, Corporate Standards.

Reference books:

1. Eisner Howard, Computer Aided System Engineering, Prentice Hall, New Jersy.
2. Richard Fairly, Software Engineering Concept, Mc-Graw Hill, New York.
3. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Pub. House, New Delhi.
4. Roger Pressmen, Software Engineering: A Practitioner's Approach McGraw Hill, New York.
5. Carlo Ghezzi, Mehdi Jazayeri, Dino Manlrioli, Fundamentals of Software Engineering Prentice Hall New Jersy.
6. Dong Bell, Ian Morrey, and Pugh, Software Engineering: A programming Approach Prentice Hall, New Jersy.
7. Kenneth Shere, Software Engineering and Management, Prentice-Hall, New Jersy.

MTSE-102: Modelling and Simulation

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

UNIT-1

Introduction: Concept of system,stochastic activities, continuous, and discrete systems, system modeling, principles use in modeling.

Simulation Of System: Concept of simulation of continuous system with the help of examples, use of integration formulas, concept of discrete system simulation with the help of examples. Generation of random numbers, Generation on non-uniformly distributed random numbers.

UNIT-2

Simulation of Queuing Systems: Basic concepts of queuing theory, simulation of single server, two-server and general quening systems

Simulation Of PERT

UNIT-3

Simulation In Inventory Control And Forecasting:Elements of inventory theory, inventory models, generation of poison and erlang variates, forecasting and reggression analysis.

Simulation Of A HypotheticalL Computer System

Design And Evaluation Of Simulation Experiments: Experiment layout and validation

UNIT-4

Simulation Languages: Continuous and discrete simulation languages, Block-Structured continous simulation languages, Expression based languages, Discrete system simulation languages, GPSS, SIMCRIPT, SIMULA, Factors in selection of discrete system simulation languages.

Reference Books:

1. Gordan G. “System Simulation,Prentice-Hall of India Pvt. Ltd. New Delhi-1993
2. Narsingh Deo. “System Simulation with Digital Computer” PHI New Delhi-1993
3. Payne James, A introduction to Simulation Programming Techniques and Methods of Analysis, Megraw Hill International Editions Computer Science Series. New York (1998).

MTSE-103- Algorithm Analysis and Design

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**
Final Theory paper: 60 Marks; **Time: 3 Hrs**
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction
Algorithm concepts, Analyzing and design, Pseudocode conventions, asymptotic efficiency of algorithms, asymptotic notations and their properties. Analysis Techniques: Growth Functions, Recurrences and Solution of Recurrence equation-, Amortized Analysis, Aggregate, Accounting and Potential Methods, Probabilistic analysis concepts, hiring problem and its probabilistic analysis, String Matching: naive string Matching, Rabin Karp, and String matching with finite Automata, KW and Boyer – Moore algorithm.

Unit 2

Number Theoretic Algorithms Elementary notions, GCD, Modular Arithmetic, Solving modular linear equations, The chines remainder theorem, Powers of an element, RSA cryptosystem, Primality testing, Integer factorization, Polynomials. Huffman Codes: Concepts, construction, correctness of Huffman's algorithms; Representation of polynomials, DFT, FFT, Efficient implementation of FFT, Graph Algorithm, Bellman Ford Algorithm, Single source shortest paths in a DAG Johnson's Algorithm for sparse graph, Flow networks & Ford fulkerson Algorithm, Maximum bipartite matching.

Unit 3

Computational Geometry
Geometric structures using C++: Vectors, points, Polygons, Edges: Geometric Objects in space: Finding the intersection of a line & triangle, Finding star shaped polygons and convex hull using incremental insertion.

Unit 4

NP-completeness Concepts
Polynomial time verification, NP-completeness and reducibility, showing problems to be NP-complete like Clique problem, vertex cover problem etc. Approximation algorithms of these problems.

Reference Books

1. T. H Cormen, C E Leiserson. R L Rivest & C Stein, "Introduction to algorithms", 2nd Edition, PHI.
2. Michael J Laszio, "Computational Geometry and Computer Graphics in C++", PHI. India 1996.
3. Brassard, Bratley, "Fundamentals of algorithms", Prentice Hall of India.
4. Knuth, "The Art of Computer Programming", Vol I-III, Pearson Education.

MTSE- 104 - Object Oriented Software System Design

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**
Final Theory paper: 60 Marks; **Time: 3 Hrs**
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction: Object-oriented Concepts, Object-oriented domain analysis, software reuse, software life cycle models, unified modeling language (UML). Object-oriented methods (OOM): Overview, Goals, Concepts: Object analysis model, Information model. Behavior model, Process model, Requirements definition model, benefits and weaknesses.

Unit 2

Object-oriented software development methods: ObjectOry: System development and analysis, use cases, entities, interface objects, services and system design, advantages, Introduction to Objectoriented structured design and application examples.
Object-oriented Methodologies: Classification, Rumbaugh methodology, Jacobson methodology, Booch methodology , Responsibility-Driven design, Pun and Winder methodology, Shlaer/Mellor methodology.

Unit 3

Object-Oriented Design: Representation of design model, Identification o components, classes, inheritance and objects, Identification of software behavior, Suitability of Methodology for Object- Oriented Design (MOOD), Context of MOOD, A CASE environment for MOOD, MOOD tools. Reusability and Life Cycle Issues: Reusability during Object-Oriented design, Object-Oriented software life cycle model, Software life cycle issues.

Unit 4

Software maintenance concepts: S/W maintenance process, Reverse engineering environment, Documentation for S/W maintenance, S/W configuration management and S/W maintenance models. Object-Oriented Programming Languages: Simula, SmallTalk, Ada95, Object COBOL.

Books and References:
1. Object-Oriented Methods for Software Development, Jag Sodhi, Prince Sodhi, McGraw-Hill.
2. Object-Oriented Software: Design and Maintenance, Luiz Fernando Capretz, Miriam A M Captrez, World Scientific.
3. Ali Bahrami, Object Oriented Systems Development ,:McGraw Hill, 1999.
4. Rumbaugh et.al.,Object Oriented Modeling and Design, PHI, 1997.
5. Forouzan, Coombs and Fegan: Introduction to data Communications and Networks TMH,1999.
6. William Stallings: Data and Computer Communications 5/e, PHI.

Semester-II

MTSE-201- SOFTWARE TESTING

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

UNIT-1

INTRODUCTION: Terminology involving nature of area.

V&V LIMITATIONS: Theoretical foundations in practicality of testing all data, in practicality of testing all parts; no absolute proof of correctness.

THE ROLE OF V&V IN SOFTWARE EVOLUTION: Types of product, requirements, specification, designs, implementations. Changes: V&V objectives, correctness, consistency, necessity, sufficiency, performance.

UNIT-2

Software technical reviews, software testing, levels of testing- module, integration, system. Regression: testing technique and there applicability- functional testing and analysis, structure testing and analysis.

UNIT-3

Error oriented testing and analysis, hybrid approaches, integration strategies, transaction flow analysis, stress analysis, failure analysis, concurrency analysis. Performance analysis: Proof of correctness, simulation and prototyping: requirement tracing.

UNIT-4

SOFTWARE V&V PLANNING: Identification of V&V goals: Selection of V&V techniques, requirements, specifications, design, implementations, changes. Organizational responsibilities: Development organization, independent test organization: software quality assurance independent V&V contractor, V&V standards: integrating V&V approaches. Problem tracking tests, activities, assessment.

Reference Books:

1. Boris Beizer Black- Box Testing-techniques of functional testing of software and system. John wilcy & sores Inc. New York.
2. Watts Humphery, Managing the software process. Addison-wesly Pub. Company masschachusetts.
3. William Perry. Effective methods for Software testing, john Wiley & Sons Inc. New York.
4. Mare Ropar, Software testing, McGraw-Hill Book Co. London.

MTSE-202- SOFTWARE RISK MANAGEMENT

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; Time: 3 Hrs

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

UNIT-1

Introduction to Software Risk Management: P212 Success Formula: Major Factors in Risk Management Capability, People, Process, Infrastructure, Implementation, Risk Management Roadmap.

UNIT-2

Risk Management Process: Identity Risk, Analyze Risk, Plan Risk, Resolve Risk.

UNIT-3

Risk Management Infrastructure: Develop policy, Define standard process, Train Risk Technology, Verify Compliance, Improve Practice.

UNIT-4

Risk Management Implementation: Establish Initiative, Develop Plan, Tailor Standard Process, Assess Risk, Control Risk.
People in Crisis and Control Problem, Mitigation, Prevention, Anticipation, Opportuninty.

Reference Books:

1. Elaine M. Hall, Managing Risk: Methods for Software Systems Development, The SEI Series in Software Engineering, Addison –Welsey, Masschachusetts.
2. Down. Alex, Michael Coleman. And Peter Absolon. Risk Management For Software Projects, McGraw-Hill, New York.
3. Charette. Robert N, Application Strategies for Risk Analysis, McGraw Hill, New York.
4. Grey. Stephen, Practical Risk Assessment for Project Management. Chichester, John Wiley & Sons. New York.
5. Glendon. A and Alan Waring, Managing Risk. International Thomson Business & COMPUTER Press, New York.
6. Jones.Capres. Assessment and Control of Software, Prentice Hll Press, New Jersey.

MTSE -203 - Advanced Database Design

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**
Final Theory paper: 60 Marks; **Time: 3 Hrs**

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction:
Overview of DBMS and its internal Architectural, Data Storage and representation in DBMS: Memory Hierarchy, Secondary storage mechanism and reliability improvement through mirroring and RAID, Recovery from disk crashes, Representing Relational data elements with records (fixed and variable) use of page and block formats, Heap, sorted and clustered file organization.

Unit 2

Indexing in DBMS: Clustered, primary, secondary, dense and Sparse indexing, Hash and Tree based index structures, ISA and B+ tree data structures, bit map indexing, R-indexing. Database Design: Three steps of Conceptual, logical and Physical design, and methodology for design, Overview of E-R and Extended E-R Modeling and conversion to logical tables and normalization, Physical database design and tuning – overview of tasks involved and methodology, Guidelines for index selection, Clustering, Demoralization and view definitions, Tuning of Queries with Explain PLAN.

Unit 3

Query Processing and Transaction management in DBMS: Query processing architecture in DBMS, relational operations and implementation techniques,Algorithms for Selection, Projection and Join, Query optimization, Query tree and optimization using Relational equivalences, Transaction Management DBMS:Transaction and ACID Properties, schedules and serializability, Concurrency control techniques – locking timestamps and Optimistic Concurrency control, Concept of Recovery management, Buffer and Recovery management structures in DBMS, Deferred update and ARIES algorithm for recovery with an example.

Unit 4

Database Security: Access Control mechanisms in DBMS, GRANT and REVOKE of VIEWS, Security for Internet applications through Encryption Firewalls, proxy servers, SSL and digital signatures.

Reference Books
1. Gracia-Mlina, Ullman and Widom, “Database System Implementation”,(2001)-Pearson Education.
2. Connolly & Begg, “Database Systems”, Third Edition (2002)- Pearson Publication.
3. Raghu Ramkrishnan & Gehrke, “Database Management Systems”, Third Edition McGraw Hill Publications (2003).

MTSE-204- Software Project Management

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**
Final Theory paper: 60 Marks; **Time: 3 Hrs**

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

UNIT-1

Introduction of software project management: The nature of software production ; Key objectives of effective management :quality productivity ,risk reduction: The role of the software project manager.

UNIT-2

Business Planning: determing , objectives, forecasting demand for product, proposal writing, requirement analysis ,legal issues , patent copyright, liability, technical planning :Life cycle models, type of plans, plan documentation method, PERT and CPM, Gantt charts , work break down structures, standards.

UNIT-3

Planning for risk management and control :entry and exit criteria , intermediate checkpoints, Performance prediction and analysis people prototyping and modeling , inspection & Reviews; process and process assessment ,development methods, configuration management testing and quality assurance, capacity planning estimating – what it takes to do the job; cost (direct and indirect),resource time, size and complexity of product risk determination ,role of requirements and design in estimating ,financial planning –budgeting ,resource allocation , organizational considerations(teams, hierarchies etc.),technology , human factors and usability, tools and environments, transitions of products of the user .

UNIT-4

Managing and Evaluating The project: Managing the task :project control ,managing the plan, reviews, feedback and repairing mechanism, configuration management, quality control and quality assurance, managing change ,readjusting goals and milestones ,risk management, testing phases ,formalized sport activities .Managing The team: Team organization , recruiting and staff picking the right people ,technical leadership, avoiding , obsolencence – trainingetc. Managing the context:Communication Skills ,decision theory business management ,assessing the organization ‘s abilty to perform the process, probability and statistics ,Managing product support and maintainence , Evaluation of the project.Case studies.

Reference Books:

1. Tom Demarco controlling Software project Mangement, Measuremet ,Prenticel Hall,New Jersy
2. Tom Glib,Einzi Susamah of Software Engineering management,Addison Wesley,England
3. Philip Metzger, Managing A programming project ,Prenticel Hall,New Jersy
4. Barbee Mynatt, Software engineering with student project guidance, ,Prenticel Hall,New Jersy

Semester-III

MTSE-301: Social Networks

Lecture: 4 hrs, Total Marks: 100, Total credits: 4
Final Theory paper: 60 Marks, Time: 3 Hours
Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 marks+ Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hour for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Question 1 (compulsory) and four other questions, selecting one question from each unit.

Unit: I: Social Networks and Related Concepts

Introduction to Social Networks: Introduction, uses, examples and types of social networks, Social and economic networks, Opportunities and challenges in social networks, Social structure in social networks, Properties of social networks, algorithmic and economic aspects of social networks,
Social Network Data: Nodes, Edges, Relationship, Graphs, Samples and Boundaries, Formal methods, Adjacency Matrix for undirected and directed networked graphs and using matrices to represent social relations, Random graphs, Properties of random graphs, Percolations, Branching processes, Growing spanning tree in random graphs.
Level in Social Networks:
Ego networks, partial networks, complete or global networks, social networks methods including binary or valued, directed or undirected.

Unit: II Mining the Social Web

Mining Twitter: Fundamental Twitter Terminology, creating a Twitter API Connection, Exploring Trending Topics, searching for Tweets, extracting Tweets entities, analyzing Tweets and Tweet entities with frequency analysis, computing the lexical diversity of Tweets, Examining patterns in Retweets, Visualizing frequency data with histograms.
Mining Facebook: Understanding the social graph API, Understanding the open graph protocol, Analyzing social graph connections
Mining LinkedIn: Making LinkedIn API requests, Downloading LinkedIn connections as a CSV file, Clustering, normalizing data for analysis, measuring similarity, and clustering algorithms.

Unit: III Mining Web pages and Semantic Web

Mining Web pages: Scraping, Parsing and Crawling the Web, Discovering semantics by decoding syntax, Entity-Centric analysis: A paradigm shift, Quality of analytics for processing human language data.
Mining the Semantically Marked-Up Web: Micro formats: Easy-to-implement Metadata, Semantics markup to semantic Web: A brief interlude, The semantic Web: An evolutionary revolution.
Social Network Analysis: Introduction, History, Metrics in social network analysis (Betweenness, Centrality, Equivalence relation, Centralization, Clustering coefficient and Structural cohesion).

Unit IV: Equivalence in Social Networks

Structural equivalence, Automorphic equivalence and Regular equivalence

Text Books:

1. Matthew A. Russell, “Mining the Social Web”, O'Reilly and SPD, Second edition New Delhi, 2013.
2. Hanneman, R. A., & Riddle, M., “Introduction to social network methods, Riverside, California: University of California, Riverside. Retrieved from http://faculty.ucr.edu/~hanneman/nettext/.
3. “Social network analysis: Theory and applications”. A free, Wiki Book available at: http://train.ed.psu.edu/WFED-543/SocNet_TheoryApp.pdf.

Reference Books:

1. Lon Safko, “The Social Media Bible: Tactics, Tools, and Strategies for Business Success”, Wiley 3rd Edition, 2012.
2. Peter K Ryan, “Social Networking”, Rosen Publishing Group, 2011.
3. John Scott, Peter J. Carrington, “Social Network Analysis”, SAGE Publishing Ltd., 2011.

MTSE-306 Software Reliability

Lecture- 4 hrs Total Marks: 100. Total credits- 4

Final Theory paper: 60 Marks; Time: 3 Hrs

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

UNIT 1

Software Reliability, Basic Ideas of Software Reliability, Software Metrics, Classes of software reliability models, Reliability vs. quality, Failures and failure modes, Recent trends in Reliably Engineering

UNIT 2

Time Dependent Software Reliability Models: Time between failure reliability Models, Fault Counting Reliability Models, Time Independent Software Reliability Models: Fault injection model of Software Reliability, Input domain reliability model.

UNIT 3

SRGM, Halstead Software Metric, MaCabe's Cylomatic Complexity Metric, Jelinski-Moranda model, Musa model, Musa-Okumoto Model, Goel-Okumoto Model.

UNIT 4

Probability Distribution (Exponential, Weibull, Gamma, Normal), Random variables and associated distributions, Pseudo random Number generation, Markov Models, Poisson process, moment generating functions, Estimation Theory, Monte Carlo simulation, Data Parameter Estimation: MLE & LSM.

Reference Books:

1. Hoang Pham, Software Reliability, Springer Verlag, New York.
2. Jhon D. Musa, Anthony Lannino, Kazuhira Okumoto," Software Reliability- Measurement, prediction, Application, Series in Software Engineering and Technology", McGraw Hill.
3. Jhon D. Musa, Software Reliability Engineering, Tata McGraw Hill
4. Doron Reled, Software Reliability Methods, Springer Verlag,
5. R. Ramakumar, Reliability Engineering: Fundamentals and Applications, Prentice Hall.
6. Patric D. T.O Conner," Practical Reliability Engineering", Jhon Wesley & Sons.

MTSE-307 Parallel Computing

Lecture- 4 hrs Total Marks: 100. Total credits- 4

Final Theory paper: 60 Marks; Time: 3 Hrs

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

UNIT I

Principles of parallel algorithm design: decomposition techniques, mapping & scheduling computation, templates. Parallel computer architectures: shared memory systems and cache coherence, distributed-memory systems, interconnection networks and routing. Case studies: Intel Multi-core architecture, CUDA.

UNIT II

Fundamental concepts, Designing for threads. Threading, Threading a loop, Thread overheads, Library functions. and parallel programming constructs , Synchronization, Critical sections, Deadlock, Non-blocking algorithms, Data races. Threading APIs.

UNIT III

Programming shared-address space systems: Cilk Plus, OpenMP, Pthreads, Solutions to parallel programming problems, Memory and cache related issues, Open MP&PRAM Model of Computation. Analytical modeling of program performance: speedup, efficiency, scalability cost optimality GPU Programming

UNIT IV

Programming scalable systems: message passing MPI, global address space languages, MPI Model , collective communication , data decomposition, communicators and topologies, point-to-point communication, MPI Library, Application Development: Algorithms of Soritng and program development .

Reference Books:

1. Michael J Quinn, “Parallel programming in C with MPI and OpenMP”, Tata McGraw Hill, 2003.
2. Shameem Akhter and Jason Roberts, “Multi-core Programming”, Intel Press, 2006.
3. John L. Hennessey and David A. Patterson, “ Computer architecture – A quantitative approach”, Morgan Kaufmann/Elsevier Publishers,4th. edition, 2007.
4. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture : A hardware/ software approach” , Morgan Kaufmann/Elsevier Publishers, 2004.
5. Wesley Petersen and Peter Arbenz, “Introduction to Parallel Computing”, Oxford University Press, 2004.

MTSE-308 SOFT COMPUTING

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**
Final Theory paper: 60 Marks; **Time: 3 Hrs**

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm,

Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit 2

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations, Fuzzy Arithmetic: Fuzzy Numbers,

Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations, Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks, Applications.

Unit 3

Regression and Optimization : Least-Squares Methods for System Identification – System Identification: An Introduction, Basics of Matrix Manipulation and Calculus, Least-Squares Estimator,

Geometric Interpretation of LSE, Recursive Least-Squares Estimator, Recursive LSE for Time-Varying Systems, An introduction to LSE for Nonlinear Models, Derivative-based Optimization-Descent Methods, The Method of Steepest Descent, Newton's Methods, Step Size Determination, Conjugate

Gradient Methods, Analysis of Quadratic Case, Nonlinear Least-squares Problems, Incorporation of Stochastic Mechanisms, Derivative-Free Optimization.

Unit 4

Genetic Algorithm: An Overview of GA, GA operators, GA in problem solving, Implementation of GA.

Reference Books:

1. “Introduction to the Theory of Neural Computation”, Hertz J. Krogh, R.G. Palmer, Addison-Wesley, California, 2012.
2. “Fuzzy Sets & Fuzzy Logic”, G.J. Klir & B. Yuan, PHI, 2014.
3. “Neuro-fuzzy and Soft Computing”, by J.-S. R. Jang, C.-T. Sun, and E. Mizutani, PHI.2012
4. “An Introduction to Genetic Algorithm”, Melanie Mitchell, PHI, 2014.
5. “Soft computing and Intelligent System Design”, F. O. Karray and C. de Silva, Pearson, 2013.
6. Soft Computing by Sivanandam Deepa , Wiley India.2014
7. “Neural Networks-A Comprehensive Foundations”, Prentice-Hall International, New Jersey, 2013.
8. “Neural Networks: Algorithms, Applications and Programming Techniques”, Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (2014).

MTSE-309 Data Mining

Lecture- 4 hrs **Total Marks: 100.** **Total credits- 4**

Final Theory paper: 60 Marks; **Time: 3 Hrs**

Sessionals: 40 marks (Attendance: 15 marks + Class performance/Behaviour: 10 + Average of two best sessionals 15 marks: I sessional-15 marks; II sessional-15 marks; III sessional-15 Marks) Time: 1 hr for each sessional.

Note for paper setter: Nine questions will be set in all. Question No. 1, which will be objective/ short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set section-wise, with two questions from each unit. The candidate will be required to attempt FIVE questions in all with Q.1 (compulsory) and four other questions, selecting one question from each unit.

Unit 1

Introduction

Data Mining, Functionalities, Data Mining Systems classification, Integration with Data Warehouse System, Data summarization, data cleaning, data integration and transformation, data reduction.

Data Warehouse

Need for Data Warehousing , Paradigm Shift, Business Problem Definition, Operational and Information Data Stores, Data Warehouse Definition and Characteristics, Data Warehouse Architecture and Implementation, OLAP.

Unit 2

Data Mining Primitives, Query Language and System Architecture, Concept Description, Data generalization, Analysis of attribute relevance, Mining descriptive statistical measures in large databases.

Unit 3

Mining association rules in large databases: Association rule mining, Mining single dimensional boolean association rules from transactional databases, mining multilevel association rules from transaction databases, Relational databases and data warehouses, correlation analysis, classification and prediction.

Unit 4

Introduction to cluster analysis, Mining complex type of data: Multidimensional analysis and descriptive mining of complex data objects, Spatial databases, Multimedia databases, Mining time series and sequence data, Mining text databases, Mining the World Wide Web, Applications and trends in data mining.

Reference Books :

1. Data Mining : Concepts and Techniques; Jiawei Han and Micheline Kamber; Elsevier. 2014
2. “Mastering Data Mining: The Art and Science of Customer Relationship Management”, by Berry and Lin off, John Wiley and Sons, 2012.
3. “Data Ware housing: Concepts, Techniques, Products and Applications”, by C.S.R. Prabhu, Prentice Hall of India, 2013.
4. “Data Mining: Concepts and Techniques”, J.Han, M.Kamber, Academic Press, Morgan Kanfman Publishers, 2011.
5. “Data Mining”, by Pieter Adrians, Dolf Zantinge, Addison Wesley 2014.
6. “Data Mining with Microsoft SQL Server”, by Seidman, Prentice Hall of India, 2012
7. Data Warehousing Fundamentals for IT Professional 2nd. Ed. Paulraj Ponniah, Wiley India, 2013
8. Data Mining Tech by Linoft Wiley, 2013
9. Data Mining by Berry, Wiley, 2014

KURUKSHETRA UNIVERSITY, KURUKSHETRA

Master of Technology (Electrical Engg.)

Credit Based

Scheme of Courses/Examination

Semester- I

S. N.	Course Code	Subject	Teaching Schedule				Evaluation Marks				Duration of Exam.(Hrs)	Credit
			L	T	P	Tot	External Marks	Internal Marks	P/V	Tot		
1	MTEE-101A	Advanced Power System Analysis	3	1	-	4	60	40	-	100	3	4
2	MTEE-103A	Power Apparatus & Electric Drives	3	1	-	4	60	40	-	100	3	4
3	MTEE-105A	Instrumentation & Control	3	1	-	4	60	40	-	100	3	4
4	MTEE-107A	Optimization Theory	3	1	-	4	60	40	-	100	3	4
5	MTEE-109A	Instrumentation & Control Lab	-	-	3	3	-	40	60	100	3	2
6	MTEE-111A	Advanced Power System Lab-I	-	-	3	3	-	40	60	100	3	2
		Total				22	240	240	120	600		20

Semester-II

SN	Course Code	Subject	Teaching Schedule				Evaluation Marks				Duration of Exam.(Hrs)	Credit
			L	T	P	Tot	External Marks	Internal Marks	P/V	Tot		
1	MTEE-102A	Advanced Power System Protection	3	1	-	4	60	40	-	100	3	4
2	MTEE-104A	Renewable Energy Resources	3	1	-	4	60	40	-	100	3	4
3	MTEE-106A	HVDC Transmission and FACTS Devices	3	1	-	4	60	40	-	100	3	4
4	MTEE-108A	Intelligent Control	3	1	-	4	60	40		100	3	4
5	MTEE-110A	Modeling and Simulation Lab	-	-	3	3	-	40	60	100	3	2
6	MTEE-112A	Advanced Power System Lab-II	-	-	3	3		40	60	100	3	2
						22	240	240	120	600		20

Note: At the end of second semester, the candidates will have to undergo thorough literature survey during vacations in the field of interest which will be the basis for his/her Dissertation/ Synopsis in semester-III and IV. A report /synopsis is to be submitted & presentation /viva will be conducted internally on literature surveyed in the end of Semester-III.

KURUKSHETRA UNIVERSITY, KURUKSHETRA

Master of Technology (Electrical Engg.)

Credit Based

Scheme of Courses/Examination

Semester-III

SN	Course Code	Subject	Teaching Schedule				Evaluation Marks				Duration of Exam.(Hrs.)	Credit
			L	T	P	Tot	External Marks	Internal Marks	P/V	Tot		
1		*Elective-I	3	1	-	4	60	40	-	100	3	4
2		**Elective -II	3	1	-	4	60	40	-	100	3	4
3	MTEE-217A	Synopsis						100		100	-	12
			-	-	-	-	120	180		300	-	20

Electives Offered

***Elective-I**

SN	Course Code	Subject	SN	Course Code	Subject
1	MTEE -201A	Power Electronics Applications in Renewable Energy	3	MTEE -205 A	Advanced Microprocessors
2	MTEE -203A	Electric Power Distribution & Automation	4	MTEE -207A	Reliability Engineering

****Elective-II**

SN	Course Code	Subject	SN	Course Code	Subject
1	MTEE -209A	Load and Energy Management	3	MTEE -213A	Power System Restructuring & Deregulation
2	MTEE -211A	Special Topics in Power System	4	MTEE -215 A	Advanced Digital Signal Processing

Semester-IV

Sl. No	Course No.	Subject	Teaching Schedule	Examination Schedule (Marks)			Credit
			Total	Sessional	P/V	Tot	
1	MTEE-202A	Dissertation(Thesis)	-	100	200	300	20
				100	200	300	20

Note: Each student is required to publish at least two research papers (minimum standards: one paper in a referred journal and one in an International journal/National conference), to enable him/her to qualify for the award of M. Tech degree. Before submission of Dissertation, student has to submit proof of his/her publications with acceptance.

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M. Tech. (Electrical Engg.) Credit Based w.e.f.Aug.2015

L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Advanced Power System Analysis
MTEE-101A

UNIT 1

Network Modelling: System graph, loop, cut set and Incidence matrices, Primitive network and matrix, Formation of various network matrices by singular transformation.

Bus Impedance Algorithm: Singular transformation, direct inspection, Building Block algorithm for bus impedance matrix, Addition of links, addition of branches, (considering mutual coupling).

UNIT 2

Balanced and unbalanced network elements: Representation of three phase network elements, representation under balanced and unbalanced excitation, transformation matrices, symmetrical components, sequence impedances, unbalanced elements and three phase power invariance.

Short circuit studies: Network representations for single line to ground fault, line to line fault, LL-G fault, and 3-phase faults, Short circuit calculations for various types of faults in matrix form.

UNIT 3

Load flow studies: Load flow and its importance. classification of buses, load flow techniques, Iterative solutions and computer flow charts using Gauss-Seidel and Newton -Raphson methods, Decoupled and fast decoupled methods, Representation of regulating and off nominal ratio transformers and modification of Y_{bus}.

UNIT 4

Power system security: Introduction to Power system security, Addition and removal of multiple lines, network reduction for contingency analysis, current injection, shift destitution factor, single outage contingency analysis.

State estimation in power systems: data acquisition system, Method of least-squares, State estimation by weighted least square technique.

References:

1. G.W. Stagg and A.H EI-Abaid, “Computer methods in Power system analysis”, McGraw Hill, New York.
2. L. P. Singh, “Advanced Power System Analysis and Dynamics”, New Age, Int. Pub, New Delhi.
3. N. V. Ramana, “Power System Analysis”, Pearson Education, Noida, 2012.
4. T K Nagsarkar and M S Sukhija, “ Power System Analysis”, Oxford University Press, New Delhi, 2010
5. K Uma Rao, “Computer Techniques and Models in Power System”, I K Publications, New Delhi, 2007.
6. John J. Grainger and W. D. Stevenson, “Power System Analysis”, McGraw Hill, New York, 1994.
7. Allen Wood and Bruce Wollenberg : Power Generation operation & control, John Wiley & Sons, 1984.
8. I. J. Nagrath and D P Kothari, “Power System Engineering” McGraw Hill, New York, 1994.
9. M. A. Pai, ‘Computer Techniques in Power System Analysis’, 2nd Edition, TMH-New Delhi.

Note1: The paper will have a total of **NINE questions. Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

Note2: All questions will have equal **weight of 12 marks.** The student will attempt a total of **FIVE questions**, each of 12 marks. Q. No. 1 is compulsory. The student shall attempt remaining **four** questions by selecting **only one question from each unit.**

KURUKSHETRA UNIVERSITY KURUKSHETRA
M. Tech. (Electrical Engg.) Credit Based w.e.f.Aug.2015

L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Power Apparatus & Electric Drives
MTEE-103A

UNIT-1

Generalized Theory of Electrical Machines: Two pole machine, Kron's primitive model and linear transformation

Induction Machines: Electrical performance equations, effect of voltage and frequency variations on induction machines performance, slip power control schemes, slip power control, Leblanc and Kramer system of speed control.

UNIT-2

Transformer: Introduction of three phase transformer, excitation phenomenon in transformers, harmonics in single phase and three phase transformers, disadvantages and suppression of harmonics in transformers, Tertiary winding and its effect.

Multi-circuit Transformers: Advantage, theory, equivalent circuit, regulation.

Three phase autotransformer, Transformer transients and inrush current phenomenon in three phase transformer.

UNIT-3

D.C. drives: Introduction, Theory of operation, E.M.F. equation, state-space modeling, block dig. & transfer function, Fundamental relationship, Field control, Armature control, Armature & Field control, 4- quadrant operation, steady state analysis of 3-Φ converter controlled DC motor drive, transfer function of DC control system, Design of controllers.

UNIT-4

Induction motor drives: Introduction, principle of operation, induction- motor equivalent circuit, real-time model of a 2- Φ induction motor, transformation to obtain constant matrices, 3 to 2- Φ transformation, power equivalence, derivation of commonly used induction motor models.

References:

8. P S Bimbhra, "Generalized Theory of Electrical Machines", Khanna Publishers, New Delhi.
9. Krishan R, "Electric Motor Drives: Modeling Analysis and Control", PHI Pvt Ltd. New Delhi-2013.
10. Dubey G K, "Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi.
11. S K Pillai, "A First Course on Electrical Drives", New Age International (P) Ltd., New Delhi.
12. Fitzgerald and Kingsley, "Electric Machinery", McGraw Hill Co. New Delhi
13. MIT Staff, "Magnetic Circuits and Transformers", MIT Press Cambridge.
14. E Openshaw Taylor, "The performance and design of A.C. commutator motors; Including the single-phase induction motor Unknown Binding", Wheeler Publicationss, 1971.
15. Bose B K, "Power Electronics and Variable Frequency Drives: Technology and Applications", IEEE Press, 1997.

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KURUKSHETRA UNIVERSITY KURUKSHETRA
M. Tech. (Electrical Engg.) Credit Based w.e.f.Aug.2015

L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Instrumentation & Control
MTEE- 105A

Unit 1

Transducers: Introduction ,Characteristics and Classifications of electrical transducers, measurement of displacement, Force, pressure, speed, temperature and intensity of light using different electrical transducers, advantages, disadvantages and applications of transducers

.

Unit 2

Smart Sensors: Introduction, architecture of smart sensor, optical sensor, microelectronic sensor, chemical, Bio Sensor and Physical Sensor, piezo-resistive pressure sensor, fiber optic temperature sensor, light sensor, advantages, disadvantages and applications of smart sensors.

Unit 3

Virtual Instrumentation: Introduction, architecture of VI, Evaluation and architecture of VI, conventional Virtual Instrumentation, Advantage of Lab View, Software Environment, Creating and Saving VI, front Panel and block diagram Tool Bar, Palettes, front panel control and indicators, block diagram : Terminals, Nodes, Functions, Sub VI, Data Flow Program.

Unit 4

VI Structures: Control structures, selection structures, case structures, Sequence structures, formula node, array, single and multi-dimensional array, auto indexing, clusters, Creating clusters control and indicators, data plotting.

References:

1. Gary Johnson, Lab VIEW Graphical Programming, Second edition, McGraw Hill, 1997.
2. Lisa K. wells & Jeffrey Travis, LabVIEW for everyone, Prentice Hall, New Jersey, 1997.
3. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement.
4. Jovitha Jerome, Virtual Instrumentation using Lab View.

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L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Optimization Theory
MTEE- 107A

Unit 1

Optimization theory: Introduction & its application in engineering, Convex set & functions, Affine set, supporting & separating Hyper-planes. Solution of Multi-variable optimization problem with equality constraints by using Lagrange Multiplier, Kuhn-Tucker condition & Convex programming problem.

Unit 2

Linear Programming Problems: Introduction, problem formulation, graphical Method, canonical & standard form of L.P.P, Simplex method, Dual principle, & Dual Simplex Method.

Unit 3

Nonlinear Programming Problem: Introduction, Formulation of quadratic optimization problem, Powell's method, steepest descent (Cauchy) method, Newton's method.

Dynamic Programming Problem: Representation of Multistage decision process (MDP) & its types, principle of optimality; causality & invariant Imbedding, MDP in continuous-time by using Hamilton-Jacobi equation.

Unit 4

Calculus of variation: Introduction, problem of calculus variation, Hamilton method. Introduction of travelling salesman problem & Hamilton circuit, Basics of Game theory & Markov model.

References:

5. SS Rao, "Optimization theory and applications" Wiley Eastern Ltd.
6. KV Mittal, "Optimization methods", Wiley Eastern Ltd.
7. NA Kheir, "System modeling and computer simulation" Marcel Decker, New York.
8. Korn G.A., "Interactive Dynamic System Simulation", McGraw Hill, N.Y.

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Note2: All questions will have equal **weight of 12 marks.** The student will attempt a total of **FIVE questions**, each of 12 marks. Q. No. 1 is compulsory. The student shall attempt remaining **four** questions by selecting **only one question from each unit.**

P	Pr/V	Int	Cr
3	60	40	2

Time: 03 Hrs

Instrumentation & Control Lab
MTEE -109A

Following experiments are required to be performed in MATLAB/ETAP/LabView or equivalent.

1. Find addition, subtraction, multiplication and division of two numeric inputs
2. Perform various Boolean operations (AND, OR, NAND, NOR, XOR).
3. Add two binary bits and find the sum and carry (half adder).
4. Create a VI to find the decimal equivalent of a binary number using sub VI.
5. Create VI for studying array functions.
6. Create VI for studying sequence structure.
7. Create VI for studying properties and options of graphs/charts.
8. Measurement of Temperature using Virtual instrumentation.
9. Measurement of Strain using Virtual instrumentation.
10. Implementation of VI to control the speed of a DC motor.
11. Real Time Power measurement and analysis using Virtual instrumentation.
12. Creating Models, Simulation and Analysis of PID Controller.
13. Study and Implementation of Displacement Transducers.

P	Pr/V	Int	Cr
3	60	40	2

Time: 03 Hrs

Advanced Power System Lab-I
MTEE-111A

Following experiments are required to be performed in MATLAB/ETAP/LabView or equivalent.

4. Write a program to develop Bus Admittance Matrix Y_{BUS}.
5. Write a program for the Power Flow Studies using N-R (Newton-Raphson) method.
6. Write a program for the power flow analysis of system using Gauss-Siedel Technique.
7. Determination of the generalized constants A, B, C, D of a long transmission line.
8. Determination of the voltage and current for three phase faults on a 2-bus power system.
9. Simulation and Analysis of a single phase & three phase power system.
10. Simulation & Analysis of generation, transmission & distribution in power system.
11. Simulation & Analysis of different fault condition in power system.
12. Simulation and Analysis of 9- bus power system.
13. Simulation and Analysis of contingency concept in a power system.

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L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Advanced Power System Protection

MTEE-102A

Unit 1

Introduction: Need for protective systems, Zones of protection, classification of protective relays, electromechanical, solid state and digital relays, comparisons between different types of relays.

Current transformers and potential transformers: construction, operating principle and their performance

Unit 2

Comparators: general equation of comparators, Analysis for amplitude comparator, analysis for phase comparator, duality between amplitude and phase comparators.

Overcurrent relays, differential relays, operating and restraining characteristics, distance relays, impedance relays, reactance relays, and mho relay quadrilateral relays, elliptical relays, comparison with conventional relays.

Unit 3

Distance protection: Principle of distance relaying, time grading of distance relays, schemes of distance protection, distance protection by impedance, reactance and mho relays, Effect of power swings on the performance of distance relays.

Pilot relaying schemes: Pilot wire protection, carrier current protection.

Protection of Generators and Motors: Types of faults, Stator and rotor protection against various types of faults.

Unit 4

Protection of Transformers: Types of faults, differential protection schemes, harmonic restraint relay, over flux protection, Earthing transformer protection.

Bus Zone Protection: Types of Bus-bar faults, differential current protection frame leakage protection.

Microprocessor based protective relays: Over current relay, impedance relay, reactance relay, mho relay, microprocessor based distance relaying.

Application of artificial intelligence and wavelet transform in protective relays

References:

1. TSM Rao, “Power System Protection – Static Relays”, Tata McGraw Hill Education Pvt. Ltd.
2. B. Bhalja, R P Maheshwari and N G Chothani, “Protection and Switchgear”, Oxford University Press.
3. Ravindernath & Chander, “Power System Protection and Switchgear”, New Age International Publishers.
4. Badri Ram & Vishwakarma, “Power system protection and switch gear” McGraw Hill Education (India)
5. C.L. Wadhwa, “Electrical Power Systems”, New Age International Publishers.
6. Protective Relays -Their Theory and Practice Vol.I & II by W.Van: Warrington.
7. Advanced power system analysis and dynamics by L.P.Singh: Wiley Eastern N.Delhi.
8. Digital Protection: Protective relay from Electro Mechanical to Microprocessor, L P Singh: Wiley Eastern.
9. Switchgear and protection by S. S. Rao: Khanna Pub

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KURUKSHETRA UNIVERSITY KURUKSHETRA
M. Tech. (Electrical Engg.) Credit Based w.e.f.Aug.2015

L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Renewable Energy Resources
MTEE- 104A

Unit 1

Solar Energy: Availability of solar energy, PV Technology, Principle operation of cell, Parameters, types of Cell Technologies, solar Energy collectors, solar power plant, photo-voltaic cell & its equivalent circuit and VI Characteristics, photo-voltaic power generation, Solar PV system and its Components, applications of solar energy.

Unit 2

Bioenergy: Introduction, biomass resources, Origin of Biomass Resources: Classification and characteristics; PROCESSES USED FOR CONVERSION OF BIOMASS INTO ELECTRICAL ENERGY: Direct combustion, incineration, pyrolysis, gasification and liquefaction; advantages and applications of biomass energy.

Unit 3

Wind Energy: Introduction, Classifications of wind mill, main components of wind mill, Principle of energy conversion, Power analysis, Aerodynamics theory: Axial momentum & Blade element theory, types of wind conversion system: fixed & variable speed, types of wind turbines, advantages and applications of wind energy.

Unit 4

New Energy Resources: Fuel Cell- working principle & basic applications; Ocean Energy- wave –tidal & ocean thermal energy conversion; Geothermal Energy- production method; Magneto Hydrodynamic (MHD)- principle of operation;

References:

1. Tiwari GN. Solar Energy, Fundamentals design, modeling and Applications. Narosa, 2002.
2. Duffie JA. Beckman WA. Solar Engineering of Thermal Processes, John Wiley, 2006.
3. Biomass renegerable Energy– D.O.hall & R.P. Overeed, John wiley & sons, New york, 1987.
4. Burton T. Sharpe D. Jenkins N. Bossanyi E. Wind Energy Handbook. John Wiley, 2001.
5. Nag P K. Power Plant Engineering, 3rd Edition, Tata McGraw Hill, 2008
6. Jain P. Wind Energy Engineering. McGraw-Hill 2011.
7. Tiwari GN. Ghoshal MK. Fundamental of Renewable Energy Sources, Narosa, 2007.

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M. Tech. (Electrical Engg.) Credit Based w.e.f.Aug.2015

L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

HVDC Transmission and FACTS Devices
MTEE-106A

Unit 1

HVDC Transmission: General considerations, Power Handling Capabilities of HVDC Lines, Basic Conversion principles, static converter configuration.
Harmonics in HVDC Systems, Harmonic elimination, AC and DC filters.

Unit 2

Interaction between HVAC and DC systems – Voltage interaction, Harmonic instability problems and DC power modulation.
Multi-terminal DC links and systems; series, parallel and series parallel systems, their operation and control.

Unit 3

Introduction Of Facts Concepts**:** Basic of flexible alternating current transmission system (FACTS) controllers, shunt, series, combined and other controllers, FACTS technology, HVDC or FACTS**,** static VAR compensator (SVC) and static synchronous compensator (STATCOM), Static Synchronous Series Compensator (SSSC), Thyristor Controlled Series, Capacitor (TCSC). Solid State Contactors (SSC) and TSSC

Unit 4

Combined Compensators: Introduction, Unified power flow controller (UPFC), conventional power control capabilities, real and reactive power flow control, comparison of UPFC to series compensators, control structure, dynamic performance. Interline power flow controller basic operating principles, control structure, application considerations.

References:

1. Hingorani N.G. and Gyragyi L., Understanding FACTS (Concepts and Technology of Flexible AC Transmission System), Standard Publishers and Distributors, Delhi.
2. Song Y.H. and Johns A.T., Flexible AC Transmission Systems, IEEE Press.
3. Ghosh A. and Ledwich G., Power Quality Enhancement using Custom Power Devices, Kluwer Academic Publishers.
4. Mathur R.M. and Verma R.K., Thyristor based FACTS controllers for Electrical Transmission Systems, IEEE Press.

14. Bollen M.H.J., Understanding Power Quality and Voltage Sag, IEEE Press.
15. Padiyar K.R., FACTS Controllers in Power Transmission and Distribution, New Age International Publisher, 2007.
16. Miller T.J.E., Reactive Power Control in Electric Systems, John Wiley.

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KURUKSHETRA UNIVERSITY KURUKSHETRA
M. Tech. (Electrical Engg.) Credit Based w.e.f.Aug.2015

L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Intelligent Control
MTEE -108A

Unit-1

ANN Models & Architecture:
Biological foundations, ANN models, Types of activation function, introduction to network architecture, multilayer feed forward network (MLFFN), Kohonen self-organizing map,radial basis, Function network (RBFN), recurring neural network.

Unit-2

Learning Processes:
Supervised and unsupervised learning, error-correction learning, Hebbian learning, Boltzmanlearning, single layer and multilayer perception model, least mean square algorithm, back propagation algorithm, Application in forecasting and pattern recognition and other power engineering problems.

Unit-3

Fuzzy Sets and Theory:
Fuzzy sets, fuzzy set operations, properties, membership functions, fuzzy to crisp conversion,measures of fuzziness, fuzzification and defuzzification methods, application in engineering problems.

Unit-4

Fuzzy Control System:
Introduction, simple fuzzy logic controllers with examples, special forms of fuzzy logic models,classical fuzzy control problems.

References:

1. M. T. Hagon, Howard B. Demuth and Mark Beale, “Neural Network Design, PWSPublishing-1995.
2. Jacek M Zurada, “Introduction to Artificial Neural Systems”, Jaico Publishing House, Bombay, 1994.
3. Wasserman, “Neural Computing: Theory and Practice, Van Nastrand Reinhold, 1989”
4. Freeman “Neural Networks _-Algorithms, application and programming techniques, Addison Weley, 1991”
5. Ronald Yager and Dimiyar Filev, Essentials of Fuzzy Modeling and Control, John Wiley & Sons, Inc
6. Rajasekran Pai: Neural Networks, Fuzzy logic and genetic Algorithm Synthesis & Applications, PHI.

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KURUKSHETRA UNIVERSITY KURUKSHETRA
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P	Pr/V	Int	Cr
3	60	40	2

Time: 03 Hrs

Modeling & Simulation Lab
MTEE- 110A

Following experiments are required to be performed in MATLAB/ETAP/LabView or equivalent.

1. To verify Thevenin's, Norton's, & Superposition theorem.
2. To find Avg. & R.M.S. value of (V-I) of RLC series & parallel; series parallel RC-RL circuit.
3. To perform 1- ϕ (half & full) wave rectifier with (R, R-L & R-C) load.
4. To perform 3-ϕ (half & full) wave rectifier with (R, R-L & R-C) load.
5. To find Avg., R.M.S. & T.H.D. of 1- ϕ (half & full) wave inverter with (R & R-L) load.
6. To find Avg., R.M.S. & T.H.D. of 3- ϕ (half & full) wave inverter with (R & R-L) load.
7. To perform current source inverter (C.S.I.) & PWM inverter.
8. To perform step down (BUCK) & step up (BOOST) chopper.
9. To perform Type- (A, B, C & D) chopper
10. To perform Field & Armature control of separately excited DC motor.
11. To perform Field & Armature control of DC series & DC shunt motor.
12. To perform 3-ϕ Induction Motor with constant & variable torque.
13. To perform speed control of 3-ϕ Synchronous motor with constant & variable torque.

P	Pr/V	Int	Cr
3	60	40	2

Time: 03 Hrs

Advanced Power System Lab-II
MTEE-112A

Following experiments are required to be performed in MATLAB/ETAP/LabView or equivalent.

1. Simulation & Analysis of the generator protection.
2. Simulation & Analysis of the transformer protection.
3. Simulation & Analysis of power quality improvement.
4. Simulation and Analysis of different types of relays in power system.
5. To perform the simulation of Photo-Electric Effect.
6. To perform the simulation to construct the PV cell to show the V-I & P-V characteristics curve of it.
7. To perform the simulation of Photovoltaic power conversion for single and 3-ph. load on account with MPPT.
8. To perform the construction of a Simulink model of Biomass Gasifier.
9. To study mathematical modelling of DFIG based Wind Turbine and its impact on connection with grid.
10. To perform the simulation of Permanent Magnet Synchronous Generator (PMSG) based wind energy conversion system.
11. To perform the simulation of PV- Grid interconnection using MPPT technique with the partial shading effect.

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L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Elective-I

Power Electronics Applications in Renewable Energy
MTEE- 201A

Unit 1

Review of Power Devices: SCR, BJT, MOSFET, IGBT, GTO, Safe operating Limits, Selection of devices for various applications.

Phase controlled Converters: **(**1-φ & 3- φ) thyristor fed half controlled, fully controlled and Dual converters with inductive and motor load.

DC to DC converters: Analysis of various conduction modes of Buck, Boost, Buck-Boost.

Unit 2

Modern Power Electronic Converters: Basic concepts of VSI, single phase half bridge, full bridge and three phase bridge inverters, PWM modulation strategies, Sinusoidal PWM, Space vector modulation, Selective Harmonic Elimination method, other inverter switching schemes, blanking time, Current source inverters.

Unit 3

Design of Power Electronics Interfaces for Solar PV: Solar PV technologies, MPPT, Design of DC-DC converters for MPPT, MPPT algorithms, Implementation of MPPT control through DSP controllers.

Topologies for grid connected and standalone applications: single phase and three phase systems, Single stage and multistage, isolated and non- isolated.

Unit 4

Power Electronics Interfaces for WES: Topologies of WES, design considerations for WES with rectifier /inverter system, Power Converters for Doubly Fed Induction Generators (DFIG) in Wind Turbines.

Power Electronics Interfaces for Fuel Cells: Types of fuel cells, Proton Exchange Membrane (PEM) fuel cell: features and operational characteristics, Design of DC-DC converters for PEM fuel cell, MPPT in Fuel Cell.

References:

1. "Power Electronics, Converters, Applications & Design", N.Mohan, T.M.Undeland, W.P Robbins, Wiley India Pvt. Ltd.
2. "Modern Power Electronics and AC Drives", B. K Bose, Pearson Education.
3. "Power Electronics", Joseph Vithayathil, Tata McGraw Hil.
4. "Voltage Source Converters in Power Systems: Modeling, Control and Applications", Amirnaser Yezdani, and Reza Iravani, IEEE John Wiley Publications.
5. "Solar PhotoVoltaics", Chetan Singh Solanki, PHI learning Pvt Ltd., New Delhi,2009.

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KURUKSHETRA UNIVERSITY KURUKSHETRA
M. Tech. (Electrical Engg.) Credit Based w.e.f.Aug.2015

L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Elective-I

Electric Power Distribution & Automation
MTEE-203A

UNIT-1

Introduction: Basis of distribution automation, power delivery systems, control hierarchy, DA concept, Distribution automation system, basis architectures and implementation strategies for DA.
Central Control and Management: Need of power control, operation environment of distribution networks, evolution of Distribution management systems, basic distribution management function, basis of a real time control system outage management, decision support applications, database structures and interfaces.

UNIT-2

Distribution Automation and Control Functions: Introduction, Demand side management, Voltage/VAR control, fault detection, restating function, reconfiguration of distribution systems, power quality.
Intelligent Systems in Distribution Automation: Distribution automation function, artificial intelligent methods, intelligent systems in DA, fault detection, classification and location in distribution systems.

UNIT-3

Renewable Energy Options and Technology: Distributed generation, classification of renewable energy, renewable energy options, other non-renewable energy sources, distributed generation concepts and benefits, examples.
Distribution Management Systems: DMS and EMS, function of EMS, SCADA, remote terminal UNITs, distribution management systems, Distribution system analysis, Feeder automation, Load management systems, GIS customer information system, automatic meter reading, advance billing, Advances in AMR technology, cost benefit analysis in DS.

UNIT-4

Communication System for Control and Automation: Communication and distribution automation, DA communication and link options, wireless communication, wire communication, DA communication and control, DA communication architecture, DA communication user interface.

References:

1. James A. Momoh, "Electric Power Distribution Automation Protection and Control", CRC Press, Taylor and Francis, 2008"
2. James N-Green and R.Wilson, "Control and Automation of electric Power Distribution Systems", CRC Press, Taylor and Francis, 2008.
3. Turan Gonen, "Electric Power Distribution System Engineering", CRC Press, 2007
4. Abdelhay A. Sallam, "Electric Distribution Systems", Wiley-IEEE Press, 2011.

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L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Elective-I

Advanced Microprocessors
MTEE -205A

UNIT-1

Architecture of 8086 microprocessor, Memory Addressing, Bus Timings for MN/MX mode, interrupt structure. Memory Interfacing and Address decoding techniques for 8086 microprocessor

UNIT-2

Addressing modes, Instruction set and application programs, Assembler Directives, Programming Techniques using TASM, Interfacing D/A and A/D converters using programmable I/O devices, Interfacing Stepper motor. Architecture of INTEL X86 Family: CPU block diagrams, Pin diagrams and internal descriptions of -80286, 386,486 and Pentium Processor, Instruction formats.

UNIT-3

Introduction to microcontrollers, Architecture of 8051 microcontroller, basic Instruction set, programming, serial data communication, interfacing with D/A and A/D converters.

UNIT-4

Application of Microprocessors, A Microcomputer-based Industrial Process-control System, Hardware for Control Systems and Temperature Controller, Overview of Smart-Scale Operation.

References:

Advanced Microprocessors, D.V.Hall, PHI.
The Intel Processors, B. Brey, Pearson Education.
Microprocessors, Gibson, Prentice Hall of India.
4. Micro Controller, K.J. Ayala, Penram International

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L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Elective-I

Reliability Engineering
MTEE-207A

Unit-1

Review of basic concepts in Reliability Engg., Reliability function, different reliability models, etc. Reliability evaluation techniques for complex systems; Tie set and cutest approaches, different reliability measures, Reliability allocation/apportionment, reliability improvement, redundancy optimization techniques.

Unit-2

Fault tree analysis: fault tree construction, simplification and evaluation, importance measures, modularization, applications, advantages and disadvantages of fault tree techniques.

Unit-3

Maintainability Analysis: measures of system performance, types of maintenance, reliability centered maintenance, reliability and availability, evaluation of engineering systems using Markov models.

Unit-4

Applications of fuzzy theory and neural networks to Reliability Engineering. Reliability testing, design for reliability and maintainability. Typical reliability case studies.

References:

1. R. Ramakumar, “Engineering Reliability”, Prentice Hall, NJ.
2. KB Mishra, “Reliability Analysis & Prediction”.
3. KB Mishra, “New trends in System Reliability Evaluation”.
4. M.L. Shooman, “Probabilistic reliability – an engineering approach” RE Krieger Pub., 1990.
5. K.K. Aggarwal, “Reliability Engineering”.
6. Roy & Billington-“Reliability Engineering”.

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KURUKSHETRA UNIVERSITY KURUKSHETRA
M. Tech. (Electrical Engg.) Credit Based w.e.f.Aug.2015

L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Elective-II

Load and Energy Management
MTEE-209A

Unit-1

Load Forecasting: Classification and characterization of loads, Approaches to load forecasting, Forecasting methodology, Energy forecasting, Peak demand forecasting, Non-weather sensitive forecast and Weather sensitive forecast, Total forecast, Annual and monthly peak demand forecasts. Applications of state estimation to load forecasting.

Unit-2

Load Management: Introduction to Load management. Electric energy production and delivery system structure (EEPDS). Design alternatives for EEPD systems. Communication/control techniques for load management. Tariff structure and load management, principles of macro & microeconomics and energy pricing strategies, Assessing the impacts of load management.

Unit-3

Energy Demand Forecasting: Static and dynamic analysis of energy demand, elements of energy demand forecasting, methodologies and models for energy demand forecasting, techno-economic approach in energy demand forecasting.

Unit-4

Trends and Case Studies: Energy management strategy, symbiotic relation between information, energy models and decision making, case studies like industrial energy forecasting, transportation energy forecasting, residential, commercial and agricultural energy forecasting

References:

1. Martino J., Technological Forecasting for Decision Making, Elsevier Press, New York.
2. Gellings and Penn Well P.E., Demand Forecasting in the Electric Utility Industry, Fairmount Press.
3. Makridakis S., Forecasting Methods and Applications, Wiley.
4. Barney , Wayne Turner, William J. Kennedy, Guide to energy management, The Fairmont Press, Inc.
5. Pradeep Chaturvedi, Energy management: challenges for the next millennium,Concept Pub. New Delhi.

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L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Elective-II

Special Topics in Power System
MTEE-211A

Unit-1

Power System Restructuring and Deregulations: Introduction to Power System Deregulation Market Models Pool & Bilateral International Experiences, Role of ISO, Market Power, Bidding and Auction Mechanisms. Transmission Open Access, Transmission Pricing, Impact of Congestion and Congestion Management, ATC and Factor affecting ATC, Determination of ATC.

Unit-2

Power System Computation and Computer Application: OPF and its Formulation, Solution Techniques NLP Methods, LPOPF Interior Point Method, AI Techniques, GA and Particle Swarm Optimization (PSO).

Unit-3

SCADA & Distribution Automation: Energy management systems, Power system communication, PICC Digital Communication, Microwave communication, Utility communication architecture, Java and Web based technologies and Software Agents.

Unit-4

Flexible AC Transmission Systems (FACTS): Reactive Power Control in Electric Transmission Systems, Loading Capability and Stability Considerations. Introduction to FACTS, related concepts and system requirements, Application considerations of FACT devices.

References:

1. Lei Lee Lai, Power System restructuring and deregulation. John Wiley and Sons, UK. 2001.
2. K. Bhattacharya, MHT Bollen and J.C Doolder, Operation of Restructured Power Systems, Kluwer Academic Publishers, USA, 2001.
3. A.J Wood and B.F Wollenberg. Power System Operation and Control, John Wiley and Sons.
4. S.A Soman, S.A Khafasok, Shubha Pandit, Computational Methods for large Sparse Power System Analysis: An Object Oriented Approach. Kluwer Academic Publishers.

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M. Tech. (Electrical Engg.) Credit Based w.e.f.Aug.2015

L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Elective-II

Power System Restructuring and Deregulation
MTEE-213A

Unit-1

Introduction: Basic concept and definitions, privatization, restructuring, transmission open access, wheeling, deregulation, components of deregulated system, advantages of competitive system.
Power System Restructuring: An overview of the restructured power system, Difference between integrated power system and restructured power system, Explanation with suitable practical examples.

Unit-2

Deregulation of Power Sector: Separation of ownership and operation, Deregulated models, pool model, pool and bilateral trades model, multilateral trade model.
Competitive electricity market: Independent System Operator activities in pool market, Wholesale electricity market characteristics, central auction, single auction power pool, double auction power pool, market clearing and pricing, Market Power and its Mitigation Techniques, Bilateral trading, Ancillary services.

Unit-3

Transmission Pricing: Marginal pricing of Electricity, nodal pricing, zonal pricing, embedded cost, Postage stamp method, Contract Path method, Boundary flow method, MW-mile method, MVA-mile method, Comparison of different methods.

Unit-4

Congestion Management: Congestion management in normal operation, explanation with suitable example, total transfer capability (TTC), Available transfer capability (ATC), Different Experiences in deregulation: England and Wales, Norway, China, California, New Zealand and Indian power system.

Reference:

1. Loi Lei Lai,"Power System Restructuring and Deregulation", John Wiley & Sons Ltd.
2. K. Bhattacharya, MHT Bollen and J.C Doolder, Operation of Restructured Power Systems, Kluwer Academic Publishers, USA, 2001.
3. Lorrin Philipson and H. Lee Willis,"Understanding Electric Utilities and Deregulation", Marcel Dekker Inc, New York.
4. Yong-Hua Song, Xi-Fan Wang, Operation of market-oriented power systems, Springer, Germany.

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L	T	Ext	Int	Cr
3	1	60	40	4

Time: 03 Hrs

Elective-II

Advanced Digital Signal Processing
MTEE-215A

Unit-1

LTI Systems:- Transform LTI systems as frequency selective filters. Invertibility of LTI systems. Minimum phase, maximum phase and mixed phase systems. All-pass filters. Design of digital filters by placement of poles and zeros. DFT as a linear transformation. Linear filtering methods based on DFT. Frequency analysis of signals using DFT. Discrete cosine transform.

Unit-2

Design of FIR filters:- Introduction-Specifications-Coefficient calculation methods-Window, Optimal and Frequency sampling methods- Comparison of different methods-Realization structures-Finite word length effects-Implementation techniques-Application examples.

Unit-3

Design of IIR filter:- Introduction-Specifications. Coefficient calculation methods-Pole zero placement, Impulse invariant, Matched Z transform and Bilinear Z transform(BZT) .Design using BZT and classical analog filters. IIR filter coefficients by mapping S plane poles and zeros.

Unit-4

Adaptive Digital Filters:- Concepts -Wiener filter-LMS adaptive algorithm-Recursive least squares algorithm-Lattice Ladder filters. Application of Adaptive filters.

Power Spectrum Estimation:- Estimation of spectra from finite-duration signals. Nonparametric and Parametric methods for Power Spectrum Estimation.

References:

1. Emmanuel C Ifeachor, Barrie W.Jervis, Digital Signal Processing, A practical Approach, 2/e, Pearson.
2. Proakis, Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications, 4/e, Pearson.
3. Johnny R. Johnson, Introduction to Digital Signal Processing, PHI, 1992
4. Ashok Ambardar, Digital Signal Processing: A Modern Introduction, Thomson, IE, 2007.
5. Douglas F. Elliott, Handbook of Digital Signal Processing- Engineering Application, Academic Press.
6. Schilling, Sandra Harris, Fundamentals of Digital Signal Processing using MATLAB, Thomson, 2005.

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L	T	Ext	Int	Cr
-	-	-	100	12

Synopsis
MTEE-217A

The students are required to initially work on Literature survey/ problem formulation / adopted methodology/ Industry selection/ etc. on some latest areas of Industrial and Production Engineering or related fields during summer vacations after second semester.

The students will be required to submit a progress report duly signed by their respective supervisors to the department, related to their dissertation work in the last week of September and November. The progress report will cover the following:

- The goal set for the month.
- Research papers studied.
- Methodology used in achieving the goal.
- The extent of fulfillment of the goal.

The progress report must be at least of 8 -10 pages and the cover page should include the tentative topic, name of the candidate, name of the supervisor, period of progress report, signature of candidate and supervisor.
The students will be required to appear for comprehensive seminar & viva-voce and submit a synopsis report based on their progress related to the dissertation at the end of semester. The synopsis report will be submitted in the same format as that of the thesis and will contain the following:

1. Introduction
2. Literature Survey
3. Gaps in Literature
4. Objectives of the Proposed Work
5. Methodology
6. References

* Student will choose his/her guide in the end of second semester

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L	T	Ext	Int	Cr
-	-	200	100	20

Dissertation (Thesis)
MTEE-202A

The students are required to undertake Analytical/Experimental/computational investigations in the field of Industrial and Production Engg. or related fields which have been finalized in the third semester. They would be working under the supervision of a faculty member.

The students will be required to submit a progress report duly signed by their respective supervisors to the department, related to their dissertation work in the last week of February and April. The progress report will cover the following:

- The goal set for the month.
- Research papers studied.
- Methodology used in achieving the goal.
- The extent of fulfillment of the goal.
- References

The progress report must be at least of 8 -10 pages and the cover page should include the tentative topic, name of the candidate, name of the supervisor, period of progress report, signature of candidate and supervisor.

The final dissertation will be submitted in the end of semester which will be evaluated by internal as well as external examiners based upon his/her research work. Each student is required to publish at least two research papers (minimum standards: one paper in a referred journal and one in an International journal/National conference), to enable him/her to qualify for the award of M. Tech degree. Before submission of Dissertation, student has to submit proof of his/her publications with acceptance.

UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY
KURUKSHETRA UNIVERSITY, KURUKSHETRA
("A" Grade NAAC Accredited University)

(2015-16 onwards in phased manner)

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING
(INDUSTRIAL & PRODUCTION ENGINEERING)
(CREDIT BASED)

SEMESTER-I	Subject	L	T	P/D	Total	Minor Test	Major Test	Duration	Credits
MTIP-601	Non-Conventional Machining	4	-	-	4	40	60	3	4
MTIP-603	Product Design & Development	4	-	-	4	40	60	3	4
MTIP-605	Computer Aided Design and Manufacturing	4	-	-	4	40	60	3	4
MTIP-607	Advanced Engineering Materials	4	-	-	4	40	60	3	4
MTIP-609	Research Methodology and Optimization Techniques	4	-	-	4	40	60	3	4
MTIP-611	CAD/CAM Lab	-	-	2	2	40	60	2	1
						240	**360**		**21**
						600			

SEMESTER-II	Subject	L	T	P/D	Total	Minor Test	Major Test	Duration	Credits
MTIP-602	Mechatronics	4	-	-	4	40	60	3	4
MTIP-604	Tool Engineering	4	-	-	4	40	60	3	4
MTIP-606	Advanced Metal Casting	4	-	-	4	40	60	3	4
MTIP-608	Advanced Welding ProcessesADVANCEDMETALCASTING	4	-	-	4	40	60	3	4
MTIP-610	Mechatronics Lab	-	-	2	2	40	60	2	1
-	**Elective-I (I&P)**	4	-	-	4	40	60	3	4

LIST OF ELECTIVES – I (Industrial and Production Engineering) for 2nd Semester		
1.	MTIP-612	Advanced Metal Cutting
2.	MTIP-614	Computational Methods in Engineering
3.	MTIP-616	Design of Experiments
4.	MTIP-618	Operations Management
5.	MTIP-620	Strategic Entrepreneurship

SEMESTER-III	Subject	L	T	P	Total	Minor Test	Major Test	Duration	Credits
-	**Elective-II**	4	-	-	4	40	60	3	4
-	**Elective-III**	4	-	-	4	40	60	3	4
MTIP-613	**Synopsis of Dissertation**	-	-	-	-	100	-	-	10
					Total	**180**	**120**		**18**
						300			

LIST OF ELECTIVES –II (Industrial and Production Engineering) for 3rd Semester		
1.	MTIP-615	Supply Chain Management
2.	MTIP-617	Finite Element Methods
3.	MTIP-619	Sequencing and Scheduling
4.	MTIP-621	Productivity Management
5.	MTIP-623	Simulation of Industrial Systems

LIST OF ELECTIVES – III (Industrial and Production Engineering) for 3rd Semester		
1.	MTIP-625	Smart Materials
2.	MTIP-627	Manufacturing Optimization through Intelligent Techniques
3.	MTIP-629	QualityEngineering and Management
4.	MTIP-631	Enterprise Resource Planning
5.	MTIP-633	Intellectual Property Rights and Patent Laws

SEMESTER-IV		L	T	P	Total	Minor Test	Major Test	Credits
MTIP-622	Dissertation	-	-	-	-	100	200	18
					Total	**300**		**18**

INSTRUCTIONS FOR PAPER SETTER

1. The question paper is to be attempted in **THREE Hours**.
2. Maximum Marks for the paper are **60.**
3. The syllabus for the course is divided into **FOUR units.**
4. The paper will have a total of **NINE questions.**
5. **Question No. 1,** which is compulsory, shall be OBJECTIVE Type **and have content from the entire syllabus (all Four Units).**

Q. No. 2 & 3 from Unit I

Q. No. 4 & 5 from Unit II

Q. No. 6 & 7 from Unit III

Q. No. 8 & 9 from Unit IV

6. All questions will have equal **weightage of 12 marks.**
7. The candidate will attempt a total of **FIVE questions**, each of 12 marks. Q. No. 1 is compulsory. The candidate shall attempt remaining **four** questions by selecting **only one question from each unit.**
8. A question may have any number of sections labeled as 1(a), 1(b), 1(c), 1(d), ---- 2(a), 2(b), --.A section may further have any number of subsections labeled as (i), (ii), (iii),.
9. **SPECIAL INSRUCTIONS FOR Q. No. 1 ONLY**

   Question No. 1, which is compulsory, shall be OBJECTIVE/ short answer type **and have content from the entire syllabus (all Four Units).**

   Emphasis is to be given on the basic concepts, analytical reasoning and understanding of the various topics in the subject. This question may have a number of parts and/or subparts. The short questions could be combination of following types:

   i. Multiple Choice
   ii. Yes/ No choice
   iii. Fill in Blanks type
   iv. Short numerical computations
   v. Short Definitions
   vi. Matching of Tables

The above mentioned question types is **only a Guideline**. Examiner could set the question as per the nature of the subject.

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1st Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–601 NON-CONVENTIONAL MACHINING

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60

Total: 100
Duration of Exam. : 3 Hrs.

UNIT I

Introduction, Need of Non-conventional machining processes, Characteristics of conventional and Non-conventional Machining processes.**Mechanical Working Processes**: **Abrasive Jet Machining:**Machining setup, Abrasives, Process Parameters, Machining Characteristics, Material removal models in AJM, Process capability, Advantages, limitations, Applications

Water Jet Machining: Basic mechanism of Water jet machining setup, Process parameters, Catcher, Process capabilities,Advantages, limitations, Applications**Abrasive Water Jet Machining process:** Working Principle, AWJM Machine, Process Variables, Mechanism of Metal Removal, Cutting Parameters, Process capabilities, Applications,Environmental issues.

Ultrasonic Machining: Fundamental principles, Equipment, Magnetostriction, Elements of process, Mechanics of cutting, Analysis of Process Parameters, Process capabilities, Economic considerations. Applications, Limitations

UNIT II

Chemical Machining: Introduction, Fundamental Principles, Process Parameters; Maskants and Etchants, Advantages, Limitations, Applications.

Electrochemical MachiningProcesses: Introduction, Classification of ECMProcesses, FundamentalsPrinciples of ECM, Elements of ECM, ECM Machine Tool Process, Determination of Metal Removal Rate, Evaluation of Metal Removal of an alloy, Electrochemistry of ECM, Cathode and Anode reaction,Dynamics of ECM, Self-Regulating feature of ECM, Process Parameters, Process capabilities, Electroc

hemical Deburring.**Electrochemical Grinding:** Schematics, Electrochemistry, Process Parameters, Process capabilities, Applications, Advantages, Limitations.

UNIT III

EDM: Introduction, Basic Principles & Schematics, Process Parameters,Characteristics of EDM, Dielectric, Electrode Material,Modelling of Material Removal, Spark Erosion Generators, Analysis and Metal Removal Rate in RC circuit, Selection of Tool Material and Tool Design, Di-Electric system, Process Variables, Dielectric Pollution and its effects, Process Characteristics, Applications,Electric Discharge Grinding and Electric Discharge Diamond Grinding; **Wire EDM**:Working Principle, Wire EDM Machine, Advances in Wire-cut EDM Process Variables, Process Characteristics, Applications.

UNIT IV

Laser Beam Machining Back Ground, Production of Laser, Working Principle of LBM, Types of LASERS, Process Characteristics, Metallurgical effects, Advantages and Limitations, Applications.

Electron Beam Machining:

Electron Beam Action, Generation and control of Electron beam, Theory of Electron Beam Machining, Process Parameters, Process capabilities, Applications.

High Energy Rate Forming, Elctro-Hydraulic Forming, Explosive Forming, Hot MachiningAnalysis of the Process.

RECOMMENDED BOOKS:

1. Advanced Machining Processes by V.K. Jain. Allied Publishers Pvt Ltd
2. Modern Machining Processes by P.C. Pandey and H.S. Shan. Tata McGraw- Hill
3. Unconventional Manufacturing Process by M K Singh, New Age Publishers
4. Advanced Methods of Machining by J. A. Mcgeough, Springer
5. Non-Traditional Manufacturing Process by Benedict, CRC pub.
6. Nonconventional manufacturing by P. K. Mishra, Narosa Publishers

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units). All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1st Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP-603: PRODUCT DESIGN & DEVELOPMENT

L	T	P	Cr	
4	0	-	4	Minor Test: 40 Major Test: 60 Total: 100 Duration of Exam. : 3 Hrs.

UNIT-I

INTRODUCTION: Introduction to product design, Design by evolution and innovation, Essential factors of product design, Production consumption cycle, Flow and value addition in production consumption cycle, Morphology of design.

PRODUCT DESIGN PRACTICE AND INDUSTRY: Product strategies, Time to market, Analysis of the product, Basic design considerations, Role of aesthetics in product design.

UNIT-II

DESIGN FOR MANUFACTURE AND ASSEMBLY: Overview and motivation, Basic method: Design guidelines: Design for assembly, Design for piece part production, Advanced method: Manufacturing cost analysis, cost driver modeling, manufacturing cost analysis, Critique for design for assembly method.

DESIGN FOR THE ENVIRONMENT: Environmental objectives, Basic DFE methods, design guidelines, Life cycle assessment, Techniques to reduce environmental impact

UNIT-III

HUMAN ENGINEERING CONSIDERATIONS IN PRODUCT DESIGN: Human being as applicator of forces, Anthropometry, the design of controls, the design of displays, Man/Machine information exchange, Workplace layout from ergonomic considerations.

VALUE ENGINEERING: Value, Nature and measurement of value, Maximum value, Normal degree of value, Importance of value, value analysis job plan, creativity, steps to problem solving and value analysis, value analysis tests, value engineering idea generation check list, Cost reduction through value engineering-case study, materials and process selection in value engineering.

UNIT-IV

MODERN APPROACHES TO PRODUCT DESIGN: Concurrent design, Quality function deployment (QFD), Rapid prototyping

PRODUCT DEVELOPMENT: A modern product development process, reverse engineering and redesign product development process, product life cycle, product development teams, Product development planning, Manufacturing & economic aspects of product development.

RECOMMENDED BOOKS:

1. Kail T Ulrich and Steven D Eppinger, “Product Design and Development.”
2. AK Chitale and Gupta, “Product Design and Engineering”
3. Niebel & Draper, “Product Design and Process Engineering”
4. Kevin Otto & Kristin Wood, “Product Design-Techniques in reverse engineering and new product development”
5. Middendorf Marcel Dekker, “Design of Systems and Devices”

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units). All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks.

Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1st Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–605 COMPUTER AIDED DESIGN AND MANUFACTURING

L	T	P	Cr
4	0	-	4

Minor Test: 40
Major Test: 60
Total: 100
Duration of Exam. : 3 Hrs.

UNIT I

Fundamentals of CAD: Introduction, Design Process, Application of computers in design, Creating manufacturing database, Benefits of CAD. Computer Hardware, Graphic input devices, display devices, Graphics output devices, Central processing unit (CPU).

Geometric transformations: 2D and 3D; transformations of geometric models like translation, scaling, rotation, reflection, shear; homogeneous representations, concatenated representation; Orthographic projections, Numerical Problems

UNIT II

Introduction to Manufacturing

Basic definitions, design activities for manufacturing systems, Planning and control activates for manufacturing system, Manufacturing control, Types of production – low, Medium and high quantity production.

Group Technology and Cellular Manufacturing

Part families, parts classifications and coding, Production flow Analysis, cellular Manufacturing-composite part concept, machine cell design, applications of group technology, Grouping parts and machines by Rank order clustering technique, Arranging machines in a G.T. cell.

UNIT III

Process Planning

Introduction, Manual process planning, Computer aided process planning – variant, generative, Decision logic- decision tables, decision trees, Introduction to Artificial intelligence.

Flexible Manufacturing

Introduction, FMS components, Flexibility in Manufacturing – machine, Product, Routing, Operation, types of FMS, FMS layouts, FMS planning and control issues, deadlock in FMS, FMS benefits and applications.

UNIT IV

CNC Basics and Part Programming

Introduction, Principle of CNC, Classification of CNC/NC – point to point and continuous path, positioning system- fixed zero and floating zero, Dimensioning- absolute and incremental, Coordinate system, Basic requirements of CNC machine control, CNC/NC words, Manual part programming, (G&M codes only) canned cycles, tool length and radius compensation.

RECOMMENDED BOOKS:

1. **Chris McMahon and Jimmie Browne**, CAD/CAM – Principle Practice and Manufacturing Management, Addison Wesley England, Second Edition, 2000.
2. **Ibrahim Zeid**, CAD/CAM theory and Practice, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1992.

3. **Ibrahim Zeid**, Mastering CAD/CAM, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. **Rogers, D.F. and Adams, A**., Mathematical Elements for Computer Graphics, McGraw Hill Inc, NY, 1989
5. **P. Radhakrishnan, S. Subramanayan and V.Raju**, CAD/CAM/CIM, New Age International (P) Ltd., New Delhi.
6. **Groover M.P. and Zimmers E. W.**, CAD/CAM: Computer Aided Design and Manufacturing, Prentice Hall International, New Delhi, 1992.
7. **Dr. Sadhu Singh**, Computer Aided Design and Manufacturing, Khanna Publishers, New Delhi, Second Edition, 2000.
8. **M.P. Groover**, Automation, Productions systems and Computer-Integrated Manufacturing by Prentice – Hall
9. **Chang, Wang & Wysk** Computer Aided Manufacturing. Prentice Hall
10. **Kundra** &**Rao**, Numerical Control and Computer Aided Manufacturing by, Rao and Tiwari, Tata Mc-Graw Hill.
11. **Mattson**, CNC programming Principles and applications, Cengage Learning India Pvt. Ltd. Delhi

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).
All questions will have equal ***weight of 12 marks*****.** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1st Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–607 ADVANCED ENGINEERING MATERIAL

L	T	P	Cr	
4	0	-	4	Minor Test: 40 Major Test: 60 Total: 100 Duration of Exam. : 3 Hrs.

UNIT-I

Piezoelectric materials (PZT): piezoelectric effect, Di-electric hysteresis, piezoelectric constants, hydrogen storage alloys, functionally gradient material (FGM).

Shape memory alloys (SMA): Shape memory effect and the metallurgical phenomenon of SMA, Temperature assisted shape memory effect,

UNIT-II

Electro rheological (ER) and magneto-rheological (MR) materials: Characteristics of ER and EM fluids. ER and EM materials.

Composite materials: Design and manufacturing of polymer matrix, metal matrix and ceramic matrix composites. Various forms and type of reinforcements, fillers and additives. Design of composites for structural, wear resistance and high temperature applications.

UNIT-III

Micro-electro-mechanical (MEMS) systems: Introduction, characteristics of silicon wafers and other materials for MEMS applications. Various manufacturing techniques of MEMS components,

Materials for high temperature applications: Ni-Cr alloys, ODS materials, Ni base and Co based super alloys, carbon-carbon composites. Diffusion bond coating of high temperature materials, Different types of Thermal spray coating for aero engines and gas turbines

UNIT-IV

Powder metallurgy: Introduction and feature of powder metallurgy processes. Advanced solidification techniques: directional solidification, single crystal growth and levitation melting.

Structural Materials: Porous matrix ceramics- composites, Metallic foam, Cellular Materials, Nano tubes, Functional Materials: Low dielectric constant materials, optoelectronic materials.

Glassy and Nano crystalline materials for soft and hard magnetic properties and their applications.

Recommended Books:

[1] Gandhi, M.V. and Thompson, B.S., Smart materials and Structures, Chapman &Hall, 1992.
[2] Otsuka, K. and Wayman, C. M., Shape memory materials, C.U.P, 1998
[3] Taylor, W., Pizoelectricity, George Gorden and Breach Sc. Pub., 1985
[4] Mallick, P.K., Fiber Reinforced Composites Materials, Manufacturing and Design.
Marcel Dekker Inc, New York, 1993.
[5] Rama Rao, P. (ed.), Advances in Materials and their applications, Wiley Eastern Ltd.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1st Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)

MTIP-609 RESEARCH METHODOLOGY AND OPTIMIZATION TECHNIQUES

L	T	P	Cr	
4	0	-	4	Minor Test: 40 Major Test: 60 Total: 100 Duration of Exam. : 3 Hrs.

UNIT I

Introduction to research methodology, various types of techniques, alternative approaches to the study of the research problem and problem formulation, formulation of hypotheses, feasibility, preparation and presentation of research proposal.

Introduction to experimental design, Taguchi method, concept of orthogonal array, primary and secondary data collection, S/N ratio, validation, regression and correlation analysis,tests of significance based on normal,T and chi square distributions, analysis of variance.

UNIT II

Edition, tabulation & testing of hypotheses, interpolation of results, presentation, styles for figures, tables, text, quoting of reference and bibliography. Use of software for statistical analysis like SPSS, Minitab or MATLAB, Report writing, preparation of thesis, use of software like MS Office.

The course will include extensive use of software, reporting writing and seminars in tutorial class.

UNIT III

Integer linear programming methods and applications, Introduction to integer non-linear programming, Basics of geometric programming.

Multi-objective optimization methods and applications, Formulation of problems – Separable programming and stochastic programming.

UNIT IV

Introduction to Genetic algorithms, neural network based optimization and optimization of fuzzy systems, Evolutionary Algorithm and Ant Colony Optimization techniques.

Note: - Some of the algorithms are to be exercised using MAT LAB.

RECOMMENDED BOOKS:

1. C.R Kothari, Research Methodology, WishwaPrakashan
2. P.G Triphati, Research Methodology, Sultan Chand & Sons, N.Delhi
3. Fisher, Design of Experiments, Hafner
4. Sadhu Singh, Research Methodology in Social Sciences, Himalya Publishers
5. Kalyanmoy Deb, Optimization for engineering design – algorithms and examples. PHI,New Delhi,1995.
6. SingiresuS.Rao, "Engineering optimization –Theory and practices", John Wiley & Sons
7. Garfinkel, R.S. and Nemhauser, G.L., Integer programming, John Wiley & Sons, 1972.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1st Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–611 CAD/ CAM LAB

L	T	P	Cr
-	-	2	1

Minor Test: 40
Major Test: 60
Total: 100
Duration of Exam. : 2 Hrs.

List of Experiments:

The students will be required to carry out the following exercises or their equivalent tasks using a 3-D modeling software package (e.g. Solid-works/ Creo/ Ideas/ Solid Edge/UG/CATIA/ etc.).Practical must be performed on licensed version (Preferably the latest version) of any one of above mentioned software.

1 BASIC SOLID MODELING
Introduction & sketcher tools

a) CAD Tools and Applications: CAD - CAM - CAE
b) Parametric Feature Based Modelling and Parent-Child Relation
c) Design Intent and Associativity between 3 Modes
d) Modelling Software - Getting Started & Graphical User Interface
e) Sketch Entities and Tools
f) Dimensioning and Adding Relations to define the Sketch
Sketched Features (Boss / Base and Cut)
a) Base Features
b) Extrude & Revolve
c) Reference Geometry, Curves & 3D Sketch
d) Sweep & Loft
Editing & Refining Model
a) Editing Sketch, Sketch Plane and Editing Feature
b) Suppress / Un-Suppress Feature and Reordering Feature

2 ADVANCE FEATURES APPLIED FEATURES
a) Patterns & Mirror
b) Fillet/Round & Chamfer
c) Hole & Hole Wizard
d) Draft, Shell, Rib and Scale
e) Dome, Flex and Wrap
Multi Body
a) Indent Tool
b) Combine Bodies – Boolean Operations
c) Split, Move/Copy and Delete Bodies
Other Tools & Options
a) Design Table and Configurations
b) Adding Equations and Link Values
c) Tools - Measure and Mass Properties
d) Appearance - Edit Material, Colour and Texture
e) Options - System and Document Properties

3 SURFACING TECHNIQUES BASIC SURFACE CREATIONS

a) Extrude & Revolve
b) Sweep & Loft
c) Boundary Surface
d) Planar Surface

Other Derived Techniques

a) Offset Surface
b) Radiate Surface
c) Ruled Surface
d) Fill Surface
e) Mid Surface

Modify / Edit Surfaces

a) Fillet/Round
b) Extend
c) Trim & Untrim
d) Knit Surfaces
e) Delete and Patch

Surfaces for Hybrid Modelling

a) Thicken – Boss / Base and Cut
b) Replace face
c) End condition for Sketched feature - Up to Surface or Offset from Surface.
d) Solid body from closed surfaces

4 ASSEMBLY & MECHANISMS BOTTOM UP ASSEMBLY APPROACH

a) Inserting Components/Sub-Assemblies
b) Adding Mates - Standard & Advance
c) Editing Mates, Part and Replacing Components

Top down Approach & Mechanisms

a) Inserting New Part to Existing Assembly
b) Use of Layout Sketching
c) External References - In-context and Out-of-context, Locked and Broken

Assembly Features

a) Component Patterns & Mirrors
b) Cuts & Holes
c) Belt/Chain and Weld Bead

Representations of Assembly Components

a) Light Weight, Suppressed and Resolved
b) Hide, Transparency and Isolate
c) Exploded View

Assembly Check

a) Interference Detection,
b) Collision Detection and Physical Dynamics

Motion Study

c) Assembly Motion & Physical Simulation
d) Animation Wizard & Save as AVI file
e) Mechanism Analysis – Plot Displacement, Velocity and Acceleration Diagram

5 DETAILED DRAFTING

Introduction to Engineering Drawings

a) General Procedure for Drafting & Detailing
b) Inserting Drawing Views, Dimensioning and Adding Annotations
c) Drawing Templates & Sheet Format
d) Setting Options

Drawing Views

a) Model View & Standard 3 View
b) Projected View & Auxiliary View
c) Section & Aligned Section View
d) Detail View, Broken-out Section and Crop View.

Dimensioning

a) Standards, Rules and Guidelines
b) Dimension Insertion/Creation - Insert Model Items & Dimension tool

Annotations

a) Notes & Holes Callout
b) Datum & Geometric Tolerances
c) Surface Finish & Weld Symbols
d) Centre Mark & Centre line
e) BOM Balloon & Bill of Material

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)

MTIP–602 MECHATRONICS

L	T	P	Cr	
4	0	-	4	Minor Test: 40 Major Test: 60 Total: 100 Duration of Exam. : 3Hrs.

UNIT-1

Introduction: The Mechatronics approach: A methodology for integrated design of Mechanical, Electronics and Electrical, Control, computer and Instrumentation

Fundamentals of Electronics and digital circuits: Number systems: Binary, Octal, Hexadecimal, Conversion from Binary to Decimal, Octal and Hexadecimal and vice–versa, Binary arithmetic: Addition, subtraction, Multiplication and division, Boolean Algebra: Laws, De-Morgan's laws, Logic Gates, Truth tables, Karnaugh maps and logic circuits. Generation of Boolean function from truth tables and simplification, Review of semiconductor devices, operational amplifier, Configurations: Inverting, summing, integrating and differentiating, Concepts of digital and analog systems, Digital to analog conversion (DAC): R-2R and summing Op-amp circuit, Analog to digital conversion (ADC): successive approximation method, Programs for DI, DO, DA and AD for PCL 208 card.

UNIT-II

HYDRAULIC SYSTEMS:

Direction Control Valves: Poppet Valve, Spool Valve, Sliding Spool type DCV, Check Valve, Pilot operated check valve, Restriction check valve, 2 Way vale, 3 way valve, 4 way valve, Manually actuated valve, Mechanically actuated valve, Pilot operated DCV, Solenoid Actuated valve, Rotary Valve, Centre flow path configurations for three position four way valve, Shuttle valve

Pressure Control Valve: Simple and compound pressure Relief Valve, Pressure Reducing Valve, Unloading valve, sequence valve, counterbalance valve, Brake Valve

Flow Control Valves: Fixed and non-adjustable valve, adjustable, throttling, non-pressure compensated pressure control valve, Pressure/temperature compensated flow control valve, Shuttleand Fast exhaust valve, Time delay valve, Flow Control Valves, Fluid Conditioners **Hydraulic Symbols (ANSI).**

Hydraulic Circuit design: Control of Single and double acting cylinders, double pump HydraulicSystem

UNIT-III

PNEUMATIC SYSTEM:

Air Generation and distribution: Air compressors, Air Receiver, Filters, intercoolers, After-coolers,Relief Valve, Air dryers,Primary and secondary lines, Piping layouts, Air Filters, Air Regulators, Air Lubricator, Actuators and output devices, Direction control valves, Flow control valves, junction elements, Pneumatic circuits, Control of Single and double acting cylinders.

UNIT-IV

INTRODUCTION TO MICROCONTROLLER

8051 Architecture: Memory map - Addressing modes, I/O Ports -Counters and Timers – Serial data - I/O - Interrupts -Instruction set, Data transfer instructions, Arithmetic and Logical Instructions, Jump and Call Instructions,Assembly Language Programming tools. Interfacing applications

PROGRAMMABLE LOGIC CONTROLLERS

Introduction - Principles of operation - PLC Architecture and specifications - PLC hardware Components, Analog &digital I/O modules, CPU & memory module - Programming devices - PLC ladder diagram, Converting simple relay ladder diagram in to PLC relay ladder diagram. PLC programming Simple instructions - Manually operated switches - Mechanically operated Proximity switches - Latching relays, Applications of PLC.

Recommended Books:

1. Mechatronics by W. Bolton, Pearson Education.
2. Pneumatic system, Majumdar, TMH
3. Hydraulic and Pneumatic systems by Andrew Parr, TMH.
4. Automation, Production systems and computer integrated manufacturing by M.P. Groover, TMH.
5. Mechatronics system design by Shetty and Kolk, Thomson learning.
6. Mechatronics by Mahalik, TMH

Note: The paper will have a total of ***NINE questions***. Question No. 1, which is compulsory, shall be **OBJECTIVE** Type and have contents from the entire syllabus (all Four Units).

All questions will have equal *weight of 12 marks*. The student will attempt a total of ***FIVE*** *questions*, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining/our questions by selecting only one question from each unit.*

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–604TOOL ENGINEERING

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs.

UNIT-I

Cutting Tool Materials: Introduction and desirable properties , Carbon and Medium-Alloy Steels , High-Speed Steels , Cast-Cobalt Alloys , Carbides , Coated Tools , Alumina-Based Ceramics , Cubic Boron Nitride , Silicon-Nitride Based Ceramics , Diamond , Reinforced Tool Materials , Cutting-Tool Reconditioning

Design of Cutting Tools Basic Requirements, Mechanics and Geometry of Chip Formation, General Considerations for Metal Cutting, Design of single point Cutting Tools, Design of Milling Cutters, Design of Drills and Drilling, Design of Reamers, Design of Taps, Design of Inserts, Determining Shank Size for Single-point Carbide Tools, Determining the Insert Thickness for Carbide Tools, Chip Breakers, Design of form tools

UNIT-II

Gages and Gage Design: Limits fits and tolerances, Geometrical tolerances-specification and measurement, Types of gages, Gage design, gage tolerances, Material for Gages.

Work Holding Devices: Basic requirements of work holding devices, Location: Principles, methods and devices, Clamping: Principles, methods and devices.

UNIT-III

Drill Jigs: Definition and types of Drill Jigs, Chip Formation in Drilling, General Considerations in the Design of Drill Jigs, Drill Bushings, Drill Jigs, and Modern Manufacturing

Design of Fixtures: Fixtures and Economics , Types of Fixtures , Milling Fixtures , Boring Fixtures, Broaching Fixtures, Lathe Fixtures, Grinding

UNIT-IV

Tool Design for Numerically Controlled Machine Tools: Fixture Design for Numerically Controlled Machine Tools, Cutting Tools for Numerical Control, Tool-holding Methods for Numerical Control

Recommended Books:

1. ASTME, “Fundamentals of Tool Design”, Prentice Hall of India, 1983.
2. Donaldson, “Tool Design”, Tata-McGraw Hill, 3rd Edition, 2000.
3. Joshi P.H., “Jigs and Fixtures”, Tata-McGraw Hill, 2010.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–606ADVANCED METAL CASTING

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs.

UNIT-I

Functional Requirement of Moulding Materials: Principal ingredients of moulding Sands;Different Types of Sands; Clays, Different types of Clay structures, ; Moisture; Bonding mechanism of silica –clay-water System, Hardened Mould or dry sand practice, The Requirement of core sands, Indian Foundry Industry and challenges.

Specification and testing of Moulding Sands

Grain Size, Grain Shape, Clay content, Moisture Content, Bulk Density and Specific Surface Area, ADV, Fines Content, Sintering Temperature, Mould hardness, Permeability, Strength, Deformation& toughness, Compactability, Mouldability, High Temperature Characteristics.

UNIT-II

Solidifications of Metals, Nucleation, free energy concept, critical radius of nucleus, Distribution coefficient and Constitutional Undercooling, Solidification in Pure Metals and Alloys, Directional Solidification, Casting Characteristics related to Solidification; Fluidity, Dendritic Growth, Dendritic coherency, Segregation, Inverse Segregation, Hot tearing, Hipping, Solidification under pressure.

Heat Transfer during casting process: Resistance to Heat Transfer, Centerline Feeding Resistance, Rate of solidification, Solidification of Large casting in an insulating mould, Solidification with predominant interface resistance, Solidification with constant casting surface temperature, Solidification with predominant resistance in mould and solidified Metal, Solidification Time and Chvorinov rule, Numerical Exercises.

UNIT-III

Gating System Design: Gating system defined, Types of Gating Systems, Types of Gates, Elements of Gating System, Gating System design, Factors involved in Gating design, Pouring time, Choke Area, Sprue design, Gating Ratio, Sprue runner gate ratio, Elimination of Slag and Dross, Filtration, Numerical exercises.

Riser Design: Need for riser, Basic requirements of an effective feeding system for a casting, Feeding Efficiency, Types of Risers, Effective feeding distances for simple and complex shapes. Use of chills, Directional solidification, Stresses in castings, Metal Mould reactions, Claine's Method, Modulus Method, Naval Research Laboratory (NRL) Method, Pouring rate and Temperature, Padding, Use of exothermic materials, Chills, Feeding Aids, Numerical exercises.

UNIT-IV

Special casting Processes: Shell Moulding, Investment Casting, Permanent Mould Casting, Diecasting, Centrifugal casting.

Inspection and testing of casting: Visual, Optical, Dimensional inspection, Laser Scanning, White lightscanning, Radiographic Inspection, ultrasonic testing, Magnetic Particle Testing,dye penetration, Casting Defects; Classification, Causes and remedies.

RECOMMENDED BOOKS:

1. H.F. Taylor, "Foundry Engineering", John Wiley and Sons.
2. P.L. Jain, "Principles of Foundry Technology", Mc-Graw Hill.
3. Mahi Sahoo and Sudhari Sahu, "Principles of Metal Casting.
4. Amitabha Ghosh, " Manufacuring Science", Affliated East West Press.
5. P.N Rao, "Manufacturing Technology: Foundry, Forming and Welding" TMH.
6. K.P. Sinha,"Foundry Technology", Standard Publishers, Delhi.
7. Flinn, "Fundamentals of Metals Casting", Addison Wesley.
8. Heine Loper and Resenthal, "Principles of Metal Casting", Mc-Graw Hill.
9. Hielel and Draper, "Product Design & Process Engineering", Mc-Graw Hill.
10. Salman & Simans, "Foundry Practice", Issac Pitman.
11. ASME, "Metals Handbook- Metal Casting."
12. P.C. Mukharjee, Fundamentals of Metal casting Technology, Oxford, IBH.
13. P.R.Beeley, Foundry Technology , Butterworth Heinmann

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).
All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–608ADVANCED WELDING PROCESSES

L	T	P	Cr	
4	0	-	4	Minor Test: 40 Major Test: 60 Total: 100 Duration of Exam. : 3Hrs.

UNIT-I

WELDING METALLURGY: Introduction, Weld Metal Zone, Theory of solidification of metals and alloys, Homogeneous Nucleation, Heterogeneous Nucleation, Freezing ofalloys, Epitaxial Solidification; Effect of Welding speed on Grain structure, Fusionboundary zone, Heat affected zone, Under bead zone, Grain Refined Zone, Partialtransformed zone, Properties of HAZ

WELDING ARC: Definition of Arc, Structure and characteristics, Arc efficiency, arcblow, Electrical Characteristics of arc, Types of Welding Arcs, mechanism of arcinitiation and maintenance, role of electrode polarity on arc behaviour and arc stability,analysis of the arc. Arc length regulation in mechanized welding processes.

UNIT-II

WELDING POWER SOURCES: Requirement of an Arc welding power sources, basic characteristics of power sources for various arc welding processes, duty cycles, Selection of a static Volt-Ampere characteristic for a welding process, AC/DC welding powersource, DC rectifiers, thyristor controlled rectifiers, transistorized units, inverter systems,Mathematical Problems on Static volt ampere characteristics

UNIT-III

COATED ELECTRODES: Electrode coatings, classification of coatings of electrodes forSMAW, SAW fluxes, role of flux ingredients and shielding gases, classification of solid and flux code wires.

METAL TRANSFER & MELTING RATE: Mechanism and types of metal transfer, forces affecting metal transfer, modes of metal transfer, metal transfer in various weldingprocesses, effective of polarity on metal transfer and melting rate.

UNIT-IV

SOLID STATE WELDING: Theory and mechanism of solid state welding. Techniques and scope of friction welding, diffusion welding, cold pressure welding and ultrasonicwelding. High energy rate welding. Analysis of the Process.

WELDING TECHNIQUES: Technique, scope and application of the electron beam andlaser welding processes. Under water welding - process & problem.

RECOMMENDED BOOKS:

1. Raymond Sacks, ―Welding: Principles & Practices‖ McGraw-Hill
2. R.S.Parmar, ―Welding processes & Technology‖, Khanna Publishers
3. R.S.Parmar, ―Welding Engineering & Technology‖, Khanna Publishers
4. S.V. Nandkarni, ―Modern Arc Welding Technology, Oxford& IBH publishing Co.
5. L.M.Gourd, ―Principles of Welding Technology‖, ELBS/ Edward Arnold.

6. Richard L. Little, ―Welding & Welding Technology‖, Mc-Graw Hill.
7. Cary, Howard, ―Modern Welding Technology‘, prentice Hall, 1998.
8. Rossi, ―Welding Technology‖, Mc-Graw Hill.

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All questions will have equal ***weight of 12 marks*****.** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)

MTIP–610 MECHATRONICS LAB

L	T	P	Cr	
-	-	2	1	Minor Test: 40 Major Test: 60 Total: 100 Duration of Exam. : 2 Hrs.

List of Experiments

1. To study and conduct exercises on PLC Simulator.
2. Control of conveyor manually and through programming, also programming using sensors and conveyor.
3. Control of X-Y position table manually and through programming.
4. To study and conduct exercises on Robotic simulation software.
5. To study and conduct exercises on Pneumatic & Electro-Pneumatic Training System.
6. **Design and testing of hydraulic circuits such as**

i) Pressure control
ii) Flow control
iii) Direction control
iv) Design of circuit with programmed logic sequence, using an optional PLC in hydraulic
Electro hydraulic Trainer.

7. **Design and testing of pneumatic circuits such as**

i. Pressure control
ii. Flow control
iii. Direction control
iv. Circuits with logic controls
v. Circuits with timers
vi. Circuits with multiple cylinder sequences in Pneumatic Electro pneumatic Trainer.

8. To perform exercises on Process control trainer

Note: At least eight experiments should be performed from the above list.

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)

MTIP–612 ADVANCED METAL CUTTING

L	T	P	Cr	
4	0	-	4	

Minor Test: 40
Major Test: 60
Total: 100
Duration of Exam. : 3Hrs.

UNIT-I

Introduction, system of Tool nomenclature, Tool Geometry, Mechanism of Chip formation and forces in orthogonal cutting, Merchant's force diagram.

Oblique Cutting: Normal chip reduction coefficient under oblique cutting, true shear angle, effective rake, influx region consideration for deformation, direction of maximum elongation, effect of cutting variables on chip reduction co-efficient, forces system in oblique cutting, effect of wear land on force system, force system in milling, effect of helix angle.

UNIT-II

Fundamentals of Dynamometry, Theoretical determination of forces, angle relations, heat and temperature during metal cutting; distribution, measurement, analysis, theoretical estimation of work piece temperature, hot machining

Fundamental factors, which effect tool forces: Correlation of standard mechanized test. (Abuladze –relation), nature of contact and stagnant phenomenon, rates of strains, shear strain and normal strain distributions, cutting variables on cutting forces.

UNIT-III

Cutting Tools: Tools materials analysis of plastic failure (from stability criterion), Analysis failure by brittle fracture, wear of cutting tools, criterion, flank and crater wear analysis, optimum tool life, tool life equations, (Taylor's woxen etc) Tool life test, machining optimization, predominant types of wear; abrasive, adhesive, diffusion wear models, wear measurements and techniques, Major Test of tool wear oxidative mathematical modelling for wear, test of machinability and influence of metallurgy on machinability. Economics of metal machining

UNIT-IV

Abrasive Machining: Mechanics of grinding, cutting action of grit, maximum grit chip thickness, energy and grit force temperature during grinding, wheel wear, grinding, process simulation, testing of grinding wheels, mechanics of lapping and honing, free body abrasion.

RECOMMENDED BOOKS:

1. Principles of Machine tools by Sen & Bhattacharya by New Central Book Agency.
2. Machining of Metals, by Brown; Prentice hall.
3. Principles of Metal cutting by Shaw; Oxford I.B.H.
4. Metal cutting theory & Cutting tool design by Arshimov & Alekree, MIR Publications.
5. Machining Science & Application by Knowenberg Longman Press.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units). All questions will have equal ***weight of 12 marks*.** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–614COMPUTATIONAL METHODS IN ENGINEERING

L	T	P	Cr
4	0	-	4

Minor Test: 40
Major Test: 60
Total: 100
Duration of Exam. : 3Hrs.

UNIT – I

Error & approximation, Solution of transcendental equations, Interpolation, Splines.
Integration & differentiation, Solution to system of linear equations (Gauss elimination, LU decomposition, solution by iteration), Method of least squares.

UNIT – II

Matrix eigen value problems, Inclusion of matrix eigen values, Power method, tridiagonalization & QR-Factorization, methods for first order differential equations.

UNIT – III

Methods for systems & higher order differential equations, Methods for elliptic, parabolic & hyperbolic partial differential equations, Neumann & mixed problems.

UNIT-IV

Random variables, mean & variance of a distribution, normal distribution, Random sampling, Estimation of parameters.
Confidence intervals, Testing of Hypothesis, Decisions, Quality Control, Acceptance Sampling, Goodness of Fit. X2-test, Correlation analysis.

Recommended Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, Inc., 8th edition 2010.
2. H. K. Dass, Higher Engineering Mathematics by S Chand & Co. Ltd., 15th edition 2006.
3. Dr B. S. Grewal, Higher Engineering Mathematics by Khanna Publication, 40th edition 2007.
4. S.S. Sastry, Introductory methods in Numerical Analysis by PHI,Latest Edition.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

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MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)

MTIP–616 DESIGN OF EXPERIMENTS

L	T	P	Cr	
4	0	-	4	

Minor Test: 40
Major Test: 60
Total: 100
Duration of Exam. : 3Hrs.

UNIT-I

Introduction: Strategy of experimentation, Some typical applications of experimental design, Basic principles, Guidelines for designing experiments, A brief history of statistical design, Using statistical design in experimentation Simple Comparative Experiments: Introduction, Basic statistical concepts, Sampling and sampling Distribution, Inferences about the Differences in means, randomized designs, Paired comparison Designs, Inferences about the Variances of Normal Distributions.

UNIT-II

Introduction To Factorial Design: Basic definition and principles, Advantages of factorials, The two factor factorial design, General factorial design, Fitting response curves and Surfaces, Blocking in a factorial design.

UNIT-III

Fitting Regression Models: Introduction, Linear regression models, Estimate of parameters in linear regression models, Hypothesis testing in multiple regression, Confidence intervals in multiple regression, Prediction of new response observations, Regression model diagnostics, Testing for lack of fit.

UNIT-IV

Taguchi Method Of Design Of Experiments: Concept design, Parameter design, Tolerance design, Quality loss function, Signal-to- Noise ratio, Orthogonal array experiments, Analysis of Mean (ANOM), Quality characteristics, Selection and testing of noise factors, Selection of control factors, Parameter optimization experiment, Parameter design case study Analysis of Variance (ANOVA): Introduction, Example of ANOVA process, Degrees of freedom, Error variance and pooling, Error variance and application, Error variance and utilizing empty columns, the F-test

Recommended Books:

1. Design and Analysis of Experiments by Douglas C Montgomery, John Wiley
2. Statistical Design and Analysis of Experiments by John P.W.M., John Wiley
3. Introduction to Linear Regression Analysis by Montgomery D.C., Runger G. C., John Wiley
4. Response Surface Methodology Process and Product Optimization Using Designed Experiments by Myres R.H. and Montgomery D. C. Wiley
5. Introduction to Quality Engineering Taguchi , G UNIPUB, White Plains, New York.

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MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–618OPERATIONS MANAGEMENT

L	T	P	Cr
4	0	-	4

Minor Test: 40
Major Test: 60
Total: 100
Duration of Exam. : 3Hrs.

UNIT I

Basics of Production Management:
Types of production, life cycle approach to production system, Productivity and Productivity measures, types of productivity index, productivity improvement, production scheduling, MRP v/s JIT, requirements and problems in implementing JIT, Benefits of JIT, Introduction to JIT purchasing and JIT quality management

UNIT II

Supply chain management, its importance, objectives and applications. Tenabled supply chain supply chain drives concepts of stockless, VRM and CRM.

UNIT III

Business Process:
Re-engineering-characteristics, organizational support, responsibility of re-engineering, re-engineering opportunities, choosing the process to re-engineer, success factors and advantages.

UNIT IV

ERP:
Evolution of ERP, Characteristics, approaches, methodology for implementation, Success factors.

Waste Management:
Introduction, classification of waste, systematic approach to waste reduction, waste disposal.

RECOMMENDED BOOKS:
1. Operation Research by D. S. Hira & P. K. Gupta,
2. Introduction to Operation Research by Hiller & Liebeman
3. Production and Operations Management by S.A.Chunawalla and D.R.Patel

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

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MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–620STRATEGIC ENTREPRENEURSHIP

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs.

UNIT I

Small Scale Industries

Definition and types of SSI's; Role, scope and performance in national economy; Problems of small scale industries.

Industrial Sickness

Definition; Causes of sickness; Indian scenario, Government help; Management strategies; Need for trained entrepreneurs

UNIT II

Entrepreneurship Development Programmes

Introduction, Origin of EDP's , Organizations involved in EDP's, Objectives of EDPs, Implementation of EDP's, Short comings of EDP's, Role in entrepreneurship development.

Step: Introduction, Origin, Status in India, Success and failure factors, Govt. polices and incentives, future prospects in India.

UNIT III

Business Incubation

Introduction, Origin and development of business incubators in India and other countries, types of incubators, success parameters for a business incubator, Benefits to industries, institutes, government and society; future prospects. A few case studies (at least 2).

UNIT IV

Special Aspects of Entrepreneurship

Entrepreneurship, Social entrepreneurship, International entrepreneurship, Rural entrepreneurship, Community Development, Women entrepreneurship.

Network Marketing

Introduction, E-business, E-commerce, E-auction, A basic internet e-business architecture, A multi-tier e-business architecture.

RECOMMENDED BOOKS:

1. Strategic Entrepreneurship by P.K. Gupta, (Everest Publishing House)
2. Project Management –Strategic Design and Implementation by David Cleland McGraw Hill
3. Entrepreneurship-New Venture Creation by David H Holl (Prentice Hall of India)
4. Sustainable Strategic Management by Steed & Steed (Prentice Hall of India)
5. Marketing Management by Kotler (Prentice Hall of India)
6. Management of Technology by Tarek Khalil (McGraw Hill)
7. Engineering Economic Principles by Henry Steiner (McGraw Hill)

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MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL AND PRODUCTION ENGINEERING)
MTIP-613 SYNOPSIS OF DISSERTATION

L	T	P	Cr.	Minor Test Marks: 100
-	-	-	10	

The studentsare required to initially work on Literature survey/ problem formulation / adopted methodology/ Industry selection/ etc. on some latest areas of Industrial and Production Engineering or related fields.

The students will be required to submit a progress report duly signed by their respective supervisors to the department, related to their dissertation work in the last week of September and November. The progress report will cover the following:

- The goal set for the month.
- Research papers studied.
- Methodology used in achieving the goal.
- The extent of fulfillment of the goal.

The progress report must be at least of 3-4 pages and the cover page should include the tentative topic, name of the candidate, name of the supervisor, period of progress report, signature of candidate and supervisor.
The students will be required to appear for comprehensive seminar & viva-voce and submit a synopsis report based on their progress related to the dissertation at the end of semester. The synopsis report will be submitted in the same format as that of the thesis and will contain the following:

1. Introduction
2. Literature Survey
3. Gaps in Literature
4. Objectives of the Proposed Work
5. Methodology
6. References

* Student will choose his/her guide in the end of second semester

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–615 SUPPLY CHAIN MANAGEMENT

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs.

UNIT I

Introduction to Supply Chain Management (SCM): Concept of Logistics Management, Concept of supply management and SCM, Core competency, Value chain, Elements of supply chain efficiency, Flow in supply chains, Key issues in supply chain management

UNIT II

Sourcing and Procurement: Outsourcing benefit, Importance of suppliers, Evaluating a potential supplier, Supply contracts, Competitive bidding and Negotiation, E-procurement

UNIT III

Introduction to Inventory Management: Selective Control Techniques, MUSIC-3D systems, Various costs. Deterministic Models, Quantity Discounts - all units, incremental price; Sensitivity, Make-or-buy decisions.

UNIT IV

Independent Demand Systems (Probabilistic Models): Q- system, P- system, Mathematical modelling under known stock out costs and service levels, Bullwhip effect, Information and supply chain trade-offs.

Decision making and application: Decision making in SC – Applications of SCM – ware house management system – product data management – E –Commerce – Reverse logistics

Cases in Paper industry – Furniture industry.

RECOMMENDED BOOKS:

1. Chopra, S., and Meindl, P., Supply chain Management: Strategy, Planning and Operations. Second Edition, Pearson Education (Singapore) Pte. Ltd, 2004.
2. Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E., Designing & Managing the Supply Chain: Concepts, Strategies & Case studies. Second Edition, Tata McGraw-Hill Edition, 2003.
3. Doebler, D.W. and Burt, D.N., Purchsing and Supply Chain Management: Text and Cases, McGraw-Hill Publishing Company Limited, New Delhi, 1996.

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MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–617 FINITE ELEMENT METHODS

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs.

UNIT-I

GENERAL PROCEDURE OF FINITE ELEMENT METHOD

Basic concept of FEM, Engineering applications, Comparison of FEM with other methods of analysis, Discretization of the domain-Basic element shapes, discretization process, Interpolation polynomials, Selection of the order of the interpolation polynomial, Convergence requirements, Linear interpolation polynomials in terms of global and local coordinates, Formulation of element characteristic matrices and vectors-Direct approach, variational approach, weighted residual approach, Assembly of element matrices and vectors and derivation of system equations together with their solution.

UNIT-II

HIGH-- ORDER AND ISO-PARAMETRIC ELEMENT FORMULATIONS

Introduction, Higher order one-dimensional element, Higher order elements in terms of natural coordinates and in terms of classical interpolation polynomials, Continuity conditions, Iso-parametric elements, Numerical integration in one, two and three-dimensions.

UNIT-III

SOLID AND STRUCTURAL MECHANICS

Introduction, Basic equations of solid mechanics, Static analysis-Formulation of equilibrium equations, analysis of trusses and frames, analysis of plates, analysis of three-dimensional problems, analysis of solids of revolution, Dynamic analysis-Dynamic equations of motion, consistent and lumped mass matrices, consistent mass matrices in global coordinate system, Dynamic response calculation using FEM

UNIT-IV

APPLICATIONS AND GENERALISATON OF THE FINITE ELEMENT METHOD

Energy balance and rate equations of heat transfer, Governing differential equation for the heat conduction in three-dimensional bodies, Derivation of finite element equations for one-dimensional, two-dimensional, unsteady state and radiation heat transfer problems and their solutions, Solution of Helmholtz equation and Reynolds equation, Least squares finite element approach.

RECOMMENDED BOOKS:

1. The Finite Element Method in Engineering – S.S. Rao, Pub. - Pergamon Press.
2. Numerical Methods in Finite Element Analysis-Klaus-Jurgen Bathe and Edwar L. Wilson, Pub.-PHI.
3. The Finite Element Method – O.C. Zienkiewicz – McGraw-Hill
4. The Finite Element Methods for Engineers – K.H. Huebner – Wiley, New York

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MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–619SEQUENCING AND SCHEDULING

L	T	P	Cr
4	0	-	4

Minor Test: 40
Major Test: 60
Total: 100
Duration of Exam. : 3Hrs.

UNIT I

Single machine models - Scheduling function and theory – scheduling problem: objectives, constraints – pure sequencing – performance measures, sequencing theorems - SPT, EDD sequence – minimization of mean flow time, mean tardiness etc – branch and bound algorithm –assignment model.

UNIT II

Parallel machine models - Independent jobs, Minimizing make span.
Job shop models – dynamic job shop simulation.

UNIT III

Flow shop models - Johnson's problem – Extension of Johnsons's rule for 3 machine problem – Jackson's method – algorithm – Palmer's method.

UNIT IV

Other models - Scheduling of intermittent production: Resource smoothing – Giffler Thomson algorithm – Branch and Bound method – Scheduling of continuous production - Line balancing.

RECOMMENDED BOOKS:

1. Michael Pinedoo, Scheduling: theory, algorithms and systems, Prentice Hall, New Delhi, 1995.
2. King, J.R. Production planning and control, Pergamon International Library, 1975.
3. Kenneth R.Baker, Introduction to sequencing and scheduling, John Wiley and Sons, 1974.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

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MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–621PRODUCTIVITY MANAGEMENT

L	T	P	Cr
4	0	-	4

Minor Test: 40
Major Test: 60
Total: 100
Duration of Exam. : 3Hrs.

UNIT I

Introduction: Productivity Basics

Concern and the Significance of Productivity Management, the Rationale of Productivity Measurement, Productivity: Some Perspectives, Productivity Measurement: A Case for Re-appraisal

UNIT II

Productivity Measurement: A Conceptual Framework

Objectives of Productivity Measurement, Management by Objectives (MBO) and Productivity Measurement, Systems Approach to Productivity Measurement, Performance Objectives – Productivity (PO-P): The Concept, PO-P: The Model, PO-P: The Methodology.

Productivity Measurements in Manufacturing Sector

Productivity Measurement in Manufacturing Sector, Productivity Measurement in a Medium Sized Organization, Productivity Measurement in a Large Sized Organization.

UNIT III

PO-P Application: Productivity Measurement in Service Sector

Need for measuring Productivity in Service Sector, Difficulties in measuring productivity, Productivity of an R&D System, Productivity of an Educational Institution.

Productivity Management: The Role of External Environment

External Environment and Organization, Impact of external Environment, External Environment: Its Sub-systems, Approaches to measure Impact of External Environment.

UNIT IV

Productivity Management and Implementation Strategies

Productivity Management System, Productivity Policy, Productivity: Organization& Planning, Productivity Measurement, Productivity Measurement Evaluation, Productivity Improvement Strategies, Productivity Audit and Control

RECOMMENDED BOOKS:

1. Productivity Management by Prem Vrat, G.D.Sardana and B.S.Sahai
2. Production and Operations Management by S.A.Chunawalla and D.R.Patel

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–623 SIMULATION OF INDUSTRIAL SYSTEMS

L	T	P	Cr
4	0	-	4

Minor Test: 40
Major Test: 60
Total: 100
Duration of Exam. : 3Hrs.

UNIT-I

Introduction and overview, concept of system, system environment, elements of system, system modeling, types of models, Monte Carlo method, system simulation, simulation - a management laboratory, advantages & limitations of system simulation, continuous and discrete systems.
Simulation of continuous systems: characteristics of a continuous system, comparison of numerical integration with continuous simulation system. Simulation of an integration formula.

UNIT-II

Simulation of discrete system: Time flow mechanisms, Discrete and continuous probability density functions. Generation of random numbers, testing of random numbers for randomness and for auto correlation, generation of random variates for discrete distribution, generation of random variates for continuous probability distributions-binomial, normal, exponential and beta distributions; combination of discrete event and continuous models.
Simulation of queuing systems: Concept of queuing theory, characteristic of queues, stationary and time dependent queues, queue discipline, time series analysis, measure of system performance,
Kendall's notation, auto covariance and auto correlation function, auto correlation effects in queuing systems, simulation of single server queues, multi-server queues, queues involving complex arrivals and service times with blanking and reneging.

UNIT-III

Simulation of inventory systems: Rudiments of inventory theory, MRP, in-process inventory. Necessity of simulation in inventory problems, forecasting and regression analysis, forecasting through simulation, generation of Poisson and Erlang variates, simulation of complex inventory situations.
Design of Simulation experiments: Length of run, elimination of initial bias, Variance, Variance reduction techniques, stratified sampling, antipathetic sampling, common random numbers, time series analysis, spectral analysis, model validation, optimization procedures, search methods, single variable deterministic case search, single variable non-deterministic case search, and regenerative technique.

UNIT-IV

Simulation of PERT: Simulation of - maintenance and replacement problems, capacity planning, production systems, reliability problems, computer time sharing problem, the elevator system.
Simulation Languages: Continuous and discrete simulation languages, block structured continuous languages, special purpose simulation languages, SIMSCRIPT, GPSS SIMULA importance and limitations of special purpose languages.

RECOMMENDED BOOKS:

1. Simulation and Modelling Loffick - Tata McGraw Hill
2. System Simulation with Digital Computer, Deo Narsingh- Prentice Hall
3. System Simulation, Hira, D.S. - S. Chand & Co.
4. Computer Simulation and Modelling Meelamkavil- John Willey
5. System Simulation by Gorden - Prentice hall
6. Jerry Banks and John, S. Carson II, 'Discrete – Event System Simulation', Prentice Hall Inc., NewJersey, 1984.
7. Geoffrey Gordon, 'System simulation', Prentice Hall, NJ, 1978.
8. Law, A.M. and W.D. Keltor, 'Simulation modelling analysis', McGraw Hill, 1982.9

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All questions will have equal ***weight of 12 marks*****.** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–625 SMART MATERIALS top

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs.

UNIT-I

Introduction to Smart Materials
Intelligence, AI Vs. embedded Intelligence, the role of Smart Materials in developing Intelligent Systems and Adaptive Structures.

Introduction to High bandwidth - Low strain generating (HBLS) Smart Materials
Piezoelectric Materials – constitutive relationship, electromechanical coupling coefficients, piezoelectric constants, piezo-ceramic materials, variation of coupling coefficients in hard and soft piezoceramics, polycrystalline vs single crystal piezoelectric materials, polyvinyldene fluoride, piezoelectric composites

UNIT-II

Magnetostrictive Materials–constitutive relationship, magneto-mechanical coupling coefficients, Joule Effect, Villari Effect, Matteuci Effect, Wiedemann effect, Giant magnetostriction in Terfenol-D, Terfenol-D particulate composites, Galfenol and Metglas materials.

Actuators based on HBLS Smart Materials – Current Trends for Actuators and Micromechatronics

UNIT-III

Introduction to Low bandwidth - High strain generating (LBHS) materials
Shape Memory Alloys (SMA) – Phase Transformations, Electro-active Polymers (EAP)

Actuators based on LBHS Smart Materials: Shape Memory Alloy based actuators for Shape Control, Electro-active Polymers for Work-Volume Generation, Sensors based on HBLS Smart Materials, Sensors based on LBHS Smart Materials

UNIT-IV

Integration of Smart Sensors and Actuators to Smart Structures – Finite Element Modelling, Optimal Placement of Sensors and Actuators, Design of Controller for Smart Structure, Case Studies to Advanced Smart Materials: Active Fibre Composites (AFC), Energy Harvesting Actuators and Energy Scavenging Sensors

Self-healing and Autophagous Smart Materials

RECOMMENDED BOOKS:

1. Smart Materials by Mel Schwartz, CRC Press, Taylor & Francis.
2. Smart Material Systems and MEMS by Vijay K. Vardhan, K. J. Vinoy, Wiley India

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).
All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–627 MANUFACTURING OPTIMIZATION THROUGH INTELLIGENT TECHNIQUES top

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs

UNIT-I

Conventional Optimization Techniques for Manufacturing Applications:
Single Variable Techniques Suitable for Solving Various Manufacturing Optimization Problems (Direct Search Method)
Multivariable Techniques Suitable for Solving Various Manufacturing Optimization Problems (Direct Search Methods)

UNIT-II

Intelligent Optimization Techniques for Manufacturing Optimization Problems
Genetic Algorithm (GA), Simulated Annealing (SA), Ant Colony Optimization (ACO), Particle Swarm Optimization (PSO), Tabu Search (TS)

UNIT-III

Optimal Design of Mechanical Elements
Introduction, Gear Design Optimization, Design Optimization of Single-Point Cutting Tool
Optimization of Machining Tolerance Allocation
Dimensions and Tolerances, Tolerance Allocation of Welded Assembly, Tolerance Design of Over Running Clutch Assembly, Tolerance Design Optimization of Stepped Clone Pulley, Tolerance Design Optimization of Stepped-Block Assembly

UNIT-IV

Optimization of Operating Parameters for CNC Machine Tools
Optimization of Turning Process, Optimization of Multi-Pass Turning Process, Optimization of Face Milling Process, Surface Grinding Process Optimization.
Modern Manufacturing Applications
Implementation of Genetic Algorithm for Grouping of Part Families and Matching Cell, Application of Intelligent Techniques for Adaptive Control Optimization.

RECOMMENDED BOOKS:

1. Manufacturing Optimization through Intelligent Techniques by R. Saravanan, CRC press, Taylor & Francis Group.
2. **Process Planning Optimization in Reconfigurable ManufacturingSystems by Farayi Musharavati.** top

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–629 QUALITY ENGINEERING AND MANAGEMENT top

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs

Unit-I

Introduction: Statistical concepts in quality control, Graphical representation of ground data, Continuous & discrete probability distributions, central limit theorem, Chi-square test, Introduction to quality control, process control and product control, chance and assignable causes of quality variation, advantages of Shewart control charts, process control charts for variables, Fixation of control limits, Type I and Type II errors, Theory of runs, interpretation of out of control points, Probability limits, initiation of control charts, trial control limits, determination of aimed-at value of process setting, rational Method of sub grouping, control chart parameters, control limits and specifications limits, natural tolerance limits, relationship of process in control to upper and lower specifications limits, process capability studies.

Unit-II

Control charts: Special control charts for variables, Group control charts, Arithmetic moving X ad R charts, Geometric Moving charts, X control charts with reject limits, Steady trend in process average with cost dispersion, trend chart with sloping limits, variable subgroup size CUSUM or cumulative sum control chart.

Unit-III

Sampling plans: Probability theory, hyper-geometric, Binomial and Poisson distributions, Acceptance inspection 100% inspection, no Inspection and sampling inspection, Operating characteristic curve, effect of sample size and acceptance number. Type a and Type B O.C curves, single, Double and multiple sampling plans, Sequential sampling plans Acceptance/rejection ad acceptance/rectification plans, procedure's risk ad consumer's risk, difference quality level, Average outgoing quality curve, average outgoing quality limit, quality protection offered by a sampling plan,Average sample number, Design of single, double and sequential plans.

Unit-IV

Quality systems: Economics of product inspection,selection of economic sampling plans, Product quality and reliability, failure data analysis and life testing, elements of total quality control quality assurance, ISO9000 quality system.

RECOMMENDED BOOKS:

1. Statistical Quality Control by Grant & Leaveworth, McGraw Hill
2. Quality Control & Industrial Statistics by Duncan, Irwin Press
3. Quality Control Handbook byJuran, McGraw Hill
4. Quality Control by Hansen, Prentice Hall
5. An Introduction to reliability & control by Thomason, Machinery Publishing
6. Total Quality Control by A.V. Taylor, McGraw-Hill

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units). All questions will have equal ***weight of 12 marks.***

The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–631 ENTERPRISE RESOURCE PLANNING

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs

UNIT I

ENTERPRISE RESOURCE PLANNING: Principle, ERP framework, Business Blue Print, Business Engineering vs Business process Re-Engineering , Tools , Languages , Value chain, Supply and Demand chain , Extended supply chain management, Dynamic Models , Process Models

UNIT II

TECHNOLOGY AND ARCHITECTURE: Client/Server architecture, Technology choices, Internet direction, Evaluation framework, CRM, CRM pricing, chain safety, Evaluation framework.

UNIT III

ERP SYSTEM PACKAGES:SAP, People soft, Baan and Oracle , Comparison , Integration of different ERP applications,ERP as sales force automation , Integration of ERP and Internet ,ERP Implementation strategies ,Organizational and social issues.

UNIT IV

Overview, Architecture,AIM,applications, Oracle SCM. SAP:Overview,Architecture,applications, before and after Y2K, criticalissues, Training on various modules of IBCS ERP Package, Oracle ERP and MAXIMO, including ERP on the NET

ERP PROCUREMENT ISSUES: Market Trends – Outsourcing ERP – Economics – Hidden Cost Issues – ROI – Analysis of cases from five Indian Companies. TOTAL: 45 PERIODS

Recommended Books:

1. Sadagopan.S , ERP-A Managerial Perspective, Tata Mcgraw Hill, 1999.
2. Jose Antonio Fernandez , The SAP R/3 Handbook, Tata Mcgraw Hill, 1998.
3. Vinod Kumar Crag and N.K.Venkitakrishnan ,Enterprise Resource Planning –Concepts and Practice, Prentice Hall of India, 1998.
4. ERPWARE , ERP Implementation Framework, Garg&Venkitakrishnan, Prentice Hall, 1999.
5. Thomas E Vollmann and BeryWhybark , Manufacturing and Control Systems, Galgothia Publications, 1998.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (3rd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)
MTIP–633 INTELLECTUAL PROPERTY RIGHTS AND PATENT LAWS

L	T	P	Cr	Minor Test: 40
4	0	-	4	Major Test: 60
				Total: 100
				Duration of Exam. : 3Hrs

UNIT I

INTELLECTUAL PROPERTY (IP) FUNDAMENTALS: Introduction, Legal concept of Property, Kinds of properties, Movable Property, Immovable Property.
IP and Classification of IP, Industrial Designs, Copy Right, Trade Mark, Importance of IP and Terms of protection.

UNIT II

PATENTS: Purpose of a Patent, Recognized conditions for Patentability, Originality of Inventions, Novelty, Non-obviousness, Utility.
Exclusive rights conferred by a Patent, National Protection, International Protection. , Patent Filing Procedure and Prosecution, Infringement of Patents, Acquisition and Transfer of Patent Rights.

UNIT III

INDUSTRIAL DESIGNS: Subject matter of Industrial Designs, Requirements for obtaining protection for industrial Design, Differences between Patent protection and Industrial design Protection, benefits of Industrial Design protection, National and International Procedure for filing, Rights granted to Design holders.
INTELLECTUAL PROPERTY MANAGEMENT: Introduction to Intellectual Property Management (IPM), Need for IP management, Interrelationships between legal advocacy and IPM, Role of Legal Practitioners, Role of Managers, IP Commercialization, IP Audit and its Importance.

UNIT IV

COPY RIGHT AND TRADEMARKS: Copyright subsists, Meaning of word 'Original', Fair dealing, Rights of Owners of Copy Rights,Procedures, Authorities and Institutions under the Copy Right Act, Infringement and remedies.
Trademarks (TM), Different types of Trademarks ,Service Mark , Classification Mark , Collective Mark, Importance of TM, Difference between registered TM and TM in use, Basic requirements for the registration of TM, Procedure for registration , Rights of registered TM owners , Infringement and remedies

Recommended Books:

1. G.B.Reddy, "Intellectual Property Rights and the Law",Gogia Law Agency, 7th Edition - Reprint, 2009.
2. N.R.Subbaram, "Demystifying Intellectual Property Rights",Lexis NexisButterworthsWadhwa, First Edition, 2009
3. N.R.Subbaram, "Patent law – Practices and Procedures", Wadhwa, Second Edition, 2007
4. N.S.Gopalakrishnan&T.G.Agitha, „Principles of Intellectual Property", Eastern Book Company, First Edition, 2009

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be

OBJECTIVE Type and have contents from the entire syllabus (all Four Units).
All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining **four** questions by selecting **only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (4th Sem.)
(INDUSTRIAL AND PRODUCTION ENGINEERING)
MTIP-622 DISSERTATION

L	T	P	Cr.	
-	-	-	18	Minor Test: 100 Major Test: 200 Total: 300

The students are required to undertake Analytical/Experimental/computational investigations in the field of Industrial and Production Engg. or related fields which have been finalized in the third semester. They would be working under the supervision of a faculty member.

The students will be required to submit a progress report duly signed by their respective supervisors to the department, related to their dissertation work in the last week of February and April. The progress report will cover the following:

- The goal set for the month.
- Research papers studied.
- Methodology used in achieving the goal.
- The extent of fulfillment of the goal.
- References

The progress report must be at least of 3-4 pages and the cover page should include the tentative topic, name of the candidate, name of the supervisor, period of progress report, signature of candidate and supervisor.

The final dissertation will be submitted in the end of semester which will be evaluated by internal as well as external examiners based upon his/her research work. At least two publications are expected before final submission of the dissertation from every student in peer reviewed referred journals from the work done by them in their dissertation.

Every dissertation will be evaluated by the joint PG evaluation Committee of the respective college, guide, an expert from the university campus and another external expert from outside the University.

Each year the College running the course will send the list of eligible students along with the topic name to the Chairman, Board of studies in Mechanical Engg. for nominating external examiner and examiner from university campus.

The list should be sent at least before 20th Dec. each year so that the evaluation of the thesis could be done in time. Any delay caused due to late submission of the student list along with the topics name will be the responsibility of the respective Director of the Institute.

In the absence of any examiner, the Director of the institute can nominate the alternative names on his own from the university campus and outside the university.

UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY
(AICTE Approved)
KURUKSHETRA UNIVERSITY, KURUKSHETRA
("A" Grade NAAC Accredited University)
MASTER OF TECHNOLOGY
IN
MECHANICAL ENGINEERING
(With Specialization in Thermal Engineering)
CREDIT BASED SYSTEM

SEMESTER-I	Subject	L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (hrs)
MTTH-901	Advanced Fluid Engineering	4	-	-	4	40	60	4	3
MTTH-903	Advanced Heat Transfer	4	-	-	4	40	60	4	3
MTTH-905	Advanced Refrigeration Engineering	4	-	-	4	40	60	4	3
MTTH-907	Design of Thermal Systems	4	-	-	4	40	60	4	3
MTME-809	Research Methodology and Optimization Techniques	4	-	-	4	40	60	4	3
MTTH-911	Advanced Heat Transfer Lab	-	-	2	2	40	60	1	-
					Total	**240**	**360**		
						600		**21**	

SEMESTER-II	Subject	L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (hrs)
MTTH-902	Computational Fluid Dynamics	4	-	-	4	40	60	4	3
MTTH-904	Advanced Internal Combustion Engines	4	-	-	4	40	60	4	3
MTTH-906	Finite Element Methods	4	-	-	4	40	60	4	3
MTTH-908	Solar Energy	4	-	-	4	40	60	4	3
	Elective-I	4	-	-	4	40	60	4	3
MTTH-910	Computational Fluid Dynamics Lab	-	-	2	2	40	60	1	-
					Total	**240**	**360**		
						600		**21**	

LIST OF ELECTIVE – I (Thermal Engg.) for 2nd Semester		
1.	MTTH-914	Advanced Thermodynamics
2.	MTTH-916	Renewable Energy & Energy Management
3.	MTTH-918	Convective Heat Transfer
4.	MTME-920	Measurements in Thermal Engineering
5.	MTTH-922	Design of Heat Transfer Equipments

SEMESTER-III	Subject	L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (hrs)
	Elective-II	4	-	-	4	40	60	4	3
	Elective-III	4	-	-	4	40	60	4	3
MTTH-913	Synopsis	-	-	-	-	100	-	10	-
					Total	**180**	**120**		
						300		**18**	

LIST OF ELECTIVE – II (Thermal Engg.) for 3rd Semester		
1.	MTTH-915	Air Conditioning
2.	MTTH-917	Cryogenic Engineering
3.	MTTH-919	Combustion Engineering
4.	MTTH-921	Nuclear Engineering
5.	MTTH-923	Jet and Rocket Propulsion

LIST OF ELECTIVE – III (Thermal Engg.) for 3rd Semester		
1.	MTTH-925	Thermal Modeling and Analysis
2.	MTTH-927	Numerical & Optimization Methods
3.	MTTH-929	Advanced Computational Fluid Dynamics
4.	MTME-931	Gas Dynamics
5.	MTTH-933	Compressible Flow Machines

SEMESTER-IV		L	T	P	Total	Minor Test	Major Test	Cr.	Duration of Exam (hrs)
MTTH-912	Dissertation	-	-	-	-	100	200	18	-
						100	**200**		
					Total	**300**		**18**	

INSTRUCTIONS FOR PAPER SETTER

6. The question paper is to be attempted in **THREE Hours**.
7. Maximum Marks for the paper are **60.**
8. The syllabus for the course is divided into **FOUR units.**
9. The paper will have a total of **NINE questions.**
10. **Question No. 1,** which is compulsory, shall be OBJECTIVE Type **and have content from the entire syllabus (all Four Units).**

Q. No. 2 & 3 from Unit I

Q. No. 4 & 5 from Unit II

Q. No. 6 & 7 from Unit III

Q. No. 8& 9 from Unit IV

10. All questions will have equal**weightage of 12 marks.**
11. The candidate will attempt a total of **FIVE questions**, each of 12 marks. Q. No. 1 is compulsory. The candidate shall attempt remaining **four** questions by selecting **only one question from each unit.**
12. A question may have any number of sections labeled as 1(a), 1(b), 1(c), 1(d), ---- 2(a), 2(b),----- . A section may further have any number of subsections labeled as (i), (ii), (iii),------.
13. **SPECIAL INSRUCTIONS FOR Q. No. 1 ONLY**

    Question No. 1, which is compulsory, shall be OBJECTIVE/ short answertype **and have content from the entire syllabus (all Four Units).**

    Emphasis is to be given on the basic concepts, analytical reasoning and understanding of the various topics in the subject. This question may have a number of parts and/or subparts. The short questions could be combination of following types:

    i. Multiple Choice
    ii. Yes/ No choice
    iii. Fill in Blanks type
    iv. Short numerical computations
    v. Short Definitions
    vi. Matching of Tables

The above mentioned question types is **only a Guideline**. Examiner could set the question as per the nature of the subject.

First Semester

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–901 ADVANCED FLUID ENGINEERING

L	T	P	Cr.	
4	0	-	4	Minor Test : 40 Major Test : 60 Total : 100 Duration of Exam : 3 Hrs.

UNIT-1

Review of basic concepts.

Basic equations of fluid flow:Reynold's transport theorem, continuity, momentum and energy equations in integral form and their applications, differential form of these equations, Navier Stokes equation, Euler's equation, Bernoulli's equation.

Ideal flow: Kinematics of fluid flow; potential flow; sources, sinks and vortices; superimposition of uniform stream with above, doublets; Rankine ovals; flow around uniform cylinders with and without circulation; pressure distribution on the surface of these bodies and D'Alembert's paradox.

UNIT-2

Exact solution of N-S equations: plane Poiselle and Coutte flows; Hagen-Poiselle flow through pipes; flows with very low Reynold's numbers; Stokes flow around a sphere; elements of hydrodynamic theory of lubrication.

Boundary layer flows: elements of two dimensional boundary layer theory; displacement thickness and momentum thickness; skin friction; Blasius solution for boundary layer on a flat plate; Karman-Pohlhausen integral method for obtaining approximate solutions, boundary layer separation & control, integral method for non-zero pressure gradient flows, entry flow into a duct, transition from laminar to turbulent flows, Reynold's stresses, turbulent boundary layer equation, turbulent pipe flow, Prandtl's mixing length hypothesis

UNIT-3

Compressible flow: speed of sound and Mach number, basic equations for one dimensional compressible flow, isentropic relation, propagation of infinitesimal and finite disturbances, stagnation and critical conditions, effect of variable flow area, converging and converging-diverging nozzles and diffusers, normal shock waves, basic equations for a normal shock wave,normal shock flow functions for one dimensional flow of an ideal gas, Supersonic channel flow with shocks, Fanno line and Rayleigh line flows, oblique shock waves,isentropic expansion waves, Prandtl Meyer expansion waves.

UNIT-4

Vortex motion: definitions; vortex lines; surfaces and tubes; vorticity; circulation; Kelvin's circulation theorem; Helmholtz's vorticity theorem; Biot-Savart law for induced vorticity; system of vortex filaments; horse-shoe vortex filaments; ring vortices; vortices streets; Karman vortex street.

Reference/Text Books:

1. Fundamentals of Mechanics of Fluid by I.G. Currie, Mcgraw-Hill
2. Foundation of Fluid Mechanics, Yuan, Prentice Hall.
3. Introduction to Fluid Mechanics, R.W. Fox, P.J. Pritchard & A.T. McDonald, Wiley India.
4. Introduction to Fluid Mechanics and Fluid Machines by S.K. Som and G. Biswas, TMH.
5. Fluid Mechanics and its applications, Gupta and Gupta, Willey Easter

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)
MTTH–903 ADVANCED HEAT TRANSFER

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam : 3 Hrs

UNIT-1

Conductive Heat Transfer: Review of the basic laws of conduction, convection and radiation.General heat conduction equation in different co-ordinates.One dimensional steady state conduction with variable thermal conductivity and with internal distributed heat sources. Extended surfaces review, tapered fins, design considerations.

Two and three dimensional steady-state conduction, method of separation of variables, graphical method, relaxation technique.

Unsteady heat conduction: lumped capacitance method, validity of lumped capacitance method, general lumped capacitance analysis, spatial effects, plane wall with convection, radial systems with convection, semi-infinite solid, constant surface temperature and heat fluxes, periodic heating, solutions using Heisler's charts.

UNIT-2

Convective Heat Transfer: Introduction to convection boundary layers,local and average convection coefficients, laminar and turbulent flow, boundary layer equations, boundary layer similarity, boundary layer analogies – heat and mass transfer analogy, Reynold's and Colburn analogies.

Forced convection: external forced convection - empirical method, flat plate in parallel flow, cylinder in cross flow, flow over a sphere; internal forced convection – hydrodynamic and thermal considerations, energy balance, laminar flow in circular tubes, convection correlations.

Natural Convection: physical considerations, governing equations, laminar free convection on vertical surface, empirical correlations, free convection within parallel plate channels, empirical correlations, combined free and forced convection.

UNIT-3

Heat Transfer with Phase Change: dimensionless parameters in boiling and condensation, boiling modes, pool boiling, correlations, forced convection boiling, physical mechanism of condensation, laminar and turbulent film condensation, film condensation in tubes, dropwise condensation.

Heat Exchangers: Basic design methodologies – LMTD and effectiveness NTU methods, overall heat transfer coefficient, fouling of heat exchangers, classification of heat exchangers according to constructional features: tubular, plate type, extended surface heat exchanger, compact heat exchangers, design of double pipe heat exchangers, plate and heat pipe type, heat transfer enhancement - Passive and active techniques.

UNIT-4

Radiation Heat Transfer: Fundamental concepts, radiation intensity, irradiation, radiosity, black body radiation, Basic laws of radiation, emission from real surfaces, absorption, reflection and transmission by real surfaces, Kirchoff's law, Gray surface, radiativeheat exchange between two or more surfaces,view factor, radiation exchange between opaque, diffuse, gray surface in an enclosure; net radiation exchange at a surface, radiation exchange between surfaces, blackbody radiation exchange, two-surface enclosure, radiation shields, multimode heat transfer, radiation exchange with participating media.

Mass Transfer:physical origins and rate equations, mixture composition, Fick's law of diffusion, mass transfer in stationary media, steady state diffusion through a plane membrane, equimolal diffusion, diffusion of water vapours through air, mass transfer coefficient, convective mass transfer, correlations.

Reference/Text Books:

1. Fundamentals of Heat and Mass Transfer by Incropera, Dewitt, Bergmann and Levine, Wiley India.
2. Heat Transfer by J.P. Holman, McGraw Hill.
3. Heat and Mass Transfer by Y.V.C. Rao, Universities Press.
4. Heat and Mass Transfer by D.S. Kumar, Katson Publication.
5. Principles of Heat Transfer by Kreith and Bohn, Thomson Learning.
6. Heat Exchangers Design and Theory by N.H. Afgan and Schliinder, MGH

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks*.** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–905ADVANCED REFRIGERATION ENGINEERING

L	T	P	Cr.	
4	0	-	4	

Minor Test : 40
Major Test: 60
Total : 100
Duration of Exam. : 3 Hrs

UNIT-1

Air Refrigeration System: Reverse Carnot cycle, most efficient refrigerator, Bell-Coleman cycle, advantages and disadvantages of air refrigeration system, necessity of cooling the aeroplanes, simple cooling and simple evaporative type, Bootstrap and Bootstrap evaporative type, regenerative type, reduced ambient. Limitation, merits and comparison.

Simple vapour compression cycle:pressure-enthalpy diagram, Ewing's construction, Suction state for maximum COP. Standard rating cycle and effect of operating conditions, (Evaporator pressure, condenser pressure, suction vapour super heat, liquid sub cooling, liquid vapour regenerative heat exchanger) Deviation of actual vapour compression cycle with that of theoretical.

UNIT-2

Multi Temperature: Method of improving the COP, optimum inter state pressure for two stages refrigeration system, Multi stage or compound compression with flash inter cooler, single expansion valve and multi expansion valve. Multi evaporator system with single compressor, individual compressor with compound compression, single expansion valve and multi-expansion valve.

Production of Low Temperature: Limitations of simple vapour compression system, multistage system, cascade system, production of solid carbon dioxide, Joule-Thomson effect, liquification of gases, hydrogen, helium, application of low temperature, Cryogenic insulation.

UNIT-3

Vapour Absorption System: Simple vapour absorption system, Maximum co-efficient of performance, modification of simple vapour absorption system, actual vapour absorption cycle and its representation on Enthalpy –composition diagram, absorption system calculation. Rich and poor solution concentration. Lithium Bromide water system.Steam Jet Refrigeration

UNIT-4

Application: Manufacture and treatment of metal, industrial medical, civil engineering, solar refrigeration, ice manufacturing and food preservation.

Design consideration of compressors, condensers, expansion devices, evaporators.Properties of refrigerants and mixture of refrigerant.

Reference/Text Books:

1. Refrigeration and Air-conditioning by C.P. Arora.
2. Mechanical Refrigeration by Sporks and Diffio.
3. ASHARE Handbook (Fundamentals) by ASHARE.
4. Thermal Environment Engineering by Threlkeld.
5. Refrigeration and Air conditioning by Stocker, Mc-Graw Hill.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–907 DESIGN OF THERMAL SYSTEM

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam : 3 Hrs

UNIT-1

Modeling of Thermal System, types of Models, mathematical Modeling, Curve Fitting, linear algebraic Systems, Numerical Model for a System, System Simulation, Methods of Numerical Simulation.

UNIT-2

Acceptable Design of Thermal System, Initial Design, Design Strategies, Design of System for Different Application Area, Additional Consideration for a Practical System,

UNIT-3

Economic Consideration, calculation of Interest, Worth of money as a function of time, series of payments, raising capital,. Taxes, economic factor in design consideration

UNIT-4

Problem Formulation For Optimization, Optimization Methods, Optimization of Thermal Systems, Practical Aspect in Optimal design, Lagrange Multipliers, Optimization of Constrained and Unconstrained Problems, applicability to thermal systems, search method, single variable problem, multi-variable constrained optimization, examples of thermal systems, geometric, linear and dynamic programming, knowledge–based design and additional considerations.

Reference/Text Books:

1. Y Jaluria, Design and Optimization of Thermal Systems, CRC Press-2007
2. N.V. Suryanarayana, Design and Simulation, MGH 2002
3. W.F.Stoecker, Design of Thermal Systems, TMH

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTME–809RESEARCH METHODOLOGY AND OPTIMIZATION TECHNIQUES

L	T	P	Cr.
4	0	-	4

Minor Test : 40
Major Test : 60
Total : 100
Duration of Exam. : 3 Hrs

UNIT I

Introduction to research methodology, various types of techniques, alternative approaches to the study of the research problem and problem formulation. formulation of hypotheses, feasibility, preparation and presentation of research proposal.
Introduction to experimental design, Taguchi method, concept of orthogonal array, primary and secondary data collection, S/N ratio, validation, regression and correlation analysis.tests of significance based on normal.T and chi square distributions. analysis of variance.

UNIT II

Edition, tabulation & testing of hypotheses, interpolation of results, presentation, styles for figures, tables, text, quoting of reference and bibliography. Use of software for statistical analysis like SPSS, Minitab or Matlab, Report writing, preparation of thesis, use of software like MS Office.

The course will include extensive use of software, reporting writing and seminars in tutorial class.

UNIT III

Integer linear programming methods and applications, Introduction to integer non-linear programming, Basics of geometric programming.
Multi-objective optimization methods and applications, Formulation of problems – Separable programming and stochastic programming.

UNIT IV

Introduction to Genetic algorithms, neural network based optimization and optimization of fuzzy systems, Evolutionary Algorithm and Ant Colony Optimization techniques.

Note: - Some of the algorithm is used to be exercised using MAT LAB

Reference/Text Books:

1. C.R Kothari, Research Methodology, WishwaPrakashan
2. P.G Triphati, Research Methodology, Sultan Chand & Sons, N.Delhi
3. Fisher, Design of Experiments, Hafner
4. Sadhu Singh, Research Methodology in Social Sciences, Himalya Publishers
5. Kalyanmoy Deb, Optimization for Engineering design – algorithms and examples. PHI,New

Delhi,1995.

6. SingiresuS.Rao, “Engineering optimization –Theory and practices”, John Wiley & Sons

7. Garfinkel, R.S. and Nemhauser, G.L., Integer programming, John Wiley & Sons, 1972.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)
MTTH–911 ADVANCED HEAT TRANSFER LAB

L	T	P	Cr.	Minor Test : 40
-	-	2	1	Major Test : 60
				Total : 100

List of Experiments

1. Study of variation of emissivity of test plate with absolute temperature.
2. To demonstrate the super thermal conductivity of heat pipe.
3. To determine natural convective heat transfer coefficient and to calculate and to plot variation of natural convective heat transfer coefficient along the vertical tube.
4. To determine the LMTD, overall heat transfer coefficient and effectiveness of evaporative heat exchanger.
5. To find out heat transfer coefficient of drop wise and film wise condensation at various flow rates of water.
6. To study different types of heat enhancement techniques.
7. To determine the Biot number, Fourier number and heat transfer coefficient for unsteady heat transfer.
8. To calculate heat transfer coefficient of the fluidized bed.
9. To find out the overall heat transfer coefficient and LMTD of a finned tube heat exchanger.
10. To find out the overall heat transfer coefficient and LMTD of a plate type heat exchanger.
11. To find out the heat flux and temperature difference between metal & liquid in a two phase transfer unit.
12. To determine the overall heat transfer co-efficient under unsteady state conditions at different temperatures and heat transfer coefficient at boiling point.

Note: Total eight experiments are to be performed selecting at least six from the above list.

Second Semester

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–902 COMPUTATIONAL FLUID DYNAMICS

L	T	P	Cr.	
4	0	-	4	

Minor Test : 40
Major Test : 60
Total : 100
Duration of Exam. : 3 Hrs

UNIT-1

Introduction: Introduction to C.F.D., comparison of the three basic approaches in engineering problem solving- analytical, experimental and computational; models of the flow, substantial derivative, governing equations – continuity equation, momentum equation, energy equation, Navier-Stokes equation; physical boundary conditions.

Mathematical behavior of governing equations: classification of quasi linear partial differential equations, general method of determining the classification of partial differential equations, general behavior of hyperbolic, parabolic, elliptic equations.

UNIT-2

Discretization: Introduction, finite difference method, difference equations, explicit and implicit approaches, error and stability analysis.

Simple CFD Techniques: Lax-Wendroff technique, MacCormack's technique, space marching, relaxation technique, pressure correction technique, SIMPLE algorithm.

UNIT-3

Heat Conduction: control volume formulation of one-dimensional steady state diffusion, unsteady one-dimensional diffusion, two and three dimensional diffusion problems, over and under relaxation.

Heat Convection & Diffusion: Steady one-dimensional convection and diffusion, central differencing scheme, upwind differencing scheme, exact solution, exponential, hybrid, and power law schemes, discretization equations for two dimensions & three dimensions.

UNIT-4

Fluid Flow:CFD solution of subsonic-supersonic isentropic nozzle flow, purely subsonic isentropic flow, viscous incompressible flow, solution of incompressible Couette flow problem by F.D.M., solution of Navier-Stokes equations for incompressible flows using MAC and SIMPLE methods.

Reference/Text Books:

1. Numerical Heat Transfer and Fluid Flow by Suhas V. Patankar, Taylor & Francis.
2. Computational fluid dynamics by John D.Anderson, Jr, McGraw Hill.
3. An Introduction to Computational Fluid Dynamics, H. Versteeg& W. Malalasekra, Pearson.
4. Computational Fluid Flow & Heat Transfer, K. Muralidhar& T. Sundararajan.
5. Introduction to Computational fluid dynamics by Anil W. Date

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–904 ADVANCED INTERNAL COMBUSTION ENGINES

L	T	P	Cr.
4	0	-	4

Minor Test : 40
Major Test : 60
Total : 100
Duration of Exam. : 3 Hrs

UNIT-1

Cycle Analysis: Fuel-air cycles, variable specific heats, dissociation, effect of operating variables, comparison with air standard cycle. Actual cycles, time and heat loss factors, exhaust blowdown, comparison of real engine cycle and fuel air cycle, availability analysis of engine processes.
Thermochemistry of fuel-air mixtures: composition of air and fuels, first law and second law applied to combustion, unburned mixture composition, combustion charts.

UNIT-2

Heat Transfer: Heat transfer and engine energy balance, parameters affecting heat transfer, convective and radiative heat transfer, measurement of instantaneous heat transfer rate, thermal loading.
Gas Exchange Processes: flow through valves and ports, exhaust gas flow rate, scavenging in two stroke engines, scavenging models, actual scavenging processes, supercharging and turbocharging, types and methods of supercharging, basic relationships, compressors, turbines, wave-compression devices, effects and limitations, charge cooling.

UNIT-3

Combustion: combustion in SI engines, thermodynamic analysis of SI engine combustion, burned and unburned mixture states, flame structure and speed, cycle variations, spark ignition, abnormal combustion, combustion in CI engines, types, CI engine combustion model, analysis of cylinder pressure data, fuel spray behavior, ignition delay, mixing controlled combustion.

UNIT-4

Fuel Injection:fuel injection systems, mechanism of spray formation, electronic injection systems, MPFI system, feedback systems, flow in intake manifolds, design requirements.

Pollution Formation and Control: trends in vehicle emission standards, unburned hydrocarbon emissions, nitrogen oxides, CO, particulate emissions, exhaust gas treatment, non-exhaust emissions.

Reference/Text Books:

1. Internal Combustion Engine Fundamentals by J.B. Heywood, McGraw Hill.
2. I.C. Engine Vol. 1 & II by C.P. Taylor, MIT press.
3. Internal Combustion Engines by V. Ganesan, Tata McGraw Hill.
4. Thermodynamics and Gas Dynamic of I.C. Engine, Vol. I & II by Horlock and Winterbone.
5. I.C. Engine, Vol. I & II by Benson and Whitehouse.
6. Thermodynamic Analysis of Combustion Engines, by Campbell.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)
MTTH–906FINITE ELEMENT METHODS

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam. : 3 Hrs

UNIT-1

Basic Steps in FEM Formulation, General Applicability of the Method; Variational Functional,Ritz Method.

VariationalFEM : Derivation of Elemental Equations, Assembly, Imposition of Boundary Conditions, Solution of the Equations.

UNIT-2

1-D Elements, Basis Functions and Shape Functions, Convergence Criteria, h and p Approximations. Natural Coordinates, Numerical Integration, Gauss Elimination based Solvers. Computer implementation: Pre-processor, Processor, Post-processor.

UNIT-3

Alternate Formulation: Weighted Residual Method, Galerkin Method; Problems with C1 Continuity: Beam Bending, Connectivity and Assembly of C1 Continuity Elements. Variational Functional; 2-D Elements (Triangles and Quadrilaterals) and Shape Functions. Natural Coordinates, Numerical Integration, Elemental Equations, .Connectivity and Assembly, Imposition of Boundary Conditions.

UNIT-4

Axisymmetric (Heat Conduction) Problem, Plane Strain and Plane Stress Solid Mechanics Problems.

Sub-parametric, Iso-parametric and Super-parametric Elements; Elements with C1 Continuity.

Free Vibration Problems, Formulation of Eigen Value Problem, FEM Formulation. Time-dependent Problems, Combination of Galerkin FEM and FDM (Finite Difference Method), Convergence and Stability of FD Scheme.

Reference/Text Books:

1. C. S. Krishnamoorty, Finite element analysis, Tata McGraw Hill
2. J. N Reddy, An introduction to Finite element method, Tata Mc. Graw Hill
3. Y. M. Desai, Finite Element Method with applications in engineering, Pearson Education India
4. Nonlinear Finite Elements for Continua and Structures (Paperback) by Belytschko (shelved 1 time as ***finite-elements***)
5. The Finite Element Method for Three-Dimensional Thermomechanical Applications (Hardcover) by Guido Dhondt (shelved 1 time as ***finite-elements***)
6. Numerical Solution of Partial Differential Equations by the Finite Element Method (Paperback) by Claes Johnson (shelved 1 time as ***finite-elements***)

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks*****.** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–908 SOLAR ENERGY

L	T	P	Cr.	
4	0	-	4	

Minor Test : 40
Major Test : 60
Total : 100
Duration of Exam. : 3 Hrs

Unit-1

Solar Radiation: Characteristics, Earth-sun relation, Estimation on horizontal and tilted surfaces, Radiation characteristics of opaque and transparent material.

Flat Plate Collectors: Description, theory, Heat capacity effects, Time constant, Measurement of thermal performance, Air heaters.

Unit-2

Evacuated Tubular Collectors: One axis, Two axis, Solar tracking, Cylindrical, Spherical and Parabolic and Paraboloid concentrators. Composite collectors, Central receiver collectors.

Heat Storage: Sensible and latent heat storage, Chemical energy system, performance calculations.

Unit-3

Flow Systems: Natural and forced flow systems, Water heating systems for domestic, industrial and space heating requirements, Solar distillation.

Solar Heating and Cooling: Direct, indirect and isolated heating concepts, Cooling concepts, Load calculation methods, Performance evaluation methods.

Unit-4

Solar Thermal Power Generation: Introduction, Paraboloidal concentrating systems, Cylindrical concentrating systems, Central receiver system.

Solar Refrigeration and Air Conditioning Systems: Introduction, Solar refrigeration and air conditioning systems, Solar desiccant cooling.

Reference/Text Books:

1. Solar Thermal Engineering Process by Duffie and Beckman.
2. Advanced Solar Energy Technology by H.P. Garg.
3. Solar Energy by S.P. Sukhatme.
4. Solar Energy by J.S. Hsieh.
5. Solar Thermal Engineering by P.J. Lunde.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–910 COMPUTATIONAL FLUID DYNAMICS LAB

L	T	P	Cr.	
-	-	2	1	Minor Test: 40 Major Test: 60 Total: 100

List of Experiments

1. To make and validate a computer programme for the one dimensional pin fin steady state heat conduction.
2. To make and validate a computer programme for the one dimensional transient heat conduction.
3. To make and validate a computer programme for the plate in two dimensions in steady state conduction.
4. To make and validate a computer programme for the plate in two dimensions in transient state.
5. To make and validate a computer programme for the comparison of explicit, implicit, semi-implicit method of computation of heat transfer equation.
6. To make and validate a computer programme for the fully developed laminar flow in circular pipe.
7. To make and validate a computer programme for the coutte flow.
8. To make and validate a computer programme to solve a model problem by stream function vorticity method.
9. To make a project by using MAC /SIMPLER method

Note: Total eight experiments are to be performed selecting at least six from the above list.

Elective-I

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH-914 ADVANCED THERMODYNAMICS

L	T	P	Cr.	
4	0	-	4	

Minor Test : 40
Major Test : 60
Total : 100
Duration of Exam. : 3 Hrs

UNIT-I

Review of basic thermodynamic principles; entropy; availability; irreversibility; first and second law analysis of steady and unsteady systems;

General thermodynamics relations; Fundamentals of partial derivatives; relations for specific heats; internal energy enthalpy and entropy; Joule - Thompson coefficient; Clapeyron equation.

UNIT-II

Multi component systems; Review of equation of state for ideal and real gases; thermodynamic surfaces; gaseous mixtures; fugacity; ideal solutions; dilute solutions; activity; non ideal liquid solutions.

Multi component phase equilibrium; Criteria of equilibrium; stability; heterogeneous equilibrium; binary vapour liquid systems; the nucleus of condensation and the behaviour of stream with formation of large and small drops; Gibbs Phase rule; higher order phase transitions.

UNIT-III

Thermodynamics of chemical reaction (combustion); internal energy and enthalpy - first law analysis and second law analysis; basic relations involving partial pressures; third law of thermodynamics; chemical equilibrium and chemical potential equilibrium constants; thermodynamics of low temperature.

UNIT-IV

Statistical mechanics - Maxwell - Boltzmann statistics; microstate and macrostates; thermodynamic probability; entropy and probability Bose Einstein statistics; Fermi Dirac statistics.

Elementary concepts of irreversible thermodynamics.

Reference/Text Books:

1. ***Thermodynamics, Kinetic Theory and Statistical Thermodynamics***, F.W.Sears and G.L.Salinger, Narosa Publishing House, New Delhi
2. ***Engineering Thermodynamics***, Zemansky, Mc Graw Hill.
3. Bejan, Advanced Engineering Thermodynamics, John Wiley and sons.
4. Engineering thermodynamics by G. Rogers and Y. Mayhow
5. Engineering Thermodynamics- a generalized approach by P.L Dhar, Elsevier publication.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–916 RENEWABLE ENERGY & ENERGY MANAGEMENT

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam. : 3 Hrs

UNIT-1

Solar Energy:The sun as a perennial source of energy, direct solar energy utilization; solar thermal applications – water heating systems, space heating and cooling of buildings, solar cooking, solar ponds, solar green houses, solar thermal electric systems; solar photovoltaic power generation; solar production of hydrogen.

Energy from Oceans:Wave energy generation – energy from waves; wave energy conversion devices; advantages and disadvantages of wave energy; Tidal energy – basic principles; tidal power generation systems; estimation of energy and power; advantages and limitations of tidal power generation; ocean thermal energy conversion (OTEC); methods of ocean thermal electric power generation.

UNIT-2

Wind energy:Basic principles of wind energy conversion; design of windmills; wind data and energy estimation; site selection considerations.

Hydro power: Classification of small hydro power (SHP) stations; description of basic civil works design considerations; turbines and generators for SHP; advantages and limitations.

UNIT-3

Biomass and bio-fuels:Energy plantation; biogas generation; types of biogas plants; applications of biogas; energy from wastes.

UNIT-4

Geothermal energy:Origin and nature of geothermal energy; classification of geothermal resources; schematic of geothermal power plants; operational and environments problems.

Energy conservation management:The relevance of energy management profession; general principles of energy management and energy management planning; application of Pareto's model for energy management; obtaining management support; establishing energy data base; conducting energy audit; identifying, evaluating and implementing feasible energy conservation opportunities; energy audit report; monitoring, evaluating and following up energy saving measures/projects

Reference/Text Books:

1. 'Renewable energy resources'.John W Twidell and Anthony D Weir.
2. 'Renewable energy – power for sustainable future'.Edited by Godfrey Boyle. Oxford University Press in association with the Open University, 1996.
3. 'Renewable energy sources and their environmental impact'.S.A.Abbasi and NaseemaAbbasi.Prentice-Hall of India, 2001.
4. 'Non-conventional sources of energy'. G.D. Rai. Khanna Publishers, 2000.
5. 'Solar energy utilization'. G.D. Rai. Khanna Publishers, 2000.
6. 'Renewable and novel energy sources'.S.L.Sah.M.I. Publications, 1995.
7. 'Energy Technology'.S.Rao and B.B. Parulekar.Khanna Publishers, 1999.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–918 CONVECTIVE HEAT TRANSFER

L	T	P	Cr.	
4	0	-	4	Minor Test : 40 Major Test : 60 Total : 100 Duration of Exam. : 3 Hrs

Unit-1

Fundamental Principles: Continuity, momentum and energy equations, Second law of thermodynamics, Rules of Scale analysis, Concept of Heat line visualization.

Laminar Forced Convection-External Flows: Boundary layer concept, velocity and thermal boundary layers, governing equations, similarity solutions, various wall heating conditions, Flow past a wedge and stagnation flow, blowing and suction, entropy generation minimization, heatlines in laminar boundary layer flow.

Laminar Forced Convection-Internal Flows: Fully developed laminar flow, heat transfer to fully developed duct flow, constant heat flux and constant wall temperature, heat transfer to developing flow, heatlines in fully developed duct flow.

Unit-2

External Natural Convection: Boundary layer equations, Scale analysis, Low and high Prandtl number fluids, integral solution, similarity solution, uniform heat wall flux, conjugate boundary layers, vertical channel flow, combined natural and forced convection, vertical walls, horizontal walls, inclined walls, horizontal and vertical cylinder, sphere.

Internal Natural Convection:transient heating from side, boundary layer regime, isothermal and constant heat flux side walls, partially divided and triangular enclosures, enclosures heated from below, inclined enclosures, annular space between horizontal cylinders and concentric spheres.

Unit-3

Transition to Turbulence:empirical transition data, scaling laws of transition, buckling of inviscid streams, instability of inviscid flow.

Turbulent Boundary Layer Flow: Boundary layer equations, mixing length model, velocity distribution, heat transfer in boundary layer flow, flow over single cylinder, cross flow over array of cylinders, Natural convection along vertical walls.

Turbulent duct flow: velocity distribution, friction factor and pressure drop, heat transfer coefficient, isothermal wall, uniform wall heating, heatlines in turbulent flow near a wall, optimal channel spacing.

Unit-4

Convection with Change of Phase: Condensation, laminar and turbulent film on a vertical surface, film condensation, drop condensation, Boiling, pool boiling regimes, nucleate boiling, film boiling and flow boiling, contact melting and lubrication, melting by natural convection.

Convection in Porous Media: Mass conservation, Darcy and Forchheimer flow models, enclosed porous media heated from side, penetrative convection, enclosed porous media heated from below.

Reference/Text Books:

1. Convection Heat Transfer by A. Bejan, Wiley Publications.
2. Convective Heat Transfer by Louis C. Burmeister, Wiley Publications.
3. Convective Heat and Mass Transfer by W.M. Kays and M.E. Crawford, McGraw Hill.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks*.** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–920 MEASUREMENTS IN THERMAL ENGINEERING

L	T	P	Cr.	
4	0	-	4	Minor Test : 40 Major Test : 60 Total : 100 Duration of Exam : 3 Hrs

Unit-1

Basics of Measurements: Introduction, General measurement system, Signal flow diagram of measurement system, Inputs and their methods of correction.

Analysis of Experimental Data: Causes and types of errors in measurement, Propagation of errors, Uncertainty analysis, Regression analysis, Statistical analysis of Experimental data.

Sensing Devices: Transducers-LVDT, Capacitive, piezoelectric, photoelectric, photovoltaic, Ionization, Photoconductive, Hall-effect transducers, etc.

Unit-2

Pressure Measurement: Different pressure measurement instruments and their comparison, Transient response of pressure transducers, dead-weight tester, low-pressure measurement.

Thermometry: Overview of thermometry, temperature measurement by mechanical, electrical and radiation effects. Pyrometer, Thermocouple compensation, effect of heat transfer.

Flow Measurement: Flow obstruction methods, Magnetic flow meters, Interferometer, LDA, flow measurement by drag effects, pressure probes, other methods.

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Unit-3

Thermal and Transport Property Measurement: Measurement of thermal conductivity, diffusivity, viscosity, humidity, gas composition, pH, heat flux, calorimetry, etc.

Nuclear, Thermal Radiation Measurement: Measurement of reflectivity, transmissivity, emissivity, nuclear radiation, neutron detection, etc.

Other measurements: Basics in measurement of torque, strain.

Unit-4

Air-Pollution: Air-Pollution standards, general air-sampling techniques, opacity measurement, sulphur dioxide measurement, particulate sampling technique, combustion products measurement.

Advanced topics: Issues in measuring thermo physical properties of micro and Nano fluids.

Design of Experiments: Basic ideas of designing experiments, Experimental design protocols with some examples and DAS

Reference/Text Books:

1. Mechanical Measurements by Thomas G. Beckwith, Pearson Publications.
2. Measurement Systems by Ernest O. Doebelin, Tata McGraw Hill Publications.
3. Experimental Methods for Engineers by J.P. Holman, Tata McGraw Hill Publications.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING

(THERMAL)

MTTH–922 DESIGN OF HEAT TRANSFER EQUIPMENTS

L	T	P	Cr.	
4	0	-	4	

Minor Test : 40
Major Test : 60
Total : 100
Duration of Exam : 3 Hrs

Unit-1

Classification of Heat Exchangers: Introduction, Classification, Overview of Heat Exchanger Design Methodology, Process and Design Specifications, Thermal and Hydraulic Design, Mechanical Design, Optimum Design , Heat Exchanger Variables and Thermal Circuit, Assumptions, Basic Definitions, ε - NTU Method , The P-NTU Method , TEMA , Multi-pass Exchangers, LMTD, Heat Exchanger Arrays and Multi-passing, Sizing and Rating Problems, Kern Method, Bell Delaware Method, Numerical on Shell and tube HEX.

Solution Methods for Determining Exchanger Effectiveness: Exact Analytical Methods, Approximate Methods, Numerical Methods, Matrix Formalism, Chain Rule Methodology , Flow-Reversal Symmetry, Design Problems, Longitudinal Wall Heat Conduction Effects, Multipass Exchangers, Non-uniform Overall Heat Transfer Coefficients, Temperature - Length - Combined Effect

Unit-2

Heat Exchanger Pressure Drop Analysis: Importance of Pressure Drop, Devices, Extended Surface Heat Exchanger Pressure Drop, Tubular Heat Exchanger Pressure Drop, Tube Banks, Shell-and-Tube Exchangers, Plate Heat Exchanger Pressure Drop, Pipe Losses, Non-dimensional Presentation of Pressure Drop Data

Heat Transfer Characteristics: Dimensionless Surface Characteristics, Experimental Techniques for Determining Surface Characteristics, Steady-State Kays and London Technique, Wilson Plot Technique, Transient Test Techniques, Friction Factor Determination, Hydrodynamic ally Developing Flows, Thermally Developing Flows, Extended Reynolds Analogy, Heat Exchanger Surface Geometrical Characteristics, Selection of Heat Exchangers and Their Components, Temperature Difference Distributions

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Unit-3

Hair-Pin Heat Exchangers: Introduction to Counter-flow Double-pipe or Hair-Pin heat exchangers, Industrial versions of the same, Film coefficients in tubes and annuli, Pressure drop, Augmentation of performance of hair-pin heat exchangers, Series and Series-Parallel arrangements of hair-pin heat exchangers, Comprehensive Design Algorithm for hair-pin heat exchangers, Numerical Problems.

Cooling tower fundamentals: Types, Nomenclature, material for construction, Structural components in details, Mechanical components (Fan, Speed reducer, Valves, Safety), Electrical components, Thermal performance testing – conduction and evaluation.

Unit-4

Furnace: Furnace, Types, Parts used in furnace, Nozzles used, Heat transfer related design of systems, Insulations, Applications in process industries.

Thermal Devices: Heat pipe, Thermal interface material, use of nano particle in heat transfer equipments, Steam Trap, Electronics cooling systems, Thermal interface materials, Heat transfer augmentation techniques

Reference/Text Books:

1. Cooling Tower Fundamentals by John C. Hensley, SPX Cooling Technologies.
2. Heat Exchanger Selection, Rating and Thermal Design by Sadik Kakac, Hongtan Liu, Anchasa Pramunjanaroenkij, CRC Press.
3. Compact Heat Exchangers by W.M. Kays and A.L. London, McGraw Hill Publications.
4. Process Heat Transfer by D. Q. Kern, McGraw Hill Publications.
5. Process Heat Transfer – Principles and Applications by R.W. Serth, Academic Press.
6. Heat Pipes Theory, design and Applications by D.S. Steinberg, Wiley Publications.
7. Fundamentals of Heat Exchanger Design by Ramesh K. Shah, Dusan P. Skulic, Wiley Publications.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

Third Semester

Elective-II

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH-915 AIR CONDITIONING

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam. : 3 Hrs

UNIT-1

Introduction and Human Comfort

Psychometric and psychometric properties, psychometric relations and processes, adiabatic temperature, psychometric chart, summer and winter air-conditioning system, year-round air-conditioning, factors influencing-human comfort, effective temperature, factors governing optimum effective temperature.

UNIT-2

Cooling Load Calculations

Types of loads, building heat transmission, solar-radiation infiltration, occupants, electric lights, products load, other internal heat sources, fresh-air miscellaneous steams, design of air-conditioning systems.

Air Conditioning Systems

Central station, unitary, distinct, self-contained direct expansion, all water, all air, air-water system, arrangement of components, air-cleaning and air filters, humidifiers, dehumidifiers air-washers, fan and blowers, grills and registers.

UNIT-3

Air Conditioning Control System

Heating and cooling coils, basic principles of control system, temperature humidity, pre-heating and humidification, cooling and dehumidification, reheat and all-year conditioning control systems. Elements of control, Deflective element (bimetallic, bulbs and below, electrical resistance, electromagnetic sensitive and pressure sensitive, controlling room conditions at partial load (ON-OFF control), by pass control, reheat control and volume control).

UNIT-4

Miscellaneous

Evaporative cooling, heating system, ventilation and ventilation standards, thermal insulation duct design and air-distribution system, noise and noise control, solar air-conditioning. Transport air conditioning, air conditioning of special type of buildings, air conditioning of textile industry, photographic industry, theatre auditorium, hospitals etc.

Reference/Text Books:

1. Refrigeration and air conditioning by C.P. Arora.
2. Refrigeration and air conditioning by Jordan and Priester
3. Refrigeration and air conditioning by William
4. ASHARAE Hand Book (Fundamentals) ASHARAE
5. Elementary Refrigeration and air conditioning Stoecjer McGraw Hill
6. Air Conditioning Engineering Jones Arnold.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH-917 CRYOGENIC ENGINEERING

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam. : 3 Hrs

UNIT-1

Gas liquefaction systems, thermodynamically ideal systems, Joule Thomson effect, adiabatic expansion; liquefaction system for air, Neon, hydrogen and helium, effect of component efficiencies on system performance.

UNIT-2

Gas separation and purification – principles, plant calculation, air, hydrogen, and helium separation systems.

UNIT-3

Cryogenic refrigeration systems, ideal and practical systems, cryogenic temperature measurement; cryogenic fluid storage and transfer systems, storage vessels and insulation, two-phase flow in cryogenics transfer systems, cool down process.

UNIT-4

Introduction to vacuum technology, low temperature properties of materials, pump down time, application of cryogenic systems, super-conductive devices, rocket and space simulation, cryogenics in biology and medicine,cryo-pumping.

Reference/Text Books:

1. Barron, R., Cryogenic Systems, McGraw-Hill, 1966.
2. Timmerhaus, K. D. and Flynn, T. M., Cryogenic Process Engineering, Plenum Press, 1989.
3. Scott, R. B., Cryogenic Engineering, D'Van-Nostrand, 1962.
4. Vance, R. W. and Duke, W. M., Applied Cryogenic Engineering, John Wiley, 1962.
5. Sitting, M. Cryogenic, D' Van-Nostrand, 1963.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–919 COMBUSTION ENGINEERING

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam. : 3 Hrs

UNIT-1

Introduction: Importance of combustion; Combustion equipments, Hostile fire problems, pollution problems arising fromcombustion.

Thermodynamics of Combustion: Enthalpy of formation; Enthalpy of reaction; Heating values; First & second laws;Analysis of reaction system, Chemical equilibrium, Equilibrium composition; Adiabatic & equilibrium, Flametemperature.

UNIT-2

Kinetics of Combustion: Law of mass action; Reacting rate; Simple and complex reaction; Reaction order &molecularity, Arhenius laws; Activation Energy; Chain reaction; Steady rate & Partial equilibrium approximation; chainexplosion; Explosion limit and oxidation characteristics of hydrogen, Carbon monoxide, Hydrocarbons.

Burning of Condensed Phase: General mass burning considerations, Combustion of fuels, droplet in a quiescent andconvective environment, Introduction to combustion of fuel sprays.

UNIT-3

Flames: Remixed flame structure & propagation of flames in homogeneous mixtures; Simplified RankineHugoniotrelation, Properties of Hugoniot curve, analysis of Deflagration &detonation branches, Properties of Chapmen Jouguetwave, Laminar flame structure; Theories of flame propagation & calculation of flame speed measurements.

Stability limits of laminar flames; Flammability limits & quenching distant, Burner design, Mechanism of flamestablization in laminar & turbulent flows, Flame quenching, Diffusion flames; Comparison of diffusion with premixedflame, combustion of gaseous fuel, jets burke & Schumann development.

UNIT-4

Ignition: Concept of ignition, Chain ignition, Thermal spontaneous ignition, Forced ignition.

Combustion Generated Pollution & its Control: Introduction, Nitrogen oxide, Thermal fixation of atmospheric nitrogenprompts, NO, Thermal NOx& control in combustors. Fuel NOx& control, post combustion destruction of NOx, Nitrogendioxide, carbon monoxide Oxidation-Quenching, Hydrocarbons, Sulphur oxide.

Reference/Text Books:

1. Internal Combustion Engines: Applied Thermo Sciences by Ferguson Colin R, John Wiley.
2. Engineering Fundamentals of the Internal Combustion Engine, Pulkrabek, Pearson Education India.
3. Instrumentation for Combustion and Flow in Engines, Durao D. F.G., Kluwer Aca.
4. Energy from Biomass: A review of Combustion and Gasification Technologies, Quaak Peter.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH-921 NUCLEAR ENGINEERING

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam. : 3 Hrs

UNIT-1

Concepts of Nuclear Physics

The atom, structure, the nucleus, nuclear structure, atomic transmutation of elements, detection of radio-activity, particle accelerator, decay, natural of elements, nucleus interactions, decay rates, half-life, transuranic elements.

Neutorn Interaction

Advantages of using neutron, neutron moderation, fission chain reaction, thermalisation of neutrons, fast neutrons, prompt and delayed neutrons, fission products.

UNIT-2

Energy Release

Mass energy equivalence, mass defect, binding energy, energy release in fission & fusion, thermonuclear reaction, fusion bomb.

Reactor Materials

Fissile & fertile materials, cladding & shielding materials, moderators, coolants.

UNIT-3

Reactor Technology

Basic principles, fuel assembly, neutron balance, reactor kinetics, reactor coefficients, reactor stability, excess reactivity, Xenon poisoning, burnable absorbers, reactivity control, heat balance, production& transfer of heat to the coolant, structural considerations.

Nuclear Reactors

Types of nuclear reactors, pressurized water reactors, boiling water reactors, CANDU type reactors, gas cooled & liquid metal cooled reactors, fast breeder reactors.

UNIT-4

Safety Considerations & Waste Disposal

Hazards, plant site selection, safety measures incorporated in; plant design, accident control, disposal of nuclear waste.

Health Physics & Radio-isotopes

Radiation: units, hazards, prevention, preparation of radio-isotopes & their use in medicine, agriculture & industry.

Reference/Text Books:

1. Nuclear Power Engineering by M.M. El-Wakel
2. Nuclear Power Plant by Taylor
3. Introduction to Nuclear Engineering by Stephenson.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–923 JET AND ROCKET PROPULSION

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam : 3 Hrs

UNIT-1

Motion in Space: Requirement for Orbit: Motion of Bodies in space, Parameters describing motion of bodies, Newton's Laws of motion, Universal law of gravitational force, Gravitational field, Requirements of motion in space, Geosynchronous and geostationary orbits, Eccentricity and inclination of orbits, Energy and velocity requirements to reach a particular orbit, Escape velocity, Freely falling bodies, Means of providing the required velocities.

UNIT-2

Theory of Rocket Propulsion: Illustration by example of motion of sled initially at rest, Motion of giant squid in deep seas, Rocket principle and rocket equation, Mass ratio of rocket, Desirable parameters of rocket, Rocket having small propellant mass fraction, Propulsive efficiency of rocket, Performance parameters of rocket, Staging and clustering of rockets, Classification of rockets.

Rocket nozzle and Performance: Expansion of gas from a high pressure chamber, Shape of the nozzle, Nozzle area ratio, Performance loss in conical nozzle, Flow separation in nozzles, Contour or bell nozzles, Unconventional nozzles, Mass flow rates and characteristics velocity, Thrust developed by a rocket; Thrust coefficient, Efficiencies, Specific impulse and correlation with C* and CF, General Trends.

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UNIT-3

Chemical Propellants: Small value of molecular mass and specific heat ratio, energy release during combustion of products, Criterion for choices of propellants, Solid propellants, Liquid propellants, Hybrid propellants.

Solid Propellants Rockets: Mechanism of burning and burn rate, Choice of index n for stable operation of solid propellant rockets, Propellant grain configuration, Ignition of solid propellant rockets, Pressure decay in chamber after propellant burnout, Action time and burn time, Factors influencing burn rate, Components of a solid propellant rocket.

UNIT-4

Liquid Propellant Rockets: Propellant feed system, Thrust chamber, Performance and choice of feed system cycle, Turbo pumps, Gas requirements for draining of propellants from storage tanks, Draining under microgravity condition, Trends in development of liquid propellant rockets.

Hybrid Rockets: Working principle, Choice of fuels and oxidizer, Future of hybrid rockets

Reference/Text Books:

1. Rocket Propulsion by M. Barrere, Elsevier Publications.
2. Rocket Propulsion Elements by G.P. Sutton, John Wiley Publications.

3. Rocket Propulsion by K. Ramamurthi, Macmillan Publishers.
4. Introduction to Rocket Technology by V.I. Feedesiev and G.B. Siniarev, Academic Press.
5. Gas Turbine Theory by H.I.H. Sarvanamuttoo, G.F.C. Rogers and H. Cohen, Pearson Prentice Hall.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks*.** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

Elective-III

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)
MTTH-925 THERMAL MODELING AND ANALYSIS

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam. : 3 Hrs

UNIT-I

Design of Thermal System: Design Principles, Workable systems, Optimal systems, Matching of system components, Economic analysis, Depreciation, Gradient present worth factor.

Mathematical Modeling: Equation fitting, Empirical equation, Regression analysis, Different modes of mathematical models, Selection, Computer programmes for models.

UNIT-2

Modeling Thermal Equipments: Modeling heat exchangers, Evaporators, Condensers, Absorption and rectification columns, Compressor, Pumps, Simulation studies, Information flow diagram, Solution procedures.

UNIT-3

Systems Optimization: Objective function formulation, Constraint equations, Mathematical formulation, Calculus method, Dynamic programming, Geometric programming, Linear programming methods, Solution procedures.

UNIT-4

Dynamic Behavior of Thermal System: Steady state simulation, Laplace transformation, Feedback control loops, Stability analysis, Non-linearties.

Reference/Text Books:

1. Hodge, B.K. and Taylor, R. P., Analysis and Design of Energy Systems, Prentice Hall (1999).
2. Bejan, A., Tsatsaronis, G. and Michel, M., Thermal Design and Optimization, John Wiley and Sons (1996).
3. Jaluria, Y., Design and Optimization of Thermal Systems, McGraw-Hill (1998).
4. Jaluria, Y., Design and Optimization of Thermal Systems, CRC Press (2008).
5. Ishigai, S., Steam Power Engineering Thermal and Hydraulic Design Principle, Cambridge University Press (1999).

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–927NUMERICAL & OPTIMIZATION METHODS

L	T	P	Cr.	
4	0	-	4	

Minor Test : 40
Major Test : 60
Total : 100
Duration of Exam. : 3 Hrs

UNIT – I

Errors in Numerical Calculations: Introduction, Numbers and their accuracy, Absolute,relative and percentage errors and their analysis, General error formula.

Interpolation and Curve Fitting: Taylor series and calculation of functions, Introduction tointerpolation, Lagrange approximation, Newton Polynomials, Chebyshev Polynomials, Least squaresline, curve fitting, Interpolation by spline functions**.**

UNIT – II

Numerical Differentiation and Integration: Approximating the derivative, Numericaldifferentiation formulas, Introduction to Numerical quadrature, Newton-Cotes formula, Gaussion-Quadrature.

Solution of Linear Systems and Nonlinear Equations: Direct Methods, Gaussianelimination and pivoting, Matrix inversion, UV factorization, iterative methods for linear systems,Bracketing methods for locating a root, Initial approximations and convergence criteria, Newton-Raphson and Secant methods

UNIT – III

Solution of Differential Equations: Introduction to differential equations, Initial valueproblems, Euler's methods, Runge-Kutta methods, Taylor series method, Predictor- Corrector methods,Finite-difference method.

Partial Differential Equations, Eigen Values and Eigen Vectors: Solution of hyperbolic, parabolic and elliptic equations, eigen value problem, Power and inverse powermethods, Jacobi's method for eigen value problems.

UNIT – IV

Optimization Methods: Optimal problem formulation, Engineering optimization problems;optimization algorithms: Single-variable optimization algorithms, optimality criteria, Bracketingmethods, Region-elimination methods, Point estimation method.

Multi- Variable Optimization Algorithms: optimality criteria, Uni-directional search,Direct search methods: Evolutionary methods, Simplex search method, Gradient based methods:Cauchy's method, Newtons method, Application to Mechanical Engg. Problems, Non- traditionaloptimization algorithms, Genetic algorithms (GA), GA for constrained optimization, other GA operators,Multi objective Optimization, Concept of Pareto Optimality, Global optimization.

Reference/Text Books:

1. Numerical Methods for Mathematics, Science and Engineering by John H.Mathews, PHI New Delhi.
2. Applied Numerical Methods – Carnahan, B.H., Luthar, H.A. and Wilkes, J.O., Wiley, New York
3. Numerical Solution of Differential Equations, by M.K. Jain, Published by Wiley Eastern, New York.
4. Introductory Methods of Numerical Analysis by S.D. Sastry, Published by Prentice Hall of India.
5. Numerical Methods – Hornbeck, R.W., Pub.- Prentice Hall, Englewood Cliffs, N.J.
6. Optimization for Engineering Design : Algorithms and Examples by Kalyanmoy Deb, PHI new Delhi
7. Numerical Optimization Techniques for Engineering Design: With Applications by Garret N. Vanderplaats,Mcgraw Hill Series in Mechanical Engineering

8. Genetic Algorithms and Engineering Optimization by Mitsuo Gen, Runwei Cheng, John Wiley & Sons
9. Global Optimization in Engineering Design, by Ignacio E. Grossmann, Kluwer Academic Publisher
10. Optimization Concepts and Applications in Engineering, by Ashok D. Belegundu , Tirupathi R. Chandrupatla, Cambridge University Press, USA

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–929 ADVANCED COMPUTATIONAL FLUID DYNAMICS

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam : 3 Hrs

Unit-1

Introduction: Revision of pre-requisite courses, finite differences and finite volume methods.

Turbulence and its modeling: transition from laminar to turbulent flow, descriptors of turbulent flow, characteristics of turbulent flow, effect of turbulent fluctuations on mean flow, turbulent flow calculations, turbulence modeling, Large eddy simulation, Direct Numerical Simulation.

Unit-2

Finite volume method for convection-diffusion problems: Steady 1-D convection-diffusion, Conservativeness, Boundedness and Transportiveness, Central, Upwind, Hybrid and Power law schemes, QUICK and TVD schemes.

Pressure - velocity coupling in steady flows: Staggered grid, SIMPLE algorithm, Assembly of a complete method, SIMPLER, SIMPLEC and PISO algorithms, Worked examples of the above algorithms.

Finite volume method for unsteady flows: 1-D unsteady heat conduction, Explicit, Crank-Nicolson and fully implicit schemes, Transient problems with QUICK, SIMPLE schemes.

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Unit-3

Implementation of boundary conditions: Inlet, Outlet, and Wall boundary conditions, Pressure boundary condition, Cyclic or Symmetric boundary condition.

Errors and uncertainty in CFD modeling: Errors and uncertainty in CFD, Numerical errors, Input uncertainty, Physical model uncertainty, Verification and validation, Guide lines for best practices in CFD, Reporting and documentation of CFD results.

Methods for Dealing with complex geometries: Introduction, body-fitted co-ordinate grids, curvilinear grids, block structured and unstructured grids, discretization in unstructured grids, diffusion and convective term, treatment of source term, assembly of discretized equations, pressure-velocity coupling, extension of face velocity interpolation method to unstructured meshes.

Unit-4

CFD modeling of combustion: Enthalpy of formation, Stoichiometry, Equivalence ratio, Adiabatic flame temperature, Equilibrium and dissociation, governing equations of combusting flows, modeling of a laminar diffusion flame, SCRC model for turbulent combustion, probability density function approach, eddy break up model.

CFD for radiation heat transfer: Governing equations for radiation heat transfer, Popular radiation

calculation techniques using CFD, The Monte Carlo method, The discrete transfer method, Raytracing, The discrete ordinates method.

Reference/Text Books:

1. An Introduction to Computational Fluid Dynamics, H. Versteeg & W. Malalasekra, Pearson.
2. Numerical Heat Transfer and Fluid Flow by Suhas V. Patankar, Taylor & Francis.
3. Computational Fluid Dynamics by J.C. Tannehill, D. A. Anderson and R.H. Pletcher, McGraw Hill.
4. Computational Fluid Dynamics: Principles and Applications, J. Blazek, Elsevier Science & Technology.
5. Computational Fluid Dynamics by T.J. Chung, Cambridge University Press.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH-931GAS DYNAMICS

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam. : 3 Hrs

UNIT-1

General differential equations of continuity; momentum and energy applied to compressible inviscid fluids; sonic velocity; Mach number and propagation of disturbance in a fluid flow; isentropic flow and stagnation properties.

UNIT-2

Flow through nozzles and diffusers; Fanno, Rayleigh and isothermal flows through pipes.

UNIT-3

Shock Waves

Normal and oblique shocks; supersonic expansion by turning; Prandtle-Meyer function, Reflection, refraction and intersection of oblique sock waves; detached shocks.

UNIT-4

Supersonic and Subsonic Flow

Linearisation and small pertuburation theory; general solutions of supersonic flow; elements of supersonic thin airfoil theory; method of characteristics for solving non-linear equations; Hodograph method for mixed subsonic and supersonic flow. Wind tunnel and its instrumentation.

Reference/Text Books:

1. Gas Dynamics by E. Rathakrishnan
2. Fundamentals of Gas Dynamics by S.M. Yahya
3. Gas Dynamics by Cambell and Jennings
4. Gas Dynamics by Becker
5. Fundamentals of Gas Dynamics by R.D.Zucker
6. Fluid Mechanics by A.K. Mohanty

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)

MTTH–933 COMPRESSIBLE FLOW MACHINES

L	T	P	Cr.	Minor Test : 40
4	0	-	4	Major Test : 60
				Total : 100
				Duration of Exam : 3 Hrs

Unit-1

Introduction*:*Introduction to Fluid Machines, Energy Transfer in Fluid Machines, Energy Transfer-impulse and Reaction Machines, efficiencies of Fluid Machines, Principles of Similarity in Fluid Machines, Concept of Specific Speed and introduction to Impulse Hydraulic Turbine.

Turbines: Analysis of Force on the Bucket of Pelton wheel and Power Generation, Specific Speed, Governing and Limitation of a Pelton Turbine, Introduction to reaction Type of Hydraulic Turbine- A Francis Turbine, Analysis of Force on Francis Runner and Power Generation, Axial Flow machine and Draft Tube, Governing of Reaction Turbine.

Unit-2

Pumps: Introduction to Rotodynamic Pumps, Flow and Energy Transfer in a Centrifugal Pump, Characteristics of a Centrifugal Pump, Matching of Pump and System Characteristics, Diffuser and Cavitation, Axial Flow Pump, Reciprocating Pump.

Unit-3

Compressors: Centrifugal and **Axial Flow Compressor, their characteristics.**

Flow through Diffusers: Classification of diffusers, internal compression subsonic diffusers, velocity gradient,effect of friction and area change, the conical internal-compression Subsonic diffusers, externalcompression subsonic diffusers, supersonic diffusers, Normal shock supersonic diffusers, theconverging diverging supersonic diffusers.

Unit-4

Shock wave: Introduction to Compressible Flow, Thermodynamic Relations and Speed of Sound, Disturbance propagation, Stagnation and Sonic Properties, Effects of Area variation on Properties in an Isentropic Flow, choking in a Converging nozzle, Isentropic Flow Through Convergent-Divergent Duct, Normal Shock, Oblique Shock, Introduction to Expansion Wave and Prandtl Meyer Flow.

Reference/Text Books:

1. Fundamentals of Compressible Flow by S. M. Yahya, New Age International.
2. Turbines, Compressors and Fans by S.M. Yahya, Tata McGraw Hill.
3. Compressible Fluid Flow by P.H. Oosthvizen and W.E. Carscallen, McGraw Hill.

Note: The paper will have a total of ***NINE questions.*** **Question No. 1,** which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal ***weight of 12 marks.*** The student will attempt a total of ***FIVE questions***, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining* ***four*** *questions by selecting* ***only one question from each unit.***

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)
MTTH-913SYNOPSIS

L	T	P	Cr.	Minor Test: 100
-	-	-	10	

The studentsare required to initially work on Literature survey/ problem formulation / adopted methodology/ Industry selection/ etc. on some latest areas of Thermal Engineering or related fields.

The students will be required to submit a progress report related to their dissertation work by the end of October. The progress report will cover the following:

- The goal set for the period.
- Research papers studied.
- Methodology used in achieving the goal.
- The extent of fulfillment of the goal.

The progress report must be at least of 3-4 pages and the cover page should include the tentative topic, name of the candidate, name of the supervisor, period of progress report, signature of candidate and supervisor.

The students will be required to appear for comprehensive Seminar & Viva-voce and submit a synopsis report based on their progress related to the dissertation before 30th November. The synopsis report will be submitted in the same format as that of the thesis and will contain the following:

7. Introduction
8. Literature Survey
9. Gaps in Literature
10. Objectives of the Proposed Work
11. Methodology
12. References

* Student will choose his/her guide in the end of second semester

Fourth Semester

MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (THERMAL)
MTTH-912DISSERTATION (PHASE-II)

L	T	P	Cr.	
-	-	-	18	Minor Test: 100 Major Test:200 Total: 300

The Students are required to undertake Analytical/Experimental/computational investigations in the field of Thermal Engg. or fields related to thermal / advanced topics etc. which have been finalized in the third semester. They would be working under the supervision of a faculty member.

The students will be required to submit a progress report duly signed by their respective supervisors to the department, related to their dissertation work in the last week of February and April. The progress report will cover the following:

- The goal set for the period.
- Research papers studied.
- Methodology used in achieving the goal.
- The extent of fulfillment of the goal.
- References

The progress report must be at least of 3-4 pages and the cover page should include the tentative topic, name of the candidate, name of the supervisor, period of progress report, signature of candidate and supervisor.

The final dissertation will be submitted in the end of semester which will be evaluated by internal as well as external examiners based upon his/her research work. At least two publications are expected before final submission of the dissertation from every student in peer reviewed referred journals from the work done by them in their dissertation.

Every dissertation will be evaluated by the joint PG evaluation Committee of the respective college, guide, an expert from the university campus and another external expert from outside the University.

Each year the College running the course will send the list of eligible students along with the topic name to the Chairman, Board of studies in Mechanical Engg. for nominating external examiner and examiner from university campus.

The list should be sent at least before 20th Dec. each year so that the evaluation of the thesis could be done in time. Any delay caused due to late submission of the student list along with the topics name will be the responsibility of the respective Director of the Institute.

In the absence of any examiner, the Director of the institute can nominate the alternative names on his own from the university campus and outside the university.

SCHEME OF EXAMINATION FOR B.A. (GENERAL)

Music (Tabla)

Paper No.	Name of Paper	Max. Marks	Time Allowed
Semester- I			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
Semester- II			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
	Practical (sem. I & sem. II)	100	20-30 Minutes
Semester- III			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
Semester- IV			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
	Practical (sem. III & sem. IV)	100	20-30 Minutes
Semester- V			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
Semester- VI			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
	Practical (sem. V & sem. VI)	100	20-30 Minutes

Note:-

(I) A candidate can opt. Music Vocal or Instrumental Sitar or Tabla or Indian Classical Dance (Kathak).

(II) The question paper (Theory) will be divided into three Sections comprising of 10 questions in all. Candidates will be required to attempt five questions in all, selecting at least one question from each section. All questions will carry equal marks.

SYLLABUS AND COURSE OF READING FOR MUSIC B.A.(GENERAL) : TABLA

SEMESTER-I

Max.Marks:40+10

PAPER–I: THEORY **Time : 3 Hrs.**

Note:-The question paper will be divided in to three sections. The candidate will be required to attempt five question selecting at least one question from each section.

SECTION-A

(a) Detailed study of various Varna of tabla.

(b) Definition of the following : Theka , Laya , Vibhag , Matra , Sam , Taali , Khaali , Taal , Kayda , Palta.

SECTION –B

(a) Knowledge of Pt. V.N. Bhatkhande Taal Lipi System.

(b) Life sketches of following :

Ustd. Ahmed jan Thirakwa , Pt. Kanthe Maharaaj , Pt. Kudau singh

(c) Ability to write the different Taalas in various simple laykaries as Thaah , Dugun , Chaugun in

notation system of Pt. Bhatkhande Taal Lipi System.

SECTION-C

(a) Ability to write the notation of kayda , palta ,and tihaai in teentaal.

(b) Explain the different parts of tabla and baya (dagga) with sketch.

SEMESTER–II

Max.Marks:40+10

PAPER–I: THEORY **Time: 3 Hrs.**

Note:-The question paper will be divided in to three section . the candidate will be required to attempt five question selecting at least one question from each section.

SECTION-A

(a) Definition of the following : Avartan , Naad , Swar , Rela , Tihaai , Mohra , Mukhda , Tukda ,

Chakkardaar.

(b) Importance of Taal in Music .

(c) Knoweldge of Pt. V.D. Palushkar Taal Lipi System.

SCTION-B

(a) Essay on the following :

(1) Importance of Music in life. (2)Rules of solo performance of Tabla.(3) Importance of laya in Music .

(b) Life sketches of following : Pt. Anokhelal mishra, Pt. Samta Prasad mishra , Pt. Pagal Das ji .

(c) Origin and development of Tabla .

SECTION –C

(a) Ability to write the notation of Kayda , Palta and Tihaai in different taals as prescribed in the

syllabus.

(b) Write the notation of different types of Laykaries such as Ekgun, Dugun , Tigun and Chaugun in

Teentaal, Rupak , Dadra, Kaherwa.

(c) Ability to write different taals in simple laykari sach as Thah, Dugun and Chaugun in Palushkar Taal

lipi System.

PRACTICAL(I&IISEMESTER)

Max.Marks : 100

Time : 20-30 Minutes

(a) Ability to play tabla solo for ten minutes with Lehra .

(b) Ability to play two kaydas with four paltas , tihai and tukdas in teentaal.

(c) Ability to play one kayda with four palta ,tihaai and two tukda in Roopak taal.

(d) Knowledge of showing Ekgun , Dugun ,Tigun Chaugun on hand in Teentaal , Roopak, Dadra,

Kaherwa .

(e) Ability to play one simple Paran and one Chakkardar Tukda in Teentaal.

(f) Ability to accompany with Light Music sach as simple geet & bhajan.

SYLLABUS AND COURSE OF READING FOR MUSIC B.A.(GENERAL)
TABLA

SEMESTER–III

Max.Marks:40+10

PAPER–I:THEORY **Time : 3 Hrs.**

Note:-The question paper will be divided in to three section . the candidate will be required to attempt

five question .selecting at least one question from each section.

SECTION –A

(a) Definition with full explanation of Paran , Farmaishi , Kamali.

(b) Origin and development of pakhawaj.

SECTION-B

(a) Classification of North Indian Taal System .

(b) Explain the Tuning method of Tabla.

(c) Life sketch and contribution of the following:

Pt. Kishan Maharaj , Ustad Habibuddin Khan , Ustad Alla Rakha.

SECTION –C

(a) Ability to write the composition in different taalas as prescribed in the syllabus.

(b) Development of different Tabla Gharana .

SYLLABUS AND COURSE OF READING FOR MUSIC B.A.(GENERAL)
TABLA

SEMESTER–IV

Max.Marks:40+10

Time : 3 Hrs.

PAPER–I:THEORY

Note:-The question paper will be divided in to three section . the candidate will be required to attempt five question .selecting at least one question from each section.

SECTION –A

(a) Define with example: Uthan , Bant , Laggi.

(b) Study in detail of TAAL DAS PRAAN.

SECTION-B

(a) Notation of Dugun,Tigun,Chaugun of following Taal:

Dhamaar , Tilwada and Adachartaal.

(b) Life sketches of the following : Pt.Nikhil Ghose , Ustad Amir Hussain Khan , Ustad Abid Husain Khan.

SECTION -C

(a) Ability to write the composition Tukda, Paran ,Kamali with notation in prescribed taals .

(b) Comparative study of Delhi & Banaras Gharana.

PRACTICAL (III&IVSEMESTER)

Max.Marks : 100

Time : 20-30 Minutes

(a) Ability to play table solo for 15 minutes with lahra.

(b) Practice & knowledge of following taals : Ek taal , Jhap taal , Chartaal.

(c) Simple Uthan in teentaal.

(d) Rela with four palta & tihai in teentaal & jhap taal.

(e) Baant with four palta & tihai in teentaal.

(f) A simple Paran in Chartaal & Farmaishi Paran in teentaal.

(g) Four Laggi in Kaharwa & Dadara taal.

(h) Two kayada with five palta & tihai of teentaal in each Delhi & Banaras Gharana.

(i) Knowledge & practice of accompaniment with chhota khayal.

(j) Ability to accompany with instrumental music in above mentioned taal.

SEMESTER–V

Max.Marks:40+10

PAPER–I: THEORY **Time : 3 Hrs.**

Note:-The question paper will be divided in to three section . the candidate will be required to attempt five question .selecting at least one question from each section.

SECTION - A

(a) Definition of following : Peshkar , Gat , Fard , Nauhakka.

(b) Characteristics of different Tabla Gharanas.

SECTION - B

(a) Development of karnatak taal system.

(b) Brief knowledge of western Rhythm notation system.

SECTION -C

(a) Merits & demerits of tabla & pakhawaj vadak mentioned in shastras.

(b) Knowledge of main Pakhawaj Gharana.

SEMESTER–VI

Max.Marks:40+10

PAPER–I:THEORY **Time : 3 Hrs.**

Note:-The question paper will be divided in to three section . the candidate will be required to attempt five question .selecting at least one question from each section.

SECTION - A

(a) Comparative study of north Indian & south Indian taal system.

(b) General review of the following Authors : Bharat muni & Sharangdev.

SECTION - B

(a) Brief study of Margi & Deshi taal system.

(b) Elimentry knowledge of staff notation system.

SECTION - C

(a) Notation of different layakaries such as : Aad(3/2) , Kuaad (5/4), Biaad(7/4).

(b) Comparison of following :

(i) Sool taal & Jhap taal

(ii) Ek taal & Char taal

(iii) Rupak & Tivra

PRACTICAL(V&VI-SEMESTER)

Max.Marks : 100

Time : 20-30 Minutes

(a) Ability to play table solo for 15 minuts.
(b) Practice & knowledge of following taals : Aada chartaal , Pancham sawari , Tivra , Deepchandi , Dhamar.
(c) A simple Peshkar with five palta & tihai in teentaal.
(d) Presentation of one Gat, Fard , and Nauhakka in Teentaal.
(e)Practice of showing different layakaries on hand : Aad , Kuaad laya.
(f) Knowledge of playing basic varnas of Pakhawaj.
(g) Solo performance at least ten minutes other than teentaal.
(h) Knowledge of accompaniment with classical vocal vilambit khayal.
(i) Knowledge of accompaniment with Instrumental Music vilambit & drut Gat.

SCHEME OF EXAMINATION FOR B.A. (GENERAL)

INDIAN CLASSICAL DANCE (KATHAK)

Paper No.	Name of Paper	Max. Marks	Time Allowed
Semester- I			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
Semester- II			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
	Practical Paper-2	100	20-30 Minutes
Semester- III			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
Semester- IV			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
	Practical Paper-2	100	20-30 Minutes
Semester- V			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
Semester- VI			
	Theory Paper- 1	40+10 (Int. Assessment)	3 Hours
	Practical Paper-2	100	20-30 Minutes

Note:-

(I) A candidate can opt. Music Vocal or Instrumental Sitar or Tabla or Indian Classical Dance (Kathak).

(II) The question paper (Theory) will be divided into three Sections comprising of 10 questions in all. Candidates will be required to attempt five questions in all, selecting at least one question from each section. All questions will carry equal marks.

(W.E.F. 2015-16)

B.A (GENERAL)

Indian Classical Dance (Kathak)
Semester - I

Paper-I Theory Max.Marks:- 40+10

Time : 3 Hrs.

Note- The question paper will be divided into 3 section comprising of 10 questions in all the candidate will be required to attempt 5 questions in all selecting at least one question from each section. All questions will carry equal marks.

SECTION –A

1. Origin of Dance according to "Natya Shastra".
2. Elements of katha in Kathak
3. Definitions of the following:-

   Tatkar, Tora, Tukda, Aamad Laya, Thaat, Paran, Chakardar, Tihai, Theka, Matra, Sam, Taali-Khali, Vibhag, Avartan.

SECTION –B

1. Brief study of origin, history and development of kathak.
2. Study of Asamyukta Hast Mudra Based on Abhinaya Darpana.
3. Contribution of important personalities and theist life sketches:
   Bindadhin Maharaj & Thakur Prasad.

SECTION –C

1. Ability to Write notation of Teentaal of the following terms:-

   Tatkar, Thaat, Tehai, Amad, Tora, Tukda, Paran, Paranamad, Chakardar Paran, Chakardar Tukda, Kavit.

2. Ability to write the following Taals and their description with their Thaah, Dugun, Tigun and Chaugun Layakaris:-

   Teentaal, Jhaptaal, Dadra, Kaharva, Sultaal.

B.A (GENERAL)

Indian Classical Dance (Kathak)
Semester - II

Paper-I Theory

Max.Marks:- 40+10

Time : 3 Hrs.

Note- The question paper will be divided into 3 section comprising of 10 questions in all the candidate will be required to attempt 5 questions in all selecting at least one question from each section. All questions will carry equal marks.

SECTION -A

1. Definitions of the following:-

   Sangit, natya, nritta, nritya, Abhinya, Anga, Pratyanga, Upanga, Gat & Parmelu.

2. Shlokas from Abhinaya Darpan :-

   (a) Four Neck Movements (Greeva Bhed).
   (b) Nine Head Movements (Shiro Bhed).
   (c) Eight Eye Glances (Drishti Bhed)

3. Study of Rasa & Bhaav.

SECTION -B

1. Define the word "Gharana" and its importance in Kathak Dance.

2. Brief study of Indian classical dance Bharatnatyam and Kuchipudi.

3. Brief study of following Folk Dances-
   Ghummar, Graba, Bhangra, Bihu, Kalbeliya, naati.

SECTION –C

1. Ability to Write notation of Jhaptaal of the following terms:-

   Tatkar, Thaat, Tehai, Amad, Tora, Tukda, Paran, Paranamad, Chakardar Paran, Chakardar Tukda, Kavit & Parmelu.

2. Comparative study of the following Taalas :-
   (I) Teentaal and Tilwara
   (II) Jhaptaal and Sultaal
   (III) Roopak and Tivra

B.A (GENERAL)

Indian Classical Dance (Kathak)
Semester – I&II

PRACTICALPaper-2(I&IISEMESTER) **Max.Marks: 100**

Time : 20-30 Minutes

TEENTAAL

1. Practical demonstration of Teentaal with Harmoniyam (Nagma) & Tabla including:-

   (I)- Tatkar in Thaah, Dugun & Chaugun Layakaries.

   (II)- That-2, (III) Salaami, (IV) Amad-2, (V) Tukda-2, (VI) Chakradar tukda-1, (VII) Tihai-5, (VIII) Paran-1, (IX) Paran amad-1, (X) parmelu-1, (XI) Kavitta-1, (XII) Gat Nikas-2,

2. Abhinay on Shlok / Vandana/ Pada.
3. Padhanta of all the above mentioned items.
4. Padhanta of Thaah, Dugun and Chaugun Layakaries on Hand of the following taals with its Introduction.

   (I) Jhaptaal (II) Dadra (II) Kehrwa.

JHAPTAAL

1. Practical demonstration of Jhaptaal with Harmoniyam (Nagma) & Tabla including:-

   (I)- Tatkar in Thaah, Dugun & Chaugun Layakaries.

   (II)- That-2, (III) Salaami, (IV) Amad-2, (V) Tukda-1, (VI) Chakradar tukda-1, (VII) Tihai-3, (VIII) Paran-1, (IX) Paranamad-1, (X) parmelu-1, (XI) Kavitta-1, (XII) Gat Nikas-1

2. Padhanta of all the above mentioned items.
3. Padhanta of Thaah, Dugun and Chaugun Layakaries on Hand of the following

   taals with its Interoduction.

   (I) Roopak (II) Sultaal (III) Dhamar.

B.A (General)
Indian Classical Dance (Kathak)
Semester - III

Paper-1 (Theory) M.M.: 40+10 (Int. Assessment)
Time : 3 Hours

Note- The question paper will be divided into 3 section comprising of 10 questions in all the candidate will be required to attempt 5 questions in all selecting at least one question from each section. All questions will carry equal marks.

Section-A

1) Definition of following:-
Gat-Bhaav, Tipalli, karan, angahar, haav-bhaav- hela, kasak-masak and Vandana.
2) Dance and its relation with other fine arts.
3) What is Rasa and its importance in dance.

Section-B

1) Explain the specialization of three kathak Gharanas (Jaipur, Lacknow and Banaras) with special reference to Raigargh-Parampra.
2) Explain "Guru-Shishya" parampra with special reference to kathak dance.
3) Contribution and Life- sketches of following Kathak Guru
1) Kalka Maharaj 2) Guru Rajendra Gangani

Section-C

1) Ability to write notation of following:-
Ektaal and teentaal with Dugun, Tigun and Chaugun layakari.
Uthaan, Amad, Toda, paran, Chakkradaar-Paran, Thaat, Kavit and Paran-amad.
2) Write the notation:- Aad and Kuaad
3) Write the following Taal and their description with their Thaah, Dugun, Tigun and Chaugun Layakaris:-
1. Ektaal 2. Rudra 3. Dhamaar.

B.A (General)
Indian Classical Dance (Kathak)
Semester – IV

Paper-1 (Theory) M.M.: 40+10 (Int. Assessment)
Time : 3 Hours

Note- The question paper will be divided into 3 section comprising of 10 questions in all the candidate will be required to attempt 5 questions in all

selecting at least one question from each section. All questions will carry equal marks.

Section-A

1) Study of Sanyukta Hasta Mudras based in Abhinaya Darpan.
2) Importance of Gaayan and Vaadan in Dance.
3) History and development of RaasLeela and its relation with Kathak Dance

Section-B

1) Contribution of following Dance Guru in their respective field of specialisation:-
   1. Pt. Shambhu Maharaj 2. Pt. Birju Maharaj.
2) Importance of Ghungroos in Dance.
3) Detail study of following Classical Dances:-
   1. Oddissi 2. Mohiniattam.
1) Ability to write, notation of Dhmaar Taal given in practical demonstration.
2) Notation of Nagma of Dhamaar Taal, Ektaal and Teentaal.
3) Write in notation:- Biaad Laya.

B.A (General)
Indian Classical Dance (Kathak)
Semester – III & IV

Paper-2 (Practical) M.M. : 100
Time: 20-30 Minutes

1) Practical demonstration of Ektaal with Nagma.
   1. Simple Tatkaar with Dugun, Tigun and Chaugun Layakari.
   2. Uthaan, Thaat, Aamad, Toda, Tukda, Chakkradar-Tukda, Tihai, Paran, Chakkradaar-Paran, Kavit, Parmelu and Ganesh-Paran.

2) Practical demonstration of Dhamaar Taal with Nagma.
   1. Simple Tatkaar with Dugun, Tigun and Chaugun Layakari.
   2. Uthaan, Thaat, Aamad, Toda, Tukda, Chakkradar-Tukda, Tihai, Paran, Chakkradaar-Paran, Kavit, Parmelu and Ganesh-Paran.

3) Following Bandish in Teentaal
   1. Uthaan, Thaat, Paran-amad, Tihai.
   2. Any two Gat-Nikaas.
   3. Practical demonstration of Gat-Bhaav “Maakhanchori” OR “Holi”.
   4. Abhinay on Shlok / Vandana/ Pada.
4) Padhant of whole material by hand.

B.A (General)
Indian Classical Dance (Kathak)
Semester - V

Paper-1 (Theory) M.M. : 40+10 (Int. Assessment)

Time : 3 Hours

Note- The question paper will be divided into 3 section comprising of 10 questions in all the candidate will be required to attempt 5 questions in all selecting at least one question from each section. All questions will carry equal marks.

Section-A

1) Brief study of "Natyashastra" with chapterization.
2) Role of Thumri and Kavit in Kathak Dance.
3) Define the "Abhinay" according "Abhinayadarpan".

Section-B

1) Detailed study of following Classical Dances:-
   1. Manipuri 2. Kathkali.
2) Relatoin between Dance and Religion.
3) Sense of presenting the Programme.

Section-C

1) Notation of the following material in Basant Taal:-
   1. Simple Tatkaar in Ekgun, Dugun, Tigun and Chaugun.
   2. Thaat, Amad, Toda, Tukda, Tihai, Paran, Chakkradaar-Paran, Kavit.
2) Notation of the following material in Teentaal:-
   1. Tatkaar with paltaas, Thaat, Amda, Chakkradaar-Tukda, Parmelu and Ganesh-Paran.

Section-D

1) Notation of Nagma of Basant Taal.
2) Notation of taals along with Dugun, Tigun, Chaugun and Aad layakaaris mentioned in section-c above.
3) Composition of any Bandish in the above mentioned Taal based on the Bols given by the paper setter.

B.A (General)
Indian Classical Dance (Kathak)
Semester - VI

Paper-1 (Theory) M.M. : 40+10 (Int. Assessment)

Time : 3 Hours

Note- The question paper will be divided into 3 section comprising of 10 questions in all the candidate will be required to attempt 5 questions in all selecting at least one question from each section. All questions will carry equal marks.

Section-A

4) Origin of Taal and its Ten Praans.
5) Naayak- Naayika Bhedas and their menifestation.
6) History of Kathak Dance upto 20th century.

Section-B

4) Study of Samyukta Hasta mudra according to Abhinayadarpan.
5) Study of "Taandav" and "Lasya".
6) Comaritive study of the following school of Indian classical dances: - Kathak, Bharatnatyam, Manipuri, kathkali, Oddisi, Kuchipudi, Mohiniattam.

Section-C

3) Notation of the following material in Pancham-Sawaari Taal:-
   3. Simple Tatkaar in Ekgun, Dugun, Tigun and Chaugun.
   4. Thaat, Amad, Toda, Tukda, Tihai, Paran, Chakkradaar-Paran, Kavit.
4) Notation of the following material in Teentaal:-
   2. Thaat, Amad, Pramelu, Tishra jaati Paran, Kavit, .

Section-D

4) Notation of Nagma of Pancham-Sawaari Taal.
5) Notation of taals along with Dugun, Tigun, Chaugun and Aad, kuaad and Biaad layakaris mentioned above in section-c.
6) Composition of any Bandish in the above mentioned Taal based on the Bols given by the paper setter.

B.A (general)
Indian Classical Dance (Kathak)
Semester – V & VI

Paper-2 (Practical) M.M.: 100
Time: 20-30 Minutes

1) Practical demonstration of Basant Taal with Nagma.
   1. Simple Tatkaar with Dugun, Tigun and Chaugun Layakari.
   2. Thaat, Amad, Salaami, Toda, paran, Chakkrdaar-Paran, Kavit, Tihai, pramelu, Shiv-Paran, Pakshi-Parann, Farmaishi-Paran.
2) Practical demonstration of Pancham-Sawaari Taal with Nagma.
   1. Simple Tatkaar with Dugun, Tigun and Chaugun Layakari.
   2. Thaat, Amad, Toda, Tukda, Paran, Chakkradaar-Paran, Kavit, Tihai, Ladi, Ganesh-Paran.
3) Following Bandish in Teentaal:-
   1. Uthaan, Thaat, Paran-amad, Tishra Jati-Paran, Chatushra Jati-Paran, Tihai.
   2. Any two Gat-Nikaas
   3. Practical demonstration of Samyukta and Asamyukta Hand Gestures according to Abhinay-Darpan.
   4. Practical demonstration of Bhaav like "Shiv-Stuti" OR "Ganesh-Vandana".
4) Padhant of whole material by hand.

SCHEME OF EXAMINATION FOR M.A. MUSIC(VOCAL & INSTRUMENTAL)
(2015-16)

SEMESTER-I

		Max. Marks	Internal Assessment	Total Marks	Time
Written:	Vocal and Instrumental Music				
Paper-I	General & Applied Music Theory	80	20	100	3 Hours
Paper –II	History of Indian Music (Vedic Period to 13th Century)	80	20	100	3 Hours

SEMESTER-II

Written:	Vocal and Instrumental Music				
Paper-I	General & Applied Music Theory	80	20	100	3 Hours
Paper –II	History of Indian Music (Vedic Period to 13th Century)	80	20	100	3 Hours

PRACTICALS

Paper-III	Practical	100			30-40 Minutes
Paper-IV	Practical-Stage Performace	100			30-40 Minutes
Paper-V	Practical	100			30-40 Minutes

SEMESTER-III

Written:	Vocal and Instrumental Music				
Paper-I	Applied Music Theory & Musical Compositions	80	20	100	3 Hours
Paper –II	General Study and History of Music (13th Century to the present day)	80	20	100	3 Hours

SEMESTER-IV

Written:	Vocal and Instrumental Music				
Paper-I	Applied Music Theory & Musical Compositions	80	20	100	3 Hours
Paper –II	General Study and History of Music (13th Century to the present day)	80	20	100	3 Hours

PRACTICALS

Paper-III	Practical	100			30-40 Minutes
Paper-IV	Practical-Stage Performace	100			30-40 Minutes
Paper-V	Practical-Revision of the Basic Ragas, Light & Folk Styles And creative Music	100			30-40 Minutes

SYLLABUS AND COURSES OF READING

SEMESTER-I

PAPER-I General and Applied Music Theory

M.M.: 80+20
Time: 3 Hours

Note: There shall be ten questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas with special reference to Kalyan,Bilawal, Bhairav Raganga.
Shyam Kalyan, Puria Kalyan, Devgiri Bilawal, Yamani Bilawal, Ahir Bhairav, Nat Bhairav.

(ii) Theoretical study of the following basic Ragas:
Yaman, Alhaiya Bilawal, Bhairav.

UNIT-II

(i) Notation of Vilambit and Druta Khayal/Gat of Ragas prescribed in the syllabys alonglwita few Mukt Alaps Tanas and Bol Tanas with a capacity to write the notation in Bhatkhande as well as Vishnudigamber paddhati.

(ii) A study of the following Talas and ability to write them in Dugun, tigun and chaugun Layakaries,Teental, Jhaptal, Rupak and Keharva.

UNIT-III

(i) Genes is of Music, Indian and Western views about the development of Music.

(ii) Nature, concept and classifications of Jati and described by Bharat, Matang and Sharangdev with special study of ten essentials of Ragas as described in the ancient texts and their application to Medieval and modern musical system.

UNIT-IV

(i) Origin and Development of Gharana-system with special reference to detailed study of Khayal and Sitar-Vadan.

(ii) Desirability and possibility of maintaining Gharana in Modern times.

UNIT-V

(i) The rationale of ancient classification of Indian Musical Instruments.Historical knowledge of the following Instruments:
Ektantri, Chitra, Vanshi, Patah, Kansya Tala.

(ii) Detailed study of Voice- Culture with reference to ancient treaties and recent Scientific Research.

PAPER-II History of Indian Music (Vedic Period to 13th Century)

M.M.: 80+20

Time: 3 Hours

Note: There shall be ten questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I Music in Samhitas, Brahmanas, Aranyakas.

UNIT-II Music in Mahakavyakal: 1. Ramayana 2. Mahabharata

UNIT-III (i) Music in Smritis

(ii) Music in Kautilya's Arthsastra.

UNIT-IV Historical Development of Swaras up to 13th Century.

UNIT-V A critical study of three grams: 1. Shadaj 2. Madhyam 3. Gandhar

SEMESTER-II

PAPER-I General and Applied Music Theory

M.M.: 80+20
Time: 3 Hours

Note: There shall be ten questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas with special reference to Kafi and Sarang Raganga.
Bageshwari, Rageshree, Shudha Saranga, Madhumad Saranga.

(ii) Theoretical study of the following basic Ragas:
Kafi, Bihag, Marwa, Puria.

UNIT-II

(i) Notation of vilambit and Druta Khayala/ Gat of Ragas Prescribed in the Syllabus along with a few Mukt Alaps Tanas and Bol Tanas Toda with a capacity to write the notation in Bhatkhande as Visnudigamber paddhati.

(ii) A study of the following Talas and ability to write them in Dugun, Tigun and Chaugun layakaries, Tilwara, Sultala, Tivra Dadra.

Note:- Candidate is required to know the Talas of 1st semester also ie Teentala, Jhaptala, Rupak & Kaharva

UNIT-III Principal of classification of Raga:

Garma Raga, Deshi-Raga, Dashvidharaga Vargikaran of Sharangdev, Jatiraga Vargikaran, Rag-Ragini Vargikaran, Mela-Raga Vargikarn, Thata-Raga Vargikaran, Raganaga Rag- Vargikaran.

UNIT-IV

(i) Relationship of Music and Aesthetics.
(ii) Relationship between Raga and Rasa. Definition of Rasa and its Verities (according to Bharta and Abhinav Gupta)

(iii) Role of Sound and Rythum in expressing a particular Bhava.

UNIT-V

(i) The rationale of ancient classification of Indian Musical Instruments:- Mattakokila, Vipanchi, Kinnari, Mridanga, Hudakka and Ghanta.

Elementary knowledge of Classical dances:-

PAPER-II History of Indian Music (Vedic Period to 13th Century)

M.M.: 80+20

Time: 3 Hours

Note: There shall be ten questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I Music in Upanishads and Vedanga Literature with special reference to Shikshas.

UNIT-II Music in Puranas with special reference to Harivansha and Markande

UNIT-III (i) Music in Paninis and Patanjalies Gramatic Treaties.

(ii) Music in Buddha and Jain GramaticTreaties.

(ii) Music in the Dramas and Mahakavya of Kalidas.

UNIT-IV

Relationship of Shruti and Swara with special reference to the following works:-

Natya Shastra, Dattilam, Brihadeshi, Bharat Bhashya, Sangeet-Ratankara.

UNIT-V A critical study of Sapta swara Murchhana and Dvadash Swara Murchhana.

PAPER-III (PRACTICAL)

M.M.: 100

Time: 30-40 Minutes

1. From intensive study of the Ragas classified under (A) and General Study of the Ragas classified (B) as mentioned below:-

(i)	Kalyan	A.	Puria Kalyan	(I)
		B.	Shyama Kalyan	(G)
(ii)	Bilawal	A.	Devgiri Bilawal	(I)
		B.	Yamini Bilawal	(G)
(iii)	Bhairav	A.	Ahir Bhairav	(I)
		B.	Nat Bhairav	(G)
(iv)	Kafi	A.	Bageshwari	(I)
		B.	Rageshwari	(G)
(v)	Sarang	A.	Shudhsarang	(I)
		B.	Madhumad Sarang	(G)

An vilambit and one drut Khyal/Gat in each raga of intensive study with Alap, Tana/Todas. General study of Ragas with one drut Khyal/Gat in each raga with Alap, Tana/Toda.

2. Practical demonstration-cum-viva-voce examination will be held. Candidates are expected to know the traditional phrases and characteristics feature of each Raga. Candidates of Instrumental Music are expected to use four notes combinations by pulling wire in mend as well as in murki and krintan etc.

PAPER-IV (PRACTICAL) STAGE PERFORMANCE

M.M.: 100
Time: 30-40 Minutes

1. A student is required to prepare any one raga from the ragas of intensive study in the practical Paper-III as his her choice Raga and perform it for not less than 30 minutes before an invited audience. Alap,Jod Jhala, Maseetkhani and Razakhani Gat for Instrumental Music are required to be presented. (50)

2. One Dhrupad or one Dhamar/ Gat in Talas other than Trital for Instrumental Music alongwith layakaries and Upaj are to be learnt in the Ragas prescribed in practical Paper-III. It is recommended that Pakhawaj accompaniment may be provided for Dhrupad/Dhamar singing. (25)

3. A Tarana/Dhun (for Instrumental Music) may be prepared in any of the Ragas. (15)

4. The Examiner may ask the candidate to tune some of the strings or his/her instrument or may asses the tuning capacity of the candidate during his/her total performance. (10)

PAPER-V (PRACTICAL)

M.M.: 100
Time: 30-40 Minutes

Revision of the basic RAGAS and Light & Folk Styles and Creative Music

1. An intensive study of only three from the following basic ragas with Alap, Vilambit and Durt composition and general study of any four Ragas with alap and Durt composition:-

   Yaman, Alhaiya Bilawal, Bhairav, Kafi, Bihag, Marva, Puriya. (60)

2. At lease one composition in each of the following forms:-

   Bhajan, Gajal, Geet, Folk Song, Four Dhuns (for instrumental Music student).

   (20)

3. Capacity of demonstrate Talas by hand and on Tabla-Teental, Jhaptal, Rupak, Chautal, Dadra,Dhamar.(Talas of Ist Semester may be asked)

   (20)

SEMESTER-III

PAPER-I Applied Music Theory and Musical Compositions.

M.M.: 80+20

Time: 3 Hours

Note: There shall be ten questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas with special reference to Bihag Kauns and Todi Ragas:-

Maru Bihag, Nat Bihag, Chanderkauns, Madhukauns, Bilaskhani Todi, Miyan Ki Todi.

(ii) Theoretical study of following Basic Ragas:

Bhupali,Darbari, Shuddh Kalyan, Multani, Malkauns.

UNIT-II

(i) Ability to compose and write notation of a given piece of poetry in a raga prescribed in the syllabus. Ability to compose and write in notation of a gat in the Tala (other than Teentala suggested by the examiner.

(ii) A study of the following Talas in Aad (1-1/2 beats) Panchguna, Chhaguna in Teentala, Tigun and Chaugun in Jhumra, Ada Chautal.

UNIT-III

(i) Classification of Indian Musical Instrumental and knowledge of the techniques of the following classical musical instruments of north and south India prevalent in modern tin.

Vichitra Veena, Sarod, Shahnai, Tabla, Mridangam.

(ii) Types of Musical Compositions.

Prabandha, Dhrupada and Dhamar.

UNIT-IV

(i) Methodology of Research and its importance in Indian Music.

(ii) Essays of the following topics from the view point of inter-disciplinary studies:-

(1) Basic principles of Rag Mishran.
(2) Pictorial Aspects of Ragas.
(3) Appreciation of Music.
(4) Muslim contribution to Indian Music.

(5) Principles of Musical compositions.

UNIT-V

(i) Folk music of Haryana styles of singing, Dancing and Instruments.
(ii) The popular folk tunes of different states e.g.
Baul, Bhatiyali, Lawani and **Gambhira**.

PAPER-II General Study and History of Music (13th Century to the present day)

M.M.: 80+20

Time: 3 Hours

Note: There shall be ten questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I

Study of the development of Music special reference to the following works:-

Sangeet-Ratnakar, Swarmelakalanidhi, Sadragchandrodaya, Sangeet Saramrit, Rasakamudi, Raga-Vibodha, Chaturdandi Prakashika, Sangeet Darpana.

UNIT-II

Study of production of sound through wire length on Veena as explained by various scholars like Sharangdev, Lochan, Ramamatya, Damodar-Mishra, Pt. Ahobala, Hridyanarayana Deva, Bhav Bhatt, Srinivasa.

UNIT-III

(i) A study of the following:-

Alapti, Sthaya, Giti, Vritti, Kaku, Kutup, Gamaka.

(ii) Meaning of word 'Swayambhu' as described by Ramamatya and Somnath.

UNIT-IV Study of Western Music:-

(i) Elementary knowledge of Staff Notation.
(ii) Harmony and Melody.

UNIT-V Comparative study of Hindustani and Karnatki with special reference to:

(i) Swara (ii) Tala(iii) Mela (iv) Raga (v) Forms of Vocal and Instrumental Music.

SEMESTER-IV

PAPER-I Applied Music Theory and Musical Compositions.

M.M.: 80+20
Time: 3 Hours

Note: There shall be ten questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas with special reference to Malhar, Kanada and Kauns Raganga, Megh Malhar, Miyan Ki Malhar, Abhogi Kanada, Nayaki Kanada.

(ii) Theoretical studies of the following basic Ragas:
Bhimpalasi and Puriya Dhanashree and Multani.

UNIT-II

(i) Ability to compose and write in notation a given piece of poetry in a Raga prescribed in the syllabus. Ability to compose and write in notation a Gat in the Tala (other than Teentala), suggested by the Examiner.

(ii) A study of the following Talas in Aad (1-1/2 beats) Panchguna, Chhaguna, Tivra, Ektal Tilwada.
Note:- To be put for previous Talas and Name.

UNIT-III

(i) Classification of Indian Musical Instruments and knowledge of the techniques of the following classical Musical Instrumental of North & South India prevalent in Modern Time:-
Sarangi, Surbahar, Flute, Pakhawaj.

(ii) Types of musical compositions:
Khayala, Tarana, Chaturang, Trivata, Masitkhani Gat, Razakhani Gat.

UNIT-IV

(i) Principles of Orchestration and its desirability and possibility in Hindustani Music.

(ii) Essays on the following topics from the view point of inter- disciplinary studies:
(a) Basic principles of Stage performance.
(b) Role of Media in the Development of Indian Classical Music.
(c) Raviandra Sangeet.
(d) Haveli Sangeet.
(e) Natya Sangeet.

UNIT-V Study of Folk Music in Punjab:

(i) Folk music of Punjab styles of Singing, Dancing and Instruments.
(ii) The popular folk tunes of different States e.g. Garba, Raas, Kajri, Chaiti and Jhoomar.

PAPER-II General Study and History of Music (13th Century to the present day)

M.M.: 80+20

Time: 3 Hours

Note: There shall be ten questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I Study of the development of Music special reference to the following works:-

Hridaya-Kautak, Hridaya- Prakash, Sangeet-Parijata, Raga Tatva- Vibodh, Raga-Tarangini, Anupavilas, anup- Sangeet-Ratnakar.

UNIT-II Shruti Swara relation as described by modern thinkers like Foxstrangways, S.N.Tagore, V.N.Bhatkhande, A. Denielou, Omkarnath Thakur, K.C.D.Brahaspati, L.M. Mishra, B.C.Deva etc.

UNIT-III Time theory of Ragas:

(i) Time theory of Ragas, its origin and development.
(ii) Observation of time in the Ragas.
(iii) Significance of time theory in Music.

UNIT-IV Study of Western Music:

Musical scales- Pythagoras, Diatonic, Natural, Equal tempored.

UNIT-V Contribution of the following composers and Musicians:

(i) Dr. Krishan Narayan Ratanjankar.
(ii) Raja Man Singh Tomar
(iii) Dr. K.C.D.Brihaspati
(iv) Dr. Lal Mani Mishra
(v) Kumar Gandharva
(vi) Wajid Ali Shah

PAPER-III (PRACTICAL)

M.M.: 100

Time: 30-40 Minutes

From the following intensive study of the Ragas classified under (A) and General Study for the Ragas classified, under (B)

1. Bihag Anga:
   (A) (i) Maru Bihag (I)

   (B) (ii) Nat Bihag (G)

2. Malhar Anga:
   (A) (i) Miyan ki Malhar (I)

   (B) (ii) Megh Malhar (G)

3. Todi Anga:

   (A) (i) Bilaskhani Todi (I)

   (B) (ii) Miyanki Todi (G)

4. Kanada Anga:
   (A) (i) Kaunsi Kanada/Aabhogi Kanada (I)

   (B) (ii) Nayki Kanada (G)

5. Kauns Anga:
   (A) (i) Chandra Kauns (I)

   (B) (ii) Mdadhu Kauns (G)

Practical demonstration-cum-viva-voce examination will be held.

Knowledge of Raga, Talas and theory portion of previous course is essential.

PAPER-IV (PRACTICAL) STAGE PERFORMANCE

M.M.: 100

Time: 30-40 Minutes

1. A student is required to prepare any one raga from the Ragas of intensive study in the practical Paper-III as his/her choice of Raga and perform it not less than 30 minutes before an invited audience. Alap, Jod, Jhala, Maseetkhani and Rajakhani Gat for Instrumental Music. (50)
2. One Dhrupad or one Dhamar/Gat in Talas other than Teental for Instrumental Music alongwith layakaries and Upajs have to be learnt. From the Ragas prescribed in practical Paper-III. It is recommended that Pakhawaj accompaniment may be provided for Dhrupad/Dhamar singing.for instrumental music-gats other than Teental. (25)
3. A Thumri/Tappa/Tarana/Dhun (for instrumental music) may be prepared. A student is supposed to perform Thumri/Tappa/Tarana/Dhun with its Gayaki during stage performance. (15)
4. Tuning of the Instrument. (10)

PAPER-V (PRACTICAL)

M.M.: 100

Time: 30-40 Minutes

Revision of the basic RAGAS and Light & Folk Styles and Creative Music

1. An intensive study of only three from the following basic Ragas with Alap, Vilambit and Drut compositions and general study of any four Ragas with Alap and Drut, compositions:
   (i) Bhupali
   (ii) Darbari
   (iii) Shuddha-Kalyan
   (iv) Bhimpalasi
   (v) Malkauns
   (vi) Puriya Dhanashree
   (vii) Multani (60)
2. One composition each from the following styles is to be presented:
   (i) Bhajan
   (ii) Gazal
   (iii) Geet
   (iv) Regional Folk Song (20)

(Four Dhuns (for instrumental Music)

3. **For Vocal Music:** To set a given piece of poetry as a Drut Khyal in a raga and tala suggested by the Examiner and to write the composition in notation.
For Instrumental Music: To compose vilambit or a Drut Gat in a Raga and Tala suggested by the Examiner and to write the composition in notation.

4. Capacity to demonstrate Talas by hand and on Tabla.
Tilawara, Sultaal, Teevra,Zhumra, Ektaal, Deepchandi.

DEPARTMENT OF MUSIC AND DANCE

KURUKSHETRA UNIVERSITY KURUKSHETRA

OUTLINES OF TEST, SYLLABI AND COURSES OF READING FOR THE

MPA 1ST YEAR (TABLA) MUSIC EXAMINATION THEORY
SESSION-2016-17

Max.Marks: 40+10

Time:3 Hrs.

Section- A

(i) Origine and development of Tabla.

(ii) Discription of parts of tabla (Anga Varnan).

(iii) Knowledge of VARNAS(PATAKSHAR) of tabla.

Section –B

(i) Defination of Taal, Laya, Theka, Sam, Taali, Khali, Maatra, Vibhag, Kayda, Palta, Tukda, Sadharan Chakkardaar, Tihaai.

Section –C

(i) Knowledge of Bhatkhande & Vishnu digambar Taal notation system.

(ii) Life sketches of Pt.Kanthe maharaj, Ustad Ahmedjaan khan, Ustad Allah Rakha, Ustad Habibbudin Khan.

Practical

(i) Knowledge of Theka of following taal:-

Teentaal, Kaherwa, Dadra, Roopak.

(ii) Two kayda (TETE & TIRKIT) in teentaal with five paltas and tihai.

(iii) One kayda in Roopak Taal with four paltaas and tihaai.

(iv) Three simple tukda and one chakkardar tukda in Teentaal.

(v) Ability to show following taals on hand with Thaah Dugun and Chaugun:- Teentaal, Roopak, Kaherwa, Dadra.

(vi) Two prakar of theka in each Dadra & Kaherwa.

DEPARTMENT OF MUSIC AND DANCE

KURUKSHETRA UNIVERSITY KURUKSHETRA

OUTLINES OF TEST, SYLLABI AND COURSES OF READING FOR THE

MPA 2nd YEAR (TABLA) MUSIC EXAMINATION THEORY

SESSION-2016-17

Max.Marks: 40+10

Time:3 Hrs.

Section –A

(i) Importance of tabla in music .

(ii) Study of TAAL DAS PRAN.

(iii) Classification of Indian instruments.

Section –B

(i) Defination of Uthan, Peshkar, Rela, Paran, Gat, Farmaishi, Kamali, Bant.

Section –C

(i) Life sketches :

Pt. Anokhe lal mishra , Khalifa Abid hussain, Ustad Munir khan, Ustad Natthu khan.

(ii) Importance of taal in music.

Practical

(a) Knowledge of Theka :

Jhaptaal, Ektaal, Adachartaal, Deepchandi.

(b) Knowledge of tabla tuning.

(c) Tabla solo for ten minuts in teentaal with uthaan ,two kayda with six palta and tihaai, rela, four tukda,two chakkardaar.

(d) One kayda with four palta& tihaai,two tukda in jhaptaal.

(e) Different laykaaries on hand Thah, Dugun, Tigun ,Chaugun in teentaal and Thah, Dugun ,Chaugun of Jhaptaal, Ektaal, Deepchandi.

Annexures to Item No. 22

SYLLABUS FOR ONE YEAR CERTIFICATE COURSE IN EFFECTIVE COMMUNICATION SKILLS, Session 2015-16

SCHEME OF STUDY

	Name of the Paper	Periods/Week
1.	Oral Communication	4 Periods
2.	Written Communication	4 Periods
3.	Practical	6 Periods

SCHEME OF EXAMINATION

	Name of the Paper	No. of Paper	Marks	Time
1.	Oral Communication	I	56+14*	3 Hrs
2.	Written Communication	II	56+14*	3 Hrs
3.	Practical Assignments	III	60	

* 56 marks for External Examination and 14 marks for Internal Assessment.

Oral Communication (Paper-I: Theory)

Time: 3 Hours **Max. Marks: 56**
Internal Assessment : 14

Note: - 1. Nine questions will be set in all by the examiner and the candidates are required to attempt five questions in all including one compulsory question.
2. Question No. 9 is compulsory consisting of short answer type questions and spread over the entire syllabus. Phonetic Transcription (10 Marks), other short answer type questions (10 Marks)
3. The remaining eight questions are to be set from 4 units, at least two questions from each unit. The candidate is required to attempt four questions, selecting at least one question (9 marks each) from each unit.

UNIT-I: Communication: Meaning, Nature, Importance and Purpose of Communication, Types of Communication, Process of Communication, Communication Network in an Organisation, Strategy for Effective Communication, Verbal and Non-Verbal Communication, Barriers to Communication, Cross Cultural Communication Language as a tool of Communication, Technology based Communication Tools.

UNIT-II: The Process of Listening, Barriers to Listening, Types of Listening, Benefits of Effective Listening, Note Talking ad Note Making.

UNIT-III: Spoken English in India, The Organs of Speech, Description and Articulation of English Speech Sounds, Syllables and Stress (Weak Forms, Intonation), Connected Speech, Spelling and Pronunciation, International Phonetic Alphabet Transcription of Received Pronunciation of Words as per the Oxford Advanced Learners Dictionary of H.S. Hornby.

UNIT-IV: Presentation Skills; Interview Skills- Preparing for an Interview, Interview Techniques Public Speaking, Preparing the Speech, Organising the Speech, Delivering the Speech.

Classroom Practice:

- Greeting and introducing.
- Practising Short Dialogues.
- Group Discussions, Seminars / Paper-Presentations.
- Listening News / Conversations / Telephonic Conversation.

Suggested Readings:

1. Sethi, J & et al. A Practice Course in English Pronunciation, Prentice Hall of India, New Delhi.
2. Sen, Leena. Communication Skills, Prentice Hall of India, New Delhi.
3. Prasad, P. Communication Skills, S.K. Kataria & Sons.
4. Bansal, R.K. and J.B. Harrison. Spoken English, Orient Language.
5. Roach Peter. English Phonetics and Phonology.
6. A.S. Hornby's. Oxford Advanced Learners Dictionary of Current English, 7th Edition.

Written Communication (Paper-II: Theory)

Time: 3 Hours **Max. Marks: 56**
Internal Assessment : 14

Note:- 1. Nine questions will be set in all by the examiner and the candidates are required to attempt five questions in all including one compulsory question.

2. Question No. 9 is compulsory consisting of short answer type questions and spread over the entire syllabus (20 marks).

3. The remaining eight questions are to be set from 4 units, at least two questions from each unit. The candidate is required to attempt four questions, selecting at least one question (9 marks each) from each unit.

UNIT-I: Reading Skills: Purpose, Process, Methodologies Strategy, Reading Comprehension.

UNIT-II: Effective Writing Skills: Elements of Effective Writing, Main Forms of Written Communication: Agenda, Minutes, Notices, Writing of CV, Memo, Drafting an E-mail, Press Release. Correspondence: Personal, Official and Business, Report Writing, Dialogue writing, Essay writing.

UNIT-III: Idioms and Phrases, Words Often Confused, One Word Substitutes, Word Formation: Prefixes, Bases and Suffixes (Derivational & Inflectional). Word Choice: Appropriate Words, Idioms and Phrases.

UNIT-IV: Remedial Grammar and Usage, Important Aspects of English Grammar and Usage, Phrases and Clauses.

Classroom Practical:

- Based on entire syllabus.

Suggested Readings:

1. Prasad, P. The Functional Aspects of Communication Skills, Delhi.
2. Sen, Leena. Communication Skills, Prentice Hall of India, New Delhi.
3. McCarthy, Michael. English Vocabulary in Use, Cambridge University Press.
4. Rajinder Pal and Prem Lata. English Grammar and Composition, Sultan Chand Publication.

Practical Assignments (Paper-III)

Max. Marks: 60

Note: - The students will be required to submit practical assignments before examination.

- Writing CV
- Memo Writing
- Letter Writing (Employment related Correspondence, Correspondence with Govt. / Authorities, Office Orders, Enquiries and Replies)
- Business Letters
- Preparing Agenda and Minutes for Meeting
- Essay Writing
- Report Writing
- Press Release
- Film Review / Book Review

Note: Student will have to certify that they have not copied assignments from any source.

DEPARTMENT OF LIBRARY & INFORMATION SCIENCE
KURUKSHETRA UNIVERSITY KURUKSHETRA

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SCHEME OF PAPERS
FOR
MASTER OF LIBRARY AND INFORMATION SCIENCE
SESSION 2016-17
SEMESTER – I

Paper Code	Nomenclature of Papers	Theory		Practice		Max. Marks
		Internal Assessment	Exam	Internal Assessment	Exam	
MLIS01	Information Analysis, Consolidation and Repackaging (Theory and Practice)	10	50	10	30	100
MLIS02	Information Systems Management	20	80	--	--	100
MLIS03	Advanced ICT Applications in LIS (Theory & Practice) – I	10	40	10	40	100
MLIS04	**ELECTIVE:** Library Systems (Theory) Any one of the following: (i) University & College Library System (ii) Public Library System (iii)Research & Technical Library System	20	80	--	--	100
MLIS05	(i) Literature Survey (20 marks)	--	--	20	30	50

	(ii) Community Information Needs Survey (30 marks)					

SEMESTER – II

Paper Code	Nomenclature of Papers	Theory		Practice		Max. Marks
		Internal Assessment	Exam	Internal Assessment	Exam	
MLIS06	Research Methods and Statistical Techniques	20	80	--	--	100
MLIS07	Advanced ICT Applications in LIS (Theory & Practice) – II	10	40	10	40	100
MLIS08	**ELECTIVE:** Information Systems Any one of the following: I. Social Science Information System II. Business Information System III. Health Science Information System	20	80	--	--	100
MLIS09	Information Retrieval (Theory and Practice)	10	50	10	30	100
MLIS10	Library Classification Practice: UDC	--	--	10	40	50

DEPARTMENT OF LIBRARY & INFORMATION SCIENCE
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SCHEME OF PAPERS
FOR
MASTER OF LIBRARY AND INFORMATION SCIENCE
SESSION 2016-17

SEMESTER – I

PAPER – MLIS01: INFORMATION ANALYSIS, CONSOLIDATION AND REPACKAGING (THEORY AND PRACTICE)

Max. Marks: 100

Objectives

(i) To impart to students thorough understanding of the conceptual framework of Information Consolidation and Repackaging.
(ii) To train the students with the practical skills for preparation of Information Products.
(iii) To introduce the concept of Marketing of Information Products and Services.

Part – I: Theory

Max. Marks: 60

Internal assessment: 10 Marks (Attendance – 5 (Includes attendance of practical Classes also) + Class Test – 5)

Theory: 50 Marks **Time: 3 Hours**

Note: The paper is divided into **3** Units. The examinees will be required to attempt ***Four*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-III). Question 1 will consist of **7** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: ***Information Consolidation***

- Definitional Analysis, purpose, process and role of Information Consolidation.
- Value and benefits of Consolidation.
- Packaging and Repackaging of Information.
- Modes of presentation.

UNIT – II: Processing Methods and Techniques

- Information Products: Types and Methodology for Preparation.
- Role of various specialists in Design and Development of Information Products.
- Methodology for preparation of House Journals, Newsletters, Technical Digests, Trend Reports, Reviews and related products.
- Technical Writing: Scaling to Audience.
- Abstract and Abstracting: Types and Guidelines in preparing Abstract.

UNIT – III: Management of Information Consolidation Centres

- Management of an Information Consolidation Unit (ICU)
- Concept of Marketing.
- Marketing of Information Products and Services.

Part – II: Practice

Max. Marks: 40

Section – A

Presentation/Test: 10 marks

(Preparation of Indicative and Informative Abstracts, Literature Reviews and Book Reviews)

Section – B

Practical Examination: 30 Marks **Time: 2 Hours**

The Distribution of Marks and scheme of examination will be as follows:

1. The examinees will be required to prepare ***One*** INDICATIVE ABSTRACT and ***One*** INFORMATIVE ABSTRACT of One Research Article. **Marks: 15**
2. The examinees will be required to prepare ***One*** abstract, either INDICATIVE ABSTRACT OR INFORMATIVE ABSTRACT of One Journal Article, as specified by the examiners. **Marks: 10**
3. Viva-voce: **Marks: 5**

Books Recommended

1. SEETHARAMA (S). Information consolidation and repackaging. 1997. Ess Ess, New Delhi.
2. ATHERTON (Pauline). Handbook for information Systems and Services. 1977. Unesco, Paris.
3. DRTC Annual Seminar 18; 1981.
4. SARACEVIC (T) and WOOD (J S). Consolidation of information: A Handbook of evaluation, restructuring and repackaging of scientific and technical information 1981. Unesco, Paris.
5. SEETHARAMA (S). Modes of presentation of information in information consolidation products. *Library Science with a Slant to Document*, 22; 1985; Paper E.

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PAPER – MLIS02: INFORMATION SYSTEMS MANAGEMENT

Max. Marks: 100

Objectives

(i) To develop an understanding of modern Principles of Management.
(ii) To familiarise with the process of Planning and Various Types of Plans.
(iii) To develop an understanding of various Organisational Positions and Techniques of Managing Human Resources.
(iv) To familiarise with the Systems Approach in Libraries and Quality in Library Functions and Services.

Internal assessment: 20 Marks (Presentation/ Test – 10 + Class Test – 5 + Attendance – 5)

Theory: 80 Marks **Time: 3 Hours**

Note: The paper is divided into **4** Units. The examinees will be required to attempt ***Five*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-IV). Question 1 will consist of **8** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT- I: Management

- Concept, Definition and Scope.
- Principles of Scientific Management.
- Management Schools of Thought: Classical School, Human Behaviour and Human Relation

UNIT- II: Human Resource Management

- Meaning, Functions and Objectives of HRM.
- Job Description, Job Analysis and Job Evaluation.
- Recruitment and Selection Procedure.
- Training and Development.
- Motivational Patterns: Maslow's Need Hierarchy. Herzberg's Two Factor Theory. McGregor's Theory X and Y.
- Performance Appraisal: Objectives, Problems in Rating, Methods of Performance Appraisal.

UNIT- III: System Analysis and Control

- System Analysis and Design.
- Work Flow and Organisational Routines.
- Monitoring Techniques: OR, MIS, MBO, Network Analysis, Budgeting as a Monitoring Techniques, Monitoring Team or Consultants.
- Evaluation Techniques.

UNIT- IV: Library Planning and Total Quality Management (TQM)

- Library Planning: Types of Plans, Factors and Techniques of Library Planning
- TQM: Definition, Concept and Elements.
- Quality Standards: ISO 9000 Series.

Books Recommended

1. EVANS (G E). Management techniques for libraries. Ed.2. 1983. Academic Press, New York.
2. STEUART (Robert) and EASTLICK (John T). Library management Ed. 2. 1991. Libraries Unlimited, Cotorado.
3. BROPHY (Peter) and COULLING (Kate). Quality management for information and library managers. 1996. Aslib Gover, Hampshire.
4. JONES (Noragh) and JORDAN (Peter). Case studies in library management. 1988. Clive Bingley, London.

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PAPER- MLIS03: ADVANCED ICT APPLICATIONS IN LIS (THEORY AND PRACTICE) – I

Max. Marks: 100

Objectives:

(i) To familiarise students with major Applications of ICT in Libraries and Information Centers and issues affecting their implementation.
(ii) To familiarise with the Networking concepts.
(iii) To enable student to use various MS Office Applications;
(iv) To enable student to understand the elements of Web Designing.

Part I: Theory

Max. Marks: 50

Internal assessment: 10 Marks (Presentation/ Test – 5 + Attendance – 5 (Includes attendance of practical classes also))

Theory: 40 Marks **Time: 2½ Hours**

Note: The paper is divided into **3** Units. The examinees will be required to attempt ***Four*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-III). Question 1 will consist of **5** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

Unit – I: Library Automation

- Planning and Implementation of Library Automation.
- Use of computers for In-house Operations: Acquisition, Cataloguing, Circulation, Serials Control, OPAC and Information Storage and Retrieval.
- Retrospective Conversion Techniques.

Unit – II: INTERNET Basic Feature and Tools

- Genesis and Utility.
- ***Connectivity:*** Dialup, Leased Line, ISDN and Cable Modem.
- ***Protocols:*** TCP/IP, HTTP, FTP
- ***Web Browsers:*** Netscape Navigator, Internet Explorer
- ***Services:*** World Wide Web (WWW), E-Mail, Search Engines, Remote Login (Telnet), FTP, Bulletin Boards, Usenet, Social Networking Sites, Chatting and Instant Message. Internet Security.

UNIT – III: Communication Technology (Networking)

- Fundamentals of Telecommunication Technology.

- What is Network? Network Media: Wires and Cables, Ethernet, Wireless (Satellite), Hubs and Switches, Modems.
- Network Types: LAN, MAN and WAN.
- Topologies: Bus, Star, Ring, Token Ring, Tree and Mesh.
- Network Protocols and Standards. OSI Architecture.
- Network Based Services: Teleconferencing, Tele-facsimile.
- Library Networks in India: ADINET and CALIBNET.

Part II: Practice

Max. Marks: 50

Internal assessment: 10 Marks (Presentation/ Test – 5 + Class Test – 5 Marks)

Practical Examination: 40 Marks **Time: 2 Hours**

Unit – I: MS OFFICE

- ***MS EXCEL:*** Toolbars, Formatting Formulas, Database Management, Charts and Additional Functions.
- ***MS ACCESS:*** Databases, Tables, Queries, Forms and Reports.

Unit – II: Web Designing with FRONT PAGE

Introduction to Front Page, Creating a Web and Web Pages, Lists and Headings, Formatting, Managing Web in the Explorer, Linking, Using Tables, Displaying Images, Getting images with image composer, Creating a consistent look for Web-using Wizards and Templates, Themes, Enhancing Design with Style Sheets, Forms, Publishing the Site.

Recommended Books

1. ALBERTO LEON-GARCIA and WIDJAJA (Indra). Communication Networks: Fundamental concepts and key architectures.
2. BHARIHOKE (Deepak). Fundamentals of IT. 2nd ed. Excel Books. New Delhi. 2002.
3. CHELLIS (James), PERKINS (Charles) and STREBE (Mathew). MCSE: Networking essential study guide. BPE. 1997.
4. D'SOUZA. Web Publishing.
5. Excel Functions & formulas book. BPB Publications.
6. FOROUZAN (Behrouz A), COOMBS (Catherine) and FEGAN (Sophia Chung). Data Communication and Networking. 2nd ed. Tata McGraw Hill, New Delhi, 2000.
7. LANCASTER (F W) and SANDORE (Beth). Technology and management in library and information services. 1997. Library Association, London.
8. LEON (Garcia). Communication Networks.
9. MANSFIELD (Ron). The compact guide to Microsoft Office professional. Tech Publication, Singapore. 1995.
10. MCSA MCSE WINDOWS XP professional study guide. 2nd Ed. Available at: http://rapidshare.com/files/115837493/mcsa_mcse_windows_xp_professional_study_guide_2nd.pdf
11. McCOY (John). Mastering Web design. LWB, New Delhi. 1996.
12. PANTRY (Sheila), Ed. Building community information networks: Strategies and experiences. 1999. Library Association, London.
13. MS OFFICE complete references. BPB, New Delhi.
14. Rajesh. Computer Networks: Fundamentals & Applications. Vikas Publishing House. 2009.

15. TANENBAUM (Andrew S). Computer networks. 4th Ed. Prentice Hall of India Pvt. Ltd. 2003.
16. TAX ALI (R K) PC software for Windows made simple. Tata McGraw Hill.
17. VITTAL (N). Information technology: India's tomorrow. 2001.

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PAPER – MLIS04: ELECTIVE: LIBRARY SYSTEMS (THEORY & PRACTICE)

(I) UNIVERSITY & COLLEGE LIBRARY SYSTEM

Max. Marks: 100

Objectives:

(i) To familiarise with the development of University & College Library System.
(ii) To develop an understanding of collection & services of University & College libraries.
(iii) To familiarize with different aspects of management practices followed in University & College libraries.

Internal assessment: 20 Marks (Presentation/ Test – 10 + Class Test – 5 + Attendance – 5)

Theory: 80 Marks **Time: 3 Hours**

Note: The paper is divided into **4** Units. The examinees will be required to attempt ***Five*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-IV). Question 1 will consist of **8** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Academic Libraries and their Development

- History and Development of Libraries with Special Reference to India, Recommendations of Commissions and Committees, NKC
- Role of Libraries in Formal and Non-Formal Education System
- UGC and its Role in the Development of College and University Libraries

UNIT – II: Collection Development and Management

- Periodicals, Conference Literature, Grey Literature and Government Publications
- Non-Book Materials
- Electronic Resources and Online Databases

UNIT – III: Library Organization and Management

- Organizational Structure
- Staff: Nature, Size, Selection, Recruitment, Qualification and Training; Responsibilities and Duties; Competency Development
-Finance: Determination of Finance, Sources of Finance; Types of Budget
- Staff Manual, Library Surveys, Statistics and Standards, etc.

UNIT – IV: Information Services

- CAS, SDI, Abstracting and Indexing Services
- Library Bulletin, Newspaper Clipping Services
- Computerized Services

- Resource Sharing and Networking: INFLIBNET, UGC-INFONET Digital Library Consortium, etc.
- Information Literacy Programmes

Recommended Books

1. BAKER (David), Ed. Resource management in academic libraries.1997. Library Associations, London.
2. BROPHY (Peter). The academic library. 2000. Library Association, London.
3. BUDD (J M). The academic library: the context, its purpose and its operation. 1988. Libraries Unlimited, London.
4. CHAPMAN (Liz). Managing acquisitions in library and information services 2001. Library Association, London.
5. DOWLER (L) Ed. Gateways to knowledge: the role of academic libraries in teaching, learning and research.1998. The MIT Press, London.
6. JORDON (Peter). The academic library and its users.1998. Gower Publishing Limited, London.
7. LINE (Maurice B), Ed. Academic library management. 1990. Library Association, London.
8. RANGANATHAN (S R). School and college libraries. 1942. Madras Library Association, Madras.
9. WEBB (Sylvia P). Personal development in information work. Ed 2. 1991. Aslib, London.
10. WHITE (Carl M). Survey of university of Delhi. 1965. Planning Unit, University of Delhi, Delhi.

(II) PUBLIC LIBRARY SYSTEM

Max. Marks: 100

Objectives:

(i) To familiarise with the development of Public Library System.
(ii) To develop an understanding of collection & services of Public Library.
(iii) To familiarize with different aspects of management practices followed in Public Libraries.

Internal assessment: 20 Marks (Presentation/ Test – 10 + Class Test – 5 + Attendance – 5)

Theory: 80 Marks **Time: 3 Hours**

Note: The paper is divided into **4** Units. The examinees will be required to attempt ***Five*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-IV). Question 1 will consist of **8** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Public Libraries and their Development

- History and Development of Libraries with Special Reference to India
- Role of Public Libraries in Society, Public Libraries as Community Information Centres
- Agencies and their Role in Promotion and Development of Public Libraries in India

UNIT – II: Collection Development and Management

- Periodicals, Conference Literature, Grey Literature and Government Publications
- Non-Book Materials
- Electronic Sources and Online Databases

UNIT – III: Library Organization and Administration

- Organizational Structure
- Staff: Nature, Size, Selection, Recruitment, Qualification and Training; Responsibilities and Duties; Competency Development
-Finance: Determination of Finance, Sources of Finance; Types of Budget
- Staff Manual, Library Surveys, Statistics and Standards, etc.

UNIT – IV: Information Services

- Public Libraries Extension Services, Abstracting and Indexing Services
- Library Bulletin, Newspaper Clipping Services
- Computerized Services
- Resource Sharing and Networking

Recommended Books

1. BARUA (B P). National policy on library and information systems and services for India: perspectives and projections. 1992. Popular, Bombay.
2. BATT (Chris). Information technology in public libraries. 1998. London Library Association Publishing, London.
3. BHATT (R K). Unesco: development of libraries and documentation centres in developing countries. 2004. K K Publications, New Delhi.
4. HIGGINS (S E). Youth services and public libraries.2007. Chandos Publishing, Oxford.
5. IFLA. IFLA guidelines for public libraries (revised). 2000. The Hague, IFLA.
6. INDIA. Advising committee for libraries. Ed. 2. 1958. Manager of Publications, Delhi.
7. JAGANAYAK (S S). Role of libraries in socio-economic, cultural, and educational development. 1997. Classical Publication, New Delhi.
8. PATEL (Jashu) and KRISHAN KUMAR. Libraries and librarianship in India.2001. Greenwood Press, Westport, Connecticut.
9. THOMAS (V K). Public libraries in India: development and finance.1997. Vikas. Publication, New Delhi.
10. WOODRUM (Pat), Ed. Managing public libraries in 21st century. 1989. The Hawork Press, New York.

(III) RESEARCH & TECHNICAL LIBRARY SYSTEM

Max. Marks: 100

Objectives:

(i) To familiarize with the development of Research & Technical Library System.
(ii) To develop an understanding of collection & services of Research & Technical Library.
(iii) To familiarize with different aspects of management practices followed in Research & Technical libraries.

Internal assessment: 20 Marks (Presentation/ Test – 10 + Class Test – 5 + Attendance – 5)

Theory: 80 Marks **Time: 3 Hours**

Note: The paper is divided into **4** Units. The examinees will be required to attempt ***Five*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-IV). Question 1 will consist of **8** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT - I: Research and Technical Libraries and their Development

- History and Development of Libraries with Special Reference to India
- Role of Special Libraries and its Relationship with Parent Organization
- Types and Functions of Special Libraries
- Agencies and their Role in the Promotion and Development of Research and Technical Libraries

UNIT- II: Collection Development and Management

- Periodicals, Conference Literature, Grey Literature, Patents, Standards, Specifications and Government Publications
- Non-Book Materials
- Electronic Resources and Online Databases

UNIT - III: Library Organization and Administration

- Organizational Structure
- Staff: Nature, Size, Selection, Recruitment, Qualification and Training; Responsibilities and Duties; Competency Development
-Finance: Determination of Finance, Sources of Finance; Types of Budget
- Staff Manual, Library Surveys, Statistics and Standards, etc.

UNIT - IV: Planning and Organization of Various Information Services

- CAS, SDI, Abstracting and Indexing Services
- Library Bulletin, Newspaper Clipping Services
- Computerized Services
- Resource Sharing and Networks: RLIN, OCLC, etc.

Recommended Books

1. AUGER (C P). Information sources in grey literature. Ed. 3. 1994. Bowker, London.
2. CHAPMAN (Liz). Managing acquisitions in library and information services. 2001. Library Associations, London.
3. GROGAN (N). Science and technology: an introduction to the literature. Ed. 4. 1982. Clive Bingley, London.
4. HERNON (Peter) and WHITMAN (John R). Delivering satisfaction and service quality: a customer-based approach for libraries. 2001. American Library Association, Chicago.
5. LAWES (Ann), Ed. Management skills for the information manager. 1993. Gower Publishing, London.
6. RAITT (David), Ed. Libraries for the new millennium. 1997. Library Association, London.
7. SAHA (J). Special libraries and information services in India and the USA. 1969. Scarecrow, New York.
8. SCAMMELL (A W), Ed. Handbook of special librarianship and information work. Rev. Ed. 7. 1997. Aslib, London.
9. SINGH (S P). Special libraries in the electronic environment.2005.Bookwell, New Delhi.

10. STRAUSS (L J). Scientific and technical libraries: their organization and administration. Ed. 2. 1972. Beckey and Hayes, New York.

PAPER – MLIS05: LITERATURE SURVEY AND FIELD SURVEY

Max. Marks: 50

For literature survey and field survey every student shall be assigned to a teacher in the Department.

(i) LITERATURE SURVEY (20 MARKS)

Every student shall conduct literature survey on an assigned topic of contemporary relevance. The teacher supervisor shall evaluate the survey report and submit the awards in the Department.

(ii) COMMUNITY INFORMATION NEEDS SURVEY (30 MARKS)

Every student shall conduct field survey on an assigned topic and submit the report in the Department. The emphasis in the field survey shall be on identifying information needs of specific groups in the society. The report shall be evaluated by the Committee consisting of all the regular teachers of the Department.

SEMESTER – II

PAPER – MLIS06: RESEARCH METHODS AND STATISTICAL TECHNIQUES

Max. Marks: 100

Objectives:

(i) To introduce students to the concept of the Research.
(ii) To provide an insight into the Research Methods in Library and Information Science.
(iii) To provide an overall understanding of Statistical Techniques in Research Operations.

Internal assessment: 20 Marks (Presentation/ Test – 10 + Class Test – 5 + Attendance – 5)

Theory: 80 Marks **Time: 3 Hours**

Note: The paper is divided into **4** Units. The examinees will be required to attempt ***Five*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-IV). Question 1 will consist of **8** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Research

- Concept, Meaning, Need and Process of Research.
- Types of Research – Fundamental and Applied.
- Types of Research Design.
- Identification and Formulation of Problem.
- Hypothesis: Definitions, Functions and Types

- Designing Research Proposal.
- Ethical Aspects of Research.
- Literature Search – Print, Non-Print and Electronic Sources.
- Research Reporting: Structure Style and Contents. (Guidelines for Research Reporting).

UNIT – II: Research Methods

- Spiral of Scientific Method. (S. R. Ranganathan).
- Historical Method.
- Experimental Method.
- Descriptive Method.
- Survey Method and Case Study Method.
- Bibliometrics: Concept and Definition, Bibliometrics Laws: Bradford, Zipf. Lotka, Bibliographic Coupling and Citation Analysis, Webometrics, Impact Factor.

UNIT – III: Research Techniques and Tools

- Questionnaire
- Interview
- Observation
- Documentary Records and Reports
- Sampling Techniques

UNIT – IV:Descriptive Analysis and Interpretation

- Descriptive Statistics – Measures of Central Tendency – Mean, Mode, Median.
- Measures of Dispersion, Variance and Co-Variance.
- Standard Deviation
- Inferential Statistics
- Z – T test Correlation
- Regression – linear and non-linear
- Chi – Square test
- Tabulation and Generalisation
- Graphical presentation of data Bar, Pie, Line graphs, Histograms
- Sociometry.

Books Recommended

1. CHARLES (H) and others. Research Methods in librarianship: Techniques and Interpretations. 1980.
2. KRISHAN KUMAR. Research Methods in Library and Information Science, New Delhi, Vikas Publishing House. 1992.
3. POWELL (Ronald R). Basic Research Methods for Librarians. 1985.
4. RAVI CHANDRA RAO (I K). Quantitative methods in Library and Information Science. New Delhi. Wiley Eastern Limited, 1983.
5. SARAVANAVEL (P). Research and Report Writing. 1993.

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PAPER-MLIS07: ADVANCED ICT APPLICATIONS IN LIS (THEORY AND PRACTICE) – II

Max. Marks: 100

Objectives

(i) To familiarise students with major Applications of ICT in Libraries and Information Centers and issues affecting their implementation.
(ii) To familiarise with the Internet, Digital Libraries and Digitisation and other ICT Services.
(iii) To enable students to understand the features and use of Library Application Software: Open Source: KOHA and Alice for Windows.
(iv) To enable students to create Digital libraries.

Part I: Theory

Max. Marks: 50

Internal assessment: 10 Marks (Presentation/ Test – 5 + Attendance – 5 (Includes attendance of practical classes also))

Theory: 40 Marks **Time: 2½ Hours**

Note: The paper is divided into **3** Units. The examinees will be required to attempt ***Four*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-III). Question 1 will consist of **5** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

Unit – I: Library Application Software Packages

- Basics of Library Automation Software.
- Selection Criteria for Library Automation Software.
- SOUL, LIBSYS, Alice for Windows, Open Source Software: KOHA.

UNIT – II: Digital Libraries

- Genesis, Definition, Objectives and Scope of Digital Libraries.
- ***Digitisation and Tools:*** Techniques of Digitisation, Resolution, Imaging.
- Files and Formats of documents, images, video, audio, etc.
- ***Metadata:*** Role of Metadata and Metadata Types.

UNIT – III: Database Types and other Concepts

- Bibliographic, Full text and Multimedia Databases.
- Basics of Artificial Intelligence, Expert Systems, Virtual Reality.
- ***Digital Preservation:*** Overview, Need, Challenges.
- ***DP strategy:*** Migration, Replication, Computer archaeology.

Part II: Practice

Max. Marks: 50

Internal assessment: 10 Marks (Presentation/ Test – 5 + Class Test – 5 Marks)

Practical Examination: 40 Marks **Time: 2 Hours**

The candidates will be required to record the steps of database creation on the assigned area and steps in Digital Library creation.

Unit – I: Library Automation Software

- **Open Source Library Application Software: KOHA**
  - Overview of KOHA.
  - Installation and Configuration of KOHA.
  - Acquisition and Cataloguing.
  - Members Management and Circulation.
  - Reports and Backups.
- **Alice for Windows**
  - Overview. Installation and Configuration.
  - Acquisition and Cataloguing.
  - Members Management and Circulation.
  - Reports and Backups.

Unit – II: Digital Library Software

- Installation, Configuration and working in Greenstone or DSpace.

Recommended Books

1. ACKERMANN (Ernest). Learning to use the Internet: An introduction with examples and experiences. BPB.
2. BHARIHOKE (Deepak). Fundamentals of IT. 2nd ed. Excel Books. New Delhi. 2002.
3. CADY (Glee Harray) and McGregor (Pat). Mastering the INTERNET. BPB. New Delhi. 1996.
4. COX (Ingemer, J). Digital Watermarking. 2002.
5. Digital Libraries: Policy, planning and practice. Hants: Ashgate. 2004.
6. Digital Libraries and Multimedia. Boston: Kluwer, Academic Publishers. 2000.
7. Digital Libraries from technology to culture. New Delhi: Kanishka Publications. 2006.
8. Digital Libraries and use. Cambridge: MIT Press, 2003.
9. DSpace Manual, Release 1.6.2. http://www.dspace.org/1_6_2Documentation/DSpace-Manual.pdf
10. DSpace Release 1.6.2 Notes. https://wiki.duraspace.org/display/DSPACE/DSpace+Release+1.6.2+Notes
11. FALK (Bennett). The Internet basic reference from A to Z.
12. GOPAL KRISHNAN. Digital Libraries in electronic information era. Delhi: Authors press. 2001.
13. Greenstone Home page. http://www.greenstone.org/greenstone3-home
14. Greenstone Manual. http://www.greenstone.org/manuals/gsdl2/
15. HUGHES (Loma M). Digitizing collection: strategic issues for the information manager. 2004.
16. JEEVAN (V K J). Digital Libraries. 2003.
17. http://koha.org/
18. KOHA Documentation. http://www.kohadocs.org/
19. KOHA on Windows. http://cid-6ac4b4f2fe0a3144.office.live.com/self.aspx/Public/Koha%20on%20Windows.pdf
20. KOHA on Windows. http://www.koha.rwjr.com/Koha_on_Windows.html
21. LEON, Alexis and LEON, Mathews. Fundamentals of Information Technology. 2nd Ed. Vikas Publishing House Pvt Ltd New Delhi. 2009.
22. RAMAMURTHY (C R). Globalization and library information networking. 2004.
23. STALLINGS (William). Data and Computer Communications. 6th Ed. Pearson Education Asia. 2001.

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PAPER – MLIS08: ELECTIVES: INFORMATION SYSTEMS

(a) SOCIAL SCIENCE INFORMATION SYSTEM

Max. Marks: 100

Objectives:

(i) To familiarise with the Concept, Scope, Landmarks and Research Trends in the disciplines of Social Sciences.
(ii) To develop an understanding of Social Science Information System and its Components.
(iii) To develop evaluative skills for Specialised Information Sources and Systems.

Internal assessment: 20 Marks (Presentation/ Test – 10 + Class Test – 5 + Attendance – 5)

Theory: 80 Marks **Time: 3 Hours**

Note: The paper is divided into **4** Units. The examinees will be required to attempt ***Five*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-IV). Question 1 will consist of **8** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Structure and Development of Social Sciences

- Growth and Development of Social Sciences. Social Sciences in India.
- Definition, Scope, Development and major contributors in the disciplines of:

- Political Science,
- Economics,
- Sociology,
- History,

UNIT – II: Information Sources

- Information Sources: Documentary and Non-documentary.
- Social Science Literature: Research Literature, Derived Literature, Bibliographical Literature
- Web-based Sources: E-journals, E-Reference Sources, Subject Gateways, Institutional Repositories, Digital Libraries.
- Databases: Bibliographic and Full Text
- Study of DARE Database, IBSS, International Encyclopedia of Social and Behavioral Sciences, Guide to Indian Periodical Literature, Social Science Citation Index, Social Sciences Full Text, J-STOR, Historical Abstracts, International Political Science Abstracts, EconLit, Bibliography of Doctoral Dissertations, Sociological Abstracts

UNIT – III: Institutional Sources

- Institutions connected with Social Science Information Generation and Dissemination.
- Study of the activities of: ICSSR, ICWA, Indian Institute of Public Administration, National Council for Applied Economic Research, TISS, UNESCO, ICHR, London School of Economics and Political Science, Social Science Research Council, International Social Science Council, Economic and Social Research Council.

UNIT – III: Information Systems and Networks

- Social Science Information System: Components.
- Planning and evaluation of Social Science Research Libraries.
- Evaluation of existing Information Systems and Networks in Social Sciences at National and International level: DELNET, INFLIBNET, NASSDOC, SENDOC, DEVSIS, DEVINSA, APINESS, Social Science Research Network, NICNET.

Books Recommended

1. WEBB (William H), *Ed.* Sources of information in social sciences.
2. HERRON (Nancy), *Ed.* Social Sciences: A Cross disciplinary guide to selected sources. 1996. Libraries Unlimited.
3. HUNT (Elgin F) and COLANDER (David L). Social sciences: An Introduction to the study of society. Ed. 9. 1995. Allyn.
4. LI (Tze Chung). Social science reference sources: A Practical guide. Rev and enlarged ed 2. 1990. Greenwood.
5. VYAS (S D). Social science information in India: Efforts toward bibliographic control. 1992. Concept, New Delhi.

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(b) BUSINESS INFORMATION SYSTEM

Max. Marks: 100

Objectives:

(i) To familiarise with the Concept, Scope, Landmarks and Research Trends in the disciplines of Business.
(ii) To develop an understanding of Business Information System and its Components.
(iii) To develop evaluative skills for Specialised Information Sources and Systems.

Part – I: Theory

Max. Marks: 60

Internal assessment: 10 Marks (Attendance – 5 (Includes attendance of practical classes also) + Class Test – 5)

Theory: 50 Marks **Time: 3 Hours**

Note: The paper is divided into **3** Units. The examinees will be required to attempt ***Four*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-III). Question 1 will consist of **7** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Business Information

- Nature and Characteristics: Its Role, Generation and Utilisation.
- Systems View of Business Information
- Components of Business Information Systems: Resources, Centres, Consultants, Suppliers, Financial Organisations, Industrial Promoters, etc.
- Users of Business Information: Categories, Role, Functions and needs.

UNIT – II: Business Information Sources, Products and Services

- ***Sources of Information:*** Documentary: Types with particular reference to Directories, Digests, Market Research Reports, Trade Literature, Technical Notes, Company Profiles, Patent, Design & Trade marks, Standards, Databases.
- ***Institutional:*** National & International: Studies related to the activities of:
  - NIDCS, IIFT, ITPO, CII, FICCI, etc.
  - UNIDO, UNCTAD, etc.
- ***Information Services and Networks:***
  - CAS, SDI, Technical Enquiry Service, other Computerised Services.
  - Overview of Business Information Networks.

UNIT – III: Organising Business Information for end user support

- Database System: Business Measurement System; Business Planning System.
- Text Management System: Text Retrieval Systems; Office Systems.
- Management Support Systems: Decision Support Systems; Information Centres.

Part – II: Practice

Max. Marks: 40

Section – A

Assignments: 10 marks

Section – B

Practical Examination: 30 Marks **Time: 2 Hours**

i. Evaluation of ***One*** Documentary Information Source. **Marks: 15**

ii. Evaluation of ***One*** Institutional Source. **Marks: 10**

iii. Viva-voce: **Marks: 5**

Note: Evaluation of Information Sources.

Books Recommended

1. AHITUV (N I V). Principles of Information System for Management. USA Business & Educational Technologies, 1994.
2. ATHERTON (Pauline). Handbook for information systems and services, 1977.
3. CAMPBELL (M J), ed. Manual of business library practice, 1975.
4. CURTIS (GRAHAM). Business information systems: Analysis, design & practice, 1989.
5. DOSSETT (PATTI), ed. Handbook of special librarianship & information services, 6th ed.1992.
6. GARLAND (John L). How to develop Business information systems for End User. 1986.
7. NEELAMEGHAM (A). Comp: DRTC reference course on information services for business and industry, 1974.
8. WASSERMAN, et al: Encyclopaedia of business information sources, 1983.

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(c) - HEALTH SCIENCE INFORMATION SYSTEM

Max. Marks: 100

Objectives:

(i) To familiarise with the Concept, Scope, Landmarks and Research Trends in the disciplines of Health Sciences.
(ii) To develop an understanding of Health Science Information System and its Components.
(iii) To develop evaluative skills for Specialised Information Sources and Systems.

Part – I: Theory

Max. Marks: 60

Internal assessment: 10 Marks (Attendance – 5 (Includes attendance of practical classes also) + Class Test – 5)

Theory: 50 Marks **Time: 3 Hours**

Note: The paper is divided into **3** Units. The examinees will be required to attempt ***Four*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-III). Question 1 will consist of **7** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Health Science Information

- Growth and developments of Health Science.
- Types of Health Science Libraries/Information Centres
- Users of Health Science information

UNIT – II: Health Science Information and Global Issues

- ***Sources of Information:*** Documentary: Printed and Non-print.
- ***Institutional:*** National & International: Studies related to the activities of:
  - The role and functions of National Medical Library.
  - The role and function of other National and International Organisations delivering Health Science Information: WHO, ICMR, Department of Biotechnology, Council of Ayurveda and Siddha, Council of Homeopathy, Unani System, National Institute of Health and Family Welfare, CDRI, CFTRI, NIN, NII, NIC, etc.
- ***Information Services:*** Current Awareness Services: SDI Services, Indexing and Abstracting Services, Literature Search.

UNIT – III: Information Systems and Networks

- HELLIS, MEDLARS, BIOSIS
- Trends in Health Science Information System
- Application of Hypertext, Hypermedia, Multimedia, Expert system and Artificial Intelligence.

Part – II: Practice

Max. Marks: 40

Section – A

Assignments: 10 marks

Section – B

Practical Examination: 30 Marks **Time: 2 Hours**

i. Evaluation of ***One*** Documentary Information Source. **Marks: 15**

ii. Evaluation of ***One*** Institutional Source. **Marks: 10**

iii. Viva-voce: **Marks: 5**

Syllabus: Evaluation of Information Sources.

Books Recommended

1. DIXIT (R P). Information management in Indian medical libraries, 1995, pp 1-423.
2. R P KUMAR, SRIVASTAVA (Divya) and GUPTA (S P), eds. Education for librarianship in information age, MLAI sp. Pub. 1995, pp.1-287.
3. GUPTA(S P) et al. Information technology and health science libraries, MLAI sp. Pub. 1993, pp.1-279.
4. CARMEL (Michael), ed.: Health care librarianship and Information work 22nd ed, 1995.
5. PICKEN (Fiona Mackay) and KAHN (Ann M C). Medical librarianship in the eighties and beyond: A world perspective, 1986.
6. JOURNAL OF American Society for Information Science: Perspectives on medical informatics: information technology in health care, 1995, 46 (10), 723 – 800.
7. VARALAXSHMI (R S R). Information services in medical college libraries. 1993.

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PAPER – MLIS09: INFORMATION RETRIEVAL (THEORY & PRACTICE)

Max. Marks: 100

Objectives

(i) To introduce the Concept and Principles of Indexing;
(ii) To acquaint with the Role and Types of Indexing Languages; and
(iii) To familiarise with the Advanced Information Processing and Retrieval Techniques.

Part – I: Theory

Max. Marks: 60

Internal assessment: 10 Marks (Attendance – 5 (Includes attendance of practical Classes also) + Class Test – 5)

Theory: 50 Marks **Time: 3 Hours**

Note: The paper is divided into **3** Units. The examinees will be required to attempt ***Four*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-III). Question 1 will consist of **7** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT- I: Information Retrieval

- Information Retrieval: Meaning and Scope
- Search strategies: Manual/ Machine, Feedback and Refining.
- Evaluation of IR Systems.
- IR Models.
- Trends in IR Models.
- Projects and Parameters.

UNIT- II: Cataloguing and Subject Indexing: Principles and Practices

- Principles of Subject Cataloguing.
- Assigning Subject Headings using:
    - Library of Congress Subject Headings (LCSH),
    - Sears List of Subject Headings (SLSH)
    - Chain Procedure.
- Models: Assigned and Derived. Pre and Post Co-ordinate indexing.

UNIT- III: Indexing Languages and Vocabulary Control

- Indexing Languages: Types and Characteristics.
- Vocabulary Control: Concept, Meaning and Tools.
- Structure and Construction of IR thesauri.
- Trends in Automatic Indexing.

Part – II: Practice

Max. Marks: 40

Section – A

Assignments: 10 marks

Assignments on assigning/ deriving Subject Headings according to Chain Procedure, PRECIS, Sears List of Subject Headings

Section – B

Practical Examination: 30 Marks **Time: 2 Hours**

The Distribution of Marks and scheme of examination will be as follows:

a) Thesaurus Construction on an assigned topic: **Marks: 10**

b) Viva-voce: **Marks: 5**

Section – C

Note: The question paper shall consist of following ***Two*** Questions:

1. There will be one question carrying ***five*** titles. The examinees will be required to assign Subject Headings to these titles according to Sears List of Subject Headings. **Marks: 15**
2. There will be one question carrying ***Six*** titles in Section – A (Chain Procedure) & B (PRECIS). The examinees will be required to attempt any ***Five*** titles. **Marks: 10**

Books Recommended

1. FOSKETT (A C). Subject approach to information. Ed.5. 1996. Bingley, London.
2. CHOUDHURY (G G). Introduction to modern information retrieval. 1999. Library Association, London.
3. AUSTIN (Derek). PRECIS: A manual of concept analysis. 1984. British Library, London.
4. RAJAN (T N). Indexing systems: Concepts methods and techniques. 1981. IASLIC, Calcutta.
5. GILCHRIST (Alan). Thesaurus construction and design.

*** * * * * ***

PAPER – MLIS10: LIBRARY CLASSIFICATIONPRACTICE: UNIVERSAL DECIMAL CLASSIFICATION

Max. Marks: 50

Internal assessment: 10 Marks (Attendance – 05 Marks + Class Test – 05 Marks)

Practical Examination: 40 Marks **Time: 2 Hours**

Note: The question paper will be divided into Two Sections: Section – A and B. Distribution of Marks and scheme of examination will be as follows:

Section - A

1. ***Six*** Titles will be given in this Section and the examinees will be required to attempt all the Titles.
2. Each Title will carry 4 Marks.

Section - B

1. ***Three*** Titles will be given in this Section and the examinees will be required to attempt ***Two*** Title.
2. Each Title will carry 8 Marks.

Syllabus: Classification of Complex Titles of Monographs and Research Articles by Universal Decimal Classification, latest available Abridged Edition.

SCHEME OF BA ECONOMICS (SEMESTER SYSTEM)
W.E F. 2016-17 IN PHASED MANNER

		EXTERNAL MAX. MARKS	INTERNAL ASSESSMENT MAX. MARKS	PROJECT REPORT MAX. MARKS	TIME
IST YEAR w.e.f (2016-17)	**SEMESTER-I**				
	MICROECONOMICS-1	64	16	20	3 Hrs.
	SEMESTER-II				
	MICROECONOMICS-II	64	16	20	3 Hrs.
2ND YEAR **w.e.f (2017-18)**	**SEMESTER-III**				
	MACROECONOMICS-I	64	16	20	3 Hrs.
	SEMESTER-IV				
	MACROECONOMICS-II	64	16	20	3 Hrs.
3RD YEAR **w.e.f (2018-19)**	**SEMESTER-V(Opt. any One)**				
	OPT-(i) INDIAN ECONOMY-I	64	16	20	3 Hrs.
	OPT-(ii) INTERNATIONAL ECONOMICS	64	16	20	3 Hrs.
	OPTION-(iii) ECONOMICS OF DEVELOPMENT-I	64	16	20	3 Hrs.
	SEMESTER-VI(Opt. any One)				
	OPT-(i) INDIAN ECONOMY-II	64	16	20	3 Hrs.
	OPT-(ii) PUBLIC FINANCE	64	16	20	3 Hrs.
	OPT-(iii) ECONOMICS OF DEVELOPMENT-II	64	16	20	3 Hrs.

Guidelines for Preparation of Project Report

In each paper the candidate will prepare a project report having a weightage of 20 marks. The project is a minor document that reflects the skills of the student to investigate critically a topic/problem, the ability to gather and analyze information, and to present and discuss the results/investigation concisely and clearly. The guidelines to be followed in the preparation and submission of the project are as given here under:

1. The students may choose any topic from the subject he/she has studied, including the social and economic issues in the local/regional context.
2. The project work should be supervised by a teacher in Economics of the concerned college.
3. The students shall prepare and submit the project report to the University.
4. The report with around 30-40 A4 size pages (excluding preliminary pages) must be handwritten/typed with at least 20 lines per page on one side of the paper only. The report should be bound (spiral or other ways).
5. The project report should be submitted to the University by 31st December in odd semester and 31st May in even semester.
6. The student shall prepare two copies of the report; one copy for submitting to the University and one copy for personal reference.
7. Structure of the project report:
   - Title page
   - Certificate from the supervising teacher
   - Certificate by the students
   - Acknowledgements
   - Contents
   - List of Tables and graphs
   - List of Acronyms used
   - An Abstract of the project work. The abstract constitutes an up to one-page executive summary, which provides a brief outline of the objectives, scope of the project , the methodology used, the main findings and results achieved and any conclusions and recommendations made. This should appear before the introductory chapter.
   - Chapter 1: Introduction (which includes importance of the study, objectives of the study, methodology and data source, Chapter frame, Concepts used, limitations of the study etc)

- Chapter II: Review of Literature
- Chapter III: Profile of the study area (Optional)
- Chapter IV: Data Analysis (Core of the report)
- Chapter V : Summary of Findings and Conclusions
- Appendix: Questionnaire/Schedule, other exhibits, case etc.
- Select Bibliography (In referencing and bibliographic preparation, the APA (American Psychological Association) style sheet is recommended).

8. A project work must be the student's own work and must not contain any plagiarized material.
9. Evaluation of the project report: The project report shall be subject to external evaluation.
10. The external evaluation shall be done by the University.

B.A. Part – I (ECONOMICS)
Semester-I
MICROECONOMICS – I

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

UNIT-I

1.1. Economics: Definition, Nature, Scope
1.2. The Economic Problem : Scarcity and Choice, Functions of an Economic System,
1.3. Law of Demand
1.4. Elasticity of Demand: Concept, Types, Measurement, Determinants and Importance

UNIT -II

2.1. Concept of Utility
2.2. Cardinal Utility Analysis,
  2.2.1. Law of Equi- Marginal Utility
  2.2.2. Law of Diminishing Marginal Utility
  2.2.3. Derivation of Demand Curve
2.3. Ordinal Utility Analysis
  2.3.1. Indifference Curves Analysis
  2.3.2. Consumer Equilibrium
2.4. Price, Income and Substitution Effects
2.5. Consumer Surplus

UNIT-III

2.1. Production Function & Product Curves
2.2. Law of Variable Proportions
2.3. Iso-quants & Iso-Lines
2.4. Returns to Scale
2.5. Economies & Diseconomies of Scale Internal & External
2.6. Supply Curve & Elasticity of Supply.

UNIT-IV

4.1. Cost Analysis: Concepts of Cost, Short Period Costs, Long Period Costs
4.2. Modern Theory of Costs.
4.3. Revenue: Total, Average and Marginal Revenue
4.4. Break Even Analysis and its Uses.

Suggested Readings:

1. N. Gregory Mankiw' "Principles of Economics"' South-Western College; 5th Edition(2008)
2. J.E Stiglitz and G.E Walsh' "Principles of Economics", W.W Norton & Co. N.Y.
3. R.G Paul Samuelson and Nordhaus' "Economics", Tata Mcgraw Hill Publishing Company, New Delhi. 18th Edition (2004)
4. Lipsey and KA. Chrystal, Economics, Oxford University Press, Oxford(2007).
5. A. Koutsoyiannis , Modern Microeconomics , Macmillan (Latest Edition).
6. R.G Lipsey and KA. Chrystal, "Principles of Economics", Oxford University Press ,Oxford(2002-03).
7. R.S Pindyck & D.L Rubinfeld: Microeconomics, Prentice Hall Series in Economics MATE (2005)
8. Walter Nicholsan' " Microeconomic Theory: Basic Principles and Extensions",South Western College.South Western Publication(2007)
9. Hal R. Varian " Intermediate Microeconomic: A modern Approach", W.W Norton & Company,6th Edition (June 2002)
10. W.J Baumol & Alan S. Blinder, "Microeconomics: Principles and Policy" Thomson, India Edition. Ceneage Learning India Pvt Ltd(2006)

B.A. Part - I (ECONOMICS)
Semester-II
MICROECONOMICS - II

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

UNIT-I

1.1. Market Structures- Concepts
1.2. Perfect Competition: Characteristics and Assumptions,
1.3. Price Determination Under Perfect Competition,
1.4. Equilibrium of the firm in the short period and the long period.

UNIT-II

2.1. Monopoly: Characteristics
2.2. Equilibrium of the Monopoly Firm in Short period and Long period
2.3. Concept of Supply Curve under Monopoly
2.4. Price Discrimination

UNIT -III

1.1. Monopolistic Competition: Characteristics
1.2. Selling Costs ,Product Differentiation
1.3. Short period and long period Equilibrium of the Firm
1.4. Concept & Characteristic of Oligopoly.

UNIT-IV

4.1. Marginal Productivity Theory of Distribution
4.2. Ricardian Theory of Rent
4.3. Theories of Interest; Classical and Neoclassical
4.4. Marginal Productivity Theory of Wages;

Suggested Readings:

1. Paul Samuelson and Nordhaus' "Economics", Tata Mcgraw Hill Publishing Company, New Delhi. 18th Edition (2004)
2. N.Gregory Mankiw' "Principles of Economics"' South-Western College; 5th Edition(2008)
3. J.E Stiglitz and G.E Walsh' "Principles of Economics", W.W Norton & Co. N.Y.
4. R.G Lipsey and KA. Chrystal, Economics, Oxford University Press, Oxford(2007).
5. A.Koutsoyiannis , Modern Microeconomics , Macmillan (Latest Edition).
6. R.G Lipsey and KA. Chrystal, "Principles of Economics",Oxford University Press ,Oxford(2002-03).
7. R.S Pindyck & D.L Rubinfeld: Microeconomics, Prentice Hall Series in Economics MATE (2005)
8. Walter Nicholsan' " Microeconomic Theory: Basic Principles and Extensions",South Western College.South Western Publication(2007)
9. Hal R. Varian " Intermediate Microeconomic: A modern Approach",W.W Norton & Company,6th Edition (June 2002)
10. W.J Baumol & Alan S. Blinder, "Microeconomics: Principles and Policy" Thomson, India Edition. Ceneage Learning India Pvt Ltd(2006)

B. A. PART- II (ECONOMICS)
Semester- III
MACROECONOMICS – I

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

UNIT-I

1.1. Nature and Scope of Macro Economics
1.2. Difference between Micro and Macro Economics
1.3. Importance of Macro Economics.
1.4. Concepts, Measurement and limitations of National Income Statistics
1.5. Circular flow of Income in Two, Three and Four Sector Economy.

UNIT-II

2.1. Say's law of Market
2.2. Classical Theory of Income and Employment
2.3. Keynesian Theory of Income and Employment
2.4. Principle of Effective Demand.
2.5. Comparison between Classical and Keynesian Theory.

UNIT-III

3.1. Consumption Function: Meaning and Technical Attributes.
3.2. Significance of MPC
3.3. Keynesian Psychological Law of Consumption and its Implications
3.4. Short run & Long run Consumption Curves.

UNIT-IV

4.1. Meaning of Capital and Investment
4.2. Types of Investment
4.3. Marginal Efficiency of Capital (MEC).
4.4. Relation between MEC and MEI
4.5. Factors affecting Inducement to Invest.

Suggested Readings:

- Lipsey R.G. and K.A. Christal (1999) ―Principles of Economics‖ 9th Ed., Oxford University Press.
- Ackley, G (1978), ―Macroeconomics: Theory and Policy‖, Macmillan, New York.
- Branson, W. A. (1989), ―Macroeconomics: Theory and Policy‖, 3rd ed. Harper and Harper and Row, New York.
- Shapiro, E (1996), ―Macroeconomics: Analysis‖ Galgotia Publication, New Delhi.
- Stiglitz J. E. and Carl E. Walsh (2002), Principles of Macroeconomics, W.W. Norton and Company, New York.
- Paul Samuelson and Nordhaus: (2005) ―Economics‖ (18th Ed.) Tata Hill Publishing Company, New York.
- Mankiw N. Gregory: (2007) ―Principles of Economics,‖ Thomson, Indian Reprint.
- Lipsey R.G. and K.A. Chrystal (2007) ―Economics‖, Oxford University Press, Oxford.

B. A. PART- II (ECONOMICS)
Semester- IV
MACROECONOMICS – II

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

UNIT-I

1.1. Keynesian Multiplier: Concepts
1.2. Relation between Multiplier, MPC and MPS
1.3. Comparative Static and Dynamic Process.
1.4. Working of Multiplier in UDC'S.
1.5. Acceleration Principle and Concept of Super Multiplier.

UNIT-II

2.1. The Demand for Money: Concepts, Functions and Significance
2.2. Quantity Theory of Money -Fisher's Approach and Cambridge Approach
2.3. Keynesian Liquidity Theory of Money
2.4. Supply of Money: Meaning and Determinants
2.5. High Powered Money and Money Multipliers

UNIT-III

1.1. Meaning, Causes and Effects of Inflation
1.2. Types of Inflation
1.3. The Classical Theory of Inflation
1.4. Demand Pull and Cost Push Inflation.
1.5. Phillips Curve in Short run and Long run.

UNIT-IV

4.1. Meaning, Nature and Features of Business Cycles
4.2. Types and Phases of Business Cycles
4.3. Keynes View of Trade Cycles
4.4. Theories of Trade Cycles (Hicks and Samuelson).
4.5. Rate of Interest: Classical and Keynesian Theories of Interest.

Suggested Readings:

- Lipsey R.G. and K.A. Christal (1999) ―Principles of Economics‖ 9th Ed., Oxford University Press.
- Ackley, G (1978), ―Macroeconomics: Theory and Policy‖, Macmillan, New York.
- Branson, W. A. (1989), ―Macroeconomics: Theory and Policy‖, 3rd ed. Harper and Harper and Row, New York.
- Shapiro, E (1996), ―Macroeconomics: Analysis‖ Galgotia Publication, New Delhi.
- Stiglitz J. E. and Carl E. Walsh (2002), Principles of Macroeconomics, W.W. Norton and Company, New York.
- Paul Samuelson and Nordhaus: (2005) ―Economics‖ (18th Ed.) Tata Hill Publishing Company, New York.
- Mankiw N. Gregory: (2007) ―Principles of Economics,‖ Thomson, Indian Reprint.
- Lipsey R.G. and K.A. Chrystal (2007) ―Economics‖, Oxford University Press, Oxford.

B. A. PART-III (ECONOMICS)
Semester- V
Option (i): INDIAN ECONOMY – I

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

UNIT-I

Developing Economy

1.1 Capitalist, Socialist & Mixed economy.
1.2 Developed and Developing Economy –Concepts
1.3 Basic Characteristics of Indian Economy as a Developing Economy.
1.4 Comparison of Indian Economy with Developed Economies
1.5 Major Issues of Development in India

UNIT-II

Population

2.1. Theory of Demographic Transition.
2.2. Size and Growth of Population.
2.3. Features of Indian Population
2.4. Causes of Growing Population.- High Birth Rate and Decreasing Death Rate.
2.5. Problems of Over Population
2.6. Measures for Population Control.
2.7. Population Policy 2005 onward

UNIT-III

Poverty and Unemployment

1.1. Meaning and Concepts of Poverty.
1.2. Poverty line- Need of Redefining.

1.3. Measurement of Poverty.
1.4. Causes of Poverty.
1.5. Measures of Eradication of Poverty.
1.6. Unemployment – Nature, Types, Causes & Measures

UNIT-IV

Agriculture

4.1. Place of Agriculture in Indian economy.
4.2. Agricultural Productivity – Causes of Low Productivity & Measures.
4.3. Green Revolution- Achievements & Failures.
4.4. Sources of Agricultural Finance.
4.5. Agricultural Marketing – Defects & Measures.
4.6. Special Economic Zone- Concept, Features, Problems.

Suggested Readings:

1. Datt, Gaurav and Mahajan, Ashwani "Dutt & Sundharam Indian Economy" S. Chand & Company (Latest Ed.).
2. Dhar, P.K. "Indian Economy – Its Growing Dimensions" Kalyani Publishers (Latest Ed.).
3. Goel, M.M. (2014): Indian Economy Long Term Challenges & Policy Measures, Monograph N.91, A Guna Gaurav Nyas Publications Think Line
4. Goel, M.M. (2012) "Economics of Human Resource Development in India" VK Global Publications
5. Government of India, Economic Survey (Annual), Ministry of Finance, New Delhi.
6. Government of India, Planning Commission; Five Year Plan Document.
7. Kapila, Uma "Indian Economy: Performance and Policies" Academic Foundation, New Delhi (Latest Edition).
8. Kapila, Uma "Indian Economy since Independence" Academic Foundation, New Delhi (Latest Edition).
9. Mishra S. K. and Puri,V. K. "Indian Economy", Himalaya Publishing House (Latest Ed.)
10. Monthly Issues of Journals "*Kurukshetra*" and "*Yojana*".

B. A. PART- III (ECONOMICS)
Semester- V
Option (ii): INTERNATIONAL ECONOMICS

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

. **UNIT – I**

1.1. Importance of the Study of International Economics
1.2. Inter-Regional and International Trade
1.3. Theories of Absolute Advantage, Comparative Advantage and Opportunity Costs
1.4. Heckscher-Ohlin Theory of Trade

UNIT – II

2.1. Doctrine of Reciprocal Demand (Meaning, Importance and Limitations)
2.2. Trade as an Engine of Economic Growth
2.3. Terms of Trade (Meaning and Measurement)
2.4. Secular Deterioration Hypothesis

UNIT – III

3.1. Concepts and Components of Balance of Payments
3.2. Causes and Consequences of Dis-equilibrium in the Balance of Payments
3.3. The Process of Adjustment in the Balance of Payments Under Gold Standard
3.4. Fixed Exchange Rate Systems.

UNIT – IV

4.1. Functions and Achievements of WTO

4.2. Impact of WTO on Industry, Agriculture and Services Sectors of Indian Economy

Reading List

- Bhagwati J. (1988), Protectionism, Cambridge University Press, Mass.
- Bo Sodersten and Geoffrey Reed, International Economics, Macmillan Press Ltd
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (1987), The Development Process of the Indian Economy, Himalaya Publishing House, Bombay.
- Cherunilam, F. (2008): International Economics, The Tata McGraw-Hill Companies, New Delhi. 5th Ed.
- Dominick Salvatore, International Economics, Wiley India
- Francis Cherunilam, International Economics, Tata Mc Graw- Hill
- K. C. Rana and K. N. Verma, International Economics, Vishal Publishing Company
- Kindlberger, C P (1991): International Economics, R D Irwin, Homewood.8th Ed.
- Krugman, P.R. and Obstfeld, M. (1994), International Economics: Theory and Policy,Glenview, Foresman.
- Mishra, S.K. and Puri, V.K. (latest), Indian Economy- Its Development Experience, Himalaya Publishing House.
- Salvator, D L (2001): International Economics, Prentice Hall, Upper Saddle Rover, New York.

B. A. PART- III (ECONOMICS)
Semester- V
Option (iii): ECONOMICS OF DEVELOPMENT-I

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

UNIT I

1.1. Economic Growth and Economic Development
1.2. Development and Underdevelopment
1.3. Approaches to Economic Development
1.4. Factors affecting Economic Growth

UNIT II

2.1. Poverty — Absolute and Relative; Measuring Poverty – Head Count and Poverty gap
2.2. Vicious Circle of Poverty
2.3. Human Development Index (HDI) and other Indices of Development and Quality of life
2.4. Population Problem and Growth Pattern of Population in Developing Countries

UNIT III

1.1. Traditional Measures of Economic Development – National Income, Per Capital Income
1.2. UNDP Indices for Measurement of Development
1.3. Classical Theory of Development- Adam Smith and Marx

UNIT IV

4.1. Steady State Growth - An Introduction
4.2. Growth models — Harrod and Domar
4.3. Neo Classical Model of Growth- Robert Solow
4.4. Cambridge Model of Growth – Joan Robinson

Basic Reading List

- Adelman, I. (1961), Theories of Economic Growth and Development, Stanford University Press, Stanford.
- Behrman, S. and T.N. Srinivasan (1995), Handbook of Development Economics, Vol. 1 to 3, Elsevire, Amsterdam.
- Ghatak, S. (1986), An Introduction to Development Economics, Allen and Unwin, London.
- Hayami, Y. (1997), Development Economics, Oxford University Press, New York.
- Higgins, B. (1959), Economic Development, Norton, New York.
- Kindleberger, C.P. (1977), Economic Development, 3e, McGraw Hill, New York.
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- Myint, Hla (1965), The Economics of Underdeveloped Countries, Preager, New York.
- Myint, Hla (1971), Economic Theory and Under Developed Countries, Oxford University Press, New York.
- Thirlwal, A.P. (1999), (6th Edition), Growth and Development, Macmillan, London.

Additional Reading List

- Arestis, P. (Ed.) (1993), Employment, Economic Growth and the Tyranny of the Market, Edward Elgar, Aldershot.
- Bhagwati, J. and P. Desai (1970), India : Planning for Industrialization, Oxford University Press, London.
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- Hemple, Lamont C. (1998), Environmental Economics : The Global Challenge, First East West Press, Edinburgh.
- Hirsch, A.O. (1958), The Strategy of Economic Development, Yale University Press, New Haven.
- Kahkonon, S. and M. Olson (2000), A New Institutional Approach to Economic Development, Vistaar.
- Kuik, O.J. et. al (Eds.) (1997), Environment Policy, Pollution Control in the South & North : A Comprehensive Assessment of Approach in India and Netherlands, Indo-Dutch Studies

on Development Alternatives, Sage Publications, New Delhi.
- Little, I.M.D. (1982), Economic Development : Theory and International Relations, Basic Books, New York.
- Lopez, R.E. (1997), Where Development Can Go Or Can Not Go, The Role of Poverty — Environmental Linkages, Annual World Bank Conference on Development Economics, World Bank, Washington D.C.
- Maler, K.G. (1997), Environment, Poverty in Economic Growth, Annual World Bank Conference on Development Economics, World Bank, Washington D.C.
- Mehrotra, S. and J. Richard (1998), Development With a Human Face, Oxford University Press, New Delhi.
- Mishan, E.J. (1975), Cost-Benefit Analysis, (2nd Edition), Allen and Unwin, London.
- Sen, A.K. (Ed.) (1990), Growth Economics, Penguin, Harmondsworth.
- Therberge, J.D. (Ed.) (1968), Economics of Trade and Development, John Wiley, New York.
- Thirwal, A.P. (1974), Inflation, Savings and Growth in Developing Economies, Macmillan, London.
- Todaro, M.P. (1971), Development Planning : Models and Methods, Oxford University Press, Oxford.

B. A. PART-III (ECONOMICS)
Semester- VI
Option(i): INDIAN ECONOMY – II

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

UNIT-I

Industry

1.1 Role of Industrialization.
1.2 Industrial Policy – 1991onwards.
1.3 New Economic Reforms – Concepts
i) Liberalization ii) Privatization, iii) Globalization .
1.4 Small and Large Scale Industry – Growth and Problems.
1.5 Growth of Knowledge Based Industry – IT, Software Consultancy.

UNIT-II

Labour

2.1. Meaning and Classification of Labour.
2.2. Characteristics of Industrial Labour.
2.3. Industrial Disputes Causes, Measures for Settlement.
2.4. Social Security Measures in India.

UNIT-III

Planning

1.4. Meaning, Concepts, Need and Objectives.
1.5. Types of Planning, Merits and Demerits.
1.6. Objectives, Achievements, and Failures of Five Year Plans.
1.7. Objectives of ongoing Five Year Plan

UNIT-IV

External Sector

4.1. Trends and Composition of India's Imports.
4.2. Trends and Direction of India's Exports
4.3. EXIM Policy of India in relation to Trade Liberalization and its Impacts
4.4. FDI, FII and MNCs in India
4.5. External Borrowings and BOP Problem in India
4.6. International Institutions (IMF, WB, ADB, WTO) and the Indian Economy.

Suggested Readings:

1. Datt, Gaurav and Mahajan, Ashwani "Dutt & Sundharam Indian Economy" S. Chand & Company (Latest Ed.).
2. Dhar, P.K. "Indian Economy – Its Growing Dimensions" Kalyani Publishers (Latest Ed.).
3. Goel, M.M. (2014): Indian Economy Long Term Challenges & Policy Measures, Monograph N.91, A Guna Gaurav Nyas Publications Think Line
4. Goel, M.M. (2012) "Economics of Human Resource Development in India" VK Global Publications
5. Government of India, Economic Survey (Annual), Ministry of Finance, New Delhi.
6. Government of India, Planning Commission; Five Year Plan Document.
7. Kapila, Uma "Indian Economy: Performance and Policies" Academic Foundation, New Delhi (Latest Edition).
8. Kapila, Uma "Indian Economy since Independence" Academic Foundation, New Delhi (Latest Edition).
9. Mishra S. K. and Puri,V. K. "Indian Economy", Himalaya Publishing House (Latest Ed.)
10. Monthly Issues of Journals "*Kurukshetra*" and "*Yojana*".

B. A. PART - III (ECONOMICS)
Semester- VI
Option(ii): PUBLIC FINANCE

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

UNIT – I

Meaning and Scope of Public Finance

1.1. Public Finance- Meaning and Scope
1.2. Public and Private Finance
1.3. Principle of Maximum Social Advantage
1.4. Public Goods
1.5. Private Goods, Mixed Goods and Merit Goods (Concept Only)

UNIT – II

Public Expenditure
2.1. Meaning and Importance
2.2. Reasons for the Growth of Public Expenditure
2.3. Wagner's Hypothesis
2.4. Peacock – Wiseman Hypothesis
2.5. Canons of Public Expenditure
2.6. Effects of Public Expenditure.

UNIT – III

Public Revenue

3.1. Sources of Public revenue
3.2. Taxes – Classification of Taxes
3.3. Canons of Taxation
3.4. Ability to Pay and Benefit Approach
3.5. Incidence and Shifting of Tax Burden
3.6. Major Taxes in India
3.7. The Concept of Goods and Service Tax (GST).

UNIT – IV

Public Debt and Budget

4.1. Meaning, Types of Public Debt
4.2. Debt Redemption.
4.3. Meaning & Types of Budget
4.4. Revenue Deficit, Fiscal Deficit, Primary Deficit
4.5. Budget Deficit
4.6. Fiscal Policy
4.7. Deficit Financing.

References

1. R.A Musgrave and PB Musgrave – Public finance – Tata Macgrail
2. Govinda Rao and Singh – Political Economy of Federalism in India- Oxford.
3. Govinda Rao – State Finances in India Issues and Challenges (Article) EPW- 03-08-2012.
4. Shankar Acharya – Thirty Years of Tax Reforms in India (Article) EPW -14-05-1995.

B.A. PART – III (ECONOMICS)
Semester –VI
Option(iii): ECONOMICS OF DEVELOPMENT-II

Time: 3 hours
Max. Marks 100
External: 64
Internal : 16
Project Report: 20

Note for Paper Setter:

1. The question paper will consist of 9 questions. The candidate is to attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any of the four units. Q.no. 1 is of 16 marks and rest of the questions are of 12 marks each.
2. Question no. 1 is compulsory and is of 16 marks. It contains 5 multiple choice questions (1 mark each),5 matching type questions (1mark each) and 3 very short answer questions (2 marks each). The question will be spread over the entire syllabus.

Note for Candidates:- Attempt 5 questions in all selecting one question each from any three units and the fourth question may be attempted from any unit. Q. No. 1 is of 16 marks and rest of the questions are of 12 marks each. Q. no. 1 is compulsory.

UNIT I

1.1. Structural Shifts with Economic Development
1.2. Relative importance of Agriculture, Industry and Services
1.3. Role of Infrastructure in Economic Development: Physical and Social Infrastructure

UNIT II

2.1. Trade and Development – Classical, Structuralist and Eclectic views.
2.2. Export Promotion and Import Substitution
2.4. Trade as an Engine of Growth
2.4. Terms of Trade and Gains from Trade.

UNIT III

1.1. Environment-Economy |Linkage
1.2. Management of Common Property Resources
1.3. Prevention, Control and Abatement of Pollution
1.4. Sustainable Development: Concept and Indicators.

UNIT IV

4.1. Development Planning : Meaning & Rationale
4.2 Types of Plans and Process of Planning
4.3. Changing Role of State

Basic Reading List

- Adelman, I. (1961), Theories of Economic Growth and Development, Stanford University Press, Stanford.
- Behrman, S. and T.N. Srinivasan (1995), Handbook of Development Economics, Vol. 1 to 3, Elsevire, Amsterdam.
- Ghatak, S. (1986), An Introduction to Development Economics, Allen and Unwin, London.
- Hayami, Y. (1997), Development Economics, Oxford University Press, New York.
- Higgins, B. (1959), Economic Development, Norton, New York.
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- Myint, Hla (1965), The Economics of Underdeveloped Countries, Preager, New York.
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- Thirlwal, A.P. (1999), (6th Edition), Growth and Development, Macmillan, London.

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- Bhagwati, J. and P. Desai (1970), India : Planning for Industrialization, Oxford University Press, London.
- Boserup, E. (1991), Population and Technological Change : A Study of Long Term Change, Chicago University Press, Chicago.
- Brahmananda, P.R. and C.N. Vakil (1956), Planning for an Expanding Economy, Vora and Co., Bombay.
- Chakravarti, S. (1982), Alternative Approaches to the Theory of Economic Growth, Oxford University Press, Delhi.
- Chakravarty, S. (1987), Development Planning : The Indian Experience, Clarendon Press, Oxford.
- Chenery, H.B. et. al. (Eds.) (1974), Redistribution with Growth, Oxford University Press, New York.
- Dasgupta, P., A.K. Sen and S. Marglin (1972), Guidelines for Project Evaluation, UNIDO, Vienna.
- Ehrlich, P., A. Ehrlich and J. Holden (1997), Economics, Population, Resources, Environment, W.H. Freeman, San Francisco.
- Government of India (2000), India 2000, Ministry of Information and Broadcasting, New Delhi.
- Hemple, Lamont C. (1998), Environmental Economics : The Global Challenge, First East West Press, Edinburgh.
- Hirsch, A.O. (1958), The Strategy of Economic Development, Yale University Press, New Haven.
- Kahkonon, S. and M. Olson (2000), A New Institutional Approach to Economic Development, Vistaar.
- Kuik, O.J. et. al (Eds.) (1997), Environment Policy, Pollution Control in the South & North :

A Comprehensive Assessment of Approach in India and Netherlands, Indo-Dutch Studies on Development Alternatives, Sage Publications, New Delhi.

- Little, I.M.D. (1982), Economic Development : Theory and International Relations, Basic Books, New York.
- Lopez, R.E. (1997), Where Development Can Go Or Can Not Go, The Role of Poverty — Environmental Linkages, Annual World Bank Conference on Development Economics, World Bank, Washington D.C.
- Maler, K.G. (1997), Environment, Poverty in Economic Growth, Annual World Bank Conference on Development Economics, World Bank, Washington D.C.
- Mehrotra, S. and J. Richard (1998), Development With a Human Face, Oxford University Press, New Delhi.
- Mishan, E.J. (1975), Cost-Benefit Analysis, (2nd Edition), Allen and Unwin, London.
- Sen, A.K. (Ed.) (1990), Growth Economics, Penguin, Harmondsworth.
- Therberge, J.D. (Ed.) (1968), Economics of Trade and Development, John Wiley, New York.
- Thirwal, A.P. (1974), Inflation, Savings and Growth in Developing Economies, Macmillan, London.
- Todaro, M.P. (1971), Development Planning : Models and Methods, Oxford University Press, Oxford.

Kurukshetra University, Kurukshetra
M. A. Economics

Proposed Credits According to CBCS in the Course Structure

w.e.f 2016-17

M.A. Economics (Semester I)						**Credits***
		Total Marks	**External**	**Internal**	**Time**	**L+T+P**
Core Papers						
Paper-101	Micro Economic Analysis-I	100	80	20	3 Hrs.	4+1+0
Paper-102	Macro Economic Analysis-I	100	80	20	3 Hrs.	4+1+0
Paper-103	Mathematics for Economists	100	80	20	3 Hrs.	4+1+0
Paper-104	Public Economics-I	100	80	20	3 Hrs.	4+1+0
Elective Papers						
Paper-105						
Option (i)	Financial Economics-I	100	80	20	3 Hrs.	4+1+0
Option (ii)	Demography-I	100	80	20	3 Hrs.	4+1+0
Option (iii)	Economics of Infrastructure-I	100	80	20	3 Hrs.	4+1+0
Option (iv)	Economics of Insurance-I	100	80	20	3 Hrs.	4+1+0
Option (v)	Economics of Labour-I	100	80	20	3 Hrs.	4+1+0
Option (vi)	Computer Applications in Economic Analysis-I	100	80	20	3 Hrs.	4+1+0
Option (vii)	Mathematical Economics-I	100	80	20	3 Hrs.	4+1+0
Option (viii)	Economics of Regionalism-I	100	80	20	3 Hrs.	4+1+0

Total Credits: 25

Note: Students are required to select any one option from Paper-105. The students will select the same optional stream in Semester II.

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

Kurukshetra University, Kurukshetra
M. A. Economics

w.e.f. 2016-2017

Course Structure

M.A. Economics (Semester II)		**Total Marks**	**External**	**Internal**	**Time**	**Credits* L+T+P**
Core Papers						
Paper-201	Micro Economic Analysis-I	100	80	20	3 Hrs.	4+1+0
Paper-202	Macro Economic Analysis-II	100	80	20	3 Hrs.	4+1+0
Paper-203	Statistics for Economists	100	80	20	3 Hrs.	4+1+0
Paper-204	Public Economics-II	100	80	20	3 Hrs.	4+1+0
Elective Papers						
Paper-205						
Option (i)	Financial Economics-II	100	80	20	3 Hrs.	4+1+0
Option (ii)	Demography-II	100	80	20	3 Hrs.	4+1+0
Option (iii)	Economics of Infrastructure-II	100	80	20	3 Hrs.	4+1+0
Option (iv)	Economics of Insurance-II	100	80	20	3Hrs.	4+1+0
Option (v)	Economics of Labour-II	100	80	20	3Hrs.	4+1+0
Option (vi)	Computer Applications in Economic Analysis-II	100	80(60+20) (60 Theory + 20 Practical)	20	3Hrs.	4+0+1
Option (vii)	Mathematical Economics-II	100	80	20	3Hrs.	4+1+0
Option (viii)	Economics of Regionalism-II	100	80	20	3Hrs.	4+1+0

Total Credits 25

Note: Students are required to select an option from Paper-205 from the same stream which they selected in Semester I.

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

Kurukshetra University, Kurukshetra
M. A. Economics

w.e.f. 2017-2018

Course Structure

M.A. Economics (Semester III)		**Total Marks**	**External**	**Internal**	**Time**	**Credits* L+T+P**
Core Papers						
Paper-306	International Trade and Finance-I	100	80	20	3 Hrs.	4+1+0
Paper-307	Economics of Environment and Social Sector-I	100	80	20	3 Hrs.	4+1+0
Paper-308	Indian Economic Policy-I	100	80	20	3 Hrs.	4+1+0
Paper-309	Economics of Growth and Development-I	100	80	20	3 Hrs.	4+1+0
Elective Papers						
Paper-310						
Option (i)	Econometrics-I	100	80	20	3 Hrs.	4+1+0
Option (ii)	History of Economic Thought-I	100	80	20	3 Hrs.	4+1+0
Option (iii)	Economics of Agriculture-I	100	80	20	3 Hrs.	4+1+0
Option (iv)	Welfare Economics-I	100	80	20	3 Hrs.	4+1+0
Option (v)	Industrial Economics-I	100	80	20	3 Hrs.	4+1+0
Option (vi)	Financial Markets and Institutions-I	100	80	20	3 Hrs.	4+1+0
Option (vii)	Economics of Gender and Development-I	100	80	20	3 Hrs.	4+1+0
Option (viii)	Economic History of ASEAN Countries, China, South Korea and Japan-I	100	80	20	3 Hrs.	4+1+0
Total Credits						**25**

Note: Students are required to select any one option from Paper-310. The students will select the same optional stream in Semester IV.

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

Kurukshetra University, Kurukshetra
M. A. Economics

w.e.f. 2017-2018

Course Structure

M.A. Economics (Semester IV)						**Credits***
		Total Marks	**External**	**Internal**	**Time**	**L+T+P**
Core Papers						
Paper-406	International Trade and Finance-II	100	80	20	3 Hrs.	4+1+0
Paper-407	Economics of Environment and Social Sector-II	100	80	20	3 Hrs.	4+1+0
Paper-408	Indian Economic Policy-II	100	80	20	3 Hrs.	4+1+0
Paper-409	Economics of Growth and Development-II	100	80	20	3 Hrs.	4+1+0
Elective Papers						
Paper-410						
Option (i)	Econometrics-II	100	80	20	3 Hrs.	4+1+0
Option (ii)	History of Economic Thought-II	100	80	20	3 Hrs.	4+1+0
Option (iii)	Economics of Agriculture-II	100	80	20	3 Hrs.	4+1+0
Option (iv)	Welfare Economics-II	100	80	20	3 Hrs.	4+1+0
Option (v)	Industrial Economics-II	100	80	20	3 Hrs.	4+1+0
Option (vi)	Financial Markets and Institutions-II	100	80	20	3 Hrs.	4+1+0
Option (vii)	Economics of Gender and Development-II	100	80	20	3 Hrs.	4+1+0
Option (viii)	Economic History of ASEAN Countries, China, South Korea and Japan-II	100	80	20	3 Hrs.	4+1+0

Total Credits **25**

Note: Students are required to select an option from Paper-410 from the same stream which they selected in Semester III.

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

M.A. 1st Semester
Paper- 101(Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MICRO ECONOMIC ANALYSIS-I

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit-I

Theory of Demand and Consumer Behaviour: Indifference curve approach; Price, Income and Substitution effects (Hicks and Slutsky); Revealed preference theory; Applications of Indifference Curve Analysis; The Consumer's surplus (Marshall and Hicks).Elasticity (Price, cross, income) of demand and Supply and their applications; Revision of Demand theory by Hicks; Linear expenditure system; Indirect utility function.

Unit-II

Production function (properties of Cobb Douglas, CES, Translog); Laws of production(variable proportions and returns to scale with the help of isoquants); Technical Progress and production function; Equilibrium of the firm-single and multi-product firm; Derivation of cost function from production function (using Cobb-Douglas function); Theories of costs – traditional and modern; Analysis of economies of scale.

Unit-III

Perfect competition – Short and long term equilibrium of the firm and industry; Dynamic changes and industry equilibrium.

Monopoly – short run and long run equilibrium; Price discrimination; Monopolistic competition - Chamberlin's approach to equilibrium of the firm.

Unit-IV

Oligopoly – non-collusive models- Cournot, Bertrand, Chamberlin, Kinked-demand curve and Stackleberg solution. Collusive models- Market sharing cartels; Price leadership models.

Basic Reading List

- Koutsoyiannis, A. (1979), Modern Microeconomics, (2nd Edition), Macmillan Press, London.
- Salvatore D(2006), Microeconomics-Theory and Applications, Oxford University Press
- Varian, H. (2003), Intermediate Microeconomics, East-West Press.

Additional Reading List

- Archibald, G.C. (Ed.) (1971), Theory of the Firm, Penguin, Harmondsworth.
- Baumol, W.J. (1982), Economic Theory and Operations Analysis, Prentice Hall of India, New Delhi.
- Boyes.W and Melvin. M , Micro economics, Houghton Mifflin Company Boston Newyork.
- Collel A.,Whinston and Green (2012), MicroEconomic Theory, Oxford University Press.
- Da Costa, G. C. (1980), Production, Prices and Distribution, Tata McGraw Hill, New Delhi.
- Goodwin, Nelson,Ackerman and WeissKopf(2009), Micro Economics in context, PHI Learning Private Limited.
- Gravelle,H.and Rees,R.(2008), Micro Economics, Dorling Kindersley.
- Green H.A.G. (1971), Consumer Theory, Penguin, Harmondsworth.
- Gupta K.R.(2009), Advanced MicroEconomics, Atlantic Publishers and Distributors LTD
- Healthfields and Wibe (1987), An Introduction to Cost and Production Functions, Macmillan, London.
- Henderson, J.M. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.
- Hirshleifer, J. and A. Glazer (1997), Price Theory and Applications, Prentice Hall of India, New Delhi.
- Jehle Geoffrey A.and Reny Philip J (2008), Advanced Micro Economic Theory, Dorling Kindersley (India)
- Kreps, David M. (1990), A Course in Microeconomic Theory, Princeton University Press, Princeton.
- Layard, P.R.G. and A.W. Walters (1978), Microeconomic Theory, McGraw Hill, New York.
- Lipsey and Chrystal(2014), Economics, Oxford University Press
- Mankiw(2006),Principles of Microeconomics,Cengage Learning
- Mansfield Edwin, Applied MicroEconomics, W.W.Norton ,New York London.
- Sen, A. (1999), Microeconomics: Theory and Applications, Oxford University Press, New Delhi.
- Sen,A.(2007), Micro Economics: Theory and applications. Oxford University Press.
- Varian, H. (2000), Microeconomic Analysis, W.W. Norton, New York.

M.A. 1st Semester
Paper-102 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MACRO ECONOMIC ANALYSIS-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Macroeconomics analyses and establishes the functional relationships between large aggregates. The aggregate analysis has assumed such a great significance in recent times that a prior understanding of macroeconomics theoretical structure is considered essential for the proper comprehension of the different issues and policies. Macroeconomics now is not only a scientific method of analysis; but also a body of empirical economic knowledge. The paper equips the students at the postgraduate level to understand systematic facts and latest theoretical developments for empirical analysis at economy level.

Unit-I

National Income and Accounts

National income accounting – social accounting, input-output accounting, flow of funds accounting; Balance of payments accounting; Classical and Keynesian Models of income determination.

Consumption function

Keynes' Psychological law of consumption – implications of the law; Empirical evidence on consumption function; Reconciliation of short run and long run consumption function – absolute income, relative income, permanent income and life cycle hypotheses.

Unit-II

Investment Theories

Investment Function; The Marginal Efficiency of Capital Approach; Accelerator- Simple & Flexible; Profits Theory; Financial Theory; The Neoclassical Model.

Unit-III

Demand for Money

Classical and Keynesian approach (The Regressive Expectations model); Post Keynesian approaches to demand for money-Tobin (Portfolio balance approach), Baumol (Inventory theoretic approaches) and Friedman (Restatement of quantity theory of money).Patinkin's real balance effect.

Unit-IV

Supply of Money

Measures of money supply; RBI's approach to money supply; Mechanism of Monetary expansion and contraction (deterministic and behavioural models); Determinants of money supply; Instruments of Monetary control.

Neo-classical and Keynesian Synthesis

The Basic IS-LM model, extension of IS-LM model with government sector, labour market and variable price level.

Basic Reading List

- Ackley, G. (1978), Macroeconomics: Theory and Policy, Macmillan, New York.
- Blackhouse, R. and A. Salansi (Eds.) (2000), Macroeconomics and the Real World (2 Vols.), Oxford University Press, London.
- Branson, W.A. (1989), Macroeconomic Theory and Policy, (3rd Edition), Harper and Row, New York.
- Dornbusch, R. and F. Stanley (1999), Macroeconomics, Irwrin McGraw Hill, Inc. New York, 7th Edition.
- Heijdra, B.J. and V.P. Fredericck (2001), Foundations of Modern Macroeconomics, Oxford University Press, New Delhi.
- Jha, R. (1991), Contemporary Macroeconomic Theory and Policy, Wiley Eastern Ltd., New Delhi.
- Romer, D.L. (1996), Advanced Macroeconomics, McGraw Hill Company Ltd., New York.
- Shapiro, E. (1996), Macroeconomic Analysis, Galgotia Publications, New Delhi.

Additional Reading List

- Mankiw, N.G. and D. Romer (Eds.) (1991), New Keynesian Economics, (2Vols.), MIT Press, Cambridge.
- Mankiw, N. Greogory (2000), Macroeconomics Macmillan Worth Publishers 4th Edition
- Frisch, H. (1983), Theories of Inflation, Cambridge University Press, Cambridge.
- Sheffirin, S.M. (1996), Rational Expectations, Cambridge University Press, Cambridge.
- Lucas, R. (1981), Studies in Business Cycle Theory, MIT Press, Cambridge, Masscechusetts.
- Taylor, L. (1983), Structuralist Macroeconomics, Basic Books, New Longman.
- Turnovsky, S.J. (1977), Macroeconomic Analysis and Stabilization Policy, Cambridge University Press, Cambridge.
- Ruggles R. and N. Ruggles (1956), National Income Accounts and Income Analysis Mc Graw Hill, Newyork.
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  John Wiley and Inc, USA.
- Dernburg, T.F.and D. M.Mc Dougall, Macroeconomics, McGraw Hill International Book Company.

M.A. 1st Semester
Paper-103 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MATHEMATICS FOR ECONOMISTS

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The main objective of this paper is to train the students to use the techniques of mathematical and statistical analysis, which are commonly applied to understand and analyze economic problems. The emphasis of this paper is on understanding economic concepts with the help of mathematical methods rather than learning mathematics itself. Hence in this paper a student will be initiated into various economic concepts, which are amenable to mathematical treatment. The paper also deals with simple tools and techniques, which will help a student in data collection, presentation, analysis and drawing inferences about various statistical hypotheses.

Unit-I

Concept of Matrix and Determinant – their types, simple operations on matrices, matrix inversion and rank of matrix; Solution of simultaneous equations through Cramer's rule and Matrix inverse method. Introduction to input-output analysis.

Unit - II

Rules of differentiation; Elasticity and their types; Rules of Partial differentiation and interpretation of partial derivatives; Problems of maxima and minima in single and multivariable functions; Unconstrained and constrained optimization in simple economic problems.

Unit - III

Concept and simple rules of integration; Application to consumer's and producer's surplus. Difference equations – Solution of first order and second order difference equations; Applications in trade cycle models; Growth models and lagged market equilibrium models.

Unit - IV

Linear programming – Basic concept, Nature of feasible, basic and optimal solution; Solution of linear programming problem through graphical and simplex method.

Concept of a game; Two-person Zero-sum game; value of a game; strategies- simple and mixed; Dominance rule; Solution of a game by linear programming.

Basic Reading List

- Mathematics for Economics by Michael Hoy etal, PHI, New Delhi, 2004.
- Quantitative Methods for Business and Economics by Adil H. Mouhammed, PHI, New Delhi, 2003.
- Quantitative Methods by D.R. Aggarwal
- Basic Mathematics for Economists by R.C. Joshi, New Academic Publishing
- Leontief, W. (1936) Quantitative input-output relations in the economic systems of the United States. Review of Economics and Statistics, Vol 18, pp.105-125.
- Miller, R.E. and P.D. Blair (1985) Input-Output Analysis: Foundations and Extensions. Prentice-Hall, Englewood Cliffs, New Jersey.
- Proops, J., Faber, M. and Wagenhals, G. (1993) Reducing CO2 Emissions: A Comparative Input-Output Study for Germany and the UK, Springer-Verlag, Heidelberg.
- Aggarwal, H.S. : Modren Micro -Economics, Konark, New Delhi, 1998.
- Taro Yamane, Mathematics for Economists, PHI, 1973.
- Quantitative Techniques in Management by N.D. Vohra, TMH.
- Operations Research by R. Wagnor
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- Black, J. and J.F. Bradley (1973), Essential Mathematics for Economists, John Wiley and Sons.
- Chiang, A.C. (1986), Fundamental Methods of Mathematical Economics (3rd Edition), McGraw Hill, New Delhi.

M.A. 1st Semester
Paper-104 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

PUBLIC ECONOMICS –I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.
(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).
(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE
Role and functions of the Government in an economy have been changing with the passage of time. The term 'Public Finance' has traditionally been applied to the package of those policies and operations which involve the use of tax and expenditure measures while budgetary policy is an important part to understand the basic problems of use of resources, distribution of income, etc.

Unit - I

Economic Rationale of Mixed Economy; The Efficient Markets; Natural Monopolies and Market Failure; Non-Existence of Futures Markets and Market Failure; Asymmetric Information and market Failure; The Problem of Externalities and their Internalisation; The Coase Theorem; Rent Seeking Costs and Political process.

Unit - II

Concept, Characteristics, Types and Efficient Provision of Public Goods; Private provision of Pure Public Goods; Bowen Model, Samuelson Model; Wagner Hypothesis, Thompson Mechanism, Clarke Mechanism, Lindahl- Wicksell Mechanism; Theory of Club Goods.

Unit - III

Efficiency and Equity Principles of Taxation; Incentive Effects of Taxation on Labour Supply; Supply of Savings and Risk Taking; Taxation and Investment; Other Distorting Effects of the Tax System; Tax Incidence – Partial and General equilibrium Analysis; Mieszkowski Analysis of Tax Incidence; Keynesian Short Run Model of Tax Incidence; Dynamic Tax Incidence.

Unit - IV

Normative Analysis of Taxation – Income v/s Excise Tax; Optimal Commodity Tax- The Ramsey Rule, The Corlett and Hague Rule; Optimal Income Tax; Excess Burden of Tax and its Measurement; Normative Principles for Redistribution; Corporation tax and its Effects on Corporate Decisions; Tax Evasion and the Black Economy

Base Text Book

Boadway, Robin, "Public Sector Economics", Cambridge, Winthrop Publishers

Basic Reading List

- Bruce, Neil, "Public Finance", Addison- Wesley Educational Publishers, Inc.
- Jones. Philip and Cullis, Jones, "Public Finance and Public Choice- Analytical Perspectives", Oxford University press
- Stiglitz, Joseph, "Economics of the Public Sector", W.W.Norton and Company, new York/London
- Rosen, H.S., "Public finance", Tata McGraw Hill
- McNutt, P.A., "The economics of Public Choice", Edward Elgar Publishing Inc.
- Mueller, D.C., "Public Choice- I,II,III" Cambridge university Press, Cambridge
- Downs, A., "An Economic Theory of Democracy", Harper and Row, New York
- Musgrave R.A and Peacock A.T., " Classics in the Theory of Public Finance", Mcmillan

M.A. 1st Semester
Paper- 105 (Option-I)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

FINANCIAL ECONOMICS-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.
(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).
(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Financial economics is the branch of economics studying the interrelation of financial variables, such as prices, interest rates and shares, as opposed to those concerning the real economy. Financial economics concentrates on influences of real economic variables on financial ones, in contrast to pure finance. Financial economics is primarily concerned with building models to derive testable or policy implications from acceptable assumptions. The theory component centers on decision making under uncertainty in the context of the financial markets, and the resultant economic and financial models. The application of the economic principles include the valuation and determination of the fair value of an asset; the riskiness of the asset, generation of cash flows and their discounting; relative valuations; derivatives and other financial instruments. The aim here is twofold: firstly, to complement the theory; secondly, providing students with practical market knowledge.

Unit-I

Nature and Scope of Financial Economics; Goals of Finance; Economics of capital Budgeting- Investment Criteria, Estimation of project Cash Flows, Risk Analysis in Capital Budgeting, Computation of Cost of Capital.

Unit-II

Economics of Capital Structure and Firm Value- Net Income Approach, Net Operating income Approach, Modigliani and Miller Approach; Analysis of Optimal Capital structure – EBIT & EPS Analysis, ROI & ROE Analysis, Operating and Financial Leverage; Ratio Analysis.

Unit-III

Economics of Dividends- Walter Model, Gordon Model, Modigliani and Miller Model; Economics of Working Capital- Estimation of Working Capital, Financing of working Capital. Cost-Volume-Profit Analysis.

Unit-IV

Economics of Cash – Cash Budgeting and its Simulation, Optimal Cash balance, Baumol Model, Miller and Orr Model; Economics of Receivables; Economics of Inventory – EOQ Model, Pricing of Raw materials, Monitoring and Control of Inventories.

Reading List

- A.C.Shapiro, **"Modern Corporate Finance"**, Macmillan Publishing Co., New York,1991
- Brealey, Myers and Allen, **"Principles of Corporate Finance"**, McGraw Hill, Inc., New York, 8th Edition.
- D.R.Mehta, **"Working Capital Management"**, Prentice Hall Inc., Englewood Cliffs, N.J.,1974
- Deryl Northcott, **"Capital Investment Decision-Making",**Thomson Learning, 1992. ISBN10: 1861524587
- E.I.Altman and M.G.Subrahmanyam (ed.), **"Recent Advances in Corporate Finance"**, Richard D.Irwin, Inc., Homewood, Ill., 1985
- H.Bierman,Jr. and S. Smidt, **"The Capital Budgeting Decision"**, The Macmillan Company, New York, 1988.
- J. Harold Mulherin, **"Mergers and Corporate Governance",** Edward Elgar Publishing, 2004. ISBN10: 1843764210
- J.A.Brittain, **"Corporate Dividend Policy"**, Brookings Institution, Washington D.C., 1966
- J.C.Van Horne, **"Financial Management and Policy"**, Prentice hall, New Delhi, 1995
- Jean Tirole, **"The Theory of Corporate Finance",** Princeton University Press, 2006. ISBN10: 0691125562
- Joel M. Stern, **"Revolution in Corporate Finance",** Blackwell Publishing, 1997. ISBN10: 1577180445
- Prasana Chandra, **"Financial Management"**, Tata McGraw-Hill Publishing Company Limited, New Delhi

M.A. 1st Semester
Paper-105 (Option-II)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

DEMOGRAPHY-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The main objective of this paper is to make the students aware of the importance of population in economic development and the various theories that explain the growth of population in a country. The paper also enlightens the student on the quantitative and the qualitative aspects and characteristics of the population through various demographic techniques. In recent times, gender characteristics of the population have acquired importance and these have also been included in the framework of study of population policy.

Unit - I

Population and Development: Meaning and scope of demography, components of population growth and their interdependence; Sources of population data; Theories of population –Malthus, Optimum theory of population; Theories of demographic transition; Models of Meadows, Enke, Becker and Easterlin; Population and Development.

Unit -II

Structure of Population: Population trends since the twentieth century; International aspects of population growth and distribution; Age and Sex structure in more developed and less developed countries; determinants of age and sex structure; Population pyramids- individual aging and population aging; Population projection

Unit - III

Fertility: Importance of the study of fertility-Total fertility rate, Gross reproduction rate and Net reproduction rate. Levels and trends in developed and developing countries; Factors affecting fertility.

Nuptiality: Concept and analysis of marital status; Trends in age at marriage, widowhood and divorce.

Unit - IV

Mortality: Levels and trends in mortality in developed and developing countries; Mortality differences by age & sex, residence, occupation etc. ; Foetal and Infant mortality; Factors leading to decline in mortality in recent past; Life Tables:- construction and uses.

Basic Reading List

- Agarwal S.N. (1972), India,s Population Problem, Tata McGraw- Hill Co., Bombay.
- Bose, A. (1996), India's Basic Demographic Statistics, B.R. Publishing Corporation, New Delhi.
- Bogue, D.J. (1971), Principle of Demography, John Wiley, New York.
- Chenery H. and T.N. Srinivasan (Eds.)(1989), Hand Book of Development Economics, Vol. 1 & 2 Elsevier, Amsterdam.
- Choubey, P.K. (2000), Population Policy in India, Kanishka Publications, New Delhi.
- Coals, A.J. and E.M. Hoover (1958), Population Growth and Economic Development in Low income Countries: A Case Study of India's Prospectus, Princeton University Press, Princeton.
- Gulati, S.C (1988), Fertility in India: An Econometric Study of a Metropolis, Sage, New Delhi.

Additional Reading List

- Agnihotri, S. B. (2000), Sex ration in Indian Population: A fresh Exploration, Sage New Delhi.
- Amsden, A. H. (Ed.) (1992), Form of Production and Women's Labour, Gender Aspects of Industrialization in India and Mexico, Sage, New Delhi.
- Boserup,E. (1970), Women's role in Economics Development, George Allen and Unwin, London.
- Chiang, C.L. (1974), Life Tables and Mortailty Analysis, W.H.O., Geneva.
- Gupta, Jj.A. (2000), New Reproductive Technogies, Women's Health and Autonomy, Indo Dutch Studies on Development Alternatives, Sage, New Delhi.
- Jhabwala,R. and R.K. Subramanya (2000) (Eds.), The Unorganized Sector: Work Security and Social Protection, sage, New Delhi.
- Krshnaji M., R.M. Sudarshan and A. Shariff (1999), Gender Population and development, Oxford University Press, New Delhi.
- King M. and M.A. Hill (Eds.)(1993), Women's Education in Developing Countries: Barriers, Benefits and Politics, John Hopkins, Baltimore.
- Lewis (Ed.)(1989), Strengthening the poor: What Have We Learnt, OECD, Paris.
- Mishra S. (2000), Voluntary Action in Health and Population: The Dynamics of Social Transition, Sage, New Delhi.
- Mitra, A. (1979), Implications of Declining Sex Ration in India's Population, Allied, New Delhi.
- Novell, C. (1988), Methods and Models in Demography, Belhaven Press, London.
- Seth M. (2000), Women and Development: The Indian Experience, Sage, and New Delhi.
- Simon, J.L. (1992), Population and Development in Poor Countries, Princeton University Press.
- Srinivasan, K. (1998), Basic Demographic Techniques and Applications, Sage, New Delhi.
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- Sryrock, H. et.al. (1973), The Methods and Materials of Demography, US Department of Commerce,Washington,D.C.
- Sudarshan and A. Shariff (1999), Gender Population and Development, Oxford University Press, New Delhi.
- United Nations (1973), The determinants and consequences of Population Trends, Vol. 1 UNO Publications, New York.

M.A. 1st Semester
Paper- 105 (Option-III)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF INFRASTRUCTURE-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The important role infrastructure plays in a country's development need not be reiterated. In case of developing countries, lack of adequate infrastructure has been held as a major obstacle to growth. The main purpose of this paper is to introduce a course on infrastructure, as it would help the students to understand the strength of infrastructure - physical and social in the process of economic development.

Unit - I

Infrastructure – Physical & Social Infrastructure; Infrastructure as a public good; the peak load, off - load problem; Role of infrastructure in economic development; Issues & policies in financing of infrastructure; Theory of natural monopoly.

Unit-II

Economic analysis of transport: Transport as an economic activity, cost of transport, pricing of transport services, law of diminishing returns and economies of scale, transport policy and development in a changing environment, assessment of present and proposed transport policy and legislation, environment cost of transport, transport regulation.

Unit-III

Rail transport**:** Analysis of the market, legal requirements and policy, railway characteristics and ownership, containerization, regional rail cooperation, international railway trends, railway pricing, pipelines. Air transport **:**Development of the Indian air transport industry, overview of current air transport policies, the roles and responsibilities of national and international control bodies, cost and pricing of air transport services, airline management and control .Airport planning and management.

Unit-IV

Concept, scope and relevance of Human Resource Development (HRD); Domain of HRD; Educational infrastructure and Economic Growth; Approaches to Educational Planning- Social Demand, Rate of Return and Manpower Balance Approaches; The case for Universal, Free, Primary Education; The issues & challenges in Indian higher education.

Basic Reading List

- O' Sullivan, A. (2003) : Urban economics, Boston, MA, Irwin McGraw-Hill
- Timothy J. B. et al (1987) :Saturn and state economic development, forum for applied research and public policy, 2 (1), 29- 40
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- Mieszkowski, P., and Mills, E.S. (1993): The causes of metropolitan suburbanization, Journal of economic perspectives, 7(1), 135-147.
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- Peter G. and Richardson H. (1989): Notes from the underground: the failure of urban mass transit, The public interest, 94, 77-86
- Timothy J. B. (1994): Jobs, productivity, and local economic development: what implications does economic research have for the role of government? national tax Journal , 47(4), 847- 862.

- Andrew C. K. (1993) :Why regions grow: a review of research on the economic base model, Federal Reserve Bank of Atlanta economic review, 16-29.
- Porter M.E. (1998): Clusters and the new economic competition, Harvard business review, 76 (6), 77-90.
- Peiser R.B. (1989): Density and urban sprawl, Land economics , 65(3), 193-204.
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- Button K.J.(1993) :Transport Economics, UK, Edward Elgar
- Singh S. K. (2000): Technical characteristics and efficiency of the Indian state road transport undertakings?, Indian journal of transport management, 24(8): 533-543.
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- Button, K.J. and Pearman A. (1985) : Applied transport economics: a practical case study approach, London, Gordon and Breach
- Button K.J. (1976) :The use of economics in urban travel demand modeling, a survey, socioeconomic planning sciences, 10(2) : 57- Crew M.A. and Kleindorfer P.R. (1979) : Public utility economics, London, Macmillan
- Mody A.(1997): Infrastructure strategies in east Asia**,** the untold story, Washington, D.C: economic development institute, world bank
- Goodman J.B. and Loveman G.W. (1991): Does privatization serve the public interest, Harvard business review, 69(6): 26-38
- Sherman R. (1983): is public utility regulation beyond hope? in A.L.Danielsen and D.R.Kamarschen (ed.), current issues in public utility economics, Lexington, MA.
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- Chaudhuri M.D. (1990): Market failure and government failure, Journal of Economic Perspectives, 4(3), 25-39
- National Council of Applied Economic Research (1996): India infrastructure report: policy implications for growth and welfare, New Delhi , NCAER
- Navarro, P. (1996): Electric utilities, the argument for radical deregulation**,** Harvardbusiness review, 73(1): 112-25
- Parikh, K.S. (Ed.) (1999): India development report - 1999-2000, New Delhi: Oxford
- Athreya M.B. (1996): India's telecommunication policy, telecommunication policy, 20(1): 11-22
- Sinha N. (1996): The political economy of India's telecom reforms, telecommunication policy, 20(1) : 23-38
- Anandalingam G. (1996) :Technological progress, industry dynamics and telecommunications policy: the need for further reforms in India, working paper No.83, IIM, Bangalore,.
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- Heal, G. (1993):The optimal use of exhaustible resources, ch 18 in handbook of natural resource and energy economics. Vol. 3. Edited by A. Kneese and J. Sweeney. San Diego, CA: Elsevier Science Publishers.

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- Considine, T. (2006): Is the strategic petroleum reserve our ace in the hole?" the energyjournal 27, no. 3: 91-112.
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- Cuddington, J., and Z. Wang. (2006): Assessing the degree of spot market integration for u.s. natural gas, evidence from daily price data., journal of regulatory economics 29: 195-210
- Borenstein, S. (2005): The long run efficiency of real-time electricity pricing, the energy journal 26, no. 3: 93-116.
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- Nordhaus, W. (2006): After Kyoto alternative mechanisms to control global warming American economics association papers and proceedings 96, no. 2: 31-34.
- Massachusetts institute of technology, (2003):The future of nuclear power,an interdisciplinary MIT study
- Hassett, K. and G. Metcal , (1993):Energy conservation investment, do consumers discount the future correctly? Energy policy (June): 710-716.
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- Palmer, K., and D. Bullaw., (2005):Cost-effectiveness of renewable electricity policies, energy economics 27: 873-894.
- McDonlad, S., S. Robinson, and K. Thierfelder.(2006:)Impact of switching production to bioenergy crops, the switchgrass example, energy economics 28: 243-265.

M.A. 1st Semester
Paper- 105 (Option-IV)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF INSURANCE-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The vital role of insurance in the task of risk-bearing and risk-elimination in the economic affairs has not been appreciated adequately in our country. Given that the element of risk or uncertainty is a universal and fundamental phenomenon in our economic life, the importance of insurance as a means of reducing uncertainty and risk in regard to personal and business activities cannot be overemphasized. The role of insurance sector in mobilizing a country's saving for channelling them into capital formation and thus contribute to a country's economic development is also documented. There is a wide spread recognition that insurance, particularly life insurance, is a prominent segment of applied economics. Insurance industry is an important constituent of financial services industry in India and is a major investment institution and prominent player in the capital market. However, in our country, study of the subject of insurance has largely remained neglected. With the opening of the insurance sector for private Indians and foreign players, the interest in the subject has been kindled. This course on Insurance Economics attempts to give a fairly comprehensive view of the subject to the postgraduate students in Economics and pave the way for possible future expansion of the teaching of an important branch of economics.

Unit-I

Insurance- Meaning, scope and limitations; Role and significance of insurance; Basic principles of insurance; insurance as a social security tool; Risk pooling and risk transfer, Social Vs private insurance; Double insurance and Re-insurance.

Unit-II

Fundamentals of life & health insurance; Functions of life & health insurance; Mathematical basis of life insurance; Plans of life insurance; Legal aspects of life insurance; Provisions of policies; Individual health insurance; Uses and types of evaluation; Principles of underwriting of life & health insurance; Group insurance and superannuation (pension) schemes.

Unit-III

Fundamentals of uncertainty & risk; Pure risk & speculative risk; Expected utility and decision-making under uncertainty; Expected utility & demand for the insurance; Moral hazard and insurance demand; Essentials of risk management; Elements of risk assessment; Risk control & risk financing. Worldwide risk sharing-concept of reinsurance, types of re-insurers; Reinsurance distribution systems; reinsurance markets in developing countries.

Unit-IV

Definition, types and importance of general insurance; Concept of short term risk; Basics of the following concepts - Common law, equity, proposal/accidence, indemnity, insurable interest, contribution subrogation; representation; utmost good faith, material fact, physical hazard, moral hazard, policy endorsements conditions/warranties; selection and inspection of risks; rating and calculation of premiums; tariffs and non-tariffs; technology development and general insurance.

Basic Reading List

- Black. K. Jr. and H.D. Skipper Jr.(2000), Life & Health Insurance, Prentice Hall, Upper Saddle River, New Jerssey.
- Dionne, G. and S.E. Harrington (eds.) (1997), Foundations of Insurance Economics, Kluwer academic Publishers, Boston.
- Pteffer, I. And D.R. Klock (1974), Perspectives on Insurance, Prentice Hall Inc., Engleword Cliffs.
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- Skipper Jr., H.D.(ed.) (1998), International Risk & Insurance : An Environmental Managerial Approach, Irwin McGraw Hill, Boston.
- United Nations Conference on Trade and Development (1987), The Promotion of Risk Management in Developing Countries, UNCTAD, Geneva.
- Insurance Institute of India, Life Assurance Underwriting, (IC-22), Mumbai.
- Insurance Institute of India, General Insurance Underwriting, (IC-22), Mumbai.
- Government of India (1998), Old Age and Income Security (OASIS) Report (Dave Committee Report), New Delhi.
- Ivers, J.I. III and E.T. Johnson (eds) (1991), Readings in Wealth Accumulation Planning, The American College, Bryn Mawr, Pa.
- Insurance Regulation and Development Authority (2001), IRDA Regulations, New Delhi.
- Meier. K.J. (1998), The Political Economy of Regulation : The Case of Insurance, The State University of New York Press, Albany, N.Y.

M.A. 1st Semester
Paper- 105 (Option-V)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF LABOUR-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Issues pertaining to the labour market, wage theories, employment policies, trade unions and collective bargaining in the globalized economy have become vitally important for developing countries. In a country like India where the bulk of the labour force is in the unorganized sector and the organized sector is witnessing "jobless" growth, the importance of issues such as employment and unemployment as well as livelihood and social security for the growing millions continues to assume significance. This Paper exposes students to theoretical as well as empirical issues relating to the labour market with special reference to India.

Unit-I

Nature and characteristics of labour markets in developing countries like India; Paradigms of labour market analysis – Classical and neo-classical; Demand for labour in relation to size and pattern of investment.

Unit-II

Supply of labour in relation to growth of labour force; Labour market policies; Mobility and productivity of labour; Rationalization; Methods of recruitment and placement; Employment service organization in India; Poverty and unemployment in developing countries; Unemployment – Concept, Types, and Measurement; particularly in India.

Unit-III

Impact of rationalization, technological change and modernization on employment in organized private industry; Public sector and employment in agricultural sector; Employment policy under Five Year Plans and its evaluation.

Unit-IV

Classical, neo-classical and bargaining theories of wage determination; Concepts of minimum wage, living wage and fair wage in theory and practice; Wage determination in various sectors – rural, urban, organized, unorganized and in informal sectors.

Basic Reading List

- Hajela, P.D. (1998), Labour Restructuring in India: A Critique of the New Economic Policies, Commonwealth Publisher, New Delhi.
- Lester, R.A. (1964), Economics of Labour, (2nd Edition), Macmillan, New York.
- McConnell, C.R. and S.L. Brue (1986), Contemporary Labour Economics, McGraw-Hill, New York.
- Papola, T.S., P.P. Ghosh and A.N. Sharma (Eds.) (1993), Labour, employment and industrial Relations in India, B.R. Publishing Corporation, New Delhi.
- Venkata Ratnam, C.S. (2001), Globalization and Labour-Management Relations: Dynamics of Change, Sage Publications/Response Books, New Delhi.

Additional Reading List

- McCormickm B. and Smith (Eds.)(1968), The Labour Market, Penguin, Harmondsworth.
- Das, N. (1960), Unemployment, Full Employment and India, Asia Publishing House, Bombay.
- Deshpande L.K. and J.C. Sandesara, (Eds.)(1970), Wage Policy and Wages Determination in India, Bombay University Press, Bombay.
- Hicks J.R. (1932), The Theory of Wages, Clarendon Press, Oxford.
- Mazumdar, D. (1989), Micro-economic Issues of Labour Markets in Developing Countries, EDI Services Paper No. 40, World Bank, Washington D.C.
- Memoria, C.B. (1966), Labour Problems and Social Welfare in India, Kitab Mahal, Allahbad.
- Punekar, S.D. (1978), Labour Welfare, Trade Unionism and Industrial Relations, Himalaya Publishing House, Bombay
- Singh V.B. (Ed.) (1970), Industrial Labour in India, Popular Parakashan, Bombay.
- Misra, L. (2000), Child Labour in India, Oxford University Press, New Delhi.
- Riveros, L. (1990), Labour Market Policies and Labour Market Reforms in Socialist Economies, World Bank, Washington D.C.

M.A. 1st Semester
Paper- 105 (Option-VI)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

COMPUTER APPLICATIONS IN ECONOMIC ANALYSIS-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The direction towards the knowledge society shall be resting on a healthy economics and proper use of Information Technology. Economics being an empirical science, computers have emerged as the pivotal instruments of economic analysis, research and forecasting. Therefore, the future economists must be equipped with skills and tools based on computers, which this course shall provide to them. This will not only enhance their employability but also prepare them for the challenges of the future.

Unit-I

Introduction to Computer Fundamentals: History and Evolution of Computers; Components of a Personal Computer System; Classification of Computers and their applications; System – Meaning and Concept; Hardware, Software and Types of Software; Operating System- Meaning and Functions; Types of memory; Input-Output Devices. Computer Languages - Machine, Assembly and High-Level Languages;

Unit-II

Data and Information: Meaning, Types, Data Storage Hierarchy; Data base Concepts; Data base Management System, Data Base Structuring Techniques, Table, Form, Query Report; Advantages and Limitations of Database System; Information Technology in Business : Internet, Intranet, Extranet, LAN, MAN, WAN, WWW, E-Mail, Search Engines, EDI and ATM. Social Media.

Unit-III

Application Softwares: Windows based operating system; Word Processing – Document Management and Formatting; Main Features of MS Access and Presentation software.

Unit-IV

Problem Solving with Spreadsheets; Spreadsheet as DBMS; Arithmetic & Geometric Progressions; Solution of Simultaneous Equation with Matrices; Mathematical, Statistical & Financial Functions; Graphical Analysis in Economics; Time-path of economic variables.

Basic Reading List

- Sinha, P.K. , Computer Fundamental, BPB Publications, New Delhi.
- Rajaraman, V. Fundamentals of Computers, Prentice Hall of India, New Delhi.
- Parameswaranm R. Computer Applications in Business, S. Chand and Company, New Delhi.
- Sudalaimuthu, S. and Anthony Raj S, Computer Applications in Business, Himalays Publishing House, New Delhi.
- Goel, Sushil, Computer Application to Business & E-Commerce, Natraj Publishing House, Karanl.
- Madan, Sushila, Information Technology, Taxman Allied Services, New Delhi.
- P.T. Joseph, S.J. , E- Commerce : An Indian Perspective, PHI Learning , New Delhi.
- Lipschultz, M.M. and S. Lipschultz , Theory and Problems of Data Processing, Schaum's Outline Series, McGraw Hill, New York.
- David Whiteley, E-Commerce: Strategy, Technologies and Applications, Tata McGraw Hill, New Delhi.

M.A. 1st Semester
Paper-105 (Option – VII)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MATHEMATICAL ECONOMICS-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

This course is designed to equip students to understand the economic concepts and theories which use mathematical tools and techniques to refine the verbal logic. The use of calculus has permitted formulation of economic problems in multivariable mode and yield valuable insight about optimizing human behaviour. Modern algebraic tools allow convenient handling of simultaneous equations in the context of linear programming, game theory and input-output analysis. Mathematical economics deals with various applications of mathematical tools and techniques in defining and developing economic relationships. This course has been accordingly designed to include various mathematical techniques/methods/models related to the different parts of economic theory like consumer theory, theory of production, pricing, trade cycles, growth models, etc. The paper covers important aspects of microeconomics, macroeconomics and development theory and the various modules have been accordingly designed.

Unit- I

Types of utility functions; Ordinal utility maximization; Demand functions- ordinary and compensated; Slutsky equation- income, substitution, and price effects; Consumer surplus; Elasticity of demand; Linear expenditure systems; Indirect utility function.

Unit - II

Production functions and their properties (CD, CES, Translog); Elasticity of factor substitution and curvature of iso-quants; Producers equilibrium; Duality in cost and production functions; Growth Accounting Equation; Methods for measuring productivity and efficiency.

Unit- III

Product and factor market equilibrium; Existence, uniqueness and stability of equilibrium; Static stability, dynamic stability-lagged adjustment, dynamic stability-continuous adjustment; Dynamic equilibrium with lagged adjustment; monopoly, monopsony and monopolistic competition.

Unit -IV

Duopoly, oligopoly and bi-lateral monopoly; Cournot, Stackleberg's models; Joint profit maximization; Price leadership model; Baumol, Willamsons, Marris models of firm;

Basic Reading List

- Henderson, J. M. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.
- Koutsoyiannis, A. (1979), Modern Microeconomics, (2nd Edition), Macmillan Press, London.
- Allen, R.G.D. (1976), Mathematical Economics, Macmillan, London.
- Arrow, K. J. and M. Intrilligator (Eds.)(1982), Handbook of Mathematical Economics, Volumes I, II and III, North Holland, Amsterdam.

Additional Reading List

- Chung, J.W. (1993), Utility and Production: Theory and Applications, Basil Blackwell, London.
- Ferguson, C.E. (1976), New-classical Theory of Production and Distribution.
- Allen R.G.D. (1974), Mathematical Analysis for Economists, Macmillan Press and ELBS, London.
- Chiang, A.C. (1986), Fundamental Methods of Mathematical Economics, McGraw Hill, New York.
- Jha, R. (1991), Contemporary Macroeconomic Theory and Policy, Wiley Eastern Ltd., New Delhi.
- Jones, H.G. (1976), An Introduction to the Modern Theory of Economic Growth, McGraw Hill-Kogakusha, Tokyo.
- Handley, G. (1962), Linear Programming, Addison Wesley Publishing Co., Massachusetts.
- Hiller, F.S. and G.J. Lieberman (1985), Operations Research, C.B.S., New Delhi.
- Kothari, C.R. (1992), An Introduction to Operations Research, Vikas Publishing House, New Delhi.
- Mustafi, C. K. (1992), Operations Research: Methods and Practice, Wiley Eastern, New Delhi.

M.A. 1st Semester
Paper-105 (Option – VIII)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF REGIONALISM -I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit - I

The rationale and motivation behind Regionalism; Multinational Trade Liberalization and RIAs; Regional v/s Global Liberalization; RIAs and Domestic Policy Integration.

Unit – II

The Economics of Custom Unions (Viner), Economies of Scale and Custom Union. The GATT's Article XXIV, Preferential Trading Areas and Multilaterarlism; Domino Theory of Regionalism; Hub and Spoke theory of Regional intearation.

Unit – III

East Asian Regionalism; Asia's New role in Global Economy; Relevance of Broader Regional Economic Integration in Asia; A Strategic Perspective on Asian Economic Integration.

Unit – IV

Building Blocs of Broader Regional Cooperation; ASEAN's Role in Asian Economic Integration; Japan in Asian Economic Community; China's Role in the Asian Economic Integration Process; India and the Asian Economic Integration.

Additional Reading List

- Jacob Viner (1950) "The Economics of Customs Unions" in the Custom Union Issue Chapter 4, NY: Carnegie Endowment for International Peace, 41-81.
- W.M. Corden (1972)"Economies of Scale and Customs Union Theory" Journal of Political Economy, 80, January/February/November/December 465-75.

- Murray C. Kemp & Henry Y. Wan Jr. 91976) An Elementary Proposition Encouraging the Formation of Customs Unions, Journal of International Economics, 6 Feb. 95-7.
- Paul Wonnacott and Ronald Wonnacott (1981) "Is Unilateral Tariff Reduction Preferable to a Customs Union? The Curios Case of the Missing Foreign Tariffs' American Economic Review 719(4) Sep. 704-14
- Richard H. Snape 91993) "History and Economics of GATTS Article XXTV in My Anderson and Richard Blackhurs (Eds) Regional Integration and Global Trading System, New York: Havesfer Wheatsheaf, 273-91.
- J. Bhagwati & A. Panagariya (1998) "Preferential Trading Areas and Multilateralism: Strangers, Friends and Foes? In Regionalism in Trade Policy: Essays on Preferential Trading, Singapore, River Edge, NJ & London.
- Arvind Panagariya (2000) "Preferential Trade Liberalisation: The Traditional Theory and New Developments" Journal Economc Literature, XXXVIII 2 June, 287-331.
- Martin Richardson (1993) "Endogenous Protection and Trade Diversion" Journal of International Economics, 34 (3-4) May 309-24.
- Richard E. Baldwin 91995) "A Domino Theory of Regionalism" in Richard Baldwin, Perth Haaparonta and Jarakko Kiander (eds), Expanding Membership of the European Union, Cambridge: Cambridge University Press 25-48.
- Arvind Panagariya and Ronald Fividlay (1996) "A Political Economy Analysis of Free Trade Areas and Customs Unions" in Robert C Feensba, Gene M. Grossman and Dongla A. Irwin (eds) The Political Economy of Trade Policy: Papers in Honor of Jagdish Bhagwati. Cambridge, MA:MIT Press (265-87)
- Kyle Bawell and Robert W. Staiger (1997) "Multilateral Tariff Cooperation During the Formation of Customs Unions" Journal of International Economics, 42,91-123.
- Philip I. Lecy (1997) " A Political Economics Analysis of Free Trade Agreements" American Economic Review 87 (4) Sept. 506-19.
- Pravin Krishna (1996) "Regionalism and Multilateralism " A Political Economy Approach" Quarterly Journal of Economics XIII (I) Feb, 227-51.
- Wilfred J. Ethier (1958) "Regionalism in a Multilateral World" Journal of Political Economy 106 (6) Dec. 1214-45.
- Caroline Freiend (2000) " Multilateralism and the Endogenous Formation of Preferential Trade Agreements" Journal of International Economics 52, 359-76
- Paul Wonnacott and Mark Lutz (1089) "Is there a case for Free Trade Areas?" in Jeftrey J. Schott (eds) Free Trade Areas and US Trade Policy Washington DC Institute of International Economics, 59-84.
- Lawrence H. Summers (1991) "Is there a case for Free Trade Areas?" in Institute of International Economics, 59-84.

- Paul Krugman (1993) “Regionalism Versus Multilateralism: Analytical Notes; in Jaime De Melo and Arvind panagariya (eds) New Dimensions in Regional Intergration Cambridge: Cambridge University Press 58-84.
- Jeffrey Frankel Ernesto Stein iand Shang Jin Wei (1995) “Trading Blocs and the Americas: The aNatural the Unnatural and the Super Natural” Journal of Development Economics, 47 (E), June, 61-95.
- “Asia’s New Regionalism and Global Role: Agenda for the East Asia Summit” edited by Nagesh Kumar, K. Kesavpny and Yao Cheocheng published by RIS & ISERS, 2008.

Kurukshetra University, Kurukshetra
M. A. Economics

w.e.f. 2016-2017

Course Structure

M.A. Economics (Semester II)		**Total Marks**	**External**	**Internal**	**Time**	**Credits* L+T+P**
Core Papers						
Paper-201	Micro Economic Analysis-I	100	80	20	3 Hrs.	4+1+0
Paper-202	Macro Economic Analysis-II	100	80	20	3 Hrs.	4+1+0
Paper-203	Statistics for Economists	100	80	20	3 Hrs.	4+1+0
Paper-204	Public Economics-II	100	80	20	3 Hrs.	4+1+0
Elective Papers						
Paper-205						
Option (i)	Financial Economics-II	100	80	20	3 Hrs.	4+1+0
Option (ii)	Demography-II	100	80	20	3 Hrs.	4+1+0
Option (iii)	Economics of Infrastructure-II	100	80	20	3 Hrs.	4+1+0
Option (iv)	Economics of Insurance-II	100	80	20	3Hrs.	4+1+0
Option (v)	Economics of Labour-II	100	80	20	3Hrs.	4+1+0
Option (vi)	Computer Applications in Economic Analysis-II	100	80(60+20) (60 Theory + 20 Practical)	20	3Hrs.	4+0+1
Option (vii)	Mathematical Economics-II	100	80	20	3Hrs.	4+1+0
Option (viii)	Economics of Regionalism-II	100	80	20	3Hrs.	4+1+0

Total Credits 25

Note: Students are required to select an option from Paper-205 from the same stream which they selected in Semester I.

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

M.A. 2nd Semester
Paper-201 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MICRO ECONOMIC ANALYSIS-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit-I

Critical evaluation of marginal analysis; Average cost pricing model; Bain's limit pricing theory; Baumal's sales revenue maximization model(all four static models); Marris model of managerial enterprise; Williamson's model of managerial discretion.

Unit-II

Pricing of factors of production (perfect and imperfect market); Elasticity of technical substitution and factor shares, technical progress and factor shares; Factor pricing and income distribution. Macro theories of distribution – Ricardo, Marx, Kalecki and Kaldor.

Unit-III

The Walrasian approach to general equilibrium; Existence, stability and uniqueness of the partial equilibrium; Maximization of social welfare; Market failure; Externalities, Public goods, asymmetric information.

Unit-IV

Inter-temporal choice in consumption; Economics of Uncertainty - Decision rules under uncertainty; Individual behaviour towards risk: Risk, gambling, insurance decisions. Economics of information – search costs, market signaling.

Basic Reading List

- Koutsoyiannis, A. (1979), Modern Microeconomics, (2nd Edition), Macmillan Press, London.
- Salvatore D(2006), Microeconomics-Theory and Applications, Oxford University Press
- Varian, H. (2003), Intermediate Microeconomics, East-West Press.
- Varian, H. (2000), Microeconomic Analysis, W.W. Norton, New York.

Additional Reading List

- Archibald, G.C. (Ed.) (1971), Theory of the Firm, Penguin, Harmondsworth.
- Baumol, W.J. (1982), Economic Theory and Operations Analysis, Prentice Hall of India, New Delhi.
- Borch, K.H. (1968), The Economics of Uncertainty, Princeton University Press, Princeton.
- Boyes.W and Melvin. M , Micro economics, Houghton Mifflin Company Boston Newyork.
- Broadway, R.W. and N. Bruce (1984), Welfare Economics, Basil Blackwell, London.
- Collel A.,Whinston and Green (2012), MicroEconomic Theory, Oxford University Press.
- Diamond and Rothschild (Eds.) (1978), Uncertainty in Economics, Academic Press New York.
- Goodwin, Nelson,Ackerman and WeissKopf(2009), Micro Economics in context, PHI Learning Private Limited.
- Graff, J. De. V. (1957), Theoretical Welfare Economics, Cambridge University Press, Cambridge.
- Gravelle,H.and Rees,R.(2008), Micro Economics, Dorling Kindersley.
- Gupta K.R.(2009), Advanced MicroEconomics, Atlantic Publishers and Distributors LTD
- Hirshleifer, J. and A. Glazer (1997), Price Theory and Applications, Prentice Hall of India, New Delhi.
- Jehle Geoffrey A.and Reny Philip J (2008), Advanced Micro Economic Theory, Dorling Kindersley (India)
- Lipsey and Chrystal(2014), Economics, Oxford University Press
- Mankiw(2006),Principles of Microeconomics,Cengage Learning
- Mansfield Edwin, Applied MicroEconomics, W.W.Norton ,New York London.
- Quirk, J. and R. Saposnik (1968), Introduction to General Equilibrium Theory and Welfare Economics, McGraw Hill, New York.
- Sen, A. (1999), Microeconomics: Theory and Applications, Oxford University Press, New Delhi.
- Sen,A.(2007), Micro Economics: Theory and applications. Oxford University Press.

M.A. 2nd Semester
Paper-202 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MACRO ECONOMIC ANALYSIS-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Macroeconomics analyses and establishes the functional relationship between large aggregates. The aggregate analysis has assumed such a great significance in recent times that a prior understanding of macroeconomics theoretical structure is considered essential for the proper comprehension of the different issues and policies. Macroeconomics now is not only a scientific method of analysis; but also a body of empirical economic knowledge. The paper entitled "Macro Economics Analysis" equips the students at the postgraduate level to understand systematic facts and latest theoretical developments for empirical analysis at economy level.

Unit-I

Open Macro Economics

International flow of capital and goods; saving and investment in a small open economy; Exchange Rates-real and nominal; Demand and supply of Foreign Exchange; Balance of payments-current and capital account; Mundell-Fleming Model under fixed and flexible exchange rates.

Unit-II

Theory of Inflation

Classical, Keynesian and Monetarist approaches; Structuralist theory of inflation; Philips curve analysis – Short run and long run Philips curve; Natural Rate of Unemployment hypothesis; Tobin's modified Philips curve. Search Theory – DMP (Diamond, Mortenson, Pissarides) Model.

Unit-III

Theory of Business Cycles

Business Cycle Theories of Schumpeter, Kaldor, Samuelson and Hicks; Control of business cycles – relative efficacy of monetary and fiscal policies.

Unit-IV

Macro Economic Policy

Monetary and Fiscal Policy- Targets and instruments; Conflicting objectives and coordination of objectives; Elasticities and effectiveness of monetary and fiscal policy. The Great Depression; Lags in the effects of policies; Expectations and Reactions; Uncertainty and Economic Policy; Economic Policy - Rules vs Discretion .

Recent Developments

The Concept of Rational Expectations; New Classical Macro Economics – basic approach and policy implications; New Keynesian Economics - Sticky Nominal prices (Mankiw Model).

Basic Reading List

- Ackley, G. (1978), Macroeconomics: Theory and Policy, Macmillan, New York.
- Blackhouse, R. and A. Salansi (Eds.) (2000), Macroeconomics and the Real World (2 Vols.), Oxford University Press, London.
- Branson, W.A. (1989), Macroeconomic Theory and Policy, (3rd Edition), Harper and Row, New York.
- Dornbusch, R. and F. Stanley (1999), Macroeconomics, Irwrin McGraw Hill, Inc. New York, 7th Edition.
- Heijdra, B.J. and V.P. Fredericck (2001), Foundations of Modern Macroeconomics, Oxford University Press, New Delhi.
- Jha, R. (1991), Contemporary Macroeconomic Theory and Policy, Wiley Eastern Ltd., New Delhi.
- Romer, D.L. (1996), Advanced Macroeconomics, McGraw Hill Company Ltd., New York.
- Shapiro, E. (1996), Macroeconomic Analysis, Galgotia Publications, New Delhi.

Additional Reading List

- Mankiw, N.G. and D. Romer (Eds.) (1991), New Keynesian Economics, (2Vols.), MIT Press, Cambridge.
- Mankiw, N. Greogory (2000), Macroeconomics Macmillan Worth Publishers 4th Edition
- Frisch, H. (1983), Theories of Inflation, Cambridge University Press, Cambridge.
- Sheffirin, S.M. (1996), Rational Expectations, Cambridge University Press, Cambridge.
- Lucas, R. (1981), Studies in Business Cycle Theory, MIT Press, Cambridge, Masscechusetts.
- Taylor, L. (1983), Structuralist Macroeconomics, Basic Books, New Longman.
- Turnovsky, S.J. (1977), Macroeconomic Analysis and Stabilization Policy, Cambridge University Press, Cambridge.
- Ruggles R. and N. Ruggles (1956), National Income Accounts and Income Analysis Mc Graw Hill, Newyork.
- Veniers, Y.P. and F.D.Sebold, (1977) Macroeconomics; Models and Policy
  John Wiley and Inc, USA.
- Dernburg , T.F.and D. M.Mc Dougall, Macroeconomics, McGraw Hill International Book Company.

M.A. 2nd Semester
Paper-203 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

STATISTICS FOR ECONOMISTS

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The main objective of this paper is to train the students to use the techniques of mathematical and statistical analysis, which are commonly applied to understand and analyze economic problems. The emphasis of this paper is on understanding economic concepts with the help of mathematical methods rather than learning mathematics itself. Hence in this paper a student will be initiated into various economic concepts, which are amenable to mathematical treatment. The paper also deals with simple tools and techniques, which will help a student in data collection, presentation, analysis and drawing inferences about various statistical hypotheses.

Unit - I

Index numbers: uses and types, tests for consistency, Base shifting, splicing and deflating of index numbers. Time series analysis: introduction and components, method of simple averages, moving averages and ratio to moving averages.

Unit - II

Basic concepts and definitions of probability; Laws of addition and multiplication; Conditional probability; Bayes theorem (statement); Binomial, Poisson and Normal distribution; Basic concepts of sampling- random and non-random sampling.

Unit - III

Types of data and statistical analysis procedures: Univariate, Bivariate and Multivariate (only overview); Hypothesis Testing procedures based on Z, t, x^2 and F-test and one-way ANOVA.

Unit - IV

Correlation: Karl Pearson and Spearman's Rank, Meaning and assumptions of simple regression analysis; Single linear equation regression model (by OLS Method), Concept of an estimator and its desirable properties; Coefficient of determination. Estimation of simple and exponential growth rates.

Basic Reading List

- Vohra, N. D. Quantitative Techniques in Management, Tata McGraw Hill, New Delhi.
- Speigal, M. R. Theory and Prodblems of Statistics, McGraw Hill Book, London
- Croxton, F. E., D. Cowden and S. Kliein, Applied General Statistics, Prentice Hall, New Delhi.
- Gupta S.C. and V.K. Kapoor, Fundamentals of Applied Statistics, S. Chand and Sons New Delhi.
- Yates, Frank, Sampling Methods for Census and Surveys, Charles, Griffin Co., London.
- Cocharm, W. G., Sampling Techniques, John Willey, New York.
- Hansen, hurditz and meadow, Sample Survey Methods and Theory, John Willey New York.
- Gupta S. C. Fundamentals of statistics, Himalaya Publishing house, New Dehlhi.
- Gupta S.P. and Gupta M. P. Business statistics, Sultan chand and sons, New Delhi.
- Kamenta J. Elements of Econometrics, Machmillan Publishing Co., Inc. New York.

M.A. 1st Semester
Paper-204 (Compulsory)
Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

PUBLIC ECONOMICS –II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Role and functions of the Government in an economy have been changing with the passage of time. The term 'Public Finance' has traditionally been applied to the package of those policies and operations which involve the use of tax and expenditure measures while budgetary policy is an important part to understand the basic problems of use of resources, distribution of income, etc.

Unit – I

Public Choice – Rational Voter Hypothesis; Characteristics of Majority Voting Rule; Buchanan and Tullock Model, Bowen-Black Model; Arrow's Impossibility Theorem; Downs Model on Demand and Supply of Government Policy; Models of Bureaucratic Behaviour- Niskanen, Tullock, Breton- Brennan- Buchanan, Dunleavey's Bureau Shaping Model; Voting and the Leviathan Hypothesis

Unit – II

International Issues in Public Economics- Global Public Goods; Taxation of International Trade; Trade Taxes and Public Choice; Harmonization of Indirect Taxes; Public Enterprises –Pricing Policy of Public Enterprises; Theory of Second Best; Capacity Constraints and Peak Load Problem; Social Cost Benefit Analysis- Measuring Economic Benefits and Costs, Determining Shadow Prices, Decision Criteria, Problem of Risk and Uncertainty.

Unit – III

Public Debt – Objectives and Sources of Public Debt; Classification and Effects of Public Debt; Burden Controversy of Public Debt – Classical Theory, Modern Theory, Buchanan Thesis, Secondary Burden of Public Debt; Public Debt and Inflation; Public Debt Management and Redemption of Public Debt.

Unit – IV

Fiscal Federalism – The Decentralisation theorem; Optimum Size of Local Community; Assignment of Functions Among Levels of Government; Tiebout Model; Theory of Intergovernmental Grants; A Public Choice Critique of Intergovernmental Grants; Redistributive Impact of the Budget

Base Text Book

Boadway, Robin, "Public Sector Economics", Cambridge, Winthrop Publishers

Basic Reading List

- Bruce, Neil, "Public Finance", Addison- Wesley Educational Publishers, Inc.
- Jones. Philip and Cullis, Jones, "Public Finance and Public Choice- Analytical Perspectives", Oxford University press
- Stiglitz, Joseph, "Economics of the Public Sector", W.W.Norton and Company, new York/London
- Rosen, H.S., "Public finance", Tata McGraw Hill
- McNutt, P.A., "The economics of Public Choice", Edward Elgar Publishing Inc.
- Mueller, D.C., "Public Choice- I,II,III" Cambridge university Press, Cambridge
- Downs, A., "An Economic Theory of Democracy", Harper and Row, New York
- Musgrave R.A and Peacock A.T., " Classics in the Theory of Public Finance", Mcmillan

M.A. 2nd Semester
Paper-205 (Option – I)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

FINANCIAL ECONOMICS-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.
(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).
(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Financial economics is the branch of economics studying the interrelation of financial variables, such as prices, interest rates and shares, as opposed to those concerning the real economy. Financial economics concentrates on influences of real economic variables on financial ones, in contrast to pure finance. Financial economics is primarily concerned with building models to derive testable or policy implications from acceptable assumptions. The theory component centers on decision making under uncertainty in the context of the financial markets, and the resultant economic and financial models. The application of the economic principles include the valuation and determination of the fair value of an asset; the riskiness of the asset, generation of cash flows and their discounting; relative valuations; derivatives and other financial instruments. The aim here is twofold: firstly, to complement the theory; secondly, providing students with practical market knowledge.

Unit-I

The investment environment and asset Classes; Risk- Return Analysis; Risk Aversion and Capital Allocation to Risky Assets; Bond Prices and Yields; Term Structure of interest Rates, Managing Bond Portfolio; Equity valuation Models.

Unit-II

Portfolio Analysis; Markowitz Model, Sharpe Index Model, Capital asset pricing Model, Arbitrage Pricing Theory; Fundamental and Technical Security Analysis; Efficient market Theory.

Unit-III

Introduction to Option markets; Option Valuation- Binomial Option pricing, Black – Scholes Option Pricing Model; Options Hedging strategies – Delta, Gamma, Theta, Vega and Rho; Futures Markets Trading and valuation

Unit-IV

Economics of Mutual Funds- Sharpe, Treynor and Jensen Performance Index.
Economics of Multinational Finance: The Multinational financial system; Current Assets and Capital Budgeting Decisions in MNCs; Designing a Global Financing strategy.

Reading List

- Bodurtha, J. and Courtadon G., **The Pricing of Foreign Currency Options**, New York, Salomon Brothers Center, New York University, 1987-4/5.
- Bolten, Steven E., **"Security Analysis and Portfolio Management: An Analytical Approach to Investments",** N.Y.Holt, Rinehert and Winston, 1972
- Bowyer, John, W., **"Investment Analysis and Management",** Illinois, Irwin, 1972
- Carr, J.L., **"Investment Economics",** Sage Pub., California, 1969
- Chance D.M., "An Introduction to Options and Futures", Dryden press, Orlando,FL,1989
- Chance, D., "**An Introduction to Derivatives"**, New York, Dryden, 1998.
- Cox, J. and M. Rubinstein, "**Options Markets"**, Englewood Cliffs, N.J., Prentice-Hall, 1985,ISBN0136382053.
- Curley, Anthony J. and Bear Robert M., **"Investment Analysis and management",** N.Y., Harper & Row, 1979
- David G. Luenberger, **"Investment Science",** Oxford University Press,1997. ISBN10: 0195108094
- David King, **"Financial Claims and Derivatives",** Thomson Learning, 1998. ISBN10: 186152448X
- Fama, E.F. and Miller, M.H., **"Theory of Finance",** N.y.Holt, Rinehert and Winston, 1972
- Figlewski, S., W. Silber and M. Subrahmanyam, "**Financial Options, : From Theory to Practice"**, Homewood, Illinois, Business One Irwin, 1990, ISBN 1556232349. Frank Milne, **"Finance Theory and Asset Pricing",** Oxford University Press, 2003. ISBN10: 0199261075
- Hull, J., "**Options, Futures and Other Derivative Securities"**, Upper Saddle River, N.J., Prentice Hall, 6th edition,2006, ISBN 013149908-4,
- Jarrow, R.A. and A. Rudd, "**Option Pricing"**, Homewood, Illinois, Dow Jones-Irwin, 1983, ISBN 0870943782.
- Jarrow, R.A. and S. Turnbull, "**Derivative Securities"**, Cincinnati, Ohio, South-Western, 1996.
- McDonald, R., "**Derivatives Markets"**, Boston, MA, Addison-Wesley Publishing, 2002, ISBN: 0201729601
- Robert W. Kolb, **"Financial Derivatives",** Blackwell Publishing, 1996. ISBN10: 1557869308
- Robert W. Kolb, James Overdahl, **"Understanding Futures Markets",** Blackwell Publishing, 2006. ISBN10: 1405134038

M.A. 2nd Semester
Paper-205 (Option – II)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

DEMOGRAPHY –II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The main objective of this paper is a sequel to Paper 105 (ii) – Demography - I- taught in semester I of the course. As stated earlier is to make the students aware of the importance of population in economic development and the various aspects of growth of population in a country. The focus this paper is to understand. The demographic profile of India alongwith the related issues of migration & urbanization human development issues the evolution of population policy in India.

Unit -I

Demographic database in India: Study of Census in India-Methodology and characteristics; Nature of information collected in India with emphasis on 2011 Census ; National Family Health survey 1,2 and 3; Rapid Household Survey; Changing characteristics of population in India; Occupational Structure of Indian Population.

Unit -II

Migration and Urbanization: Basic concept and definitions; importance of migration, Types of migration; factor affecting migration. Theories of migration related to internal migration; Urbanization-Growth and distribution of rural-urban population in developed and developing countries with special reference to India.

Unit –III

Population and Development with reference to India: Population, economy and environment linkage; Population, health, nutrition productivity nexus; population and human development issues; Demography and household economic behavior.

Unit -IV

Evolution of Population Policy in India: The shift in policy from population control to family welfare, to women empowerment; Family planning strategies and their outcomes; Reproductive health, maternal nutrition and child health policies; Population and strategies for human development of different social groups; Social impact of new reproductive technologies and their regulation; The population policy; Tasks before the National Population Commission.

Basic Reading List

- Agarwal S.N. (1972), India,s Population Problem, Tata McGraw- Hill Co., Bomby.
- Bose, A. (1996), India's Basic Demographic Statistics, B.R. Publishing Corporation, New Delhi.
- Bogue, D.J. (1971), Principle of Demography, John Wiley, New York.
- Chenery H. and T.N. Srinivasan (Eds.)(1989), Hand Book of Development Economics, Vol. 1 & 2 Elsevier, Amsterdam.
- Choubey, P.K. (2000), Population Policy in India, Kanishka Publications, New Delhi.
- Coals, A.J. and E.M. Hoover (1958), Population Growth and Economic Development in Low income Countries: A Case Study of India's Prospectus, Princeton University Press, Princeton.
- Gulati, S.C (1988), Fertility in India: An Econometric Study of a Metropolis, Sage, New Delhi.

Additional Reading List

- Agnihotri, S. B. (2000), Sex ration in Indian Population: A fresh Exploration, Sage New Delhi.
- Amsden, A. H. (Ed.) (1992), Form of Production and Women's Labour, Gender Aspects of Industrialization in India and Mexico, Sage, New Delhi.
- Boserup,E. (1970), women's role in Economics Development, George Allen and Unwin, London.
- Chiang, C.L. (1974), Life Tables and Mortailty Analysis, W.H.O., Geneva.
- Gupta, Jj.A. (2000), New Reproductive Technogies, Women's Health and Autonomy, Indo Dutch Studies on Development Alternatives, Sage, New Delhi.
- Jhabwala,R. and R.K. Subramanya (2000) (Eds.), The Unorganized Sector: Work Security and Social Protection, sage, New Delhi.
- Krshnaji M., R.M. Sudarshan and A. Shariff (1999), Gender Population and development, Oxford University Press, New Delhi.
- King M. and M.A. Hill (Eds.)(1993), Women's Education in Developing Countries: Barriers, Benefits and Politics, John Hopkins, Baltimore.
- Lewis (Ed.)(1989), Strengthening the poor: What Have We Learnt, OECD, Paris.
- Mishra S. (2000), Voluntary Action in Health and Population: The Dynamics of Social Transition, Sage, New Delhi.
- Mitra, A. (1979), Implications of Declining Sex Ration in India's Population, Allied, New Delhi.
- Novell, C. (1988), Methods and Models in Demography, Belhaven Press, London.
- Seth M. (2000), Women and Development: The Indian Experience, Sage, and New Delhi.
- Simon, J.L. (1992), Population and Development in Poor Countries, Princeton University Press.
- Srinivasan, K. (1998), Basic Demographic Techniques and Applications, Sage, New Delhi.
- Srinivasan, K and A. Shariff (1998), India: Towards Population and Demographic Goals, Oxford University Press, New Delhi.
- Sryrock, H. et.al. (1973), The Methods and Materials of Demography, US Department of Commerce,Washington,D.C.

- Sudarshan and A. Shariff (1999), Gender Population and Development, Oxford University Press, New Delhi.
- United Nations (1973), The determinants and consequences of Population Trends, Vol. 1 UNO Publications, New York.

M.A. 2nd Semester
Paper-205 (Option-III)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF INFRASTRUCTURE-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.
(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).
(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE
The important role infrastructure plays in a country's development need not be reiterated. In case of developing countries, lack of adequate infrastructure has been held as a major obstacle to growth. The main purpose of this paper is to introduce a course on infrastructure, as it would help the students to understand the strength of infrastructure - physical and social in the process of economic development.
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Unit - I

Water supply: Water utilities, urban and rural water supply; Telecommunication: Telecom reforms in India with a critique of national telecom policy; Relationship between TRAI, Department of telecom, and public and private operators; Role of telecom infrastructure in meeting needs of the economy and the IT sector.

Unit - II

Energy demand: short run and long run price and income elasticities; Energy supply and the economics of depletable resources; World oil markets and energy security; Natural gas price and regulation, deregulation and markets; Current Electricity Policies, and programmes.

Unit - III

Risk management, futures markets and derivatives; Energy and climate change; Internalizing environmental externalities with a focus on CO_2 emissions-cap and trade Mechanisms; Analysis of energy sources: Coal , nuclear power; Energy efficiency policies and programmes; Renewable energy policies and programmes; Trading in energy markets.

Unit - IV

Health and economic development; Determinants of Health – poverty, malnutrition, illiteracy and lack of information; Economic dimensions of health care – Demand and supply of health care; Financing of health care and resource constraints; Inequalities in health – class and gender perspectives; Institutional issues in health care delivery; Development of health infrastructure in Indian plans.

Basic Reading List

- O' Sullivan, A. (2003) : Urban economics, Boston, MA, Irwin McGraw-Hill
- Timothy J. B. et al (1987) :Saturn and state economic development, forum for applied research and public policy, 2 (1), 29- 40
- Glaeser, Edward L.(1998) Are cities dying? Journal of economic perspectives, 12(1), 139-160.
- Ellen, I. G. and Schwartz, A. E**.** (2000)**:** No easy answers: cautionary notes for competitive cities, The Brookings, review, 18(3), 43–45
- McLean, M. L., and Voytek K.P. (1992) :Understanding your economy, using analysis to guide local strategic planning, 2nd ed, Chicago, Planners Press
- Mieszkowski, P., and Mills, E.S. (1993): The causes of metropolitan suburbanization, Journal of economic perspectives, 7(1), 135-147.
- Kenneth A. S. (1993) Urban traffic congestion, a new approach to the gordian knot, the Brookings review, 11(2), 6-11.
- Peter G. and Richardson H. (1989): Notes from the underground: the failure of urban mass transit, The public interest, 94, 77-86
- Timothy J. B. (1994): Jobs, productivity, and local economic development: what implications does economic research have for the role of government? national tax Journal , 47(4), 847- 862.
- Andrew C. K. (1993) :Why regions grow: a review of research on the economic base model, Federal Reserve Bank of Atlanta economic review, 16-29.
- Porter M.E. (1998): Clusters and the new economic competition, Harvard business review, 76 (6), 77-90.
- Peiser R.B. (1989): Density and urban sprawl, Land economics , 65(3), 193-204.
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- Berube A. and Forman B. (2002) :Living on the Edge, decentralization within cities in the 1990s, the living cities census series, The Brookings Institution (October 2002)
- Molly O'Meara S. (2002): What will it take to halt sprawl, world watch, 15(1), 12-23.
- Sivaramakrishnan, K.C., Kundu A. and Singh B.N. (2005): Handbook of urbanization in India. New Delhi: Oxford University Press
- Naik N.T.K and Mansoor S. R. (2007): Urbanisation of India. New Delhi, Eastern Book Corporation.
- Jose G.-I., Tye W.B., Winston C. (1999): Essays in transportation economics and policy, a handbook in honor of John R. Meyer, Washington D.C, The Brookings Institution Press
- Button K.J.(1993) :Transport Economics, UK, Edward Elgar
- Singh S. K. (2000): Technical characteristics and efficiency of the Indian state road transport undertakings?, Indian journal of transport management, 24(8): 533-543.
- Singh S. K. (2005): Review of urban transportation in India? Journal of public transportation, 8(1): 79-97
- Button, K.J. and Pearman A. (1985) : Applied transport economics: a practical case study approach, London, Gordon and Breach
- Button K.J. (1976) :The use of economics in urban travel demand modeling, a survey, socioeconomic planning sciences, 10(2) : 57- Crew M.A. and Kleindorfer P.R. (1979) : Public utility economics, London, Macmillan
- Mody A.(1997): Infrastructure strategies in east Asia**,** the untold story, Washington, D.C: economic development institute, world bank

- Goodman J.B. and Loveman G.W. (1991): Does privatization serve the public interest, Harvard business review, 69(6): 26-38
- Sherman R. (1983): is public utility regulation beyond hope? in A.L.Danielsen and D.R.Kamarschen (ed.), current issues in public utility economics, Lexington, MA.
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- Chaudhuri M.D. (1990): Market failure and government failure, Journal of Economic Perspectives, 4(3), 25-39
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- Navarro, P. (1996): Electric utilities, the argument for radical deregulation**,** Harvardbusiness review, 73(1): 112-25
- Parikh, K.S. (Ed.) (1999): India development report - 1999-2000, New Delhi: Oxford
- Athreya M.B. (1996): India's telecommunication policy, telecommunication policy, 20(1): 11-22
- Sinha N. (1996): The political economy of India's telecom reforms, telecommunication policy, 20(1) : 23-38
- Anandalingam G. (1996) :Technological progress, industry dynamics and telecommunications policy: the need for further reforms in India, working paper No.83, IIM, Bangalore,.
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- Flynn, E. (2000):Impact of technological change and productivity on the coal market, energy information administration, issues in midterm analysis and forecasting.
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- Smith, J. (2005): Inscrutable OPEC? behavioral tests of the cartel hypothesis, The energy journal 25, no. 1: 51-82.
- Barsky, R., and L. Killian,. (2004):Oil and the macroeconomy since the 1970 journal of economic perspectives 18, no. 4: 115-134.
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- MacAvoy, P., and R. Pindyck. (1973):Alternative regulatory policies for dealing with the natural gas shortage., the bell journal of economics and management science 4, no. 2: 454- 498.
- Cuddington, J., and Z. Wang. (2006): Assessing the degree of spot market integration for u.s. natural gas, evidence from daily price data., journal of regulatory economics 29: 195-210
- Borenstein, S. (2005): The long run efficiency of real-time electricity pricing, the energy journal 26, no. 3: 93-116.
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- Herce, M., J. Parsons, and R. Ready. (2006): Using futures prices to filter short-term volatility and recover a latent, long-term price series for oil, MIT center for energy and environmental policy research working paper 06-005 (April).
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- Palmer, K., and D. Bullaw., (2005):Cost-effectiveness of renewable electricity policies, energy economics 27: 873-894.
- McDonlad, S., S. Robinson, and K. Thierfelder.(2006:)Impact of switching production to bioenergy crops, the switchgrass example, energy economics 28: 243-265.

M.A. 2nd Semester
Paper-205 (Option-IV)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF INSURANCE-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The vital role of insurance in the task of risk-bearing and risk-elimination in the economic affairs has not been appreciated adequately in our country. Given that the element of risk or uncertainty is a universal and fundamental phenomenon in our economic life, the importance of insurance as a means of reducing uncertainty and risk in regard to personal and business activities cannot be overemphasized. The role of insurance sector in mobilizing a country's saving for channeling them into capital formation and thus contribute to a country's economic development is also documented. There is a wide spread recognition that insurance, particularly life insurance, is a prominent segment of applied economics. Insurance industry is an important constituent of financial services industry in India and is a major investment institution and prominent player in the capital market. However, in our country, study of the subject of insurance has largely remained neglected. With the opening of the insurance sector for private Indians and foreign players, the interest in the subject has been kindled. This course on Insurance Economics attempts to give a fairly comprehensive view of the subject to the postgraduate students in Economics and pave the way for possible future expansion of the teaching of an important branch of economics.

Unit – I

Wealth accumulation planning; Life cycle planning; Planning for accumulation; Micro-insurance products. Weather insurance in Agriculture, Livelihood Risk Management using Crop Insurance; Index Based Insurance; valuation of insurance products.

Unit - II

Essentials of individual retirement planning; Analysis of retirement; Income needs; Retirement planning strategies; Investing for retirement, pension plans; Basic principles of pension plans; Pension plans in India; Estate planning - process and tools; Life insurance for estate liquidity.

Unit - III

Role of risk-management and insurance in economic development; Insurance institutions as financial intermediaries and investment institutions; Insurance institutions in Indian capital market.

Unit IV

Regulation of insurance; Purpose of government intervention in markets; Theories of regulation; Insurance regulation in India; Insurance regulation & Development Authority; Set up and management of insurance companies; Marketing of general insurance; Regulation of investments by insurance institutions in India; scope and limitation of Indian Agriculture Insurance.

Basic Reading List

- Black. K. Jr. and H.D. Skipper Jr.(2000), Life & Health Insurance, Prentice Hall, Upper Saddle River, New Jerssey.
- Dionne, G. and S.E. Harrington (eds.) (1997), Foundations of Insurance Economics, Kluwer academic Publishers, Boston.
- Pteffer, I. And D.R. Klock (1974), Perspectives on Insurance, Prentice Hall Inc., Engleword Cliffs.
- Williams Jr., C.A. M.L. Smith and P.C.Young (1995), Risk Management and Insurance, McGraw Hill, New York.
- Skipper Jr., H.D.(ed.) (1998), International Risk & Insurance : An Environmental Managerial Approach, Irwin McGraw Hill, Boston.
- United Nations Conference on Trade and Development (1987), The Promotion of Risk Management in Developing Countries, UNCTAD, Geneva.
- Insurance Institute of India, Life Assurance Underwriting, (IC-22), Mumbai.
- Insurance Institute of India, General Insurance Underwriting, (IC-22), Mumbai.
- Government of India (1998), Old Age and Income Security (OASIS) Report (Dave Committee Report), New Delhi.
- Ivers, J.I. III and E.T. Johnson (eds) (1991), Readings in Wealth Accumulation Planning, The American College, Bryn Mawr, Pa.
- Insurance Regulation and Development Authority (2001), IRDA Regulations, New Delhi.
- Meier. K.J. (1998), The Political Economy of Regulation : The Case of Insurance, The State University of New York Press, Albany, N.Y.

M.A. 2nd Semester
Paper-205(Option-V)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF LABOUR-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Issues pertaining to the labour market, wage theories, employment policies, trade unions and collective bargaining in the globalized economy have become vitally important for developing countries. In a country like India where the bulk of the labour force is in the unorganized sector and the organized sector is witnessing "jobless" growth, the importance of issues such as employment and unemployment as well as livelihood and social security for the growing millions continues to assume significance. This Paper exposes students to theoretical as well as empirical issues relating to the labour market with special reference to India.

Unit -I

Non-wage component of labour remuneration; inflation-wage relationship at micro and macro levels; Productivity and wage relationship; National wage policy; Wages and Wage Boards in India; Bonus system and profit sharing.

Unit -II

Theories of labour movement – Growth, pattern and structure of labour unions in India; Achievements of labour unions; Causes of industrial disputes and their settlement and prevention mechanism; social security and labour welfare in India.

Unit -III

Role of tripartism; Current trends in collective bargaining; Role of judicial activism; Labour legislation in India with special reference to the Trade Union Act 1923, Industrial Disputes Act 1947 and Factories Act 1948.

Unit -IV

Special problems of labour; Child labour, female labour, discrimination and gender bias in treatment of labour; Labour market reforms – Exit policy, need for safety nets, measures imparting flexibility in labour markets; Second National Commission of Labour; Globalization and labour markets.

Basic Reading List

- Hajela, P.D. (1998), Labour Restructuring in India: A Critique of the New Economic Policies, Commonwealth Publisher, New Delhi.
- Lester, R.A. (1964), Economics of Labour, (2nd Edition), Macmillan, New York.
- McConnell, C.R. and S.L. Brue (1986), Contemporary Labour Economics, McGraw-Hill, New York.
- Papola, T.S., P.P. Ghosh and A.N. Sharma (Eds.) (1993), Labour, employment and industrial Relations in India, B.R. Publishing Corporation, New Delhi.
- Venkata Ratnam, C.S. (2001), Globalization and Labour-Management Relations: Dynamics of Change, Sage Publications/Response Books, New Delhi.

Additional Reading List

- McCormickm B. and Smith (Eds.)(1968), The Labour Market, Penguin, Harmondsworth.
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- Mazumdar, D. (1989), Micro-economic Issues of Labour Markets in Developing Countries, EDI Services Paper No. 40, World Bank, Washington D.C.
- Memoria, C.B. (1966), Labour Problems and Social Welfare in India, Kitab Mahal, Allahbad.
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- Misra, L. (2000), Child Labour in India, Oxford University Press, New Delhi.
- Riveros, L. (1990), Labour Market Policies and Labour Market Reforms in Socialist Economies, World Bank, Washington D.C.

M.A. 2nd Semester
Paper-205 (Option-VI)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80 (60 +20)
Theory : 60
Practical : 20
Internal : 20

COMPUTER APPLICATIONS IN ECONOMIC ANALYSIS-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The direction towards the knowledge society shall be resting on a healthy economics and proper use of Information Technology. Economics being an empirical science, computers have emerged as the pivotal instruments of economic analysis, research and forecasting. Therefore, the future economists must be equipped with skills and tools based on computers, which this course shall provide to them. This will not only enhance their employability but also prepare them for the challenges of the future.

Unit - I

Statistical Processing Techniques and Methods: Summarizing and analysis of data, Descriptive Statistics; Calculation of Mean, Correlation and Regressing analysis, Estimation of Growth Rates, Trends Forecasting; Construction of Index numbers; Moving Averages.

Unit – II

IT Application to Commerce: E-Commerce: Meaning, basis and scope, E-Commerce, E-Business and E-Transaction; E-Commerce Vs. Traditional Commerce; Basis of E-Commerce; Business Models of E-Commerce; Electronic Transactions- Security, Digital Signature, Digital Certificate; Encryption; Electronic Payment System - Debit Cards, Credit Cards, Smart Cards, Electronic Funds Transfer, ATM.

Unit – III

Project Appraisal & Selection: Estimation of present values; Decision making with benefit Cost, APR, NPV, IRR, Payback Period. Risk analysis – Scenario development; Hillier Model; Monte – Carlo Simulation; Profitability Projection, Break -even analysis; Decision Tree Analysis.

Unit – IV

Information System for a business organization; Information flow and requirements; information system design approaches; Decision Support Systems; Data mining and analytics.

Basic Reading List

- David Whiteley, E-Commerce: Strategy, Technologies and Applications, Tata McGraw Hill, New Delhi.
- Goel, Sushil, Computer Application to Business & E-Commerce, Natraj Publishing House, Karanl.
- Lipschultz, M.M. and S. Lipschultz , Theory and Problems of Data Processing, Schum's Outline Series, McGraw Hill, New York.
- Madan, Sushila, Information Technology, Taxman Allied Services, New Delhi.
- P.T. Joseph, S.J. , E- Commerce : An Indian Perspective, PHI Learning , New Delhi.
- Parameswaranm R. Computer Applications in Business, S. Chand and Company, New Delhi.
- Rajaraman, V. Fundamentals of Computers, Prentice Hall of India, New Delhi.
- Sinha, P.K. , Computer Fundamental, BPB Publications, New Delhi.
- Sudalaimuthu, S. and Anthony Raj S, Computer Applications in Business, Himalaya Publishing House, New Delhi.

M.A. 2nd Semester
Paper-205(Option-VII)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MATHEMATICAL ECONOMICS-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

This course is designed to equip students to understand the economic concepts and theories which use mathematical tools and techniques to refine the verbal logic. The use of calculus has permitted formulation of economic problems in multivariable mode and yield valuable insight about optimizing human behaviour. Modern algebraic tools allow convenient handling of simultaneous equations in the context of linear programming, game theory and input-output analysis. Mathematical economics deals with various applications of mathematical tools and techniques in defining and developing economic relationships. This course has been accordingly designed to include various mathematical techniques/methods/models related to the different parts of economic theory like consumer theory, theory of production, pricing, trade cycles, growth models, etc. The paper covers important aspects of microeconomics, macroeconomics and development theory and the various modules have been accordingly designed.

Unit - I

Pricing of factors of production; Product exhaustion theorems. Multi-market equilibrium- pure exchange; production and exchange; The numeraire and money; existence, stability and uniqueness of general equilibrium.

Unit -II

Pareto Optimality; The efficiency of perfect and imperfect competition; The external effects in consumption and production; Social welfare functions- The Arrow impossibility theorem; The Theory of Second Best.

Unit - III

Problem of choice in situations of uncertainty and risk; production under uncertainty; futures market and hedging; multi-period consumption; time value of money and project selection criterion. Risk –return trade off.

Unit – IV

Input-output model; National Income models (open & closed); Expected Inflation Augmented Phillips relation; Multiplier-Accelration interaction model; Growth models –Domar, Harrod, John Robinson's Golden Age Model, Duesenberry's Optimum Growth Model, Solow, Kaldor.

Basic Reading List

- Baldani, Bradfield and Turner (2007), An Introduction to Mathematical Economics, South-Western, Cengage Learning, New Delhi.
- Henderson, J. M. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.
- Chiang, A.C. (1986), Fundamental Methods of Mathematical Economics, McGraw Hill, New York.
- Koutsoyiannis, A. (1979), Modern Microeconomics, (2nd Edition), Macmillan Press, London.
- Varian, H. (2000), Microeconomic Analysis, W.W. Norton, New York.
- Allen, R.G.D. (1976), Mathematical Economics, Macmillan, London.
- Arrow, K. J. and M. Intrilligator (Eds.)(1982), Handbook of Mathematical Economics, Volumes I, II and III, North Holland, Amsterdam.
- Chiang & Wainright, Fundamental Methods Mathematical Economics, 4th ed, McGrawHill, Singapore, 2005.
- Dernburg, and Dernburg, Macroeconomics; A Mathematical approach McGraw Hill International Book Company.
- Henderson, J. M. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.

Additional Reading List

- Allen R.G.D. (1974), mathematical Analysis for Economists, Macmillan Press and ELBS, London.
- Chiang, A.C. (1986), Fundamental Methods of Mathematical Economics, Mc Graw Hill, New York.
- Jha, R. (1991), Contemporary Macroeconomics Theory and Policy, Willey Eastern Ltd., New Delhi.
- Jones, H.g. (1976), An Introduction to the Modern Theory of Economics Growth, McGraw Hill-Kogakusha, Tokyo.
- Handley, G. (1962, Linear programming, Addison Wesley Publishing Co., Massachusetts.
- Hiller, F.S. and G.J. Lieberman (1985), Operations Research, C.B.S., New Delhi.
- Kothari, C.R. (1992), An Introduction to Operations Research, Vikas Publishing House, New Delhi.
- Mustafi, C. K. (1992), Operations Research: Methods and Practice, Wiley Eastern, New Delhi.

M.A. 2nd Semester
Paper-205(Option-VIII)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF REGIONALISM-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.
(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).
(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit - I

Political Economy of Regionalism : An Overview, Regionalism in Asia and The America; the Political Economy of Currency regions; Open regionalism.
The European Case; Systemic Sources of variation in Regional Institutionalization in Europ; East Asia and the Americas Major Power Trade floors.

Unit - II

Theories of New Regionalism; The New Regionalism: Revisited; The World Order Approach; Regionalism and World Order: The Changing Global Setting.

Unit -III

Regional Security Complex; Theory in the Post Cold War World; A regional
Building Approach: Futures for new Regionalism.

Unit- IV

WTO and RTAs; Rules on Regional Trade Agreements; The EU, ASEAN, NAFTA, SAARC; Asian Economics Community.

Reading List

- "The Political Economy of Regionalism", by Edward D Mansfield, Helen V Milner; Columbia University Press, 1997.
- "Open Regionalism", Working Paper 97-3 by C Fred Bergsten, Peterson Institute, Washington D.C. USA.
- "Regionalism or Multilateralism" of Giorgia Albertin: IMF Working Paper, 1st March 2008.
- "Theories of New Regionalism" A Palgrave Macmillan Publication, Nov 2003 Edited by Fredriek Soderbaurne and Timothy M. Shaw.
- "The Economics of International Integration", by Peter Robson, Published by
- Regional Trade Agreement Section, WTO, Geneva, SWISS.

- WTO Multilateralising Regionalism; Challenges for the Global Trading System, Feb. 2009.
- WTO Discussion Paper No. 12, the Changing Landscape of Regional Trade Agreement, 2006.

Kurukshetra University, Kurukshetra
M. A. Economics

w.e.f. 2017-2018

Course Structure

M.A. Economics (Semester III)		**Total Marks**	**External**	**Internal**	**Time**	**Credits* L+T+P**
Core Papers						
Paper-306	International Trade and Finance-I	100	80	20	3 Hrs.	4+1+0
Paper-307	Economics of Environment and Social Sector-I	100	80	20	3 Hrs.	4+1+0
Paper-308	Indian Economic Policy-I	100	80	20	3 Hrs.	4+1+0
Paper-309	Economics of Growth and Development-I	100	80	20	3 Hrs.	4+1+0
Elective Papers						
Paper-310						
Option (i)	Econometrics-I	100	80	20	3 Hrs.	4+1+0
Option (ii)	History of Economic Thought-I	100	80	20	3 Hrs.	4+1+0
Option (iii)	Economics of Agriculture-I	100	80	20	3 Hrs.	4+1+0
Option (iv)	Welfare Economics-I	100	80	20	3 Hrs.	4+1+0
Option (v)	Industrial Economics-I	100	80	20	3 Hrs.	4+1+0
Option (vi)	Financial Markets and Institutions-I	100	80	20	3 Hrs.	4+1+0
Option (vii)	Economics of Gender and Development-I	100	80	20	3 Hrs.	4+1+0
Option (viii)	Economic History of ASEAN Countries, China, South Korea and Japan-I	100	80	20	3 Hrs.	4+1+0
Total Credits						**25**

Note: Students are required to select any one option from Paper-310. The students will select the same optional stream in Semester IV.

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

M.A. 3rd Semester
Paper-306

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INTERNATIONAL TRADE AND FINANCE-1

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The course provides a deep understanding about the broad principles and theories, which tend to govern the free flow of trade in goods, services and capital — both short-term and long-term — at the global level. Besides, preparing the students about the relevance and limitations of these principles, the contents of the paper spread over different modules, lay stress on the theory and nature of the subject which, in turn, will greatly help them to examine the impact of the trade policies followed both at the national and international levels as also their welfare implications at macro level and the distribution of gains from trade to North and South with particular reference to India. The study of the paper under the present era of globalization will train the students about the likely consequences on income, employment and social standards and possible policy solutions as the world will move into the 21st century.

Unit - I

Theory of International Trade

Classical Theory of International Trade – Theories of absolute advantage, comparative advantage. Neo Classical Theory of international Trade (opportunity costs theory); Modern Theory of International Trade (Heckscher-Ohlin Model).Empirical Testing of theory of Heckscher-Ohlin.

Unit - II

AlternativeTheories of International Trade-

Offer Curve Analysis; J.S. Mill's Theory of Reciprocal Demand; Factor Price equalization theorem; Factor Progress and Rybczynski theorem; Kravis and Linder theory of International trade. Trade Under Imperfectly Competitive Markets conditions.

Unit - III

Gains from International Trade

Measurement of gains from trade and their distribution; Concepts of terms of trade, their uses and limitations; Hypothesis of secular deterioration of terms of trade, its empirical effects of relevance and policy implications for less developed countries; Theory of interventions (Tariffs, quotas and Nontariff)-Economic effects of tariffs (Partial and General Eqilibrium analysis) Tariff and Stopler Samuelson Theoram .Optimum rates of tariffs – their measurement and effective rate of Protection.

Unit - IV

Growth and Trade

Economic Growth and International Trade-Production effect,consumption Effect,The effects of growth on small countries; The Effects of Growth on Large Countries; Technical Progress and International Trade; Import substitution v/s Export Push; Trade Liberalization:Need and Objectives; Liberalization experience of developing countries with special reference to India.

Basic Reading List

- Chacholiades, M. (1990), International Trade: Theory and Policy, McGraw Hill, Kogkusha, Japan.
- Cherunilam, F. (2008): International Economics, The Tata McGraw-Hill Companies, New Delhi. 5th Ed.
- Dunn R.M. and J.H. Mutt (2000), International Economics, Routledge, London.
- Kindlberger, C P (1991): International Economics, R D Irwin, Homewood.8th Ed.
- Krugman, P.R. and Obstfeld, M. (1994), International Economics: Theory and Policy, Glenview, Foresman.
- Mishra, S.K. and Puri, V.K. (2012), Indian Economy- Its Development Experience, Himalaya Publishing House. 30th Revised Ed.
- Salvator, D L (2001): International Economics, Prentice Hall, Upper Saddle Rover, New York.
- Soderston, Bo. (1999), International Economics, The Macmillan Press Ltd. London.
- Yarbough, R.J. (1999), International Economics, International Thompson Publishing, New York.

Additional Reading List

- Bhagwati J. (1988), Protectionism, Cambridge University Press, Mass.
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (1987), The Development Process of the Indian Economy, Himalaya Publishing House, Bombay.
- Dana, M.S. (2000), International Economics: Study, Guide and Work Book, (5th Edition), Routledge Publishers, London.
- Goldsten, M. (1998), The Asian Financial crisis: causes cure and systematic implications, Institute of International Economics, Washington D.C.
- Hufbauer G.C. and K.A. Elliott (1994), Measuring the Costs of Protection in the United States, Institute for International Economics.
- Jackson, J. (1989),The World Trading System, Cambridge University Press, Mass.
- Joshi, V. and I.M.D. Little (1998), India's Economic Reforms, 1999-2000, Oxford University Press, New Delhi.
- King, P.G. (1995), International Economics and International Economic Policy: A Reader, McGraw Hill International, Singapore.
- Maggi, G. and A. Rodriguez-Clare (1998), "The Value of Trade Agreements in the Presence of Political Pressures," Journal of Political Economy, 106, 574-601.
- Mishkin, S.F. (1998), The Economics of Money, Banking and Financial Markets, (5th Edition), Harper Colins Publishers, New York.
- Panagariya, A. (2000), "Preferential Trade Liberalization: the Traditional Theory and new Developments," Journal of Economic Literature, 38, 287-331.
- Panchamukhi V.R. and R. Tandon (1987), Money and Finance in World Economic Order (RIS), Indus Publishing Co. Delhi.
- Panchmukhi, V.R. (1978), Trade Policies of India–A Quantitative Analysis, Concept Publishing Company, New Delhi.

- Patel, S. J. (1995), Indian Economy Towards the 21st Century, University Press Ltd., India.
- Pomfert, R. (1988), Unequal Trade: The Economics of Discriminatory International Trade Policies, Blackwell Publishers, Oxford.
- Satyanarayan, B. (1986), India's Trade with Asia and the Far East Countries, B.R. Publishing Corp., New Delhi.
- Vanderbussche, H. and M. Zanardi (2006), "The Global Chilling Effects of Antidumping Proliferation, "CEPR Discussion paper. 5597.

M.A. 3rd Semester
Paper-307

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF ENVIRONMENT AND SOCIAL SECTOR-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

This course is meant to provide some insights into the application of economic theory in the design and implementation of public policy related to the management of environment and social sectors. The course finds roots in welfare economics, national income accounting, macroeconomic policies and trade and development. Modules incorporated in this paper are devoted to issues of environmental economics, environmental and social services and the problem of valuation of these services, and designing of instruments and institutions for the management of environment. The models of optimal use of natural resources, macroeconomic issues, sustainable development, environmental resource problems in India and the economics of health and education constitute the other areas of the modules of this paper.

Unit - I

Environment, ecology and economy; Pareto optimality and perfect competition; External effects in production and consumption; Market failure in case of environmental goods - incomplete markets, externalities, non-exclusion; non-rivalry; non-convexities and asymmetric information.

Unit - II

Environmental policy framework in India - problems of command & control regime; New Environment Policy. Natural resources: types, classification and scarcity; Elementary capital theory; Economics of natural resources.

Unit – III

Economic instruments for environmental protection; Pollution charges, ambient charges, product charges, subsidies; Liability rules - non-compliance fees, deposit refund system, performance bonds. Marketable pollution permits; Evaluative criteria of and practical conditions for use of the economic incentives; Mixed instruments; Choice among policy instruments. Estimation of marginal cost of pollution abatement for designing the pollution tax.

Unit - IV

Coase's bargaining solution and collective action. Measures of economic value of environment WTP and WTAC; Contingent valuation method; Travel cost method; Hedonic market methods; Averting behaviour approach - household health production function method.

Reading List

- Henderson, J.M. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.
- Hanley, N., J.F. Shogern and B. White (1997), Environmental Economics in Theory and Practice, Macmillan.
- Cropper, Maureen (1999), Valuing Environmental Benefits, Edward Elgar.
- Sankar, U. (Ed.) (2001), Environmental Economics, Oxford University Press, New Delhi.
- James, A.J., M. N. Murty and Smita Misra (1999), Economics of Water Pollution – The Indian Experience, Oxford University Press, New Delhi.

M.A. 3rd Semester
Paper-308

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INDIAN ECONOMICS POLICY-1

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The objective of this Paper at the postgraduate level would be to sharpen the analytical faculty of the student, by highlighting an integrated approach to the functioning aspects of the Indian economy, keeping in view the scope for alternative approaches. Such an analysis is essential because the Indian economy is a unique amalgam of alternative competing and often conflicting theories and a proper understanding of its working is imperative if the student is to comprehend the ramifications that underlie most of the observed phenomena in the Indian economic set-up. The emphasis of the paper is on overall social, political and economic environment influencing policy decisions. To develop all these themes, the course is divided into specific modules.

Unit-I

Major features of Indian Economy in present times. Role of State and Market in economic development. Broad demographic features of Indian population; Rural-urban migration; Urbanization; Poverty and Inequality.

Unit-II

Institutional Structure – land reforms in India; Technological change in agriculture; pricing of agricultural inputs and output; Issues in food security; Policies for sustainable agriculture.

Unit-III

Fiscal federalism – Centre-state financial relations; Finances of Central Government; Finances of State Governments; Parallel economy; Problems relating to fiscal policy.

Unit-IV

Structure and direction of foreign trade; Balance of payments; Issues in export-import policy; Exchange rate policy and FEMA; Foreign capital and MNCs in India.

Reading List

- Ahluwalia, I.J. and I.M.D. Little (Eds.) (1999), India's Economic Reforms and Development (Essays in honour of Manmohan Singh), Oxford University Press, New Delhi.
- Bardha, P.K. (9th Edition) (1999), The Political Economy of Development in India, Oxford University Press, New Delhi.
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (2001), Development Experience in the Indian Economy: Inter-State Perspectives, Bookwell, Delhi.
- Datt, R. (Ed.) (2001), Second Generation Economic Reforms in India, Deep & Deep Publications, New Delhi.
- Government of India, Economic Survey, (Annual), Ministry of Finance, New Delhi.
- Government of India, Planning Commission; Five Year Plan Development.
- Jalan, B. (1992), The Indian Economy – Problems and Prospects, Viking, New Delhi.
- Jalan, B. (1996), India's Economic Policy- Preparing for the Twenty First Century, Viking, New Delhi.
- .Kapila Uma Indian Economy Academic Foundation New Delhi Latest Edition.
- Mishra S.K.and Puri V.K, Indian Economy Himalya Publication House Latest Edition.
- Monga G.S.and Goel M.M. (2001) Wage Goods Approach and Development Deep and Deep New Delhi.
- Parikh, K.S. (1999), India Development Report – 1999-2000, Oxford University Press, New Delhi.
- Reserve Bank of India, Report on Currency and Finance, (Annual).
- Rudar Dutt and Sundram; Indian Economy S Chand and Company Latest Edition
- Sen, R.K. and B. Chatterjee (2001), Indian Economy: Agenda for 21st Century (Essays in honour of Prof. P.R. Brahmananda), Deep & Deep Publications, New Delhi.
- Goel, MM (2011): Economics of Human Resource Development in India,VK Global Publications, New Delhi
- Goel, MM (2014): Indian Economy Long Term Challenges & Policy Measures, Monograph N.91 , A Guna Gaurav Nyas Publications Think Line

M.A. 3rd Semester
Paper-309

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF GROWTH AND DEVELOPMENT-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.
(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).
(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The study of economic development has gained importance because of sustained interest of the developing countries in uplifting their economic conditions by restructuring their economies to acquire greater diversity, efficiency and equity in consonance with their priorities. While few success stories can be counted, many have grappled with chronic problems of narrow economic base, inefficiency and low standard of living. For this and other reasons, there have been many approaches to economic development. In recent times, besides hardcore economic prescriptions to development, concerns hitherto relegated to background like education, health, sanitation and infrastructural development, have found a place of pride in explaining the preference of various economies. Modules incorporated in this paper are devoted to the theories of growth and development, social and institutional aspects of development, importance of agriculture, and the rationale and pattern of industrialization in developing countries. The other important issues in the context of development such as infrastructure-linkages, role of international trade, importance of domestic macroeconomic policies, investment criteria, and relevance of planning have been included in the modules of this paper.

Unit I

Concepts & Measurement of Economic Development

Economic growth, economic development and sustainable development; Historical Perspective of Economic Growth and its relevance; Structural Diversity and common characteristics of developing nations.

Measuring Development: Income Measures, Basic Needs Approach, PQLI, HDI and Capabilities Approach; Goulet's core values of development.

Poverty, Inequality and Development: Measurement, Impact and Policy options.

Unit-II

Classical Theories of Growth and Development

Contributions of Adam Smith, Ricardo, Karl Marx and Schumpeter, Rostow's Theory of Stages of Economic Growth.

Unit-III

Growth Models

Harrod and Domar: Instability of equilibrium; Neo Classical Growth Models: Solow and Meade; Growth Models of Joan Robinson, Kaldor and Pasinetti.

Unit-IV

Technological Progress

Embodied and Disembodied; Neutral and Non-Neutral (Hicks and Harrod); TFP and growth accounting; Endogenous Growth Theory: Role of learning, education and research; Accumulation of Human Capital; Explanation of Cross-Country Differentials in Economic Growth.

Basic Reading List

- Adelman, I. (1961), Theories of Economic Growth and Development, Stanford University Press, Stanford.
- Barro, R. and X. Salai- Martin, Economic Growth, McGraw Hill, New York.
- Behrman, S. and T.N. Srinivasan (1995), Handbook of Development Economics, Vol. 3, Elsevier, Amsterdam.
- Brown, M. (1966), On the Theory and Measurement of Technical Change, Cambridge University Press, Cambridge, Mass.
- Chakravarti, S. (1982), Alternative Approaches to the Theory of Economic Growth, Oxford University Press, New Delhi.
- Chenery, H. and T.N. Srinivasan (Eds.) (1989), Handbook of Development Economics, Vols. 1 & 2, Elsevier, Amsterdam.
- Ghatak, S. (1986), An Introduction to Development Economics, Allen and Unwin, London.
- Gillis, M., D.H. Perkins, M. Romer and D.R. Snodgrass (1992), Economics of Development, (3rd Edition), W.W. Norton, New York.
- Higgins, B. (1959), Economic Development, W.W. Norton, New York.
- Jones, HG.(1975), An Introduction to Modern Theories of Economic Growth, Nelson, London.
- Kindleberger, C.P. (1977), Economic Development, (3rd Edition), McGraw Hill, New York.
- Meier, G.M. and J.E.Rauch (2005), Leading Issues in Economic Development, (8th Edition), Oxford University Press, New Delhi.
- Sen, A.K. (Ed.) (1990), Growth Economics, Penguin, Harmondsworth.
- Todaro, M.P. and S.C. Smith (2003), (8th Edition), Economic Development, Pearson Education, Delhi.
- Thirlwal, A.P. (1999), (6th Edition), Growth and Development, Macmillan, U.K.

M.A. 3rd Semester
Paper- 310 (Option- i)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMETRICS–I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Applications of economic theory need a reasonable understanding of economic relationships and relevant statistical methods. The econometric theory thus becomes a very powerful tool for understanding of applied economic relationships and for meaningful research in economics. This paper accordingly is devoted to equip the students with basic theory of econometrics and relevant applications of the methods. The topics covered in the course include various problems faced in estimation of both single equations and simultaneous equations models. The course also covers various econometric methods applicable to different topics in economics and those needed for applied economic research. An introductory module on multivariate methods has also been included in the course which constitutes an important tool for analysis in multivariable data in development-related studies.

Unit – I

Definition, Scope and Methodology of Econometrics, Simple Linear Regression Model; OLS Estimates and Their Properties. Functional forms of Regression Models, Growth Rates.

Unit – II

General Linear regression Model, Maximum Likelihood Estimates and their properties. R^2 and adjusted R^2; Significance Testing of Parameters in Multiple Regression Analysis.

Unit – III

Nature, Test, Consequences and remedial steps of problem of Heteroscedasticity, Multicollinearity and Autocorrelation; Generalized Least Square.

Unit – IV

Types of Specification Errors, Errors of Measurement. The Simultaneous Equation bias and Consistency of OLS Estimators; The Identification Problem; Rules of Identification- Order and Rank Conditions.

Basic Reading List:

- Amemiya, T. (1985), Advanced Econometrics, Harvard University Press, Cambridge, Mass.
- Baltagi, B.H. (1988), Econometrics, Springer, New York.
- Goldberger, A.S. (1998), Introductory Econometrics, Oxford University Press, New York.
- Gujarati, D.N. (1995), Basic Econometrics (2^{nd} Edition) MC Graw Hill New Delhi.
- Intrilligator, M.D. (1978), Econometric Methods, Techniques and Applications, Prentice Hall Englewood Cliffs, New Jersey.
- Johnson J. (1991), Econometric Methods, MCGraw Hall Book Co. London
- Kmenta J. (1998), Elements of Econometrics, University of Michigan Press, NewYork
- Koutsoyiannis, A. (1977), Theory of Econometrics, The Macmillan Press Ltd. London
- Maddala G.S.(Ed) (1993), Econometric Methods and application, Aldershot U.K.
- Pindyck R.S. and D.L. Rubinfield (1976), Econometric Models and Economic Forecasts**,** MCGraw Hill Kogakusha Tokyo
- Theil H. (1981), Introduction to Econometrics**,** Prentice Hall of India, New Delhi

M.A. 3rd Semester
Paper-310 (Option-ii)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

HISTORY OF ECONOMICS THOUGHT-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The history of economic thought deals with different thinkers and theories in the field of economics from ancient medieval world to the present day. The history of economic thought is as old as human thought itself. It clearly demonstrates the continuous development of economic ideas from the very early times of civilization to the present day. Changes in economic thought have always accompanied changes in the economy and economic policy. The revised course attempts to cover different phases in the evolution of economic ideas including the contribution of liberal economic thinkers in the neo-liberalist phase.

Unit-I

General outline of Mercantilist theories: Physiocracy - Basic principles and policies, natural order, tableau economique; Classical Political Economy: Adam Smith : division of labour, Theory of Value, Economic Development.

Unit-II

David Ricardo : Theory of value, Theory of Distribution, Doctrine of Rent, Views on International Trade, Theory of Economic Development and the Stationary State, Critique by Sraffa; T.R. Malthus: Theory of Population and Theory of Gluts - Critics of Classicism.

Unit-III

Karl Marx: Materialistic Interpretation of history, Labour Theory of Value and Surplus Value, Neo-Classical School: Marshall: Consumers' Surplus, Tax bounty analysis, External Economies, Quasi-Rent, Role of time element in value; Pigou: Welfare Economics.

Unit-IV

Nobel Prize Winners in Economics
Tobin, Markowitz, Myrdal (1974), A.K.Sen (1998), Solow, Meade,

References

- Blaug, M 1997, Economic Theory in retrospect, Cambridge Universitypress, Cambridge
- Da Costa,G.C:Production,Prices and Distribution(1985)TMH,NewDelhi
- Dasgupta A.K.L1985) Epochs of Economic Theory ,Oxford Univ Press,New Delhi.
- Ekelund and Hebert :A History of Economic Theory and Method(1990)McGraw Hill Publ Co.New York.
- Eatwell,John, Murray Milgate ,Peter Newman(1998):The New Palgrave _A Dictionary of Economics, Macmillan Reference Ltd.
- Ghosh and Ghosh; Concise History of Economic Thought, Himalaya.
- Gill Richard: (1972)Evolution of Modern Economics,Prentice Hall ofIndia.
- Hunt E.K : (:1990) History of Economic Thought, Wodsworth.
- Morgan M. S.(1990), A History of Economic Ideas,Cambridge UnivPress. U.K.
- Oser Jacob,and S,.Brue L 1988)The Evolution of EconomicThought,Harcourt,NY
- Puttaswamaiah K.(1995) :Nobel Economists-Lives and Contributions,Indus Publ Co.,New Delhi.
- Roll, Eric : (1973) A History of Economic Thought, Faber, London.
- Seligman B.S: (1962),Main Currents In Modern Economics,Quadrangle, Chicago 32.
- Serepanti E,and Zamagui Stefano: An Outline of Economic Thought,OUP.
- Seshadri G.B:(1997),Economic Doctrines,B.R Publ Corp., New Delhi.
- Spiegel H.W. (1971) The Growth of Economic Thought, N.C .DukeUniv,Durham.
- Vohra P. and R. Mehta: Encyclopaedia of World Great Economists,Commonwealth.

M.A. 3rd Semester
Paper-310 (Option -iii)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF AGRICULTURE-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The objective of this course is to provide a detailed treatment of issues in Agricultural Economics to those intending to specialize in this area. Its objective is to familiarize students with policy issues that are relevant to Indian Agricultural Economics and enable them to analyze the issues using basic micro-economic concepts.

Unit - I

Introduction

Agricultural Economics: Definition, Nature and Scope; Role of Agriculture in Economic Development; Inter-Sectoral Linkages of Agriculture (Backward and Forward Linkages and Feedback Effects), Role of Agriculture in Haryana and Indian Economy, Farming as a business or way of life, Risks and Uncertainties in Agriculture.

Unit - II

Models of Agricultural Development

Ancient Economic Thought and Agriculture: Hebrew Economic Thought, Greek Economic Thought – Socrates, Plato, Aristotle; Roman Economic Thought; Medieval Economic Thought and Agriculture – St. Augustine; Physiocrats and Agriculture; Classical Economic Thought and Agriculture.

Unit - III

Agricultural Development and Policy in India

Indian Agriculture: Features, Problems and Trends; Agricultural Productivity in India – Causes of Low Productivity and Suggestions to increase Productivity in India; Agricultural Price Policy : origin, objectives, need, instruments, shortcomings and suggestions for Re-orientation of Agricultural Price Policy in India, Agriculture Marketing in India, Agricultural Development and Five Year Plans.

Unit - IV

Rural Unemployment and Poverty in India

Rural Unemployment : Nature, Magnitude, Causes and Suggestions to solve unemployment problem; Problems and Measures to improve the conditions of Agricultural Labourers, Rural Poverty, Inequalities in income distribution, Concept of Poverty Line and Measures to eradicate Poverty in India.

Basic Reading List

- Black, J.D. (1945), Introduction to Economics of Agriculture. MacMillan, New York.
- Bruce L., Gardener and Gordon C., Rausser (Eds.), Handbook of Agricultural Economics, Vol.1A, Agricultural Production, Amersterdam, Elsevier Science B.V.
- Bruce L., Gardener and Gordon C., Rausser (Eds.), Handbook of Agricultural Economics, Vol. 2B, Agricultural and Policy, Amsterdam, Elsevier Science B.V.
- Bruce L., Gardener and Gordon C., Rausser (Eds.),Handbook of Agricultural Economics, Vol.1B, Marketing, Distribution and Consumption, Amersterdam, Elsevier Science B.V.
- Bruce, L., Gardener and Gordon C., Rausser (Eds.), Handbook of Agricultural Economics, Vol.2A, Agricultural and Its External Linkages, Amsterdam, Elsevier Science B.V.
- Cohen, R.L. (1948), Economics of Agriculture, Nishet, London.
- Dantwala, M.L. et. al (1991), Indian Agricultural Development Since Independence, Oxford & IBH, New Delhi.
- Drummond H. Evan and Goodwin W. John (2006), Agricultural Economics, Pearson Education, New Delhi.
- Eicher Carl and Lawrence Witt (Eds.) (1964), Agriculture in Economic Development, New York, McGraw Hill Co.
- Forster, G.W. and Leoger, M.C. (1959), Elements of Agricultural Economics, Prentice Hall.
- Ghatak Subrata and Ken Ingersent, Agriculture and Economic Development, Harvestor Press Ltd., London.
- Goodwin, H.G. (1977), Economics of Agriculture, Reston Publiching Co.
- Halcrow, H.G.(1981), Economics of Agriculture, McGraw Hill International Book Agency.
- Meier, G.M. (1995), Leading Issues in Economic Development, Oxford University Press, New Delhi.
- Metcaff, D. (1969), Economics of Agriculture, Harmondsworth, Penguin Books.
- Nicholls, W.H. (1964), "The Place of Agriculture in Economics Development", in Eicher, C. and Witt, L.(ed) 1964, Agriculture in Economics Development, Vora & Co. Publishers Pvt. Ltd, Bombay.
- Ojala, E.M.(1950), Agriculture and Economic Progress, Oxford University Press, London.
- Southworth Herman and Bruce Johnston (eds.) (1968), Agricultural Development and Economic Growth, Cornell University Press, New York.

Additional Reading List

- Bilgrami, S.A.R. (1996), Agricultural Economics, Himalaya Publishing House, Delhi.
- Harque, T. and A.S. Sirohi (1986), Agrarian Reforms and Institutional Changes in India, Concept Publishing Company, Delhi.
- Lekhi, R.K. and Singh, Joginder (2010), Agricultural Economics, Kalyani Publishers, New Delhi.
- Sadhu and Singh (1991), Agricultural Problems in India, Himalaya Publishing House, New Delhi.

- Sadhu and Singh (2002), Fundamentals of Agricultural Economics, Himalaya Publishing House, New Delhi.
- Singh, Kuldeep (2010), "Agricultural Trajectories and Environment Dilemma : Some Evidence from Haryana", Agricultural Situation in India, Vol. LXVII, No. 3, June, 2010.
- Soni, R.N. (1995), Leading Issues in Agricultural Economics, Arihant Press, Jalandhar.

M.A. 3rd Semester
Paper-310 (Option-iv)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

WELFARE ECONOMICS – I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Evaluation of normative significance of economic events and issues forms the framework of welfare economics. Many applied branches of economics such as public finance, cost-benefit analysis, industrial economics and economics of government policy use welfare economic criteria as their foundation. The paper is divided into three modules — Pre-Paretian Welfare Economics, Paretian Welfare Economics and Later Developments.

Unit-I

Scope and Purpose of Welfare Economics; Benthamite Approach to Aggregate Welfare ; Assumption of Uniform Income – Utility Function of Individuals; Questions of Income Distribution; Issue of Interpersonal Comparisons of Utility.

Unit-II

Fairness, Equity and Distributive Justice; Marshallian Welfare Economics; Consumer's Surplus-Measurement, Difficulties involved and Criticism.

Unit-III

Hicks's Surpluses- Concept of Consumer's Surplus, Principle of Compensating Variation; Consumer's Surplus and Tax-Bounty Analysis.

Unit-IV

Optimum Resource Allocation and Welfare Maximization, Pareto optimality – Optimum exchange conditions, The production optimum, The consumption optimum, Concept of contract curve; Top level optimum.

Basic Reading List

- Boadway, R.W. and Neil,B. (1984), Welfare Economics, Basil Blackwell, Oxford.
- Little, I.M.D. (1958), A critique of Welfare Economics, Oxford University Press.

- Scitovsky,T.(1958), Welfare and Competition, GOERGE ALLEN AND UNWIN LTD.
- Sen,A.(1982), Choice,Welfare and Measurement, Basil Blackwell.
- Johansson(1991),An Introduction to Modern Welfare Economics,Cambridge University Press

Additional Reading List

- Baumol, W.J. (ed.) (2001), Welfare Economics, Edward Elgar Publishing Ltd., U.K.
- Pigou, A.C. (1962), The Economics of Welfare (4th Edition), Macmillan.
- Hicks, J.R. (1956), A Revision of Demand Theory, Clarendon Press, Oxford.
- Little, I.M.D. (1949), The Foundations of Welfare Economics, Oxford Economic Papers,Vol. 1.

M.A. 3rd Semester
Paper-310 (Option-v)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INDUSTRIAL ECONOMICS- I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

In the contemporary world with globalization and liberalization more and more attention is being given to industry. This course intends to provide knowledge to the students on the basic issues such as productivity, efficiency, capacity utilization and debates involved in the industrial development of India. The objective is to provide a thorough knowledge about the economics of industry in a cogent and analytical manner, particularly in the Indian context.

Unit-I

Concept and Organization of a firm – ownership, control and objectives of the firm; Passive and active behaviour of the firm; Growth of the firm –Theory and evidence, constraints on firm's growth;

Unit-II

Productivity, efficiency and Capacity utilization – concept and measurement; Indian situation.
Theories of industrial location – Weber and Sargent theories, Factors affecting location.

Unit-III

Sellers' concentration; Product differentiation; Entry conditions; Economies of Scale; Market structure and profitability; Market structure and innovation;
Product pricing – theories and evidence.

Unit-IV

Methods of project evaluation; Ranking of Projects – NPV and IRR; Social cost-benefit Analysis;
Theories and empirical evidence on Mergers and Acquisitions (M & A's) and diversification.

Basic Reading List

- Ahluwalia, I.J. (1985), Industrial Growth in India, Oxford University Press, New Delhi.
- Barthwal, R.R. (1985), Industrial Economics, Wiley Eastern Ltd. New Delhi.
- Cherunilam, F. (1994), Industrial Economics: Indian Perspective (3rd Edition), Himalaya Publishing House, Mumbai.
- Desai, B. (1999), Industrial Economy in India (3rd Edition), Himalaya Publishing House, Mumbai
- Divine, P.J. and R.M. Jones et. al. (1976), An Introduction to Industrial Economics, George Allen and Unwin Ltd., London.
- Government of India, Economic Survey (Annual).
- Hay, D. and D.J. Moris (1979), Industrial Economics: Theory and Evidence, Oxford University Press, New Delhi.
- Kuchhal, S.C. (1980), Industrial Economy of India (5th Edition), Chaitanya Publishing House, Allahbad.
- Reserve Bank of India, Report on Currency and Finance (Annual).

Additional Reading List

- Bains, J.S. (1996), Industrial Organization, Cheltanham, U.K.
- Harndeen, J.B. (1975), The Economics of Corporate Economy, Dunellen Publishers, New York.
- Kemien, M.T. and N.L. Schwartz (1982), Market Structure and Innovation, Cambridge University Press, Cambridge.
- Bagchi, A. and M. Banerjee (Eds.) (1979), Change and Choice in Indian Industry, Bagchi Publications, Calcutta.
- Kelkar, V.L. and V.V. Bhnoji Rao (Eds.) (1996), India Development Policy Imperatives, Tata McGraw Hill, New Delhi.
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (1987), The Development Process of the Indian Economy, Himalaya Publishing, Bombay.
- Chakravarty, S. (1987), Development Planning: The Indian Experience, Oxford University Press, New Delhi.
- Joshi, V. and I.M.D. Little (1999), India: Macro Economics and Political Economy: 1964-1991, Oxford University Press, New Delhi.
- Jalan, B. (1996), India's Economy Policy, Viking, New Delhi.
- Sen, R. and B. Chatterjee (2001), Indian Economy: Agenda for the 21st Century (Essays in honour of Professor P.R. Brahmananda), Deep and Deep Publications Pvt. Ltd., New Delhi.

M.A. 3rd Semester
Paper-310 (Option-vi)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

FINANCIAL MARKETS AND INSTITUTIONS-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit-I

Financial System

Meaning and Rationale of studying Financial System; Risk management in Financial Institutions; Risk management in Banks.

Interest Rate

Terms structure of Interest rate and Yield curve; Efficient Market Hypothesis.

Unit-II

Commercial Banking System

Meaning, Functions and Types of Commercial Banks ; Recent NPA Scenario in Indian Banking ; Banking sector reforms over last decade.

Central Banking System

Central Banking in India; Conduct of monetary policy in India; Role of RBI in Financial Stability and Financial inclusion.

Unit-III

Money Market

Introduction, Meaning and main characteristics of Money Market segments- Call Money Market, Treasury bill market, Commercial Papers Market, Certificate of Deposit Market, Gilt- edged Securities Market, Repo Market,

Functions and Importance of money market in India; Recent Developments in Indian Money Market; An introduction about Discounting services by DFHI and STCI.

Unit-IV

Capital Market

Meaning, Objectives, Importance and Functions of Capital Market; Financial instruments in primary capital Market; Characteristics and Functions of Stock Exchange.

Hedging with Financial derivatives- Futures, Options and Interest Swaps.

Reading List

- Bhasin, N. (2007), Banking and Financial System India 1947-2007, New Century Publications.
- Gupta,S.K , Aggarwal,N. and Gupta,N. (2005), Financial Institutions and Markets, Kalyani Publishers.
- Khan, M.Y.(2008) Indian Financial System. Tata McGraw Hill Company Ltd
- Mishkin, F.S and Eakins,S.G.(2009) Financial Markets and Institutions, (5th Edition) Dorling Kindersley.
- Bhole, L.M. and Mahakud, J.(2009), Financial Institutions and Markets-Structure, Growth and Innovations, Tata Mcgraw Hill.
- Madura, J.(2006) Financial Institutions and Markets (7th Edition), CENGAGE Learning.
- Fabozzi, F.J, Modigliani, F. Jones,F.J.and Ferri,M.G.(2009), Foundations of Financial Markets and Institutions, Dorling Kindesley.
- Mishkin, (2013) ' The economics of Money, Banking and Financial Markets'. 7e, Pearson Publications.
- Cecchetti, S.G. and Schoenholtz, K.L.(2013) , 'Money , Banking and Financial Markets' . 3rd edition. Tata McGraw Hill Company Ltd

- Bhole, L.M. (1999), Financial Institutions and Markets, Tata McGraw Hill Company Ltd., New Delhi.
- Bhole, L.M. (2000), Indian Financial System, Chugh Publications, Allahbad.
- Johnson, H.J. (1993), Financial Institutions and Markets, McGraw Hill, New York.
- Machiraju, M.R. (1999), Indian Financial Systems, Vikas Publishing House, New Delhi.
- Ohlson, J.A. (1987), The Theory of Financial Markets and Institutions, North Holland, Amsterdam.
- Prasad, K.N. (2001), Development of India's Financial System, Sarup & Sons, New Delhi.
- Smith, P.F. (1978), Money and Financial Intermediation: The Theory and Structure of Financial System, Prentice Hall, Englewood-Cliffs, New Jersey.
- Chandra, P. (1997), Financial Markets, (4th Edition), Tata McGraw Hill, New Delhi.
- Machiraju, H.R. (1997), International Financial Markets in India, Wheeler Publishing, Allahbad.
- Bhatt, R.S. (1996), Unit Trust of India and Mutual Funds: A Study, UTI Institute of Capital Markets, Mumbai.
- Sahadevan, K.G. and M.T. Thiripalraju (1997), Mutual Funds, Prentice Hall of India, New Delhi.
- Goss, B.A. and B.S. Yamey (1978), The Economics of Futures Trading, Macmillan, London
- Gupta, L.C. (Ed.) (1999), India's Financial Markets and Institutions, Society for Capital Research and Development, Delhi.
- Crocker, A. (1982), International Money; Issues and Analysis, The English Language Book Society, Nelson, London.
- Niehans, J. (1994), International Monetary Economics, John Hopkins University Press, New York.
- Official websites of IMF, RBI,SEBI

M.A. 3rd Semester
Paper- 310 (Option-vii)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF GENDER AND DEVELOPMENT- I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Gender biases in societal practices and development policies have resulted in persistent gender inequalities. It is increasingly being realized that mitigating such inequalities and enhancing women's capabilities and entitlements are crucial to the overall development of the country. This course "Economics of Gender and Development" would provide students an understanding of the nature of the economic role of women and their contribution to the national economy on the basis of a scientific and non-sexist analysis. The modules incorporated in this course provide an analysis of issues at the theoretical level and also with regard to specificity of issues prevailing in the Indian context.

Unit-I

Importance and concepts of women studies – women in patriarchal and matriarchal societies and structures, patrilineal and matrilineal systems and relevance to present day society in India; Economic basis and functioning of patriarchy in developed Countries and LDCs, particularly India.

Unit-II

Demography of female population: Age structure, mortality rates, and sex ratio – Causes of declining sex ratios and fertility rates in LDCs and particularly India – Theories and measurement of fertility and its control; Women and their access to nutrition, health, education and social and community resources, and its impact on female mortality and fertility, economic status, and work participation rate.

Unit-III

Factors affecting decision making by women; Property rights; access to and control over economic resources, assets; Power of decision making at household, class community level; Economic status of women and its effect on work-participation rate, income level, health, and education in developing countries and India.

Unit-IV

Concept and analysis of women's work: valuation of productive and unproductive work; visible and invisible work; paid and unpaid-work; economically productive and socially productive work .Factors affecting female entry in labour market; Supply and demand for female labour in developed and developing countries, particularly India; Studies of female work participation in agriculture, non-agricultural rural activities, informal sector, cottage and small-scale industries, organized industry and services sector.

Basic Reading List

- Boserup E. (1970), Women's Role in Economic Development, George Allen and Unwin, London.
- Desai, N. and M.K. Raj (Eds.) (1979), Women and Society in India, Research Center for Women Studies, SNDT Unviersity, Bombay
- Government of India (1974), Towards Equality – Report of the Committee on the Status of Women in India, Department of Social Welfare, Ministry of Education and Social Welfare, New Delhi.
- Krishnaraj, M., R.M. Sudarshan and A. Shariff (1999), Gender, Population and Development, Oxford University Press, New Delhi.
- Seth, M. (2000), Women and Development: The Indian Experience, Sage Publications, New Delhi.
- Srinivasan K. and A. Shariff (1998), India: Towards Population and Development Goals, Oxford University Press, New Delhi.
- Venkateswaran S. (1995), Environment, Development and the Gender Gap, Sage Publications, New Delhi.
- Wazir, R. (2000), The Gender Gap in Basic Education: NGOs as Change Agents, Sage Publications, New Delhi.

M.A. 3rd Semester

Paper- 310 (Option viii)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS HISTORY OF ASEAN COUNTRIES, CHINA, SOUTH KOREA AND JAPAN-I

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit – I

Problems of Economic History of ASEAN: China, Japan and South Korea, Different Approaches of Study and Their Limitations, Sources for the study of Modern Economic History of ASEAN: China, Japan and South Korea.

Unit - II

China, Japan and South Korea during the first half of the 20th century: Industrial Development and effects of industrial development, Labour Organization and Labour Problems.The population problems, Foreign Trade, Agrarian Settlements and Changes in the Agrarian Life, Development of credit and Banking System.

Unit – III

Economy of ASEAN during the Second half of the 20th century: Economic and Educational Reforms, The Land Reforms and changes in Agrarian Life, Industrialization.

Unit – IV

Foreign Trade, Development of Roads and Railways, Competition and Collaboration with Global Economy, Internal Aspects of the Economic problem, China, Japan and South Korea.

Reading List:

- 'Reshaping the Asia Pacific Economic Order", by Hadi Soesastro, Christopher Charles Findley, 2006, 286 P.
- "Institutional Balancing in the Asia Pacific: economic" by Kaithe 2009, P. 209.

- "China and World Economy" by Zhouggno she hui ke Xue Yawn shi jie juia ji, 2002.
- "Strategic consequences of India's Economic Essays" by Sanjay Baru published in 2006.
- "A New look at the US-China-Japan Triangle" Toward Building a Stable Framework" Asian Perspectives, Vol. 27, No3, 2003, PP 177-219 by Yoshihide Soeya, Jianweiwang and David A Weleh.
- "The Economic History of Korea" by Myung soo Cha, Yeunguam University. EH. Net Encyclopedia.
- "Economic Growth and Democratization in North East Asia, Part I & II.
- "The Rise of China and its effectson Taiwan, Japan and South Korea" US Policy choices, Jan. 2006 Dick K Nanto.
- "America and Japan Approach a Rising China" by Dan Blumenthal, Dec. 2006.
- "Look East: India's Economic ties with Japan, South Korea, China, 3 Dec. 2009.
- "China, Japan and South Korea to consider Free trade Pact" Oct. 11, 2009 MYT.

Kurukshetra University, Kurukshetra
M. A. Economics

w.e.f. 2017-2018

Course Structure

M.A. Economics (Semester IV)		**Total Marks**	**External**	**Internal**	**Time**	**Credits* L+T+P**
Core Papers						
Paper-406	International Trade and Finance-II	100	80	20	3 Hrs.	4+1+0
Paper-407	Economics of Environment and Social Sector-II	100	80	20	3 Hrs.	4+1+0
Paper-408	Indian Economic Policy-II	100	80	20	3 Hrs.	4+1+0
Paper-409	Economics of Growth and Development-II	100	80	20	3 Hrs.	4+1+0
Elective Papers						
Paper-410						
Option (i)	Econometrics-II	100	80	20	3 Hrs.	4+1+0
Option (ii)	History of Economic Thought-II	100	80	20	3 Hrs.	4+1+0
Option (iii)	Economics of Agriculture-II	100	80	20	3 Hrs.	4+1+0
Option (iv)	Welfare Economics-II	100	80	20	3 Hrs.	4+1+0
Option (v)	Industrial Economics-II	100	80	20	3 Hrs.	4+1+0
Option (vi)	Financial Markets and Institutions-II	100	80	20	3 Hrs.	4+1+0
Option (vii)	Economics of Gender and Development-II	100	80	20	3 Hrs.	4+1+0
Option (viii)	Economic History of ASEAN Countries, China, South Korea and Japan-II	100	80	20	3 Hrs.	4+1+0

Total Credits **25**

Note: Students are required to select an option from Paper-410 from the same stream which they selected in Semester III.

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

M.A. 4th Semester
Paper-406

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INTERNATIONAL TRADE AND FINANCE-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The course provides a deep understanding about the broad principles and theories, which tend to govern the free flow of trade in goods, services and capital — both short-term and long-term — at the global level. Besides, preparing the students about the relevance and limitations of these principles, the contents of the paper spread over different modules, lay stress on the theory and nature of the subject which, in turn, will greatly help them to examine the impact of the trade policies followed both at the national and international levels as also their welfare implications at macro level and the distribution of gains from trade to North and South with particular reference to India. The study of the paper under the present era of globalization will train the students about the likely consequences on income, employment and social standards and possible policy solutions as the world will move into the 21st century.

Unit-I

Balance of Payments

Meaning and components of balance of payments; Equilibrium and disequilibrium in the balance of payments;

Process of adjustment under gold standard; Automatic adjustment mechanism through fixed exchange rates and flexible exchange rate., Foreign Exchange Market: Expectations (Spot rate, forward exchange rate, Speculative Pressures) and Exchange Rate.

Unit-II

Expenditure changing Polices(Monetary and fiscal policy), Expenditure-Switching Policies and Direct Controls for Balance of payment Equilibrium.; Monetary approach to Balance of Payment Equilibrium.; Foreign trade multiplier(with and without foreign repercussions); and determination of national income in an open Economy.

Unit-III

The International Monetary System

International Monetary Fund-Working and conditionality clause of International monetary Fund; Functions and Achievements of GATT/WTO, UNCTAD, World Bank and India.

The Theory of Regional Blocs

Forms of economic cooperation; Static and Dynamic effects of a customs union and free trade area; SAARC, ASEAN, EU; Asian Economic Integration : Rationale and Economic Progress.

Unit-IV

Trade Policies in India

Trade problems and trade policies in India during the last five decades; Recent changes in the direction and composition of trade and their implications; Rationale and impact of trade reforms since 1991 on balance of payments, employment and Growth; FDI and Sectoral Growth in India.

Basic Reading List

- Chacholiades, M. (1990), International Trade: Theory and Policy, McGraw Hill, Kogkusha, Japan.
- Cherunilam, F. (2008): International Economics, The Tata McGraw-Hill Companies, New Delhi. 5th Ed.
- Dunn R.M. and J.H. Mutt (2000), International Economics, Routledge, London.
- Kindlberger, C P (1991): International Economics, R D Irwin, Homewood.8th Ed.
- Krugman, P.R. and Obstfeld, M. (1994), International Economics: Theory and Policy, Glenview, Foresman.
- Mishra, S.K. and Puri, V.K. (2012), Indian Economy- Its Development Experience, Himalaya Publishing House. 30th Revised Ed.
- Rudar Dutt and Sundram; Indian Economy S Chand and Company Latest Edition
- Salvator, D L (2001): International Economics, Prentice Hall, Upper Saddle Rover, New York.
- Soderston, Bo. (1999), International Economics, The Macmillan Press Ltd. London.
- Yarbough, R.J. (1999), International Economics, International Thompson Publishing, New York.

Additional Reading List

- Bhagwati J. (1988), Protectionism, Cambridge University Press, Mass.
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (1987), The Development Process of the Indian Economy, Himalaya Publishing House, Bombay.
- Dana, M.S. (2000), International Economics: Study, Guide and Work Book, (5th Edition), Routledge Publishers, London.
- Goldsten, M. (1998), The Asian Financial crisis: causes cure and systematic implications, Institute of International Economics, Washington D.C.
- Hufbauer G.C. and K.A. Elliott (1994), Measuring the Costs of Protection in the United States, Institute for International Economics.
- Jackson, J. (1989),The World Trading System, Cambridge University Press, Mass.
- Joshi, V. and I.M.D. Little (1998), India's Economic Reforms, 1999-2000, Oxford University Press, New Delhi.
- King, P.G. (1995), International Economics and International Economic Policy: A Reader, McGraw Hill International, Singapore.
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- Panchmukhi, V.R. (1978), Trade Policies of India–A Quantitative Analysis, Concept Publishing Company, New Delhi.
- Patel, S. J. (1995), Indian Economy Towards the 21st Century, University Press Ltd., India.
- Pomfert, R. (1988), Unequal Trade: The Economics of Discriminatory International Trade Policies, Blackwell Publishers, Oxford.
- Satyanarayan, B. (1986), India's Trade with Asia and the Far East Countries, B.R. Publishing Corp., New Delhi.
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M.A. 4th Semester
Paper- 407

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF ENVIRONMENT AND SOCIAL SECTOR-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

This course is meant to provide some insights into the application of economic theory in the design and implementation of public policy related to the management of environment and social sectors. The course finds roots in welfare economics, national income accounting, macroeconomic policies and trade and development. Modules incorporated in this paper are devoted to issues of environmental economics, environmental and social services and the problem of valuation of these services, and designing of instruments and institutions for the management of environment. The models of optimal use of natural resources, macroeconomic issues, sustainable development, environmental resource problems in India and the economics of health and education constitute the other areas of the modules of this paper.

Unit-I

Concept and indicators of sustainable development - sustainability rules, Common-Perrings model; The Solow/Hartwick approach to sustainability. System of integrated environmental and economic accounting (SEEA).

Unit-II

Management of common property resources; CPRs, LDCs and sustainable development; Subsidies, controls and use of natural capital in India. Political Economy of ecology and equity. Gender perspective in environmental management.

Unit-III

Environment and energy; Water resource planning; Water and air pollution - existing pollution control mechanisms; People's participation in the management of common and forest lands; The institutions of joint forest management and the joint protected area management; Social forestry — rationale and benefits. Wetlands. Global environmental issues- problems in managing climate change; International trade and environment; Trade and environment in WTO regime.

Unit-IV

Education as an instrument for economic growth; Important issues in basic and higher education; Education and labour market — Effects of education, ability and family background on earnings, poverty and income distribution, education and employment; production function models, growth accounting equations of Schultz and Denison, Manpower requirements approach; Economic dimensions of health care and determinants of health; Role of Government and market in health care; Inequalities in health and education – the class and gender perspective; Financing of education and health in India.

Reading List

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- Chary, S.N. and Vyasulu, Vinod (2000), Environmental Management - an Indian Perspective, Macmillan, New Delhi.
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- Psacharopoulos, G. 1973. Returns to Education: An International Comparison. Amsterdam:Elsevier.
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- Education and Economic Growth, Robert J. Barro, pdf from internet.
- Painuly, J P, Economic Instruments: Application to Environmental Problems, Working paper no 3, by UNEP from IGIDR, Bombay, 1995.
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- Hussen, A.M. (1999), Principles of Environmental Economics, Routledge, London.
- Jeroen. C.J.M. van den Berg (1999), Handbook of Environmental and Resource Economics, Edward Elgar Publishing Ltd., U.K.
- Pearce, D.W. and R. Turner (1991), Economics of Natural Resource Use and Environment, John Hopkins University Press, Baltimore.

M.A. 4th Semester
Paper- 408

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INDIAN ECONOMIC POLICY-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The objective of this Paper at the postgraduate level would be to sharpen the analytical faculty of the student, by highlighting an integrated approach to the functioning aspects of the Indian economy, keeping in view the scope for alternative approaches. Such an analysis is essential because the Indian economy is a unique amalgam of alternative competing and often conflicting theories and a proper understanding of its working is imperative if the student is to comprehend the ramifications that underlie most of the observed phenomena in the Indian economic set-up. The emphasis of the paper is on overall social, political and economic environment influencing policy decisions. To develop all these themes, the course is divided into specific modules.

Unit-I

Five year Plans with emphasis on latest plan. Infrastructural development- issues and policies in its financing.

Unit -II

Industrial policy; Public Sector enterprises and their performance; Privatization and dis- investment debate; Micro and Small-scale Industries ; Labour sector reforms.

Unit -III

Analysis of price behaviour in India; Review of monetary policy of the Reserve Bank of India (RBI) with emphasis on latest developments; Banking Sector reforms in India.

Unit IV

Globalization of Indian economy; WTO and its impact on the different sectors of the economy; Rationale of and issues in good governance.

Reading List

- Ahluwalia, I.J. and I.M.D. Little (Eds.) (1999), India's Economic Reforms and Development (Essays in honour of Manmohan Singh), Oxford University Press, New Delhi.

- Bardha, P.K. (9th Edition) (1999), The Political Economy of Development in India, Oxford University Press, New Delhi.
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (2001), Development Experience in the Indian Economy: Inter-State Perspectives, Bookwell, Delhi.
- Datt, R. (Ed.) (2001), Second Generation Economic Reforms in India, Deep & Deep Publications, New Delhi.
- Government of India, Economic Survey, (Annual), Ministry of Finance, New Delhi.
- Government of India, Planning Commission; Five Year Plan Development.
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- Reserve Bank of India, Report on Currency and Finance, (Annual).
- Rudar Dutt and Sundram; Indian Economy S Chand and Company Latest Edition
- Sen, R.K. and B. Chatterjee (2001), Indian Economy: Agenda for 21st Century (Essays in honour of Prof. P.R. Brahmananda), Deep & Deep Publications, New Delhi.
- Goel, MM (2011): Economics of Human Resource Development in India, VK Global Publications, New Delhi.
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M.A. 4th Semester
Paper- 409

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF GROWTH AND DEVELOPMENT – II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The study of economic development has gained importance because of sustained interest of the developing countries in uplifting their economic conditions by restructuring their economies to acquire greater diversity, efficiency and equity in consonance with their priorities. While few success stories can be counted, many have grappled with chronic problems of narrow economic base, inefficiency and low standard of living. For this and other reasons, there have been many approaches
to economic development. In recent times, besides hardcore economic prescriptions to development, concerns hitherto relegated to background like education, health, sanitation and infrastructural development, have found a place of pride in explaining the preference of various economies. Modules incorporated in this paper are devoted to the theories of growth and development, social and institutional aspects of development, importance of agriculture, and the rationale and pattern of industrialization in developing countries. The other important issues in the context of development such as infrastructure-linkages, role of international trade, importance of domestic macroeconomic policies, investment criteria, and relevance of planning have been included in the modules of this paper.

Unit-I

Approaches to Development

Balanced and Unbalanced Growth; Critical Minimum Efforts Theory; Low Income Equilibrium Trap; Dual Economy: Models of Lewis, Fei-Ranis, Jorgensen, Basic idea of Dixit and Marglin, Kelly et.al.

Unit-II

Sectoral Aspects of Development

Role of Agriculture in Economic Development; Heterogeneity in Agriculture; Agricultural Transformation: Designing Strategy for Agriculture Transformation; Rationale and Pattern of Industrialization in developing Countries; Choice of Techniques, appropriate technology and employment; Terms of Trade between Agriculture and Industry.

Services Sector in Developing Economies: Role, growth and sustainability, Infrastructure and its importance.

Unit-III

Trade and Development Experience

International Trade as an Engine of Growth: Static and Dynamic gains from Trade; Prebisch-Singer Thesis vis-à-vis Free Trade experience of Developing Countries; Trade Policy Debate: Export promotion, Import Substitution and Economic Integration; WTO and Developing Countries, International Organizations IMF and World Bank.

Unit-IV

State and Economic Development

Market Failure & Rational of state in Economic development; State Capacity and State Failure; Good Economic Governance.

Development Planning: Financial System & Macroeconomic Stability, Fiscal Policy for inclusive Growth.

Basic Reading List:

- Behrman, S. and T.N. Srinivasan (1995), Handbook of Development Economics, Vol. 3, Elsevier, Amsterdam.
- Bhagwati, J. and P. Desai (1970), India: Planning for Industrialization, Oxford University Press, London.
- Brown, M. (1966), On the Theory and Measurement of Technical Change, Cambridge University Press, Cambridge, Mass.
- Chakravarti, S. (1982), Alternative Approaches to the Theory of Economic Growth, Oxford University Press, New Delhi.
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- Chenery, H. and T.N. Srinivasan (Eds.) (1989), Handbook of Development Economics, Vols. 1 & 2, Elsevier, Amsterdam.
- Dasgupta, P. (1993), An Enquiry into Well-being and Destitution, Clarendon Press, Oxford.
- Ghatak, S. (1986), An Introduction to Development Economics, Allen and Unwin, London.
- Gillis, M., D.H. Perkins, M. Romer and D.R. Snodgrass (1992), Economics of Development, (3rd Edition), W.W. Norton, New York.
- Grossman, G. and E. Helpman (1991), Innovation and Growth in the Global Economy, MIT Press, Cambridge, Mass.
- Higgins, B. (1959), Economic Development, W.W. Norton, New York.
- Hirschman, A.O. (1958), The Strategy of Economic Development, Yale University Press, New York.
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- Lewis, W.A. (1955), The Theory of Economic Growth, George Allen and Unwin, London.
- Meier, G.M. and J.E.Rauch (2005), Leading Issues in Economic Development, (8th Edition), Oxford University Press, New Delhi.
- Nayyar, D. (Ed.) (1994), Industrial Growth and Stagnation: The Debate in India, Oxford University Press, New Delhi.
- Sen,A. (1983), Poverty and Famines, Oxford University Press, Oxford.

- Sen, A.K.(Ed.) (1990), Growth Economics, Penguin, Harmondsworth.
- Sen, A. (1992), Inequality Reexamined, Oxford University Press, Oxford.
- Todaro, M.P. and S.C. Smith (2003), (8th Edition), Economic Development, Pearson Education, Delhi.
- Thirlwal, A.P. (1999), (6th Edition), Growth and Development, Macmillan, U.K.

M.A. 4th Semester
Paper- 410 (Option- i)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMETRICS–II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Applications of economic theory need a reasonable understanding of economic relationships and relevant statistical methods. The econometric theory thus becomes a very powerful tool for understanding of applied economic relationships and for meaningful research in economics. This paper accordingly is devoted to equip the students with basic theory of econometrics and relevant applications of the methods. The topics covered in the course include various problems faced in estimation of both single equations and simultaneous equations models. The course also covers various econometric methods applicable to different topics in economics and those needed for applied economic research. An introductory module onmultivariate methods has also been included in the course which constitutes an important tool for analysis in multivariable data in development-related studies.

Unit – I

Auto Regressive and Distributed lag Models- Koyak Model, Partial Adjust Model, Adaptive Expectations; Almon Approach to distributed- lag model; Causality tests; Granger and Sim's Test.

Unit – II

Dummy Variable Technique- Testing Structural Stability of Regression Models, Comparing two regressions, interaction effects, seasonal analysis, piecewise linear Regression; Regression with dummy dependent variables; The LPM , Logit and Probit Models.

Unit – III

Methods of Estimating Simultaneous Equation System; Indirect Least Squares (ILS), Instrumental Variables (IV) , 2SLS and 3SLS Methods. Basic idea and outline of Limited Information Maximum Likelihood (LIML), FIML & SURE Methods. Application to theory of firm – Estimation of Cobb Douglas and CES Production Functions.

Unit – IV

Time Series ; Stationarity, Unit Roots, Co-Integration, Dicky Fuller Test, Random Walk Model, Forecasting with ARIMA and VAR Models-Box Jenkins Methodology, Vector Auto Regression (VAR).
Introduction to Panel Data Methods: Problems with panel data, Pooled OLS, Random effects and fixed effects models.

Basic Reading List:

- Amemiya, T. (1985), Advanced Econometrics, Harvard University Press, Cambridge, Mass.
- Baltagi, B.H. (1988), Econometrics, Springer, New York.
- Goldberger, A.S. (1998), Introductory Econometrics, Oxford University Press, New York.
- Gujarati, D.N. (1995), Basic Econometrics (2nd Edition) MC Graw Hill New Delhi.
- Intrilligator, M.D. (1978), Econometric Methods, Techniques and Applications, Prentice Hall Englewood Cliffs, New Jersey.
- Johnson J. (1991), Econometric Methods, MCGraw Hall Book Co. London
- Kmenta J. (1998), Elements of Econometrics, University of Michigan Press, NewYork.
- Koutsoyiannis, A. (1977), Theory of Econometrics, The Macmillan Press Ltd. London
- Maddala G.S.(Ed) (1993), Econometric Methods and application, Aldershot U.K.
- Pindyck R.S. and D.L. Rubinfield (1976), Econometric Models and Economic Forecasts, MCGraw Hill Kogakusha Tokyo
- Theil H. (1981), Introduction to Econometrics, Prentice Hall of India, New Delhi.
- Shyamala S., Navdeep Kaur & T. Arul Pragasam (2009) " A Text book on Econometrics Theory and Applications" Vishal Publishing Company Jalandhar.

M.A. 4th Semester
Paper-410 (Option-ii)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

HISTORY OF ECONOMIC THOUGHT - II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The history of economic thought deals with different thinkers and theories in the field of economics from ancient medieval world to the present day. The history of economic thought is as old as human thought itself. It clearly demonstrates the continuous development of economic ideas from the very early times of civilization to the present day. Changes in economic thought have always accompanied changes in the economy and economic policy. The revised course attempts to cover different phases in the evolution of economic ideas including the contribution of liberal economic thinkers in the neo-liberalist phase.

Unit-I

Institutionalism: Veblen - Theory of the leisure class, Commons; Frank Knight : Theory of Profit, Risk and Uncertainty; Schumpeter : Vision of Development and the demise of Capitalism

Unit-II

Keynesianism: Principle of Effective demand, consumption function, multiplier, investment function, liquidity preference theory of interest, role of fiscal policy, uncertainty and role of expectations.

Unit-III

Post Keynesian Developments :Hayek - Supply side economics : Arthur Laffer, Evans Monetarism : Milton Friedman' Don Patinkin - An overview of the neo classical economics: Ratex-JF Muth, Robert Lucas, Sargent and Wallace.

Unit-IV

Nobel Prize Winners in Economics
Tobin, Markowitz, Myrdal (1974)

References

- Blaug, M 1997, Economic Theory in retrospect, Cambridge Universitypress, Cambridge
- Da Costa,G.C:Production,Prices and Distribution(1985)TMH,NewDelhi
- Dasgupta A.K.L1985) Epochs of Economic Theory ,Oxford Univ Press,New Delhi.
- Ekelund and Hebert :A History of Economic Theory and Method(1990)McGraw Hill Publ Co.New York.
- Eatwell,John, Murray Milgate ,Peter Newman(1998):The New Palgrave _A Dictionary of Economics, Macmillan Reference Ltd.
- Ghosh and Ghosh; Concise History of Economic Thought, Himalaya.
- Gill Richard: (1972)Evolution of Modern Economics,Prentice Hall ofIndia.
- Hunt E.K : (:1990) History of Economic Thought, Wodsworth.
- Morgan M. S.(1990), A History of Economic Ideas,Cambridge UnivPress. U.K.
- Oser Jacob,and S,.Brue L 1988)The Evolution of EconomicThought,Harcourt,NY
- Puttaswamaiah K.(1995) :Nobel Economists-Lives and Contributions,Indus Publ Co.,New Delhi.
- Roll, Eric : (1973) A History of Economic Thought, Faber, London.
- Seligman B.S: (1962),Main Currents In Modern Economics,Quadrangle, Chicago 32.
- Serepanti E,and Zamagui Stefano: An Outline of Economic Thought,OUP.
- Seshadri G.B:(1997),Economic Doctrines,B.R Publ Corp., New Delhi.
- Spiegel H.W. (1971) The Growth of Economic Thought, N.C .DukeUniv,Durham.
- Vohra P. and R. Mehta: Encyclopaedia of World Great Economists,Commonwealth.

M.A. 4th Semester
Paper-410 (Option-iii)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF AGRICULTURE-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

The objective of this course is to provide a detailed treatment of issues in Agricultural Economics to those intending to specialize in this area. Its objective is to familiarize students with policy issues that are relevant to Indian Agricultural Economics and enable them to analyze the issues using basic micro-economic concepts.

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Unit I

Agricultural Production and Productivity

Agricultural Production- Stock and Flow Resources, Production Relationships, Resource use and efficiency; Production Functions analyses in agriculture; Factor Relationships – Isoquant and Iso Cost Line, Optimum Combination; Product Relationships – Joint Products, Competitive Products, Supplementary Products and Antagonistic Products; Diversification of Agricultural Production – Horticulture and Floriculture, Mushroom Cultivation and Processing of Agricultural Products.

Unit II

Agricultural Credit

Role of capital and rural credit; Organized and unorganized capital market; Rural savings and capital formation; Characteristics and Sources of rural credit- Institutional and non institutional; Reorganization of rural credit- cooperatives, commercial banks, regional rural banks; Role of the NABARD.

Unit III

Development Theory and Agriculture

Schultz's Transformation of Traditional Agriculture,
Mellor's Model of Agricultural Development,
Boserup Model of Agriculture Development,
Hayami - Ruttan Induced Innovation Hypothesis.

Unit IV

Recent Agricultural Problems in India

Issues in liberalization of domestic and international trade in agriculture, Impact of the World Trade Organization on Indian Agriculture; Agriculture and Environment- Sustainable Development, Food Security and International Trade – Concept, Threat, Indicators and Mechanism to Food Security.

Basic Reading List

- Black, J.D. (1945), Introduction to Economics of Agriculture. MacMillan, New York.
- Bruce L., Gardener and Gordon C., Rausser (Eds.), Handbook of Agricultural Economics, Vol.1A, Agricultural Production, Amersterdam, Elsevier Science B.V.
- Bruce L., Gardener and Gordon C., Rausser (Eds.), Handbook of Agricultural Economics, Vol. 2B, Agricultural and Policy, Amsterdam, Elsevier Science B.V.
- Bruce L., Gardener and Gordon C., Rausser (Eds.),Handbook of Agricultural Economics, Vol.1B, Marketing, Distribution and Consumption, Amersterdam, Elsevier Science B.V.
- Bruce, L., Gardener and Gordon C., Rausser (Eds.), Handbook of Agricultural Economics, Vol.2A, Agricultural and Its External Linkages, Amsterdam, Elsevier Science B.V.
- Cohen, R.L. (1948), Economics of Agriculture, Nishet, London.
- Dantwala, M.L. et. al (1991), Indian Agricultural Development Since Independence, Oxford & IBH, New Delhi.
- Drummond H. Evan and Goodwin W. John (2006), Agricultural Economics, Pearson Education, New Delhi.
- Eicher Carl and Lawrence Witt (Eds.) (1964), Agriculture in Economic Development, New York, McGraw Hill Co.
- Forster, G.W. and Leoger, M.C. (1959), Elements of Agricultural Economics, Prentice Hall.
- Ghatak Subrata and Ken Ingersent, Agriculture and Economic Development, Harvestor Press Ltd., London.
- Goodwin, H.G. (1977), Economics of Agriculture, Reston Publiching Co.
- Gulati, A. and T. Kelly (1999), Trade Liberalisation and Indian Agriculture, Oxford University Press, New Delhi.
- Halcrow, H.G.(1981), Economics of Agriculture, McGraw Hill International Book Agency.
- Meier, G.M. (1995), Leading Issues in Economic Development, Oxford University Press, New Delhi.
- Metcaff, D. (1969), Economics of Agriculture, Harmondsworth, Penguin Books.
- Nicholls, W.H. (1964), "The Place of Agriculture in Economics Development", in Eicher, C. and Witt, L.(ed) 1964, Agriculture in Economics Development, Vora & Co. Publishers Pvt. Ltd, Bombay.
- Ojala, E.M.(1950), Agriculture and Economic Progress, Oxford University Press, London.
- Rao, C.H. Hanumantha (1994), Agricultural Growth, Rural Poverty and Environmental Degradation in India, Oxford University Press, New Delhi.
- Rudra, A. (1982), Indian Agricultural Economics: Myths and Reality, Allied Publishers, New Delhi.
- Southworth Herman and Bruce Johnston (eds.) (1968), Agricultural Development and Economic Growth, Cornell University Press, New York.
- Taylor, H.C.(1949), Outlines of Agriculture Economics, MacMillan, New York.

Additional Reading List

- Bilgrami, S.A.R. (1996), Agricultural Economics, Himalaya Publishing House, New Delhi.

- Harque, T. and A.S. Sirohi (1986), Agrarian Reforms and Institutional Changes in India, Concept Publishing Company, Delhi.
- Kumar, Rajesh (2010), India's Export in Processed Food Products : Status & Potential, an Unpublished Thesis of the Department of Economics, K.U.K.
- Lekhi, R.K. and Singh, Joginder (2010), Agricultural Economics, Kalyani Publishers, New Delhi.
- Rana, Sarita (2002), Global Marketing in Floricultural Products : Challenges and Prospects for India, an Unpublished Thesis of the Department of Economics, K.U.K.
- Rani, Vandna (2004), Economics of Mushroom Cultivation in Haryana, an Unpublished Thesis of the Department of Economics, K.U.K.
- Sadhu and Singh (1991), Agricultural Problems in India, Himalaya Publishing House, New Delhi.
- Sadhu and Singh (2002), Fundamentals of Agricultural Economics, Himalaya Publishing House, New Delhi.
- Singh, Kuldeep (2006), "Indian Agriculture Trade in Pre and Post WTO Regime : A Comparative Study", K.U.R.J.(Arts & Humanities), Vol. XL, Jan- Dec., 2006.
- Soni, R.N. (1995), Leading Issues in Agricultural Economics, Arihant Press, Jalandhar.
- Sundaram I. Satya (2009), Rural Development, Himalaya Publishing House , New Delhi.

M.A. 4th Semester
Paper-410 (Option-iv)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

WELFARE ECONOMICS – II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Evaluation of normative significance of economic events and issues forms the framework of welfare economics. Many applied branches of economics such as public finance, cost-benefit analysis, industrial economics and economics of government policy use welfare economic criteria as their foundation. The paper is divided into three modules — Pre-Paretian Welfare Economics, Paretian Welfare Economics and Later Developments.

Unit-I

Pigovian welfare economics; Compensation criteria – Contributions of Barone, Kaldor and Hicks. The Scitovsky double criterion; Samuelson's utility possibility curve; Choice Functions and Revealed Preference.

Unit-II

Value judgements and welfare economics: Bergson's social welfare function, Arrow's impossibility theorem; Second-best optima.

Unit-III

Divergence between private and social costs; Problems of non-market interdependence; Externalities of production and consumption; Problem of public goods; The Role of The State.

Unit-IV

Marginal cost pricing; Cost-benefit analysis; Welfare Analysis of Risky Projects; The Value of Information and Irreversible Consequences; Welfare Theory and International Trade.

Basic Reading List

- Boadway, R.W. and Neil,B. (1984), Welfare Economics, Basil Blackwell, Oxford.
- Little, I.M.D. (1958), A critique of Welfare Economics, Oxford University Press.
- Scitovsky,T.(1958), Welfare and Competition, GOERGE ALLEN AND UNWIN LTD.

- Sen,A.(1982), Choice,Welfare and Measurement, Basil Blackwell.
- Johansson(1991),An Introduction to Modern Welfare Economics,Cambridge University Press

Additional Reading List

- Baumol, W.J. (ed.) (2001), Welfare Economics, Edward Elgar Publishing Ltd., U.K.
- Pigou, A.C. (1962), The Economics of Welfare (4th Edition), Macmillan.
- Hicks, J.R. (1956), A Revision of Demand Theory, Clarendon Press, Oxford.
- Little, I.M.D. (1949), The Foundations of Welfare Economics, Oxford Economic Papers,Vol. 1.

M.A. 4th Semester
Paper-410 (Option-v)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INDUSTRIAL ECONOMICS - II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.
(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).
(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

In the contemporary world with globalization and liberalization more and more attention is being given to industry. This course intends to provide knowledge to the students on the basic issues such as productivity, efficiency, capacity utilization and debates involved in the industrial development of India. The objective is to provide a thorough knowledge about the economics of industry in a cogent and analytical manner, particularly in the Indian context.

Unit-I

Industrial Policy in India – evolution and paradigm shift; Recent trends in Indian industrial growth; National manufacturing Policy 2011; MNCs, transfer of technology and issues related with TRIMS.

Unit-II

Regional industrial growth in India; Industrial economic concentration and remedial measures; MRTP and Competition Act, 2002.
Development of Cottage and Small Scale industries; Recent Policy Measures.

Unit-III

Industrial Finance; Sources of short term and long term finance; Industrial Financial Institutions: Role and functioning in India; Corporate securities; Ownership and creditorship securities.

Unit-IV

Structure of Industrial labour; Globalization and labour ; Gender Dimensions of industrial labour; Industrial legislation – Industrial Disputes Act ,1947 and Factories Act, 1948 . Industrial relations – Worker's participation in management and Collective Bargaining; Exit policy and safety nets; Second National Commission on Labour Report.

Basic Reading List

- Ahluwalia, I.J. (1985), Industrial Growth in India, Oxford University Press, New Delhi.
- Arun Monappa- Industrial Relations,Tata Mcgraw Hill,1997.
- Barthwal, R.R. (2000), Industrial Economics, Wiley Eastern Ltd. New Delhi.
- Cherunilam, F. (1994), Industrial Economics: Indian Perspective (3rd Edition), Himalaya Publishing House, Mumbai.
- C.S. Venkata Ratnam-Industrial Relations ,Oxford University Press,2008.
- Chadha, V. and G.S. Bhalla (1999), Industrial Development in India: The Post Reform Scene, Kalyanai Publishers, New Delhi.
- Desai, B. (1999), Industrial Economy in India (3rd Edition), Himalaya Publishing House, Mumbai.
- Hajela, F.D. (1998), Labour Restructuring in India : A Critique of the New Economic Policies, Commonwealth Publishers, New Delhi.
- Government of India, Economic Survey (Annual).
- Kuchhal, S.C. (1980), Industrial Economy of India (5th Edition), Chaitanya Publishing House, Allahbad.
- Mishra &Puri-Indian Economy, Himalaya Publishing House ,2008
- Reserve Bank of India, Report on Currency and Finance (Annual).
- Ratna Sen-Industrial Relations in India Shifting Paradigms,Mcmillan,2005
- Website of Labour Ministry (Government of India)

Additional Reading List

- Bains, J.S. (1996), Industrial Organization, Cheltanham, U.K.
- Bagchi, A. and M. Banerjee (Eds.) (1979), Change and Choice in Indian Industry, Bagchi Publications, Calcutta.
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (1987), The Development Process of the Indian Economy, Himalaya Publishing, Bombay.
- Chakravarty, S. (1987), Development Planning: The Indian Experience, Oxford University Press, New Delhi.
- Chandra, Prasanna (1995), Projects: Planning Analysis, Selection, Implementation and Review, Tata McGraw Hill Publishing Co. Ltd., New Delhi
- Harndeen, J.B. (1975), The Economics of Corporate Economy, Dunellen Publishers, New York.
- Joshi, V. and I.M.D. Little (1999), India: Macro Economics and Political Economy: 1964-1991, Oxford University Press, New Delhi.
- Jalan, B. (1996), India's Economy Policy, Viking, New Delhi.
- Kemien, M.T. and N.L. Schwartz (1982), Market Structure and Innovation, Cambridge University Press, Cambridge.
- Kelkar, V.L. and V.V. Bhnoji Rao (Eds.) (1996), India Development Policy Imperatives, Tata McGraw Hill, New Delhi.
- Mamoria and Mamoria (2000), Dynamics of Industrial Relations in India (15th Edition), Himalaya Publishing House, Mumbai.
- Sen, R. and B. Chatterjee (2001), Indian Economy: Agenda for the 21st Century (Essays in honour of Professor P.R. Brahmananda), Deep and Deep Publications Pvt. Ltd., New Delhi.

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M.A. 4th Semester
Paper-410 (Option-vi)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

FINANCIAL MARKETS AND INSTITUTIONS-II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.
(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).
(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit-I

Insurance Market
Meaning, Types and Principles of Life Insurance and General Insurance; Rationale for opening up of the Insurance to Private Sector,
Emerging Scenario in Insurance Sector in India; Main features of Working of LIC.

Unit-II

International Finance
Foreign Exchange Rate- Meaning, Types; Foreign Exchange market- Importance, Trading and Participants, International Financial and Monetary System; Working and Functions of IMF.

Unit-III

Financial Institutions
Functions and Importance of Merchant Bankers, Functions and Types of Mutual Funds, Main features of Working of UTI.
Meaning and Functions of NBFC's- Credit Unions, Savings and Loan Associations, Pension Funds, Finance Company, Investment Trusts, Common Trusts Fund.

Unit-IV

Regulatory Framework of Financial Institutions in India
Role, Main Features and Functions of -- Forward Markets Commission (FMC), Securities and Exchange Board of India(SEBI), Pension Fund Regulatory and Development Authority (PFRDA), Insurance Regulatory and Development Authority (IRDA).
Financing and refinancing institutions in India
Functions and working of Small Industries Development Bank of India (SIDBI), National Bank for Agriculture and Rural Development (NABARD), Export-Import Bank of India (EXIM) National Housing Bank (NHB).
Reading List

- Bhasin, N. (2007), Banking and Financial System India 1947-2007, New Century Publications.
- Gupta,S.K , Aggarwal,N. and Gupta,N. (2005), Financial Institutions and Markets, Kalyani Publishers.
- Khan, M.Y. Indian Financial System.
- Mishkin, F.S and Eakins,S.G.(2009) Financial Markets and Institutions, (5th Edition) Dorling Kindersley.
- Bhole, L.M. and Mahakud, J.(2009), Financial Institutions and Markets-Structure, Growth and Innovations, Tata Mcgraw Hill.
- Madura, J.(2006) Financial Institutions and Markets (7th Edition), CENGAGE Learning.
- Fabozzi, F.J, Modigliani, F. Jones,F.J.and Ferri,M.G.(2009), Foundations of Financial Markets and Institutions, Dorling Kindesley.
- Mishkin, (2013) ' The economics of Money, Banking and Financial Markets'. 7e, Pearson Publications.
- Cecchetti, S.G. and Schoenholtz, K.L.(2013) , 'Money , Banking and Financial Markets' . 3rd edition. Tata McGraw Hill Company Ltd

- Bhole, L.M. (1999), Financial Institutions and Markets, Tata McGraw Hill Company Ltd., New Delhi.
- Karampal, Bodla,B.S. and Garg,M.C.(2007), 'Insurance Management : Principles and Practices' Deep and Deep

- Bhole, L.M. (2000), Indian Financial System, Chugh Publications, Allahbad.
- Johnson, H.J. (1993), Financial Institutions and Markets, McGraw Hill, New York.
- Machiraju, M.R. (1999), Indian Financial Systems, Vikas Publishing House, New Delhi.
- Ohlson, J.A. (1987), The Theory of Financial Markets and Institutions, North Holland, Amsterdam.
- Prasad, K.N. (2001), Development of India's Financial System, Sarup & Sons, New Delhi.
- Smith, P.F. (1978), Money and Financial Intermediation: The Theory and Structure of Financial System, Prentice Hall, Englewood-Cliffs, New Jersey.
- Chandra, P. (1997), Financial Markets, (4th Edition), Tata McGraw Hill, New Delhi.
- Machiraju, H.R. (1997), International Financial Markets in India, Wheeler Publishing, Allahbad.
- Bhatt, R.S. (1996), Unit Trust of India and Mutual Funds: A Study, UTI Institute of Capital Markets, Mumbai.
- Sahadevan, K.G. and M.T. Thiripalraju (1997), Mutual Funds, Prentice Hall of India, New Delhi.
- Goss, B.A. and B.S. Yamey (1978), The Economics of Futures Trading, Macmillan, London
- Gupta, L.C. (Ed.) (1999), India's Financial Markets and Institutions, Society for Capital Research and Development, Delhi.
- Crocker, A. (1982), International Money; Issues and Analysis, The English Language Book Society, Nelson, London.
- Niehans, J. (1994), International Monetary Economics, John Hopkins University Press, New York.
- Official websites of IMF, RBI,UTI, LIC, FMC, SEBI, PFRDA, IRDA, SIDBI, NABARD, EXIM, NHB

M.A. 4th Semester
Paper- 410 (Option-vii)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF GENDER AND DEVELOPMENT - II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.
(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).
(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

PREAMBLE

Gender biases in societal practices and development policies have resulted in persistent gender inequalities. It is increasingly being realized that mitigating such inequalities and enhancing women's capabilities and entitlements are crucial to the overall development of the country. This course "Economics of Gender and Development" would provide students an understanding of the nature of the economic role of women and their contribution to the national economy on the basis of a scientific and non-sexist analysis. The modules incorporated in this course provide an analysis of issues at the theoretical level and also with regard to specificity of issues prevailing in the Indian context.

Unit-I

Wage differential in female activities; Determinants of wage differentials: Gender, education, skill, productivity, efficiency, opportunity; Structure of wages across regions and economic sectors.

Unit-II

Impact of technological development and modernization on women's work participation in general and in various sectors such as agriculture, non-agriculture rural activities, small and cottage industries and organized industry.

Unit-III

Female activities, ecological and environmental concern: the two way relationship - Role of new technologies for helping women – Provision of information and training for simple harvesting of economic services.

Unit-IV

Review of legislation for women's entitlements, protection of property rights, social security. Gender and development indices; Mainstreaming gender into development policies; Gender-planning techniques; Gender sensitive governance.

Basic Reading List

- Boserup E. (1970), Women's Role in Economic Development, George Allen and Unwin, London.
- Desai, N. and M.K. Raj (Eds.) (1979), Women and Society in India, Research Center for Women Studies, SNDT University, Bombay
- Government of India (1974), Towards Equality – Report of the Committee on the Status of Women in India, Department of Social Welfare, Ministry of Education and Social Welfare, New Delhi.
- Krishnaraj, M., R.M. Sudarshan and A. Shariff (1999), Gender, Population and Development, Oxford University Press, New Delhi.
- Seth, M. (2000), Women and Development: The Indian Experience, Sage Publications, New Delhi.
- Srinivasan K. and A. Shariff (1998), India: Towards Population and Development Goals, Oxford University Press, New Delhi.
- Venkateswaran S. (1995), Environment, Development and the Gender Gap, Sage Publications, New Delhi.
- Wazir, R. (2000), The Gender Gap in Basic Education: NGOs as Change Agents, Sage Publications, New Delhi.

M.A. 4th Semester

Paper- 410 (Option viii)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMIC HISTORY OF ASEAN COUNTRIES, CHINA, SOUTH KOREA AND JAPAN- II

Note: (i) Nine Question will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type questions of 2 marks spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit – I

Contemporary Economic History: East ASEAN Economic Development, Globalization and Economic Development in East Asia; Dictatorship and Democratizations in South East Asia, South East Asia globalization and Social Change.

Unit – II

Economic Reforms and Their impact on: Agriculture, Industry and Service Sector in ASEAN, China, South Korea and Japan.Trade Development Strategies: Export Promotion versus Import Substitution in ASEAN, China, South Korea and Japan.

Unit – III

Trade, Investment and Monetary Cooperation: Forging an integrated Asia-Pacific Region. Welfare Gains from Regional Economic Integration in Asia: ASEAN and China, South Korea and Japan. Monetary and Financial Cooperation in Asia; Reducing Global Imbalances.

Unit – IV

Regional Cooperation for Energy Security: Asian Energy outlook to 2020: Trends; Regional Cooperation for Asian Energy Security; Climate change and Asian Economic Development; India's role in Asian Economic Community; East Asia Summit, European Union, NAFTA, APEC, and their impact on Asian Economic Integration.

Reading List:

- 'Reshaping the Asia Pacific Economic Order", by Hadi Soesastro, Christopher Charles Findley, 2006, 286 P.
- "Institutional Balancing in the Asia Pacific: economic" by Kaithe 2009, P. 209.
- "China and World Economy" by Zhouggno she hui ke Xue Yawn shi jie juia ji, 2002.
- "Strategic consequences of India's Economic Essays" by Sanjay Baru published in 2006.
- "A New look at the US-China-Japan Triangle" Toward Building a Stable Framework" Asian Perspectives, Vol. 27, No3, 2003, PP 177-219 by Yoshihide Soeya, Jianweiwang and David A Weleh.
- "The Economic History of Korea" by Myung soo Cha, Yeunguam University. EH. Net Encyclopedia.
- "Economic Growth and Democratization in North East Asia, Part I & II.
- "The Rise of China and its effectson Taiwan, Japan and South Korea" US Policy choices, Jan. 2006 Dick K Nanto.
- "America and Japan Approach a Rising China" by Dan Blumenthal, Dec. 2006.
- "Look East: India's Economic ties with Japan, South Korea, China, 3 Dec. 2009.
- "China, Japan and South Korea to consider Free trade Pact" Oct. 11, 2009 MYT.

M.A. Business Economics
Proposed Credits According to CBCS in the Course Structure

TO BE IMPLEMENTED FROM 2016-17

SEMESTER-I

PAPER CODE	NOMENCLATUR (Compulsory)	EXTERNAL	INTERNAL	TIME	CREDITS
CORE PAPERS					
MABE 101	MICRO ECONOMIC ANALYSIS	80	20	3 Hrs.	4+1+0
MABE 102	MATHEMATICAL AND STATISTICAL TECHNIQUES	80	20	3 Hrs.	4+1+0
MABE 103	COMPUTER APPLICATIONS IN BUSINESS ECONOMICS	60+20	20	3 Hrs.	4+0+1
MABE 104	MANAGEMENT AND ORGANISATION BEHAVIOUR	80	20	3 Hrs.	4+1+0
MABE 105	MATHEMATICAL ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 106	SEMINARS		50		0+2+0
Total		550			27

SEMESTER-II

PAPER CODE	NOMENCLATUR (Compulsory)	EXTERNAL	INTERNAL	TIME	CREDITS
CORE PAPERS					
MABE 201	MACRO ECONOMIC ANALYSIS AND POLICY	80	20	3 Hrs.	4+1+0
MABE 202	FUNDAMENTALS OF ECONOMETRICS	80	20	3 Hrs.	4+1+0
MABE 203	ACCOUNTING FOR BUSINESS ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 204	PUBLIC ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 205	INTERNATIONAL ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 206	COMPREHENSIVE VIVA-VOCE	50			0+0+2
Total		550			27

SUMMER TRAINING

Each student is required to go on 6 weeks summer training in any business organisation after 2nd semester examinations. He/she has to prepare a training report on the project undertaken in the concerned business organisation and submit a copy of this report duly certified by the authorised signatory from the same business organisation. This project report is to be submitted latest by 30th november and will be externally evaluated in the 3rd semester and carries a weightage of 100 marks.

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

SEMESTER-III
w.e.f 2017-18

PAPER CODE	NOMENCLATUR (Compulsory)	EXTERNAL	INTERNAL	TIME	CREDITS
CORE PAPERS					
MABE 301	OPERATIONS RESEARCH	80	20	3 Hrs.	4+1+0
MABE 302	ADVANCED MICROECONOMICS	80	20	3 Hrs.	4+1+0
MABE 303	SUMMER TRAINING REPORT	100			0+0+4
MABE 304	SEMINARS		50		0+2+0
Elective Papers **CHOOSE ANY ONE OF THE FOLLOWING ELECTIVE GROUPS**					
GROUP-I **ECONOMICS OF MARKETING**					
MABE 311	MARKETING MANAGEMENT	80	20	3 Hrs.	4+1+0
MABE 312	INTERNATIONAL MARKETING	80	20	3 Hrs.	4+1+0
MABE 313	CONSUMER BEHAVIOUR AND MARKETING RESEARCH	80	20	3 Hrs.	4+1+0
GROUP-II **ECONOMICS OF FINANCE**					
MABE 321	ECONOMICS OF CORPORATE FINANCE	80	20	3 Hrs.	4+1+0
MABE 322	INVESTMENT AND PORTFOLIO MANAGEMENT	80	20	3 Hrs.	4+1+0
MABE 323	PROJECT MANAGEMENT	80	20	3 Hrs.	4+1+0
GROUP-III **ECONOMICS OF HUMAN RESOURCES**					
MABE 331	LABOUR ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 332	ECONOMICS OF HUMAN RESOURCE DEVELOPMENT	80	20	3 Hrs.	4+1+0
MABE 333	ENTREPRENEURSHIP DEVELOPMENT	80	20	3 Hrs.	4+1+0
GROUP-IV **ECONOMICS OF AGRICULTURE AND RESOURCES**					
MABE 341	AGRICULTURE ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 342	DEMOGRAPHY	80	20	3 Hrs.	4+1+0
MABE 343	ENVIRONMENTAL ECONOMICS	80	20	3 Hrs.	4+1+0
GROUP-V **ECONOMICS OF TAXATION**					
MABE 351	DIRECT TAXES-I	80	20	3 Hrs.	4+1+0
MABE 352	VAT AND SERVICE TAX	80	20	3 Hrs.	4+1+0
MABE 353	THEORY OF TAXATION	80	20	3 Hrs.	4+1+0
Total		650			31

SEMESTER-IV

w.e.f 2017-18

PAPER CODE	NOMENCLATUR (Compulsory)	EXTERNAL	INTERNAL	TIME	CREDITS
CORE PAPERS					
MABE 401	TIME SERIES AND BUSINESS FORECASTING	80 (Theory 60 + Practical 20)	20	3 Hrs.	4+1+0
MABE 402	INDIA IN THE CONTEMPORARY WORLD ECONOMY	80	20	3 Hrs.	4+1+0
MABE 403	ECONOMICS OF GROWTH AND DEVELOPMENT	100	20	3 Hrs.	0+0+4
MABE 404	COMPREHENSIVE VIVA VOCE	50			0+2+0
Elective Papers **CHOOSE ANY ONE OF THE FOLLOWING ELECTIVE GROUPS**					
GROUP-I **ECONOMICS OF MARKETING**					
MABE 411	MARKETING OF SERVICES	80	20	3 Hrs.	4+1+0
MABE 412	INTEGRATED PROMOTIONAL MANAGEMENT	80	20	3 Hrs.	4+1+0
GROUP-II **ECONOMICS OF FINANCE**					
MABE 421	FINANCIAL DERIVATIVES AND RISK MANAGEMENT	80	20	3 Hrs.	4+1+0
MABE 422	FINANCIAL INSTITUTIONS AND MARKETS	80	20	3 Hrs.	4+1+0
GROUP-III **ECONOMICS OF HUMAN RESOURCES**					
MABE 431	CROSS CULTURAL AND GLOBAL HRD	80	20	3 Hrs.	4+1+0
MABE 432	ORGANISATIONAL CHANGE AND DEVELOPMENT	80	20	3 Hrs.	4+1+0
GROUP-IV **ECONOMICS OF AGRICULTURE AND RESOURCES**					
MABE 441	INDUSTRIAL ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 442	ECONOMICS OF INFRASTRUCTURE	80	20	3 Hrs.	4+1+0
GROUP-V **ECONOMICS OF TAXATION**					
MABE 451	DIRECT TAXES-II	80	20	3 Hrs.	4+1+0
MABE 452	CORPORATE TAX PLANNING	80	20	3 Hrs.	4+1+0
Total		550			26

Total Marks: 2300

Total Credits: 111 **GRAND TOTAL = 2300**

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

MABE - 1st Semester
Paper- MABE 101 (Compulsory)

Total Credit : 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MICRO ECONOMIC ANALYSIS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Consumer behaviour: Law of demand, Basic ideas of demand estimation and forecasting; Indifference curve approach to demand: Price, Income and Substitute effects (Hicks); Applications of Indifference Curve Analysis; The Consumer's Surplus (Marshall and Hicks);
Elasticity (Price, cross, income) of Demand and Supply and their applications

Unit II

Objectives of the firm; Production functions; Law of Variable Proportions; capacity utilization; Estimation of Production and Cost functions, Break Even Analysis; Equilibrium of the firm-single and multi-product firm; Theories of costs – traditional and modern; Analysis of economies of scale.

Unit III

Pricing and output decisions under different forms of market structure - Perfect Competition, Monopoly, Bilateral Monopoly, Price Discrimination and Monopolistic Competition (Chamberlin's approach)

Unit IV

Different models of Pricing- Mark up Pricing, Marginal Cost Pricing, factor Pricing, Peak-Load pricing, Transfer pricing; Oligopoly – Non-collusive Models- Cournot, Bertrand, Chamberlin, Kinked-demand curve and. Collusive models- Market sharing cartels, Price leadership models.

Reading List

- Jones, Trefor (2004): Business Economics and Managerial Decision Making, USA John
- Keat,Paul G. and Young Philip K.Y.(1996) , Managerial Economics. : Economic Tools for Today's Decision Makers, Prentice Hall.
- Koutsoyiannis, A. (1979), Modern Microeconomics, (2nd Edition), Macmillan Press, London.
- Salvatore D(2006), Microeconomics-Theory and Applications, Oxford University Press
- Varian, H. (2003), Intermediate Microeconomics, East-West Press.
  Wiley and Sons
- Damodaran, Suma,(2006:. Managerial Economics, U.K.Oxford University Press.
  Mansfied, Edwin (1997): Applied Microeconomics,USA, W.W. Norton and Co.
- Pindyck and Rubinfeld (2002): Microeconomics, India, Prentice Hall,
- Archibald, G.C. (Ed.) (1971), Theory of the Firm, Penguin, Harmondsworth.
- Baumol, W.J. (1982), Economic Theory and Operations Analysis, Prentice Hall of India, New Delhi.
- Boyes.W and Melvin. M , Micro economics, Houghton Mifflin Company Boston Newyork.
- Collel A.,Whinston and Green (2012), MicroEconomic Theory, Oxford University Press.
- Da Costa, G. C. (1980), Production, Prices and Distribution, Tata McGraw Hill, New Delhi.
- Goodwin, Nelson,Ackerman and WeissKopf(2009), Micro Economics in context, PHI Learning Private Limited.
- Gravelle,H.and Rees,R.(2008), Micro Economics, Dorling Kindersley.
- Green H.A.G. (1971), Consumer Theory, Penguin, Harmondsworth.
- Gupta K.R.(2009), Advanced MicroEconomics, Atlantic Publishers and Distributors LTD
- Healthfields and Wibe (1987), An Introduction to Cost and Production Functions, Macmillan, London.
- Henderson, J.M. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.
- Hirshleifer, J. and A. Glazer (1997), Price Theory and Applications, Prentice Hall of India, New Delhi.
- Jehle Geoffrey A.and Reny Philip J (2008), Advanced Micro Economic Theory, Dorling Kindersley (India)
- Kreps, David M. (1990), A Course in Microeconomic Theory, Princeton University Press, Princeton.
- Krugman, Paul and Robin Wells, (2008): Microeconomics,USA, Worth Publishers
- Layard, P.R.G. and A.W. Walters (1978), Microeconomic Theory, McGraw Hill, New York.
- Lipsey and Chrystal(2014), Economics, Oxford University Press
- Mankiw(2006),Principles of Microeconomics,Cengage Learning
- Mansfield Edwin, Applied MicroEconomics, W.W.Norton ,New York London.
- Sen, A. (1999), Microeconomics: Theory and Applications, Oxford University Press, New Delhi.
- Sen,A.(2007), Micro Economics: Theory and applications. Oxford University Press.
- Varian, H. (2000), Microeconomic Analysis, W.W. Norton, New York.

MABE - 1st Semester
Paper- MABE 102 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks: 100
External : 80
Internal : 20

MATHEMATICAL AND STATISTICAL TECHNIQUES

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Arithmetic Progression (A.P.) and Geometric Progression (G.P.): Definition, sum of A.P. and G.P. series, Arithmetic and Geometric means, Application of A.P. and G.P. in solving business problems
Determinants and Matrices: Determinants of second and third order, properties of determinant, simple problems, solutions of simultaneous equations and solutions of business problems involving simultaneous equations by Cramer's rule, Definition of Matrices over real numbers, Types of Matrices, matrix operations, Transpose of a square matrix, Inverse of a matrix through adjoint, Application of matrices in solving business problems.

Unit II

Differential Calculus: Concepts of function, Limit and Continuity, Definition of derivative, Rules for differentiation, , Derivative of a function of a function, Second order derivative, Maximum and Minimum of functions involving one variable only, Concept of partial derivative.
Integral Calculus: Rules for integration, Integration by substitution and by parts, concept of definite integral

Unit III

Correlation and Regression: Karl Pearson's Coefficient of Correlation, Rank Correlation, Regression lines, Regression equations, Regression coefficients.
Index Numbers: Uses and Types, Tests for consistency, Base shifting, Splicing and Deflating of index numbers. **Probability Theory**: Probability–Classical, Relative, and subjective probability; Addition and Multiplication Probability models. **Probability Distributions**: Binomial. Poisson, and Normal distributions; their characteristics and applications

Unit IV

Types of Data and Statistical Analysis Procedures: Univariate, Bivariate and Multivariate (only overview); **Sampling**:Basic concepts , Random and Non-Random sampling.
Hypothesis Testing: Procedure based on Z, t, x^2 and F-test and one-way ANOVA

Reading List

- Business Mathematics, and Statistics, R.K. Ghosh, S. Saha, New Central Book Agency
- (Pvt.) Ltd.Mathematics for Economics –Dowling E.T. –Schawn Series, McGraw Hill, London.
- Mathematics for Business studies –J.K. Thukural –Mayoor Paperbacks.
- Mathematics and Statistics –Goel, Ajoy and Aloka, Taxman Allied Servies (P) Ltd.
- Speigal, M. R. Theory and Prodblems of Statistics, McGraw Hill Book, London
- Croxton, F. E., D. . Cowden and S. Kliein, Applied General Statistics, Prentice Hall, New Delhi.
- Gupta S.C. and V.K. Kapoor, Fundamentals of Applied Statistics, S. Chand and Sons New Delhi.
- Gupta S. C. Fundamentals of statistics, Himalaya Publishing house, New Dehlhi.
- Gupta S.P. and Gupta M. P. Business statistics, Sultan chand and sons, New Delhi.
- Quantitative Methods for Business and Economics by Adil H. Mouhammed, PHI, New Delhi, 2003.
- Taro Yamane, Mathematics for Economists, PHI, 1973.
- Black, J. and J.F. Bradley (1973), Essential Mathematics for Economists, John Wiley and Sons

MABE - 1st Semester
Paper- MABE 103(Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

COMPUTER APPLICATIONS IN BUSINESS ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Introduction to Computer Fundamentals: History and Evolution of Computers; Classification of Computers and their applications; Hardware, Software and Types of Software; Operating System- Meaning and Functions; Types of memory; Input-Output Devices.

Application Softwares: Windows based operating system; Word Processing – Document Management and Formatting; Main Features of MS Access and Presentation software.

Unit II

Problem Solving with Spreadsheets; Spreadsheet as DBMS; Arithmetic & Geometric Progressions; Solution of Simultaneous Equation with Matrices; Mathematical, Statistical & Financial Functions; Graphical Analysis in Economics; Time-path of economic variables.

Unit III

Statistical Processing Techniques and Methods: Summarizing and analysis of data, Descriptive Statistics; Calculation of Mean, Correlation and Regressing analysis, Estimation of Growth Rates, Trends Forecasting; Construction of Index numbers; Moving Averages.

Unit IV

E-commerce-meaning, basis, scope; Electronic Transactions and security issues; E- governance in India; Use of IT for development; Information System for a business organization; Information flow and requirements; information system design approaches; Decision Support Systems; Data mining and analytics.

Basic Reading List

- Sinha, P.K. , Computer Fundamental, BPB Publications, New Delhi.
- Rajaraman, V. Fundamentals of Computers, Prentice Hall of India, New Delhi.
- Parameswaranm R. Computer Applications in Business, S. Chand and Company, New Delhi.
- Sudalaimuthu, S. and Anthony Raj S, Computer Applications in Business, Himalays Publishing House, New Delhi.
- Goel, Sushil, Computer Application to Business & E-Commerce, Natraj Publishing House, Karanl.
- Madan, Sushila, Information Technology, Taxman Allied Services, New Delhi.
- P.T. Joseph, S.J. , E- Commerce : An Indian Perspective, PHI Learning , New Delhi.
- Lipschultz, M.M. and S. Lipschultz , Theory and Problems of Data Processing, Schaum's Outline Series, McGraw Hill, New York.
- David Whiteley, E-Commerce: Strategy, Technologies and Applications, Tata McGraw Hill, New Delhi.

MABE Ist Semester
Paper-MABE 104 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MANAGEMENT AND ORGANISATIONAL BEHAVIOUR

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Meaning, Nature and Importance of Management; Management Functions; Co-Ordination; Principles of Management; Major School of Management Thought: An Overview; Planning: Importance of Planning, Types of Plans, Planning and Decision Making Process.

Unit II

Process of Organizing and Control; Introduction to Organizational Behaviour in Management; Foundations of Individual Behaviour –Personality, Perception, Learning; Values; Attitudes

Unit III

Motivation; Job Design and Goal Setting; Group: Foundations of Group Behaviour; Communication and Group Decision Making; Interactive Conflict and Negotiation; Occupational Stress.

Unit IV

Leadership: Power and Politics; Organizational Theory and Design; Organisational Culture: Meaning, Importance and Characteristics of Organization Culture; Organisation Change: Significance, Forces and Resistance.

Reading List:

- Luthans, Fred, Organizational Behaviour, 7 th ed., McGraw-Hill, New York.
- Koontz, Harold, Cyril 'O' Donnell, And Heinz Weihrich, Essentials of Management,Fourth Edition, McGraw-Hill, Singapore.
- Cook, Curtis, Phillip Hunsaker and Robert Coffey, Management and Organisation Behaviour, McGraw Hill Co., New York, 2000.
- Griffin, Ricky W., Organisational Behaviour, Houghton Mifflin Co., Boston.
- Hellreigel, Don, John W. Slocum, Jr., and Richard W. Woodman, Organizational Behaviour, South Western College Publishing, Ohio.
- Hersey and Blanchard, Management of Organisational Behaviour: Utilising Human Resources, 7th ed., Prentice Hall of India Ltd., New Delhi.
- Ivancevich, John and Michael T. Matheson, Organisational Behaviour and Management, Business Publication Inc., Texas.
- Koontz, Harold, Cyril 'O' Donnell, And Heinz Weihrich, Essentials of Management, Fourth Edition, McGraw-Hill, Singapore.
- Luthans, Fred, Organizational Behaviour, 7 th ed., McGraw-Hill, New York.
- Nelson, Debra L. and James Campbell Quick, Organizational Behaviour, West Publishing Company, St. Paul.
- Newman and Warren, The Process of Management: Concepts, Behaviour and Practice, Prentice Hall of India Ltd., New Delhi.
- Newstrom, John W. and Keith Davis, Organizational B ehaviour: Human Behaviour at Work, Tata McGraw-Hill, New Delhi, 1997.
- Rendolph, Bobbitt, H., Organisational Behaviour, 7 th ed., Prentice Hall, New Jersey.
- Robbins, Stephen P., Organizational Behaviour, 7 th ed., Prentice Hall, New Jersey.
- Robbins, Stephen P. and Mary Coutler, Management, 5 th ed., Prentice Hall of India Private Ltd., New Delhi.
- Sharma, R.A., Organizational Theory and Behaviour, Tata McGraw -Hill, New Delhi.
- Steers, Richard M. and J. Stewart Black, Organizational Behaviour, Harper Collins College Publishers, New York.
- Stoner and Wankel, Management, 10 th Ed Prentice-Hall of India Ltd., New Delhi.

MABE Ist Semester
Paper-MABE 105(Compulsory)

Total Credit: 5

Time	: 3 Hrs.
Max. Marks	: 100
External	: 80
Internal	: 20

MATHEMATICAL ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Derivation of Consumer Equilibrium and Direct Demand functions from utility functions; Indirect utility functions; Duality theorems; Slutsky equation; Linear expenditure system; Elasticities of demand.

Unit II

Production functions and their properties (CD, CES, Translog); Elasticity of factor substitution and curvature of iso-quants; Producers equilibrium; Duality in cost and production functions; Growth Accounting Equation; Methods for measuring productivity and efficiency.

Unit III

Price determination in perfect and imperfect competition; Baumol, Willamson's and Marris model of firm; wages and employment determination (Neo- Classical Approach); Product exhaustion theorems.

Unit IV

Multi-market equilibrium Model; Partial Market Equilibrium- Static, Discrete and Continuous; National Income models (open & closed); Expected Inflation Augmented Phillips relation; Multiplier-Acceleration interaction model; Growth models –Domar, Harrod, Solow and Kaldor.

Reading List

- Baldani, Bradfield and Turner (2007), An Introduction to Mathematical Economics, South-Western, Cengage Learning, New Delhi.
- Henderson, J. M. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.
- Chiang, A.C. (1986), Fundamental Methods of Mathematical Economics, McGraw Hill, New York.
- Koutsoyiannis, A. (1979), Modern Microeconomics, (2nd Edition), Macmillan Press, London.
- Varian, H. (2000), Microeconomic Analysis, W.W. Norton, New York.
- Allen, R.G.D. (1976), Mathematical Economics, Macmillan, London.
- Arrow, K. J. and M. Intrilligator (Eds.)(1982), Handbook of Mathematical Economics, Volumes I, II and III, North Holland, Amsterdam.
- Chung, J.W. (1993), Utility and Production: Theory and Applications, Basil Blackwell, London.
- Ferguson, C.E. (1976), New-classical Theory of Production and Distribution.
- Allen R.G.D. (1974), Mathematical Analysis for Economists, Macmillan Press and ELBS, London.
- Jha, R. (1991), Contemporary Macroeconomic Theory and Policy, Wiley Eastern Ltd., New Delhi.
- Jones, H.G. (1976), An Introduction to the Modern Theory of Economic Growth, McGraw Hill-Kogakusha, Tokyo.

SEMESTER-II

PAPER CODE	NOMENCLATUR (Compulsory)	EXTERNAL	INTERNAL	TIME	CREDITS
CORE PAPERS					
MABE 201	MACRO ECONOMIC ANALYSIS AND POLICY	80	20	3 Hrs.	4+1+0
MABE 202	FUNDAMENTALS OF ECONOMETRICS	80	20	3 Hrs.	4+1+0
MABE 203	ACCOUNTING FOR BUSINESS ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 204	PUBLIC ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 205	INTERNATIONAL ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 206	COMPREHENSIVE VIVA-VOCE	50			0+0+2
Total		550			27

SUMMER TRAINING

Each student is required to go on 6 weeks summer training in any business organisation after 2nd semester examinations. He/she has to prepare a training report on the project undertaken in the concerned business organisation and submit a copy of this report duly certified by the authorised signatory from the same business organisation. This project report is to be submitted latest by 30th november and will be externally evaluated in the 3rd semester and carries a weightage of 100 marks.

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

MABE 2nd Semester
Paper- MABE 201(Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MACRO ECONOMIC ANALYSES AND POLICY

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

National Income and Accounts

Circular Flow of Income in two, three and four-sector economy.

Consumption function

Keynes' Psychological law of consumption and implications of the law; Empirical evidence on consumption function; Reconciliation of short run and long run consumption function – Absolute Income, Relative income, Permanent Income and Life Cycle Hypotheses.

Investment Theories

Investment Function; The Marginal Efficiency of Capital Approach.

Unit II

Demand for Money

Classical and Keynesian approach (The Regressive Expectations model); Post Keynesian approaches to demand for money-Tobin (Portfolio balance approach), Baumol (Inventory approaches).

Supply of Money

Measures of Money Supply; Instruments of Monetary control; Mechanism of Monetary Expansion and Contraction (Deterministic and Behavioural models).

Neo-classical and Keynesian Synthesis

The Basic IS-LM model, Extension of IS-LM model with government sector, Labour market and Variable price level.

Unit III

Open Macro Economics

Mundell-Fleming Model under fixed and flexible exchange rates.

Theory of Inflation

Classical, Keynesian and Monetarist approaches; Structuralist theory of inflation; Philips curve analysis – Short run and long run Philips curve; Natural Rate of Unemployment hypothesis; Tobin's modified Philips curve.

Unit IV

Theory of Business Cycles

Business Cycle Theories of Schumpeter, Kaldor, Samuelson and Hicks; Control of business cycles – Relative efficacy of Monetary and Fiscal policies.

Macro Economic Policy

Monetary and Fiscal Policy- Targets and instruments; The Great Depression; Lags in the effects of policies; Expectations and Reactions; Uncertainty and Economic Policy; Economic Policy - Rules vs Discretion .

Reading List

- Ackley, G. (1978), Macroeconomics: Theory and Policy, Macmillan, New York.
- Blackhouse, R. and A. Salansi (Eds.) (2000), Macroeconomics and the Real World (2 Vols.), Oxford University Press, London.
- Branson, W.A. (1989), Macroeconomic Theory and Policy, (3rd Edition), Harper and Row, New York.
- Dornbusch, R. and F. Stanley (1999), Macroeconomics, Irwrin McGraw Hill, Inc. New York, 7th Edition.
- Heijdra, B.J. and V.P. Fredericck (2001), Foundations of Modern Macroeconomics, Oxford University Press, New Delhi.
- Jha, R. (1991), Contemporary Macroeconomic Theory and Policy, Wiley Eastern Ltd., New Delhi.
- Romer, D.L. (1996), Advanced Macroeconomics, McGraw Hill Company Ltd., New York.
- Shapiro, E. (1996), Macroeconomic Analysis, Galgotia Publications, New Delhi.
- Dernburg , T.F.and D. M.Mc Dougall, Macroeconomics, McGraw Hill International Book Company.
- Frisch, H. (1983), Theories of Inflation, Cambridge University Press, Cambridge.
  John Wiley and Inc, USA.
- Lucas, R. (1981), Studies in Business Cycle Theory, MIT Press, Cambridge, Masscechusetts.
- Mankiw, N. Greogory (2000), Macroeconomics Macmillan Worth Publishers 4th Edition
- Mankiw, N. Greogory (2000), Macroeconomics Macmillan Worth Publishers 4th Edition
- Mankiw, N.G. and D. Romer (Eds.) (1991), New Keynesian Economics, (2Vols.), MIT Press, Cambridge.
- Ruggles R. and N. Ruggles (1956), National Income Accounts and Income Analysis Mc Graw Hill, Newyork.
- Sheffirin, S.M. (1996), Rational Expectations, Cambridge University Press, Cambridge.
- Taylor, L. (1983), Structuralist Macroeconomics, Basic Books, New Longman.
- Turnovsky, S.J. (1977), Macroeconomic Analysis and Stabilization Policy, Cambridge University Press, Cambridge.
- Veniers, Y.P. and F.D.Sebold, (1977) Macroeconomics; Models and Policy

MABE 2nd Semester
Paper- MABE 202 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

FUNDAMENTALS OF ECONOMETRICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Nature and scope of Econometrics; Types of Econometric Models; Nature of Regression Analysis; Classical Linear Regression Model; Test of significance of models; Functional forms of regression models.

Unit II

Nature, Tests, Consequences and Remedial Steps of problems of Heteroscedasticity; Multicollinearity and Auto-Correlation; Problems of Specification error; Errors of measurement.

Unit III

Dummy variable technique – Testing structural stability of regression models comparing two regressions, interaction effects, seasonal analysis, Piecewise linear regression, regression with dummy dependent variables; The LPM, Logit and Probit models – Applications.
Auto-regressive and distributed lag models – Koyak Model, Partial adjustment model, Adaptive Expectations; Almon's Approach to distribute-lag models; Causality test, Granger test and Sim's test.

Unit IV

Stationarity, unit root, co-integration, spurious regression, Dickey-Fuller test, Engle-Granger test, Random walk model, Forecasting with ARIMA modelling; Box-Jenkins methodology; Panel data techniques – Random and fixed effects model.

Reading List

- Gujarati, D.N. (2010), Essentials of Econometrics (4th Edition), McGraw-Hill, New Delhi.
- Gujarati, D.N. (1995), Basic Econometrics (2nd Edition), McGraw-Hill, New Delhi.
- Pindyck, R.S. and D.L. Rubinfield (1976), Econometric Models and Economic Forecasts, McGraw Hill Kogakusha, Tokyo.
- Amemiya, T. (1985), Advanced Econometrics, Harvard University Press, Cambridge, Mass.
- Baltagi, B.H. (1988), Econometrics, Springer, New York.
- Dougherty, C. (1982), Introduction to Econometrics, Oxford University Press, New York.
- Goldberger, A.S. (1998), Introductory Econometrics, Harvard University Press, Cambridge.
- Hill R.C., E.G. William and G.G. Judge (1997), Undergraduate Econometrics, Willey, New York.
- Kennedy. P. (1998), A Guide to Econometrics (4th Edition), MIT Press, New York.
- Kmenta, J. (1997), Elements of Econometrics (Reprint Edition), University of Michigan Press, New York.
- Koutsoyiannis, A. (1977), Theory of Econometrics (2nd Edition), The Macmillan Press Ltd., London.
- Krishna, K.L. (Ed.) (1997), Econometric Applications in India, Oxford University Press, New Delhi.
- Maddala, G.S. (Ed.) (1993), Econometrics Methods and Application (2 Vols.), Aldershot U.K.
- Theil, H. (1981), Introduction to Econometrics, Prentice Hall of India, New Delhi.
- Croxton, F.E., D.J. Cowden and S.Klein (1973), Applied General Statistics, Prentice Hall, New Delhi.
- Intrilligator, M.D. (1978), Econometric Methods, Techniques and Applications, Prentice Hall Englewood Cliffs, New Jersey.
- Johnston, J. (1991), Econometric Methods, McGraw Hill Book Co., London.
- Chow, G.C. (1983), Econometrics, McGraw Hill, New York.
- Fanses, P.H. (1998), Time Series Models for Business and Economic Forecasting, Cambridge University Press, New York.
- Hamonda, O.F. and J.C.R. Roley (1997), Time Series Model, Casuality and Exogeneity, Cheltenham, U.K.
- Hansen, P.R. and S. Johanson, (1998), Workbook on Cointegration, Oxford University Press, New York.
- Harvey, A.C. (1981), Econometric Analysis of Time Series, Phillip Allen, London.
- Dhrymes, P.J. (1970), Econometrics – Statistical Foundations and Applications, Harper and Row Publishers, New York.
- Draper, N.R. and H. Smith (1966), Applied Regression Analysis, John Wiley, New York.

MABE 2nd Semester
Paper-MABE 203 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ACCOUNTING FOR BUSINESS ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Basic Accounting Theory: Accounting Concept and Conventions, Double Entry System, Accounting Equation, Journal, Ledger, Trial Balance, Trading and Profit And Loss Account and Balance Sheet, Understanding the Financial Statements of an Organization with Special Reference to Companies (Requirements of Schedule VI of Companies Act.)

Unit II

Concept of Marginal Cost, Marginal Costing and Absorption Costing; Cost Volume Profit Analysis, Break-Even Analysis. Assumption and Practical Applications of Break-Even Analysis. Decisions Relating Sales Mix, Make or Buy Decisions and Discontinuation of a Product Line.

Unit III

Standard Costing and Variance Analysis : Standard Costing as a Control Technique, Setting of Standards and their Revision. Variance Analysis – Meaning and Importance, Kinds of Variances and Their Uses Computation of Material, Labour and Overhead Variances.

Unit IV

Financial Statement Analysis: Tools for Financial Statement Analysis: Cash Flow Analysis, Ratio Analysis-Liquidity Ratios, Solvency Ratios, Activity Ratios, Profitability Ratios.

Reading list

- I.M.Pandey, “Management Accounting”, Vikas Publications, , Noida
- R.L.Gupta, “Advanced Accountancy- Vol.1” , Sultan Chand and Sons, New Delhi

- Anthony A. Atkinson,Rajiv D. Banker,Robert S. Kaplan,S. Mark Young, **"Management Accounting"**, Prentice-Hall of India
- Ashok Banerjee, **"Financial accounting- a Managerial emphasis"**, Excel books
- Asish K. Bhattacharyya, **"Financial accounting for Business Managers",** Prentice-Hall of India
- B.Lev, **"Financial Statement Analysis : A New Approach"**, Prentice Hall Inc., Englewood Cliffs, N.J., 1978
- B.M. Lall Nigam,I.C. Jain, **"Cost Accounting: An Introduction"**, Prentice-Hall of India
- B.M.Lall Nigam,I.C.Jain, **"Cost Accounting: Principles and Practice"**, Prentice-Hall of India
- C.F.Lee, **"Financial Analysis and Planning: Theory and Application"**, Addison-Wesley, Reading, Mass, 1985
- Charles T. Horngren,Srikant M. Datar,George Foster, **"Cost Accounting: A managerial Emphasis"**, Prentice-Hall of India
- Duncan Williamson, **"Cost and management accounting"**, Prentice-Hall of India
- Dutta, **"Cost Accounting: Principles and Practice"**, Pearson Education
- E.A.Helfert, **"Techniques of Financial Analysis"**, Richard d. Irwin Inc., Homewood, Ill. 1977
- G.Foster, **"Financial Statement Analysis"**, Prentice Hall Inc., Englewood Cliffs, N.J., 1990
- H. Thomas Johnson, **"Relevance Lost- The Rise and fall of Management accounting"**, Harvard Business
- Hilton, Ronald W., **"Management Accounting- Creating Value in a Dynamic Business environment"** Tata McGraw-Hill
- Horngren, **"Cost Accounting: A managerial Emphasis"**, Pearson Education
- J Sizer, **"Insights into Management accounting"**, Penguin Books
- J.C.T.Mao, **"Quantitative Analysis of Financial Decisions"**, Macmillan, New York, 1971
- Jawaharlal, **"Cost Accounting"**, Tata McGraw-Hill
- Kaplan, **"Advanced Management Accounting"**, Pearson Education
- Khan, M.Y., **"Cost Accounting"**, Tata McGraw-Hill
- Kulshrestha, N.K., **"Management Accounting- Concepts and cases"**, Tata McGraw-Hill
- Lynch, Richard M., **"Accounting for Management Planning and control"**, Tata McGraw-Hill
- M. Bendrey, R. Hussey, **"Essentials of Management accounting in Business"**, Ane Books
- Meigs, Robert F., **"Accounting the basis for business decisions"**, Tata McGraw-Hill
- Nitin Balwani, **"Accounting and Finance for managers"**, Excel Books
- Peter Atrill,Eddie Mclaney, **"Accounting and Finance for non- specialists"**, Prentice-Hall of India
- R. Narayanaswamy, **"Financial accounting- a Managerial Perspective",** Prentice-Hall of India
- R.S.Kaplan, **"Advanced Management Accounting"**, Prentice Hall Inc., Englewood Cliffs, N.J., 1982
- Robert S. Kaplan,Anthony A. Atkinson, **"Advanced Management Accounting"**, Prentice-Hall of India
- T.H.Naylor, **"Corporate Planning Models"**, Addison-Wesley, Reading, Mass, 1979

MABE 2nd Semester
Paper-MABE 204 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

PUBLIC ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

The Efficient Markets; The Problem of Externalities and their Internalisation; The Coase Theorem; Rent Seeking Costs and Political Process; Efficient Provision of Public Goods; Samuelson Model; Wagner Hypothesis; Thompson Mechanism; Clarke Mechanism; Lindahl- Wicksell Mechanism; Theory of Club Goods.

Unit II

Public Choice – Rational Voter Hypothesis; Characteristics of Majority Voting Rule; Buchanan and Tullock Model; Bowen-Black Model; Arrow's Impossibility Theorem; Downs Model on Demand And Supply of Government Policy; Models of Bureaucratic Behaviour- Niskanen, Tullock, Breton- Brennan- Buchanan, Voting and the Leviathan Hypothesis.

Unit III

Efficiency and Equity Principles of Taxation; Tax Incidence – Partial and General Equilibrium Analysis; Excess Burden of Tax And its Measurement; Burden Controversy of Public Debt; Fiscal Federalism- Tiebout Model; Theory of Intergovernmental Grants.

Unit IV

Public Enterprises –Pricing Policy of Public Enterprises; Theory of Second Best; Capacity Constraints and Peak Load Problem; Social Cost Benefit Analysis- Measuring Economic Benefits and Costs, Determining Shadow Prices, Decision Criteria, Problem of Risk and Uncertainty.

Reading list

- Boadway, Robin, “Public Sector Economics”, Cambridge, Winthrop Publishers
- Bruce, Neil, “Public Finance”, Addison- Wesley Educational Publishers, Inc.
- Jones. Philip and Cullis, Jones, “Public Finance and Public Choice- Analytical Perspectives”, Oxford University press
- Stiglitz, Joseph, “Economics of the Public Sector”, W.W.Norton and Company, new York/London
- Rosen, H.S., “Public finance”, Tata McGraw Hill
- McNutt, P.A., “The economics of Public Choice”, Edward Elgar Publishing Inc.
- Mueller, D.C., “Public Choice- I,II,III” Cambridge university Press, Cambridge
- Downs, A., “An Economic Theory of Democracy”, Harper and Row, New York
- Musgrave R.A and Peacock A.T., “ Classics in the Theory of Public Finance”, Mcmillan

MABE. 2nd Semester
Paper- MABE 205 (Compulsory)

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INTERNATIONAL ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Theory of International Trade

Classical Theory of International Trade – Theory of Absolute Advantage, Comparative Advantage and Opportunity Costs, Empirical testing of Theory of Comparative Advantage.
Heckscher-Ohlin Model, Factor Price Equalization Theorem, Intra Industry Trade: Emergence and Measurement; Trade under Imperfectly Competitive Markets.

Unit II

Measurement of Gains from International Trade

Measurement of gains from trade; Concepts of terms of Trade, their uses and limitations; Hypothesis of secular deterioration of Terms of trade and its policy implications for less developed countries; Effects of Tariffs, Quotas and Non-tariff Barriers (NTBs).
Trade and Growth- Trade as an engine of economic growth; Import substitution v/s Export Push; The effects of growth on small and large countries.

Unit III

Foreign Exchange and Balance of Payments

Foreign Exchange Market: Meaning, Nature and Concepts; The Determination of Floating Exchange Rate; Expenditure-Switching Policies and Direct Controls; Determination of national income in an open economy. Meaning and components of Balance of payments; Equilibrium and Disequilibrium in the Balance of payments; Process of adjustment of BOP under Gold Standard, Fixed Exchange Rates and Flexible Exchange Rates.

Unit IV

The International Monetary System and Trade Policies in India

WTO, UNCTAD, IMF, World Bank and Asian Development Bank: Functions, achievements and relevance to India.

Foreign Trade problems and Foreign Trade policies in India after liberalization; Working and Regulations of MNCs in India; FDI impact on Sectoral Growth in India; Recent Export and Import Policy of India.

Reading List

- Chacholiades, M. (1990), International Trade: Theory and Policy, McGraw Hill, Kogkusha, Japan.
- Cherunilam, F. (2008): International Economics, The Tata McGraw-Hill Companies, New Delhi. 5th Ed.
- Dunn R.M. and J.H. Mutt (2000), International Economics, Routledge, London.
- Kindlberger, C P (1991): International Economics, R D Irwin, Homewood.8th Ed.
- Krugman, P.R. and Obstfeld, M. (1994), International Economics: Theory and Policy, Glenview, Foresman.
- Mishra, S.K. and Puri, V.K. (2012), Indian Economy- Its Development Experience, Himalaya Publishing House. 30th Revised Ed.
- Salvator, D L (2001): International Economics, Prentice Hall, Upper Saddle Rover, New York.
- Soderston, Bo. (1999), International Economics, The Macmillan Press Ltd. London.
- Yarbough, R.J. (1999), International Economics, International Thompson Publishing, New York.
- Bhagwati J. (1988), Protectionism, Cambridge University Press, Mass.
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (1987), The Development Process of the Indian Economy, Himalaya Publishing House, Bombay.
- Dana, M.S. (2000), International Economics: Study, Guide and Work Book, (5th Edition), Routledge Publishers, London.
- Goldsten, M. (1998), The Asian Financial crisis: causes cure and systematic implications, Institute of International Economics, Washington D.C.
- Hufbauer G.C. and K.A. Elliott (1994), Measuring the Costs of Protection in the United States, Institute for International Economics.
- Jackson, J. (1989),The World Trading System, Cambridge University Press, Mass.
- Joshi, V. and I.M.D. Little (1998), India's Economic Reforms, 1999-2000, Oxford University Press, New Delhi.
- King, P.G. (1995), International Economics and International Economic Policy: A Reader, McGraw Hill International, Singapore.
- Maggi, G. and A. Rodriguez-Clare (1998), "The Value of Trade Agreements in the Presence of Political Pressures," Journal of Political Economy, 106, 574-601.
- Mishkin, S.F. (1998), The Economics of Money, Banking and Financial Markets, (5th Edition), Harper Colins Publishers, New York.
- Panagariya, A. (2000), "Preferential Trade Liberalization: the Traditional Theory and new Developments," Journal of Economic Literature, 38, 287-331.
- Panchamukhi V.R. and R. Tandon (1987), Money and Finance in World Economic Order (RIS), Indus Publishing Co. Delhi.
- Panchmukhi, V.R. (1978), Trade Policies of India–A Quantitative Analysis, Concept Publishing Company, New Delhi.
- Patel, S. J. (1995), Indian Economy Towards the 21st Century, University Press Ltd., India.

- Pomfert, R. (1988), Unequal Trade: The Economics of Discriminatory International Trade Policies, Blackwell Publishers, Oxford.
- Satyanarayan, B. (1986), India's Trade with Asia and the Far East Countries, B.R. Publishing Corp., New Delhi.
- Vanderbussche, H. and M. Zanardi (2006), "The Global Chilling Effects of Antidumping Proliferation, "CEPR Discussion paper. 5597.

SEMESTER-III

PAPER CODE	NOMENCLATUR (Compulsory)	EXTERNAL	INTERNAL	TIME	CREDITS
CORE PAPERS					
MABE 301	OPERATIONS RESEARCH	80	20	3 Hrs.	4+1+0
MABE 302	ADVANCED MICROECONOMICS	80	20	3 Hrs.	4+1+0
MABE 303	SUMMER TRAINING REPORT	100			0+0+4
MABE 304	SEMINARS		50		0+2+0
Elective Papers **CHOOSE ANY ONE OF THE FOLLOWING ELECTIVE GROUPS**					
GROUP-I **ECONOMICS OF MARKETING**					
MABE 311	MARKETING MANAGEMENT	80	20	3 Hrs.	4+1+0
MABE 312	INTERNATIONAL MARKETING	80	20	3 Hrs.	4+1+0
MABE 313	CONSUMER BEHAVIOUR AND MARKETING RESEARCH	80	20	3 Hrs.	4+1+0
GROUP-II **ECONOMICS OF FINANCE**					
MABE 321	ECONOMICS OF CORPORATE FINANCE	80	20	3 Hrs.	4+1+0
MABE 322	INVESTMENT AND PORTFOLIO MANAGEMENT	80	20	3 Hrs.	4+1+0
MABE 323	PROJECT MANAGEMENT	80	20	3 Hrs.	4+1+0
GROUP-III **ECONOMICS OF HUMAN RESOURCES**					
MABE 331	LABOUR ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 332	ECONOMICS OF HUMAN RESOURCE DEVELOPMENT	80	20	3 Hrs.	4+1+0
MABE 333	ENTREPRENEURSHIP DEVELOPMENT	80	20	3 Hrs.	4+1+0
GROUP-IV **ECONOMICS OF AGRICULTURE AND RESOURCES**					
MABE 341	AGRICULTURE ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 342	DEMOGRAPHY	80	20	3 Hrs.	4+1+0
MABE 343	ENVIRONMENTAL ECONOMICS	80	20	3 Hrs.	4+1+0
GROUP-V **ECONOMICS OF TAXATION**					
MABE 351	DIRECT TAXES-I	80	20	3 Hrs.	4+1+0
MABE 352	VAT AND SERVICE TAX	80	20	3 Hrs.	4+1+0
MABE 353	THEORY OF TAXATION	80	20	3 Hrs.	4+1+0
Total		650			31

MABE 3rd Semester
Paper- MABE 301

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

OPERATIONS RESEARCH

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

(iv) The Computer practical shall be based on programming & simulation problems.

Unit I

Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables, big-M method, degeneracy and unbound solutions. Sensitivity analysis.

Unit II

Problem Formulation & Solution by computer package – Goal, Integer, Dynamic Programming; Transportation; Assignment model.

Unit III

Decision theory and decision trees. Decisions under risk & uncertainty; Games Theory. Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.

Unit IV

Replacement Models. Inventory models. Role and importance of PERT/CPM in business decision making; SIMULATION: simulation models – phases of simulation– applications of simulation. Queuing problems – Single Channel – Poisson arrivals – exponential service times.

Suggested Reading :

- Budnik, Frank S. Dennis Meleavey, Reichard : Principles of Operations Research, 2nd ed., Richard Irwin, Illinois – All India Traveller Bookseller, New Delhi, 1995.
- Gould, F.J. etc. : Introduction to Management Science, Englwood Cliffs, New Jersey, Prentice Hall Inc., 1993.
- Mathur, K and Solow, D. : Management Science, Englewood, New Jersey, Prentice Hall Inc. 1994.
- Narang A.S. : Linear Programming Decision-Making. New Delhi, Sultan Chand, 1995.
- Sharma, J.K. : Operations Research : Theory and Applications, New Delhi, Macmillian India Ltd., 1997.
- Taha, H.A. : Operations Research – An Introduction, New York, Macmillan, 1989.
- Theirouf, R.J. and Klekamp, RC. : Decision-Making Through Operations Research, New York, John Wiley, 1989.
- N.D. Vohra : Quantitative Techniques in Management, Tata McGraw Hill, 2001.

Text books:

- P. Sankara Iyer, "Operations Research", Tata McGraw-Hill, 2008.
- A.M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2005.

Reference books:

- J K Sharma., "Operations Research Theory & Applications , 3e", Macmillan India Ltd, 2007.
- P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & co., 2007.
- J K Sharma., "Operations Research, Problems and Solutions, 3e", Macmillan India Ltd.

N.V.S. Raju, "Operations Research", HI-TECH, 2002.

MABE 3rd Semester
Paper- MABE 302

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ADVANCED MICRO ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Critical evaluation of marginal analysis; Average cost pricing model; Bain's limit pricing theory; Baumal's sales revenue maximization model(all four static models); Marris model of managerial enterprise; Williamson's model of managerial discretion.

Unit II

Pricing of factors of production (perfect and imperfect market); Elasticity of technical substitution and factor shares, technical progress and factor shares; Factor pricing and income distribution; Product Exhaustion Theorems.

Unit III

The Walrasian and Input –output approaches to general equilibrium; Maximization of social welfare; Market failure; Externalities, Public goods, asymmetric information.

Unit IV

Inter-temporal choice in consumption; Economics of Uncertainty - Decision rules under uncertainty; Individual behaviour towards risk: Risk, gambling, insurance decisions. Economics of information – search costs, market signaling.

Basic Reading List

- Koutsoyiannis, A. (1979), Modern Microeconomics, (2nd Edition), Macmillan Press, London.
- Salvatore D(2006), Microeconomics-Theory and Applications, Oxford University Press
- Varian, H. (2003), Intermediate Microeconomics, East-West Press.
- Varian, H. (2000), Microeconomic Analysis, W.W. Norton, New York.
- Archibald, G.C. (Ed.) (1971), Theory of the Firm, Penguin, Harmondsworth.
- Baumol, W.J. (1982), Economic Theory and Operations Analysis, Prentice Hall of India, New Delhi.
- Borch, K.H. (1968), The Economics of Uncertainty, Princeton University Press, Princeton.

- Boyes.W and Melvin. M , Micro economics, Houghton Mifflin Company Boston Newyork.
- Broadway, R.W. and N. Bruce (1984), Welfare Economics, Basil Blackwell, London.
- Collel A.,Whinston and Green (2012), MicroEconomic Theory, Oxford University Press.
- Diamond and Rothschild (Eds.) (1978), Uncertainty in Economics, Academic Press New York.
- Goodwin, Nelson,Ackerman and WeissKopf(2009), Micro Economics in context, PHI Learning Private Limited.
- Graff, J. De. V. (1957), Theoretical Welfare Economics, Cambridge University Press, Cambridge.
- Gravelle,H.and Rees,R.(2008), Micro Economics, Dorling Kindersley.
- Gupta K.R.(2009), Advanced MicroEconomics, Atlantic Publishers and Distributors LTD
- Hirshleifer, J. and A. Glazer (1997), Price Theory and Applications, Prentice Hall of India, New Delhi.
- Jehle Geoffrey A.and Reny Philip J (2008), Advanced Micro Economic Theory, Dorling Kindersley (India)
- Lipsey and Chrystal(2014), Economics, Oxford University Press
- Mankiw(2006),Principles of Microeconomics,Cengage Learning
- Mansfield Edwin, Applied MicroEconomics, W.W.Norton ,New York London.
- Quirk, J. and R. Saposnik (1968), Introduction to General Equilibrium Theory and Welfare Economics, McGraw Hill, New York.
- Sen, A. (1999), Microeconomics: Theory and Applications, Oxford University Press, New Delhi.
- Sen,A.(2007), Micro Economics: Theory and applications. Oxford University Press.

MABE 3rd Semester
Paper- MABE 311

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MARKETING MANAGEMENT

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Marketing: Meaning, Nature, Scope, Evolution and Importance. Modern concept of marketing. Ethics in marketing. Role of Information Technology in marketing. Challenges before marketers.

Unit II

Marketing Mix and STP (Segmentation, Targeting and Positioning) Marketing Information System: Concept and Components of a marketing information system. Marketing Research: meaning, scope and techniques. Consumer Behaviour: meaning and importance, buying motives, buying process, factors influencing consumer behaviour.

Unit III

Product decisions: concept, classification, product-line decisions. New product development process, product life cycle, Packaging and Branding decisions. Pricing Concepts: objectives, policies and procedures, factors affecting pricing, pricing strategy and product life cycle, price changes and organizational strategies, product line pricing.

Unit IV

Integrated Marketing Communication: Promotion-Mix; Advertising, sales promotion, public relations, personal selling and direct marketing. Web-advertising; Use of social media in promotion; Channels of distributions: Concept, types and factors affecting channel selection. Recent developments in marketing. Social, ethical and legal aspects of marketing. Marketing and information economy; Direct and online marketing.

Suggested Readings:

1 Michael J. Etzel, Bruce J. Walker, William J. Stanton, Ajay Pandit : Marketing Concepts and Cases, Tata McGraw-Hill Publishing Company Limited.

2 Michael R.Czinkota, Masaaki Kotabe :Marketing Management, Thomson, South Western.

3 Philip Kotler, Kevin lane Keller : Marketing Management, Pearson Prentice-Hall.

4 Dhru Greqal, Michael Levy : Marketing, Tata McGraw Hill Publishing Company Limited.

5. V.S. Ramaswamy, S. Nama Kumari : Marketing Management, Macmillan Publisher India Ltd.

6. Rajan Sexena : Marketing Management, Tata McGraw Hill Publishing Company Limited.

7. Ramaswami, V.S. and Namakumari, S.; *Marketing Management*; MacMillan India Ltd.

8. Grewal, Dhruv and Michael Levy; *Marketing*; Tata McGraw Hill.

9. Etzel, Michael J, Bruce J. Walker, William J. Stanton and Ajay Pandit; Marketing Concepts and Cases*; McGraw Hill, New Delhi.*

10. Kotler, Philip, Kevin Lane Keller, Abraham Koshy and Mithileshwar Jha; *Marketing Management;* Pearson Education.

11. Lancaster, Geoff and Lester Massingham; *Essentials of Marketing;* McGraw Hill International Ed.

12. Cundiff, Still and Govoni; *Fundamentals of Marketing Management;* Prentice Hall of India, New Delhi.

13. Luck, David J. and Ferrell, O.C.; *Marketing Strategy and Plans-Systematic Marketing Management*; Prentice Hall of India , Private Limited, New Delhi.

14. Saxena, Rajan; *Marketing Management*; Tata McGraw Hill.

15. Raju, M S and Dominique Xardel; *Marketing Management*; Tata McGraw Hill

MABE 3rd Semester
Paper- MABE 312

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INTERNATIONAL MARKETING

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

International Marketing: Definitions, nature, scope and benefits; reasons and motivations underlying International Trade; Process of International Marketing; Domestic Marketing versus International Marketing, basic modes for entry. Introduction to theories of international trade.

Unit II

International Marketing Environment; Factors influencing International market selection and segmentation, Selection strategies. International Marketing Planning and Control.
Tarrif and Not Tarriff Barriers to Trade; Trading in WTO regime; Environmental and Labour Issues.

Unit III

International Marketing Mix: International product policy and planning: International product mix, Product life cycle, product standardization and adaptation, and organization of product warranties and services. Branding, labeling, packaging, International pricing policies. Terms of payment in international transactions, dumping, counter trade, transfer pricing and grey marketing. International Advertising: International advertising strategy, elements of advertising strategy, media strategy.

Unit IV

International Distribution Management: International Distribution Channels, International distribution policy, selecting distribution channels.
Emerging issues in international marketing: Global e-marketing- Targeting the individual customers, relationship marketing, The role of information and communication technology .

Suggested Reading

- Vern Terpestra and Ravi Sarthy : International Marketing, Thosmson.
- Simon Majaro : International Marketing.
- John, Fayerweather : International Marketing.
- R. L. Varshney and B. Bhattacharya : International Marketing; Sultan Chand Publication, N. Delhi.
- Sak Onkvisit and John Shaw : International Marketing (Analysis and Strategy), PHI, N. Delhi.

Rakesh Mohan Joshi: International Marketing, Oxford University Press.

MABE 3rd Semester
Paper- MABE 313

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

CONSUMER BEHAVIOUR & MARKETING RESEARCH

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Consumer Behaviour: Meaning, Nature, Scope and Significance. Consumer Research: Role and Process. Consumer Decision Making Process.
Psychological Factors Influencing Consumer Behaviour. Theories and Principles of Perception, Learning, Motivation, Personality & Self Concept and Attitude and their Marketing Implications.

Unit II

Group Influences on Consumer Behaviour- Family and Reference Groups. Impact of Culture, Subculture and Social Class on Consumer Behaviour.
Opinion Leadership and Diffusion of Innovation along with their Marketing Implications.

Unit III

Introduction to Marketing Research, Importance, nature and scope of marketing research; marketing information system and marketing research; Marketing research process, Ethical issues in MR. Problem Identification and Research Design: Problem identification and definition: Development of a research proposal: Types of research designs. Data Resource: Secondary data sources and usage; Online data sources; Primary data collection methods - Questioning techniques, online surveys, observation method; Questionnaire preparation. Attitude measurement and scaling techniques - elementary introduction to measurement scales.

Unit IV

Sampling Plan: Universe, sample frame and sampling unit; Sampling techniques; Sample size determination. Data Collection : Organisation of field work and survey errors - Sampling and non - sampling errors. Data Analysis: Hypothesis testing, tests of significance (Parametric & non - parametric) Univariate, bivariate and multivariate data analysis; Report preparation and presentation. Marketing Research Applications: Product research; Advertising research; Sales and Market research.

Suggested Readings :

- Boyd. H.W. Ralph Westfall and S.F. Starsh : Marketing Research: Text and Cases, Richard D. Irwin, Boston.
- Chisnall, peter M: The Essence of Marketing Research, Prentice Hall, New Delhi.
- Churchill, Gilbert. A : Basic Marketing Research, Dryden Press, Boston.
- Green Paul E. Donald S. Tull and Gerald Albaum : Research for Marketing Decision, Prentice Hall, New Delhi.
- Luck, D.J.: Marketing Research, Prentice Hall, New Delhi.
- Tull, Donald and Hawkin, Del : Marketing Research : Measurement and Method, Prentice Hall, New Delhi.
- Beri, G.C.: Marketing Research, Tata McGraw Hill, New Delhi.

Suggested Readings:

- Schiffman, LG and LL Kanuk, Consumer Behaviour, Pearson Education
- Blackwell, RD, PW Miniard and JF Angel, Consumer Behaviour, Cengage Learning India Pvt. Ltd.
- Peter, JP and JC Olson, Consumer Behaviour and Marketing Strategy, McGraw Hill.
- Handerson, S, Consumer Behaviour in Theory and Action, John Wiley and Sons.
- Assel,H: Consumer Behaviour- A Strategic Approach, Houghton Miffin.
- Loudon and A Della, Consumer Behaviour, Tata McGraw Hill.
- Hawkins, DL, DL Mothersbaugh and Amit Mookerjee, Consumer Behaviour: Building Marketing Strategy, Tata McGraw Hill Education Pvt. Ltd., 11th Edition.
- Solomon, Michael R, Consumer Behaviour, Prentice Hall, 10th Edition, 2012.

MABE 3rd Semester
Paper- MABE 321

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF CORPORATE FINANCE

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Nature and Scope of Financial Economics; Goals of Finance; Economics of capital Budgeting- Investment Criteria, Estimation of project Cash Flows, Risk Analysis in Capital Budgeting, Computation of Cost of Capital.

Unit II

Economics of Capital Structure and Firm Value- Net Income Approach, Net Operating income Approach, Modigliani and Miller Approach; Analysis of Optimal Capital structure – EBIT & EPS Analysis, ROI & ROE Analysis, Operating and Financial Leverage.

Unit III

Economics of Dividends- Walter Model, Gordon Model, Modigliani and Miller Model; Economics of Working Capital- Estimation of Working Capital, Financing of working Capital.

Unit IV

Economics of Cash – Cash Budgeting and its Simulation, Optimal Cash balance, Baumol Model, Miller and Orr Model; Economics of Receivables; Economics of Inventory – EOQ Model, Pricing of Raw materials, Monitoring and Control of Inventories.

Base Text Book

- I.M.Pandey, "Financial management", Vikas Publications, , Noida

Suggested Readings:

- I.M.Pandey, "Financial management", Vikas Publications, , Noida
- Prasana Chandra, **"Financial Management"**, Tata McGraw-Hill Publishing Company Limited, New Delhi
- Khan and Jain, "Financial management- text, Problems and cases", McGraw Hill Education, New Delhi
- A.C.Shapiro, **"Modern Corporate Finance"**, Macmillan Publishing Co., New York,1991
- Brealey, Myers and Allen, **"Principles of Corporate Finance"**, McGraw Hill, Inc., New York, 8th Edition.
- D.R.Mehta, **"Working Capital Management"**, Prentice Hall Inc., Englewood Cliffs, N.J.,1974
- E.I.Altman and M.G.Subrahmanyam (ed.), **"Recent advances in corporate Finance"**, Richard D.Irwin, Inc., Homewood, Ill., 1985
- H.Bierman,Jr. and S. Smidt, **"The Capital Budgeting Decision"**, The Macmillan Company, New York, 1988.
- J. Harold Mulherin, **"Mergers and Corporate Governance",** Edward Elgar Publishing, 2004. ISBN10: 1843764210
- J.A.Brittain, **"Corporate Dividend Policy"**, Brookings Institution, Washington D.C., 1966
- J.C.Van Horne, **"Financial Management and Policy"**, Prentice hall, New Delhi, 1995
- Jean Tirole, **"The Theory of Corporate Finance",** Princeton University Press, 2006. ISBN10: 0691125562
- Joel M. Stern, **"Revolution in Corporate Finance",** Blackwell Publishing, 1997. ISBN10: 1577180445

MABE 3rd Semester
Paper- MABE 322

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INVESTMENT AND PORTFOLIO MANAGEMENT

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

The Investment Environment and Asset Classes; Risk- Return Analysis; Risk Aversion and Capital Allocation to Risky Assets; Bond Prices and Yields; Term Structure of Interest Rates, Managing Bond Portfolio

Unit II

Portfolio Analysis; Markowitz Model, Sharpe Index Model, Capital Asset Pricing Model, Arbitrage Pricing Theory; Equity Valuation Models; Equity Portfolio Management Strategies

Unit III

Macroanalysis and Micro Valuation of Stock Market; Industry Analysis; Company Analysis; Technical Security Analysis; Efficient Market Theory.

Unit IV

Economics of Mutual Funds- Sharpe, Treynor and Jensen Performance Index.;Investment Companies- Organization and Management; Hedge Funds; Evaluation of Portfolio Performance

Base Text Book

- Bodie, Kane, Marcus and Mohanty, "Investments", Tata Mcgraw Hill, New Delhi

Suggested Readings:

- Reilly and Brown, "Investment Analysis and Portfolio Management", Cengage Learning, New Delhi
- Bodie, Kane, Marcus and Mohanty, "Investments", Tata Mcgraw Hill, New Delhi
- Bolten, Steven E., "Security Analysis and Portfolio Management: An Analytical Approach to Investments", N.Y.Holt, Rinehert and Winston, 1972
- Carr, J.L., "Investment Economics", Sage Pub., California, 1969
- Chance D.M., "An Introduction to Options and Futures", Dryden press, Orlando,FL,1989
- Chance, D., "An Introduction to Derivatives", New York, Dryden, 1998.
- Curley, Anthony J. and Bear Robert M., "Investment Analysis and management", N.Y., Harper & Row, 1979
- David G. Luenberger, "Investment Science", Oxford University Press,1997. ISBN10: 0195108094
- Fama, E.F. and Miller, M.H., "Theory of Finance", N.y.Holt, Rinehert and Winston, 1972
- Figlewski, S., W. Silber and M. Subrahmanyam, "Financial Options, : From Theory to Practice", Homewood, Illinois, Business One Irwin, 1990, ISBN 1556232349.
- Hull, J., "Options, Futures and Other Derivative Securities", Upper Saddle River, N.J., Prentice Hall, 6th edition,2006, ISBN 013149908-4,
- Jarrow, R.A. and S. Turnbull, "Derivative Securities", Cincinnati, Ohio, South-Western, 1996.
- McDonald, R., "Derivatives Markets", Boston, MA, Addison-Wesley Publishing, 2002, ISBN: 0201729601
- Robert W. Kolb, "Financial Derivatives", Blackwell Publishing, 1996. ISBN10: 1557869308
- Robert W. Kolb, James Overdahl, "Understanding Futures Markets", Blackwell Publishing, 2006. ISBN10: 1405134038

MABE 3rd Semester

Paper- MABE 323

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

PROJECT MANAGEMENT

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks). (iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Generation and Screening of Project Ideas; Capital Expenditure; Importance and Difficulties; Market and Demand Analysis; Technical Analysis. Financial Estimates and Projections; Financing of Projects;

Unit II

Investment Criteria. Analysis of Project Risk : Firm Risk and Market Risk; Social Cost and Benefit Analysis; Multiple Projects and Constraints.

Unit III

Network Techniques for Project Management; Project Review and Administrative Aspects.

Unit IV

Assessment of the Tax Burden; Environment Appraisal of Projects; Human aspects of Project Management. Project Financing: BOT, PPP and consortium financing.

Suggested Reading

- W. Ahuja, G.K. & Gupta, Ravi : Systematic Approach to Income Tax, Allahabd, Bharat Law Hose, 1997.
- Bhalla, V.K. : Financial Management and Policy, 2nd ed., New Delhi, Anmol, 1998.
- Chandra, Prasanna : Projects : Preparation, Appraisal, Budgeting and Implementation, 3rd ed., New Delhi, Tata McGraw Hill, 1987.

Dhankar, Raj S.: Financial Management of Public Sector Undertakings. New Delhi, Westville, 1995.

MABE 4th Semester
Paper- MABE 331

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

LABOUR ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Labour Market: Concept and characteristics, Labour Markets in India
Theories of Labour Market: Classical, Neo-Classical and Theories of Dual Labour Markets.

Unit II

Trade Unions: Functions and Role, Problems of Trade Unions in India, Measures to strengthen trade union movement in India, Trade Union Act 1926.

The Concept of Wages: Theories of Wages - Classical, Neo-Classical, Bargaining, Minimum, Fair and Living Wages, Minimum Wages Act, Problems in Application, Payment of Wages Act.

Unit III

Industrial Relations: Constitutional framework, plans and industrial relations.
Industrial Disputes: Causes and consequences, Industrial Disputes act 1947, various provisions; Work Committees conciliation, Court of Enquiry, Adjudication and Voluntary arbitration.

Unit IV

Social Security – Social assistance, social insurance and social security policy in India. Labour Welfare: State policies with respect to labour welfare in India. Labour market reforms in India-exit policy and measures to make labour market flexible; Second National Commission on labour. Globalization and labour markets.

Suggested Readings:

- Datar, B.N. : Labour Economics
- Dobb, Maurice (1932): Wages, Macmillar, London
- Dunlop J.T. (ed) : Theory of Wages Determination.
- Dunlop, J.T. : Wages Determination under Trade Unionism.
- Dunlop, J.T. : Industrial Relations Systems.
- Government of India : Indian Labour Year Book, 1967. Labour Investigation Committee, Main Report, 1946. Report of the Fair Wages Committee, 1949, Report of the National Commission on Labour in India, 1969.
- Hajela, P.D. (1998), Labour Restructuring in India : A Critique of the New Economic Policies, Commonwealth Publishers, New Delhi.
- I.L.O. : Approaches to Social Security.
- Lester, R.A. (1964), Economics of Labour, (2nd Edition), Macmillan, New York.
- Reynolds, L.G., Labour Economics and Labour Relations.
- Srivastava, S.C., Industrial Relations and Labour Law.
- S.D.Tripathi and P.P.Aryas : Trade Union Management Relations in India.
- Papola, T.S., P.P.Ghosh and A.N.Sharma (eds) (1993) : Labour Employment and Industrial Relations in India, B.R.Publishing Corp., New Delhi.
- Charles, A. Mayers & Kanappan, S., Industrial Relations in India.
- Dunlop, J.T.(1932), The Theory of Wage Determination, Macmillan, London.
- McConnell, C.R. & S.L. Brue (1986) : Contemporary Labour Economics, McGraw- Hill, New York.
- McCormick, B. & Smith (eds.) (1968) : The Labour Market, Penguin, Harmondsworth.

MABE 3rd Semester
Paper- MABE 332

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF HUMAN RESOURCE DEVELOPMENT

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Concept, scope and relevance of Human Resource Development. Human capital vs. physical capital, components of human capital- Food security, education, health and nutrition; Indicators of development — PQLI, Human Development Index (HDI), gender development indices; Concept of intellectual capital; Role of Human capital in economic growth. Approaches to HRD.

Unit II

Education as an instrument for economic growth; Growth accounting equations of Schultz and Denison; Determinants of demand for education-private and social demand; Social & Private Costs- Benefits of education; Production function models, Manpower requirements approach, programming and input-output models.

Unit III

Educational financing — Resource mobilization and utilization, pricing and subsidies and effects of educational financing on income distribution. Education and labour market — Effects of education, ability and family background on earnings, poverty and income distribution, education and employment; Educational planning in developing countries with special emphasis on India. Problems of basic, higher education, training & skill development.

Unit IV

Health Economics-Health dimensions of development; Determinants of health — poverty, malnutrition and environmental issues; Economic dimensions of health care — demand and supply of health care; Financing of health care and resource constraints; The concept of human life value; Theory and empirical studies of production of health care; Inequalities in health — class and gender perspectives; Institutional issues in health care delivery.

Basic Reading List

- Baru, R. V. (1998), Private Health Care in India: Social Characteristics and Trends, Sage Publications, New Delhi.
- Blaug, M. (1970), An Introduction to Economics of Education, Cambridge University Press, Cambridge.
- Cohn, E. and T. Gaske (1989), Economics of Education, Pergamon Press, London.
- Klarman, H.E. (1965), The Economics of Health, Columbia University Press, New York.
- Panchmukhi, P.R. (1980), Economics of Health: A Trend Report in ICSSR, A Survey of Research in Economics, Vol. VI, Infrastructure, Allied Publishers, Delhi.
- Schultz, T.W. (1963), Economic Value of Education, Columbia University Press, New York.
- Beman, P. and M.E. Khan (1993), Paying for India's Health Care, Sage Publications, New Delhi.
- Cooms, P.H. and J. Hallak (1988), Cost Analysis in Education, John Hopkins University Press, Baltimore.
- Woodhall, M. (1992), Cost-Benefit Analysis in Educational Planning, UNESCO, Paris.
- World Bank (1993), The World Development Report, 1993: Investing in Health, Oxford University Press, New York.

MABE 3rd Semester
Paper- MABE 333

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ENTREPRENEURSHIP DEVELOPMENT

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Entrepreneurship- introduction, meaning, types & functions; Entrepreneurial Mindset: Decision Making; Leadership, Innovation and Creativity; Entrepreneurial Intentions - Social and Corporate Entrepreneurship; Women Entrepreneurs in India; Family Business; Environmental Factors affecting success of a new business; Reasons for the failure and visible problems for business. Stages in entrepreneurial process.

Unit II

Creative problem solving: Heuristics, Brainstorming, Synectics, Value Analysis. Source of New Idea, Ideas into Opportunities. Entrepreneurial Strategy: Generating and Exploiting New Ideas; Identifying and Analyzing Domestic and International Opportunities; Project Report – Financial, market & Technical Feasibility; Legal Issues for the Entrepreneur-Intellectual Property Rights. Business Planning Process: Meaning of business plan, Business plan process, Advantages of business planning, Marketing plan, Final project report with feasibility study, Economic, Technical, Financial and Managerial Feasibility of Project. Preparing a model project report for starting a new venture.

Unit III

The Product Concept and Commercial Opportunities. Market Segmentation, Customer Adoption Process; Venture Team Building and Organizational Plan; The Financial Plan- Sources of Capital, Informal Risk Capital, Venture Capital, and Going Public; Facilitators and Inhibitors of Business; Role of E-commerce and M-commerce.

Unit IV

Business Creation: Methods and procedures to start and expand one's own business. Managing growth: Using external parties to help grow a business, franchising, advantages and limitations, investing in a franchise, joint ventures- types, Acquisitions and mergers. Entrepreneurship Development Programmes; Role of government and various institutions in developing entrepreneurship in India (A brief description only).

Reading List

- Cases in Entrepreneurship, by Eric Morse, Ronald K. Mitchell, Sage, 2008
- Developmental Aspects of Entrepreneurship by Shivganesh Bhargava, Sage, 2007
- Entrepreneurial Policies and Strategies - The Innovator's Choice, by Mathew J Manimala, Sage, 1999
- Small Business and Industry - A Handbook for Entrepreneurs by J C Verma, Gurpal Singh, Sage, 2002
- Fundamentals of Entrepreneurship By Mohanty, Sangram Keshari, PHI.
- Fundamentals of Entrepreneurship, NANDAN, H. PHI, Third Edition
- Entrepreneurship : New Venture Creation, Holt, David H., PHI
- Entrepreneurship In Action--Second Edition, Coulter Mary, PHI
- Essentials of Entrepreneurship and Small Business Management by Scarborough, Norman M., Wilson, Doug , Zimmerer, Thomas W., PHI
- Managing New Ventures : Concepts And Cases In Entrepreneurship by RAICHAUDHURI, ANJAN, PHI
- Foundation course in Business, Entrepreneurship and Management, 1/eUniversity of Delhi 2014 Pearson Education
- Entrepreneurship: Creating and Leading an Entrepreneurial Organization, 1/eArya Kumar 2012 Pearson Education
- Preparing Effective Business Plans: An Entrepreneurial Approach, 1/e Bruce R. Barringer 2014 Pearson Education
- Entrepreneurship Development and Small Business Enterprise: For VTU, 1/e Poornima M Charantimath 2011Pearson Education
- Entrepreneurship Development and Small Business Enterprises, 2/e Poornima M Charantimath 2014 Pearson Education
- Technology Strategy for Managers and Entrepreneurs, 1/e Scott A. Shane 2014 Pearson Education
- India Land of a Billion Entrepreneurs, 1/e Upendra Kachru 2011 Pearson Education
- Desai, A.N.: "Entrepreneur & Environment". 1990. Ashish, New Delhi.
- Drucker, Peter : "Innovation and Entrepreneurship", 1985 Heinemann, London.
- Pareek, Udai and Venkateswara Rao, T.: "Developing Entrepreneurship - A Handbook on Learning Systems", 1978, Learning Systems, Delhi.
- Shankar, Raj: "Entrepreneurship", Tata McGraw Hill Education Private Limited, New Delhi
- Desai, Vasant: "Dynamics of Entrepreneurship Development & Management", Himalaya Publishing House.

MABE 3rd Semester
Paper- MABE 341

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

AGRICULTURE ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Introduction

Agricultural Economics: Definition, Nature and Scope; Role of Agriculture in Economic Development; Inter- Sectoral Linkages of Agriculture (Backward and Forward Linkages and Feedback Effects), Role of Agriculture in Haryana and Indian Economy, Farming as a business or way of life, Risks and Uncertainties in Agriculture.

Unit II

Rural Unemployment and Poverty in India

Rural Unemployment : Nature, Magnitude, Causes and Suggestions to solve unemployment problem; Problems and Measures to improve the conditions of Agricultural Labourers, Rural Poverty, Inequalities in income distribution, Concept of Poverty Line and Measures to eradicate Poverty in India.

Unit III

Agricultural Credit

Role of capital and rural credit; Organized and unorganized capital market; Rural savings and capital formation; Characteristics and Sources of rural credit- Institutional and non institutional; Reorganization of rural credit- cooperatives, commercial banks, regional rural banks; Role of the NABARD.

Unit IV

Recent Agricultural Problems in India

Issues in liberalization of domestic and international trade in agriculture, Impact of the World Trade Organization on Indian Agriculture; Agriculture and Environment- Sustainable Development, Food Security and International Trade – Concept, Threat, Indicators and Mechanism to Food Security.

Basic Reading List

- Black, J.D. (1945), Introduction to Economics of Agriculture. MacMillan, New York.
- Bruce L., Gardener and Gordon C., Rausser (Eds.), Handbook of Agricultural Economics, Vol.1A, Agricultural Production, Amersterdam, Elsevier Science B.V.
- Bruce L., Gardener and Gordon C., Rausser (Eds.), Handbook of Agricultural Economics, Vol. 2B, Agricultural and Policy, Amsterdam, Elsevier Science B.V.
- Bruce L., Gardener and Gordon C., Rausser (Eds.),Handbook of Agricultural Economics, Vol.1B, Marketing, Distribution and Consumption, Amersterdam, Elsevier Science B.V.
- Bruce, L., Gardener and Gordon C., Rausser (Eds.), Handbook of Agricultural Economics, Vol.2A, Agricultural and Its External Linkages, Amsterdam, Elsevier Science B.V.
- Cohen, R.L. (1948), Economics of Agriculture, Nishet, London.
- Dantwala, M.L. et. al (1991), Indian Agricultural Development Since Independence, Oxford & IBH, New Delhi.
- Drummond H. Evan and Goodwin W. John (2006), Agricultural Economics, Pearson Education, New Delhi.
- Eicher Carl and Lawrence Witt (Eds.) (1964), Agriculture in Economic Development, New York, McGraw Hill Co.
- Forster, G.W. and Leoger, M.C. (1959), Elements of Agricultural Economics, Prentice Hall.
- Ghatak Subrata and Ken Ingersent, Agriculture and Economic Development, Harvestor Press Ltd., London.
- Goodwin, H.G. (1977), Economics of Agriculture, Reston Publiching Co.
- Gulati, A. and T. Kelly (1999), Trade Liberalisation and Indian Agriculture, Oxford University Press, New Delhi.
- Halcrow, H.G.(1981), Economics of Agriculture, McGraw Hill International Book Agency.
- Meier, G.M. (1995), Leading Issues in Economic Development, Oxford University Press, New Delhi.
- Metcaff, D. (1969), Economics of Agriculture, Harmondsworth, Penguin Books.
- Nicholls, W.H. (1964), "The Place of Agriculture in Economics Development", in Eicher, C. and Witt, L.(ed) 1964, Agriculture in Economics Development, Vora & Co. Publishers Pvt. Ltd, Bombay.
- Ojala, E.M.(1950), Agriculture and Economic Progress, Oxford University Press, London.
- Rao, C.H. Hanumantha (1994), Agricultural Growth, Rural Poverty and Environmental Degradation in India, Oxford University Press, New Delhi.
- Rudra, A. (1982), Indian Agricultural Economics: Myths and Reality, Allied Publishers, New Delhi.
- Southworth Herman and Bruce Johnston (eds.) (1968), Agricultural Development and Economic Growth, Cornell University Press, New York.
- Taylor, H.C.(1949), Outlines of Agriculture Economics, MacMillan, New York.

Additional Reading List

- Bilgrami, S.A.R. (1996), Agricultural Economics, Himalaya Publishing House, New Delhi.
- Harque, T. and A.S. Sirohi (1986), Agrarian Reforms and Institutional Changes in India, Concept Publishing Company, Delhi.
- Kumar, Rajesh (2010), India's Export in Processed Food Products : Status & Potential, an Unpublished Thesis of the Department of Economics, K.U.K.
- Lekhi, R.K. and Singh, Joginder (2010), Agricultural Economics, Kalyani Publishers, New Delhi.

- Rana, Sarita (2002), Global Marketing in Floricultural Products : Challenges and Prospects for India, an Unpublished Thesis of the Department of Economics, K.U.K.
- Rani, Vandna (2004), Economics of Mushroom Cultivation in Haryana, an Unpublished Thesis of the Department of Economics, K.U.K.
- Sadhu and Singh (1991), Agricultural Problems in India, Himalaya Publishing House, New Delhi.
- Sadhu and Singh (2002), Fundamentals of Agricultural Economics, Himalaya Publishing House, New Delhi.
- Singh, Kuldeep (2006), "Indian Agriculture Trade in Pre and Post WTO Regime : A Comparative Study", K.U.R.J.(Arts & Humanities), Vol. XL, Jan- Dec., 2006.
- Singh, Kuldeep (2010), "Agricultural Trajectories and Environment Dilemma : Some Evidence from Haryana", Agricultural Situation in India, Vol. LXVII, No. 3, June, 2010.
- Soni, R.N. (1995), Leading Issues in Agricultural Economics, Arihant Press, Jalandhar.
- Sundaram I. Satya (2009), Rural Development, Himalaya Publishing House , New Delhi.

MABE 4th Semester
Paper- MABE 342

Time	: 3 Hrs.
Max. Marks	: 100
External	: 80
Internal	: 20

DEMOGRAPHY

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Introduction to Demography: Meaning and scope of demography, components of population growth and their interdependence; Sources of population data; Theories of population –Malthus, Optimum theory of population; Theories of demographic transition; Population and Development; Population trends since the twentieth century; International aspects of population growth and distribution; Age and Sex structure in more developed and less developed countries; determinants of age and sex structure.

Unit II

Fertility: Importance of the study of fertility-Total fertility rate, Gross reproduction rate and Net reproduction rate. Levels and trends in developed and developing countries; Factors affecting fertility.
Nuptiality: Concept and analysis of marital status; Trends in age at marriage, widowhood and divorce.
Mortality: Basic Concepts, Levels and trends in mortality in developed and developing countries; Factors leading to decline in mortality in recent past.

Unit –III

Migration: Basic concept and definitions; importance of migration, Types of migration; factor affecting migration. Theories of migration related to internal migration;
Urbanization: Meaning & Trends, growth and distribution of rural-urban population in developed and developing countries with special reference to India.

Unit IV

Population and Development with reference to India: Population information collected in India with special reference to 2011 Census, Natinal Family Health Surveys; Evolution of Population Policy in India The shift in policy from population control to family welfare, to women empowerment; Family planning strategies and their outcomes; Tasks before the National Population Commission, Latest population policy in india.

Basic Reading List

- Agarwal S.N. (1972), India,s Population Problem, Tata McGraw- Hill Co., Bomby.
- Bose, A. (1996), India's Basic Demographic Statistics, B.R. Publishing Corporation, New Delhi.
- Bogue, D.J. (1971), Principle of Demography, John Wiley, New York.
- Chenery H. and T.N. Srinivasan (Eds.)(1989), Hand Book of Development Economics, Vol. 1 & 2 Elsevier, Amsterdam.
- Choubey, P.K. (2000), Population Policy in India, Kanishka Publications, New Delhi.
- Coals, A.J. and E.M. Hoover (1958), Population Growth and Economic Development in Low income Countries: A Case Study of India's Prospectus, Princeton University Press, Princeton.
- Gulati, S.C (1988), Fertility in India: An Econometric Study of a Metropolis, Sage, New Delhi.

Additional Reading List

- Agnihotri, S. B. (2000), Sex ration in Indian Population: A fresh Exploration, Sage New Delhi.
- Amsden, A. H. (Ed.) (1992), Form of Production and Women's Labour, Gender Aspects of Industrialization in India and Mexico, Sage, New Delhi.
- Boserup,E. (1970), women's role in Economics Development, George Allen and Unwin, London.
- Chiang, C.L. (1974), Life Tables and Mortailty Analysis, W.H.O., Geneva.
- Gupta, Jj.A. (2000), New Reproductive Technogies, Women's Health and Autonomy, Indo Dutch Studies on Development Alternatives, Sage, New Delhi.
- Jhabwala,R. and R.K. Subramanya (2000) (Eds.), The Unorganized Sector: Work Security and Social Protection, sage, New Delhi.
- Krshnaji M., R.M. Sudarshan and A. Shariff (1999), Gender Population and development, Oxford University Press, New Delhi.
- King M. and M.A. Hill (Eds.)(1993), Women's Education in Developing Countries: Barriers, Benefits and Politics, John Hopkins, Baltimore.
- Lewis (Ed.)(1989), Strengthening the poor: What Have We Learnt, OECD, Paris.
- Mishra S. (2000), Voluntary Action in Health and Population: The Dynamics of Social Transition, Sage, New Delhi.
- Mitra, A. (1979), Implications of Declining Sex Ration in India's Population, Allied, New Delhi.
- Novell, C. (1988), Methods and Models in Demography, Belhaven Press, London.
- Seth M. (2000), Women and Development: The Indian Experience, Sage, and New Delhi.
- Simon, J.L. (1992), Population and Development in Poor Countries, Princeton University Press.
- Srinivasan, K. (1998), Basic Demographic Techniques and Applications, Sage, New Delhi.
- Srinivasan, K and A. Shariff (1998), India: Towards Population and Demographic Goals, Oxford University Press, New Delhi.
- Sryrock, H. et.al. (1973), The Methods and Materials of Demography, US Department of Commerce,Washington,D.C.
- Sudarshan and A. Shariff (1999), Gender Population and Development, Oxford University Press, New Delhi.
- United Nations (1973), The determinants and consequences of Population Trends, Vol. 1 UNO Publications, New York.

MABE 3rd Semester
Paper- MABE 343

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ENVIRONMENTAL ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Pareto optimality and perfect competition; External effects in production and consumption; Market failure in case of environmental goods - incomplete markets, externalities, non-exclusion; non-rivalry; non-convexities and asymmetric information.
Measures of economic value of environment WTP and WTAC; contingent valuation method; travel cost method; hedonic market methods; averting behaviour approach - household health production function method.

Unit II

Economic approaches for environmental protection; Price & Quantity rationing - pollution charges, ambient charges, product charges, subsidies; Liability rules - non-compliance fees, deposit refund system, performance bonds; marketable pollution permits; Evaluative criteria of and practical conditions for use of the economic incentives; Estimation of marginal cost of pollution abatement for designing the pollution tax; Mixed instruments; Choice among policy instruments; Coase's bargaining solution and collective action; New Environment Policy.

Unit III

Natural resources: types, classification and scarcity; Elementary capital theory; Economics of sustainable development - sustainability rules, Common-Perrings model; The Solow-Hartwick approach to sustainability and green GDP. Management of common property resources. System of integrated environmental and economic accounting (SEEA);

Unit IV

Environmental policy framework in India - problems of command & control regime; Development and degradation; Poverty, population and political economy; Water and air pollution and existing pollution control mechanisms; Land and forest degradation and the strategy for regeneration; Wetlands; International environmental issues – climate change; Trade and environment in WTO regime.

Reading List

- Henderson, J.M. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.
- Hanley, N., J.F. Shogern and B. White (1997), Environmental Economics in Theory and Practice, Macmillan.
- Cropper, Maureen (1999), Valuing Environmental Benefits, Edward Elgar.
- Sankar, U. (Ed.) (2001), Environmental Economics, Oxford University Press, New Delhi.
- James, A.J., M. N. Murty and Smita Misra (1999), Economics of Water Pollution – The Indian Experience, Oxford University Press, New Delhi.
- Chary, S.N. and Vyasulu, Vinod (2000), Environmental Management - an Indian Perspective, Macmillan, New Delhi.
- Painuly, J P, Economic Instruments: Application to Environmental Problems, Working paper no 3, by UNEP from IGIDR, Bombay, 1995.
- Hussen, A.M. (1999), Principles of Environmental Economics, Routledge, London.
- Jeroen. C.J.M. van den Berg (1999), Handbook of Environmental and Resource Economics, Edward Elgar Publishing Ltd., U.K.
- Pearce, D.W. and R. Turner (1991), Economics of Natural Resource Use and Environment, John Hopkins University Press, Baltimore.

MABE 3rd Semester
Paper- MABE 351

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

DIRECT TAXES-I

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Income Tax- Basic Concepts; Previous Year, Assessment Year, Assessee, Income; Agricultural Income, Casual Income, Person, Average Rate, Marginal Rate, Capital and Revenue Receipts and Expenditure; Return Of Income.

Unit II

Residential Status and Tax Incidence; Scope of Income; Individual, HUF, Firms, Association of Persons, Body of Individuals, Companies, Other Persons; Gross Total Income, Total Income, Exempted Incomes.

Unit III

Clubbing of Income; Set Off and Carry Forward of Losses; Agricultural Income- Tax Treatment of Agricultural Income; Tax Deducted at Source

Unit IV

Deductions from Gross Total Income; Income from other sources– Dividends, Interest on Security; Deduction of Tax at Source; Grossing Up; Bond Washing Transaction; Deductions; Filing Of Return Of Income.

Base Text Book

- V.K. Singania: Direct Taxes Law & Practice, Taxman.

Suggested Readings:

- Mehrotra and Goyal: Income Tax Law & Practice, Sahitya Bhavan.
- V.K. Singania: Direct Taxes Law & Practice, Taxman.
- Bhagawati Prasad: Income Tax Law & Practice.
- Manoharan T.N.: Income Tax Law & Practice.
- Income Tax Act 1956 and Finance Act of the relevant year

MABE 3rd Semester
Paper- MABE 352

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

VAT AND SERVICE TAX

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Introduction to Service Tax: Basic Terms, CENVAT Credit related to Service Tax; Taxable services; exemptions from service tax

Unit II

Provisions related to following Taxable Services and Computation of Tax Liability: Courier, Clearing and Forwarding Agent, Construction Services, Event Management services, Advertising Services, Architect's Services, Payment of Service Tax & Filing of return; Interest & Penalty

Unit III

Value Added Tax: Concept of value added. Input Goods and Services for CENVAT; Capital Goods for CENVAT; Exempted Final Products / Output Services

Unit IV

Input Tax Credits and Composition Scheme for Small Dealers; VAT Procedures

Base Text Book

- V.S. Datey, Indirect Taxes Law & Practice, Taxman Publications Pvt. Ltd., New Delhi.

Suggested Readings:

- V.S. Datey, Indirect Taxes Law & Practice, Taxman Publications Pvt. Ltd., New Delhi.
- V.K.Sareen and Ajay Sharma, Indirect Tax laws, Kalyani Publications, New Delhi.
- S. S. Gupta: Service Tax (Taxmann)
- R. Mohan Lavis : Service Tax (Bharat Publishers, New Delhi)

MABE 3rd Semester
Paper- MABE 353

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

THEORY OF TAXATION

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Principles of Taxation; Theories of Taxation; Taxable Capacity and its measurement; Tax Burden and Economic Efficiency

Unit II

Tax Incidence- Partial and General Equilibrium Analysis; Keynesian Short Run Model; Dynamic Tax Incidence

Unit III

Income V/S Excise Tax; Optimal Taxation; Tax Evasion and the Black Economy; Impact of Taxes on Individual Decisions

Unit IV

Impact of Excise Tax on Market Outcomes; Impact of Income Tax on Labour Supply, Savings and Portfolio Choice; Economic Effects of Corporation Income Tax

Base Text Book

- **Boadway, Robin, "Public Sector Economics", Cambridge, Winthrop Publishers**

Suggested Readings:

- Bruce, Neil, "Public Finance", Addison- Wesley Educational Publishers, Inc.
- Jones. Philip and Cullis, Jones, "Public Finance and Public Choice- analytical Perspectives", Oxford University press
- Stiglitz, Joseph, "Economics of the Public Sector", W.W.Norton and Company, new York/London
- Rosen, H.S., "Public finance", Tata McGraw Hill
- McNutt, P.A., "The economics of Public Choice", Edward Elgar Publishing Inc.
- Mueller, D.C., "Public Choice- I,II,III" Cambridge university Press, Cambridge

- Downs, A., “An Economic Theory of Democracy”, Harper and Row, New York
- Musgrave R.A and Peacock A.T., “ Classics in the Theory of Public Finance”, Mcmillan

SEMESTER-IV

PAPER CODE	NOMENCLATUR (Compulsory)	EXTERNAL	INTERNAL	TIME	CREDITS
CORE PAPERS					
MABE 401	TIME SERIES AND BUSINESS FORECASTING	80 (Theory 60 + Practical 20)	20	3 Hrs.	4+1+0
MABE 402	INDIA IN THE CONTEMPORARY WORLD ECONOMY	80	20	3 Hrs.	4+1+0
MABE 403	ECONOMICS OF GROWTH AND DEVELOPMENT	100	20	3 Hrs.	0+0+4
MABE 404	COMPREHENSIVE VIVA VOCE	50			0+2+0
Elective Papers **CHOOSE ANY ONE OF THE FOLLOWING ELECTIVE GROUPS**					
GROUP-I **ECONOMICS OF MARKETING**					
MABE 411	MARKETING OF SERVICES	80	20	3 Hrs.	4+1+0
MABE 412	INTEGRATED PROMOTIONAL MANAGEMENT	80	20	3 Hrs.	4+1+0
GROUP-II **ECONOMICS OF FINANCE**					
MABE 421	FINANCIAL DERIVATIVES AND RISK MANAGEMENT	80	20	3 Hrs.	4+1+0
MABE 422	FINANCIAL INSTITUTIONS AND MARKETS	80	20	3 Hrs.	4+1+0
GROUP-III **ECONOMICS OF HUMAN RESOURCES**					
MABE 431	CROSS CULTURAL AND GLOBAL HRD	80	20	3 Hrs.	4+1+0
MABE 432	ORGANISATIONAL CHANGE AND DEVELOPMENT	80	20	3 Hrs.	4+1+0
GROUP-IV **ECONOMICS OF AGRICULTURE AND RESOURCES**					
MABE 441	INDUSTRIAL ECONOMICS	80	20	3 Hrs.	4+1+0
MABE 442	ECONOMICS OF INFRASTRUCTURE	80	20	3 Hrs.	4+1+0
GROUP-V **ECONOMICS OF TAXATION**					
MABE 451	DIRECT TAXES-II	80	20	3 Hrs.	4+1+0
MABE 452	CORPORATE TAX PLANNING	80	20	3 Hrs.	4+1+0
Total		550			26

Total Marks: 2300

Total Credits: 111 **GRAND TOTAL = 2300**

*** One credit has been given for one Hour of Teaching per week and Two Hours of Tutorial/ Practical/Seminar/Viva-Voce/Training (L+T+P=Lecture + Tutorial + Practical)**

MABE 4th Semester
Paper- MABE 401

Total Credit : 5

Time : 3 Hrs.
Max. Marks : 100
External : 80 (60+ 20)
Theory : 60
Internal : 20
Practical : 20

TIME SERIES AND BUSINESS FORECASTING

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Time-series Analysis: Introduction and Components, Time Series data versus cross-sectional data versus panel data. Features of time-series data such as seasonality and cyclicality. Stationarity,unit root, cointegration, Dicky fuller test, engle granger test.

Unit II

Autoregressive and moving Average Process. De-trending and differencing, Time series decomposition**.** Spurious regression, error correction mechanism , forecasting theory and method: overview and types of forecasts ,choosing forecasting techniques ,Exponential smoothing.

Unit III

Forecasting with ARIMA and VAR Models- Box Jenkins methodology, vector Auto regression, Granger Causality.

Unit IV

Introduction to Panel data method: problems with panel data, Pooled OLS, Random effects and fixed effects methods, Volatility measurement, the ARCH and GARCH process.

Practical

Students will be required to solve the forecasting problems with the help of SAS or EVIEWS

Reading List

- Time Series Analysis and Its Applications: With R Examples, Shumway and Stoer, 2nd edition (2006), Springer.

- The Analysis of Time Series: An Introduction, Chris Chateld, 6th edition (2003), Chapman& Hall / CRC.
- Time Series: Theory and Methods, Brockwell and Davis, 2nd edition (1991), Springer.
- Time Series Analysis, James Hamilton, (1994), Princeton University Press.
- Analysis of Financial Time Series, T. S. Tsay, 3rd ed, Wiley, 2010.
- Econometric Analysis, W. H. Greene ,7th ed., Part V: Time Series and Macroeconometrics, Prentice Hall, 2011.
- C. F. Braum, An Introduction to Modern Econometrics Using Stata, Stata Press, 2006
- Time Series Analysis with Applications in R, Cryer, J. and Chan, K. 2nd edition, Springer.
- SAS for Forecasting Time Series, John C. Brockelbank and David A. Dickey, John Wiley and Sons
- Introduction to Time Series and Forecasting, John C. Brockelbank and David A. Dickey, Springer-Verlag New York, 2002
- Time Series Models for Business and economics Forecasting, Anne Opschoor, Dick Van Dijk, Philip Han Franses, Cambridge University Press.

MABE 4th Semester
Paper- MABE 402

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INDIA IN THE CONTEMPORARY WORLD ECONOMY

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

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Unit I

Brief economic history and major features of Indian Economy in present times. Role of State and Market in economic development. Role of Pressure groups in Indian economy. Role of regulatory agencies in India; Objectives and strategy of Indian planning; Achievements and failures of five year Plans. Structural changes in Indian economy.

Unit II

Broad demographic features of Indian population; Rural-urban migration; Urbanization and civic amenities; Poverty and Inequality. Approaches for employment generation and poverty alleviation. Energy; Social infrastructure – education and health; Environment; Regional imbalance; Issues and policies in financing infrastructure development.

Fiscal federalism – Centre-state financial relations; Finances of Central Government; Finances of State Governments; Parallel economy; Problems relating to fiscal policy; Fiscal sector reforms in India.

Unit III

Institutional Structure – land reforms in India; Problems & prospects of Indian agriculture; Pricing of agricultural inputs and output; Issues in food security; Policies for sustainable agriculture. Industrial policy; Public Sector enterprises and their performance; Privatization and disinvestment debate; Growth and pattern of industrialization; Small-scale sector; Exit policy – issues in labour market reforms.

Unit IV

Globalisation of Indian economy; WTO and its impact on the different sectors of the economy; Need for and issues in good governance.

Structure and direction of foreign trade; Balance of payments; Issues in export-import policy; Exchange rate policy and FEMA; Foreign capital and MNCs in India. Analysis of price behaviour in India; Review of monetary policy of RBI; Money and capital markets.

Reading List

- Ahluwalia, I.J. and I.M.D. Little (Eds.) (1999), India's Economic Reforms and Development (Essays in honour of Manmohan Singh), Oxford University Press, New Delhi.
- Bardha, P.K. (9th Edition) (1999), The Political Economy of Development in India, Oxford University Press, New Delhi.
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (2001), Development Experience in the Indian Economy: Inter-State Perspectives, Bookwell, Delhi.
- Datt, R. (Ed.) (2001), Second Generation Economic Reforms in India, Deep & Deep Publications, New Delhi.
- Government of India, Economic Survey, (Annual), Ministry of Finance, New Delhi.
- Government of India, Planning Commission; Five Year Plan Development.
- Jalan, B. (1992), The Indian Economy – Problems and Prospects, Viking, New Delhi.
- Jalan, B. (1996), India's Economic Policy- Preparing for the Twenty First Century, Viking, New Delhi.
- .Kapila Uma Indian Economy Academic Foundation New Delhi Latest Edition.
- Mishra S.K.and Puri V.K, Indian Economy Himalya Publication House Latest Edition.
- Monga G.S.and Goel M.M. (2001) Wage Goods Approach and Development Deep and Deep New Delhi.
- Parikh, K.S. (1999), India Development Report – 1999-2000, Oxford University Press, New Delhi.
- Reserve Bank of India, Report on Currency and Finance, (Annual).
- Rudar Dutt and Sundram; Indian Economy S Chand and Company Latest Edition
- Sen, R.K. and B. Chatterjee (2001), Indian Economy: Agenda for 21st Century (Essays in honour of Prof. P.R. Brahmananda), Deep & Deep Publications, New Delhi.

MABE 4th Semester
Paper- MABE 403

Total Credit: 4

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF GROWTH AND DEVELOPMENT

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Concepts & Measurement of Economic Development
Economic growth, economic development and sustainable development; Structural Diversity and common characteristics of developing nations.
Measuring Development: Income Measures, Basic Needs Approach, PQLI, HDI and Capabilities Approach; Poverty, Inequality and Development: Measurement, Impact and Policy options.

Unit II

Theories of Economics Development
Contributions of Ricardo, Karl Marx and Schumpeter,
Growth Models:
Harrod and Domar: Solow and Joan Robinson

Unit III

Approaches to Development
Balanced and Unbalanced Growth; Big push theory;Critical Minimum Efforts Theory; Low Income Equilibrium Trap;
Sectoral Aspects of Development
Role of Agriculture and industry in Economic Development; Services Sector in Developing Economies: Role, growth and sustainability, Infrastructure and its importance.

Unit IV

Trade and Development Experience

International Trade as an Engine of Growth: Static and Dynamic gains from Trade; Prebisch-Singer Hypothesis vis-à-vis Free Trade experience of Developing Countries; Trade Policy Debate: Export promotion, Import Substitution and Economic Integration; WTO and Developing Countries.

State and Economic Development

Market Failure & Rationale of State in economic development; State Capacity and State Failure; Good economic governance.

Basic Reading List:

- Adelman, I. (1961), Theories of Economic Growth and Development, Stanford University Press, Stanford.
- Barro, R. and X. Salai- Martin, Economic Growth, McGraw Hill, New York.
- Behrman, S. and T.N. Srinivasan (1995), Handbook of Development Economics, Vol. 3, Elsevier, Amsterdam.
- Bhagwati, J. and P. Desai (1970), India: Planning for Industrialization, Oxford University Press, London.
- Brown, M. (1966), On the Theory and Measurement of Technical Change, Cambridge University Press, Cambridge, Mass.
- Chakravarti, S. (1982), Alternative Approaches to the Theory of Economic Growth, Oxford University Press, New Delhi.
- Chakravarti, S. (1987), Development Planning: The Indian Experience, Clarendon Press, Oxford.
- Chenery, H. and T.N. Srinivasan (Eds.) (1989), Handbook of Development Economics, Vols. 1 & 2, Elsevier, Amsterdam.
- Dasgupta, P. (1993), An Enquiry into Well-being and Destitution, Clarendon Press, Oxford.
- Ghatak, S. (1986), An Introduction to Development Economics, Allen and Unwin, London.
- Gillis, M., D.H. Perkins, M. Romer and D.R. Snodgrass (1992), Economics of Development, (3rd Edition), W.W. Norton, New York.
- Grossman, G. and E. Helpman (1991), Innovation and Growth in the Global Economy, MIT Press, Cambridge, Mass.
- Higgins, B. (1959), Economic Development, W.W. Norton, New York.
- Hirschman, A.O. (1958), The Strategy of Economic Development, Yale University Press, New York.
- Jones, HG.(1975), An Introduction to Modern Theories of Economic Growth, Nelson, London.
- Kindleberger, C.P. (1977), Economic Development, (3rd Edition), McGraw Hill, New York.
- Lewis, W.A. (1955), The Theory of Economic Growth, George Allen and Unwin, London.
- Meier, G.M. and J.E.Rauch (2005), Leading Issues in Economic Development, (8th Edition), Oxford University Press, New Delhi.
- Nayyar, D. (Ed.) (1994), Industrial Growth and Stagnation: The Debate in India, Oxford University Press, New Delhi.
- Sen, A. (1992), Inequality Reexamined, Oxford University Press, Oxford.
- Sen, A.K. (Ed.) (1990), Growth Economics, Penguin, Harmondsworth.
- Sen,A. (1983), Poverty and Famines, Oxford University Press, Oxford.

- Thirlwal, A.P. (1999), (6th Edition), Growth and Development, Macmillan, U.K.
- Todaro, M.P. and S.C. Smith (2003), (8th Edition), Economic Development, Pearson Education, Delhi.

MABE 4th Semester
Paper- MABE 411

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

MARKETING OF SERVICES

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Services and the Economy -The growing influence of services in the economies of the countries around the globe. Services and the Indian Economy: Contribution and Reasons for Growth of Services in India.

Services marketing -Unique Characteristics of Services and Problems Associated with Services Marketing . Overcoming Challenges Associated with Services Marketing. Goods-Service Categorisation. Types of Services- Core and Supplementary.

Unit II

Service Marketing Environment And Mix -Prominent Environmental Factors Influencing Service Marketing. A Bird's Eye-View of Service Marketing Mix- Product, Price, Place, Promotion, Process, People, Physical Evidence and Productivity.

Service management triangle - An Introduction to the Concept and its Variants viz. Internal Marketing, External Marketing and Interactive Marketing.

Unit III

Service Quality, Productivity And Recovery - Service Quality- concept, dimensions 2 models.; Service Productivity- Measurement and Productivity Enhancement Strategies. Relationship between Service Quality and Productivity. Service Recovery- Significance. Recovery Techniques.

Unit IV

Service Value Enhancement -Service Differentiation- Significance and Techniques. Service Positioning- Ways. Relationship Marketing- Significance and Tools.

References

- Jauhari. Vinnie and Dutta, Kirti : *Services-Marketing, Operations and Management,* Oxford University Press, New Delhi.
- Lovelock, C.H. *Services Marketing*, Pearsons, New Delhi
- Payne, A: *The Essence of Services Marketing*, Prentice Hall, New Delhi.
- Ravi Shankar: *Services Marketing – The Indian Perspective*, Excel Books, New Delhi.
- Rao, K. Rama Mohana, *Services Marketing*, Pearson Education, Delhi.
- Shankar, Ravi: *Services Marketing -The Indian Perspective*, Excel Books, New Delhi.
- Zeithaml, V.A., Bitner, M.J.: *Services Marketing*, Tata McGraw Hill, New Delhi

Suggested Readings

- Zeithaml, V.A, D.D Gremler, M.J Bitner and A Pandit, Services Marketing, Tata McGraw Hill, 4th Special Indian Edition.
- Hoffman, K.D and JEG Bateson, Marketing of Services, Cengage Learning, Indian Edition.
- Lovelock, Christopher, Services Marketing, Pearson Education, 7th Edition.
- Woodruff, H.E, Services marketing, Longman Group.
- Payne, D, The Essence of Services Marketing, Prentice Hall of India.
- Verma, Harsh V, Services Marketing- Text and Cases, Pearson Education.
- Kotler, Philip and Gary Armstrong, Principles of Marketing, Prentice Hall of India.
- Journal of Services Marketing, Emerald Publications

MABE 4th Semester
Paper- MABE 412

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INTEGRATED PROMOTIONAL MANAGEMENT

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

The communication process- The nature of communication, A basic model of communication, Role of IMC in Marketing Process.IMC Planning Model, Developing IMC Plan. Elements, Features and Determinants of Marketing Communication Mix, Measuring Effectiveness of Various Elements of Marketing Communication Mix.

Unit II

Creative Strategy Planning and Development: Creativity techniques, Creative execution in advertising: Message, Appeals and execution styles, Celebrity endorsements in advertisement. Creative Execution in Print Advertising, Layout, Headlines, Copy, Visuals. Creative Execution on Television; Creative execution online: Internet and integrated marketing communication- Advertising and sales promotion on the internet.

Unit III

Advertising : concepts, types, forms and Role; Advertising planning and objective setting: Dagmar approach. Determination of target audience; Building of advertising programme; campaign planning; Media planning and Budgeting; Measuring the effectiveness of the promotional program- Market testing, pre testing, post testing, laboratory tests, field tests, Advertising agency; types, functions and structure of advertising agency.

Unit IV

Meaning and Importance of Direct Marketing, Prominent Direct Marketing Tools, Direct Marketing Decisions and Strategies. Meaning, Importance and Principles of personal selling, Designing Sales Force, Managing the Sales Force.

Suggested Readings

- Belch and Belch, Advertising and Promotions- IMC Perspectives, Tata McGraw Hill.
- Clow and Baack, Integrated Advertising, Promotion, and Marketing Communications, Pearson Education.
- O Guinn and Allen Semenik, Advertising and Integrated Brand Promotion, Cengage Learning.
- Murthy, S N and U Bhojanna, Advertising- An IMC Perspective, Excel Books.
- Batra, Meyers and Aaker, Advertising Management, PHI Publications.
- Kotler, P and Kevin L Keller, **Marketing Management, Prentice Hall India, 12th**
- Edition..
- Journal of Marketing Communication, American Marketing Communication

Suggested Readings:

- Belch, George E and Belch, Michael A. : Introduction to Advertising and Promotion, 3rd ed, Chicago, Irwin, 2002.
- Arens and Bovee : Contemporary Advertising, Irwin, 1995.
- Sandage and Fryberger : Advertising, AITBS, Delhi, 2000.
- Batra, Rajeev, Myers, johan G. and Aaker, David A. Advertising Management, 4th ed., New Delhi, prentice Hall of India, 2002.
- O, Guinn : Advertising & Integrated Brand Production, Vikas Publishing House, New Delhi.
- Kleppner, Otto : Advertising Procedure, Englewood Cliffs, New Jersey, Prentice Hall Inc., 1986.
- Wells, William, Burnett, Johan & Moriarty Sandara, PHI, 2002.

Suggested Reading

- Kruti Shah and Alan D'Souza - Advertising & Promotion an IMC perspective
- Books of advertising Management

MABE 4th Semester
Paper- MABE 421

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

FINANCIAL DERIVATIVES AND RISK MANAGEMENT

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Investors and risk management; measuring and managing VaR and CaR; Introduction to Derivative Markets; The Basis and Spreads; Models of Futures Prices- Cost-of-Carry Model, Expectations Model; Price Discovery, Speculation and Hedging Functions of Futures Markets; Interest Rate Futures and their Hedging Applications.

Unit II

Stock Index Futures- Pricing and Hedging Strategies; Foreign Exchange Futures- Pricing, Speculation and Hedging; The Options Market; Options Pay-Offs

Unit III

Option Pricing – Binomial Model, Black- Scholes Model; Option Price Sensitivities – Delta, Gamma, Vega, Rho, Delta Hedging

Unit IV

Option Trading Strategies – Building Blocks of Derivatives; Directional Strategies; Volatility Strategies; Horizontal Spreads; Ratio and Black Spreads; Swaps – Motives, Pricing and Hedging

Base Text Book

- Stulz, Rene M, " Risk management and Derivatives", Cengage learning.
- Robert W. Kolb, James Overdahl, **"Futures, Options and Swaps",** Blackwell Publishing

- S.S.S.Kumar, "Financial Derivatives", Prentice Hall

Suggested Readings:

- Bodurtha, J. and Courtadon G., **The Pricing of Foreign Currency Options**, New York, Salomon Brothers Center, New York University, 1987-4/5.
- Bolten, Steven E., **"Security Analysis and Portfolio Management: An Analytical Approach to Investments",** N.Y.Holt, Rinehert and Winston, 1972
- Bowyer, John, W., **"Investment Analysis and Management",** Illinois, Irwin, 1972.
- Carr, J.L., **"Investment Economics",** Sage Pub., California, 1969
- Chance D.M., "An Introduction to Options and Futures", Dryden press, Orlando,FL,1989.
- Chance, D., "**An Introduction to Derivatives"**, New York, Dryden, 1998.
- Conrad Michael Mattern, **" Handbook of Investment Research: Economic and Financial Indicators as Market Movers",** Palgrave Macmillan, 2002. ISBN10: 0333968697
- Cox, J. and M. Rubinstein, "**Options Markets"**, Englewood Cliffs, N.J., Prentice-Hall, 1985,ISBN0136382053.
- Curley, Anthony J. and Bear Robert M., **"Investment Analysis and management",** N.Y., Harper & Row, 1979
- David G. Luenberger, **"Investment Science",** Oxford University Press,1997. ISBN10: 0195108094
- David King, **"Financial Claims and Derivatives",** Thomson Learning, 1998. ISBN10: 186152448X
- Fama, E.F. and Miller, M.H., **"Theory of Finance",** N.y.Holt, Rinehert and Winston, 1972
- Figlewski, S., W. Silber and M. Subrahmanyam, "**Financial Options, : From Theory to Practice"**, Homewood, Illinois, Business One Irwin, 1990, ISBN 1556232349.
- Frank Milne, **"Finance Theory and Asset Pricing",** Oxford University Press, 2003. ISBN10: 0199261075
- Hull, J., "**Options, Futures and Other Derivative Securities"**, Upper Saddle River, N.J., Prentice Hall, 6th edition,2006, ISBN 013149908-4,
- Jarrow, R.A. and A. Rudd, "**Option Pricing"**, Homewood, Illinois, Dow Jones-Irwin, 1983, ISBN 0870943782.
- Jarrow, R.A. and S. Turnbull, "**Derivative Securities"**, Cincinnati, Ohio, South-Western, 1996.
- McDonald, R., "**Derivatives Markets"**, Boston, MA, Addison-Wesley Publishing, 2002, ISBN: 0201729601
- Richard T. Baillie, **"The Foreign Exchange Market"** Cambridge University Press, 1990. ISBN10: 0521396905
- Robert W. Kolb, **"Financial Derivatives",** Blackwell Publishing, 1996. ISBN10: 1557869308
- Robert W. Kolb, James Overdahl, **"Understanding Futures Markets",** Blackwell Publishing, 2006. ISBN10: 1405134038
- Thomas A. Ho, Sang Bin Lee**,"Securities Valuation: Applications of Financial Modeling",** Oxford University Press, 2005. ISBN10: 0195172752

MABE 4th Semester
Paper- MABE 422

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

FINANCIAL INSTITUTION AND MARKETS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Financial System AND Interest Rate

Meaning and Rationale of studying Financial System; Risk management in Financial Institutions; Terms structure of Interest rate and Yield curve;

Commercial AND Central Banking System

Meaning, Functions and Types of Commercial Banks.
Central Banking in India; Conduct of monetary policy in India.

Unit II

Money Market

Introduction, Meaning and main introductory characteristics of Money Market segments- Call Money Market, Treasury bill market, Commercial Papers Market, Certificate of Deposit Market, Gilt- edged Securities Market, Repo Market.

Capital Market

Meaning, Objectives, Importance and Functions of Capital Market; Financial instruments in primary capital Market.

Unit III

Insurance Market

Meaning, Types and Principles of Life Insurance and General Insurance; Rationale for opening up of the Insurance to Private Sector.

International Finance

Foreign Exchange Rate- Meaning, Types; Foreign Exchange market- Importance, Trading and Participants.

Unit IV

Financial Institutions

Functions and Importance of Merchant Bankers, Functions and Types of Mutual Funds, Main features of Working of UTI.

Meaning and Functions of NBFC's- Credit Unions, Savings and Loan Associations, Pension Funds, Finance Company, Investment Trusts, Common Trusts Fund.

Reading List

- Bhasin, N. (2007), Banking and Financial System India 1947-2007, New Century Publications.
- Gupta,S.K , Aggarwal,N. and Gupta,N. (2005), Financial Institutions and Markets, Kalyani Publishers.
- Khan, M.Y. Indian Financial System.
- Mishkin, F.S and Eakins,S.G.(2009) Financial Markets and Institutions, (5th Edition) Dorling Kindersley.
- Bhole, L.M. and Mahakud, J.(2009), Financial Institutions and Markets-Structure, Growth and Innovations, Tata Mcgraw Hill.
- Madura, J.(2006) Financial Institutions and Markets (7th Edition), CENGAGE Learning.
- Fabozzi, F.J, Modigliani, F. Jones,F.J.and Ferri,M.G.(2009), Foundations of Financial Markets and Institutions, Dorling Kindesley.
- Mishkin, (2013) ' The economics of Money, Banking and Financial Markets'. 7e, Pearson Publications.
- Cecchetti, S.G. and Schoenholtz, K.L.(2013) , 'Money , Banking and Financial Markets' . 3rd edition. Tata McGraw Hill Company Ltd
- Bhole, L.M. (1999), Financial Institutions and Markets, Tata McGraw Hill Company Ltd., New Delhi.
- Karampal, Bodla,B.S. and Garg,M.C.(2007), 'Insurance Management : Principles and Practices' Deep and Deep
- Bhole, L.M. (2000), Indian Financial System, Chugh Publications, Allahbad.
- Johnson, H.J. (1993), Financial Institutions and Markets, McGraw Hill, New York.
- Machiraju, M.R. (1999), Indian Financial Systems, Vikas Publishing House, New Delhi.
- Ohlson, J.A. (1987), The Theory of Financial Markets and Institutions, North Holland, Amsterdam.
- Prasad, K.N. (2001), Development of India's Financial System, Sarup & Sons, New Delhi.

- Smith, P.F. (1978), Money and Financial Intermediation: The Theory and Structure of Financial System, Prentice Hall, Englewood-Cliffs, New Jersey.
- Chandra, P. (1997), Financial Markets, (4th Edition), Tata McGraw Hill, New Delhi.
- Machiraju, H.R. (1997), International Financial Markets in India, Wheeler Publishing, Allahbad.
- Bhatt, R.S. (1996), Unit Trust of India and Mutual Funds: A Study, UTI Institute of Capital Markets, Mumbai.
- Sahadevan, K.G. and M.T. Thiripalraju (1997), Mutual Funds, Prentice Hall of India, New Delhi.
- Goss, B.A. and B.S. Yamey (1978), The Economics of Futures Trading, Macmillan, London
- Gupta, L.C. (Ed.) (1999), India's Financial Markets and Institutions, Society for Capital Research and Development, Delhi.
- Crocker, A. (1982), International Money; Issues and Analysis, The English Language Book Society, Nelson, London.
- Niehans, J. (1994), International Monetary Economics, John Hopkins University Press, New York.
- Official websites of IMF, RBI,UTI, LIC, FMC, SEBI, PFRDA, IRDA, SIDBI, NABARD, EXIM, NHB

MABE 4th Semester
Paper- MABE 431

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

CROSS CULTURAL AND GLOBAL HRD

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Core concepts in managing human resources in the global business environment; Understanding and managing the Culture factor in GHRM. Approaches to Understanding & Managing Cultural Diversity. The Contingency Matrix approach to GHRM. Cross Cultural Differences and Managerial Implications; Cross Cultural Research Methodologies and Hofstede's Hermes Study; Structural Evolution of Global Organisations; Cross Cultural Leadership and Decision Making; Cross Cultural Communication and Negotiation.

Unit II

Global organisation design. Global staffing and staff flow practices. Learning, training & development of global employees. Human Resource Management in Global Organisations; Selection, Sourcing, Selection Criteria for International Assignment; Compensation and Appraisal in Global Perspective. Performance management in MNCs. Global compensation and benefits.

Unit III

MNCs and industrial relations trends. Emerging global HRM practices. Industrial Relations in a Comparative Perspective. Emerging Trends in Employee Relations and Employee Involvement. International Labour Standards. HR/IR issues in MNCs and Corporate Social Responsibility.

Unit IV

Ethics in International Business; Western and Eastern Management Thoughts in the Indian context. Technology & HRD. Organizational and HR Implications of Technological Change. Technological Innovation: Concept and Process, Role of HR in supporting innovation programme in an organisation. Process of measuring the outcome of an Innovation in organisation. Technology and Culture; Process of transition from Reactive to Proactive culture, Steps in technology transition process.

Suggested Reading:

- Adler,NJ. International Dimensions of Organizational Behaviour. Boston, Kent Publishing, 1991.
- Bartlett,CandGhoshal, S.TransnationalManagement:Text, Cases and Readings in Cross Border Management. Chicago, Irwin, 1995.
- Dowling. P J. etc. International Dimensions of Human Resource Management 2nd ed. California,Wadsworth, 1994.
- Hofstede,G. Cultures Consequence: International Differences inWork Related Values. London, Sage, 1984.
- Marcic, D and Puffer, S M. Management International: Cases, Exercise and Readings. St. Paul,West Publishing, 1994.
- Mead, R. International Management: Cross Cultural dimensions. BlackWell, Camb., Mass., 1994.
- Mendenhall, M. etc., Global Management. Cambridge Massachusetts.,Blackwell, 1995.

- Bhattacharya, Deepak Kumar — *Technological Change and Manpower Development*, Excel Publications 2010.
- Aggarwala, Tanuja — *Strategic HRM* Oxford University Press.2010.
- Mankin, David — *Human Resource Development*, Oxford University Press.2012
- Haldar, Udai — *Human Resource Development*, Oxford University Press.2010.
- Dessler, Garry & Varakkey, Biju — *Human Resource Management* , 12th Edition, Pearson Education 2012.
- Clark, Jon — *Human Resource Management and Technology Change*, Sage, London, 1993.
- Gampbell, A & Warner, M. — *New Technology, Skills, and Management*, Routledge, London, 1992.
- Rastogi, P.N. — *Management of Technology and Innovation*, Sage, New Delhi, 1995.
- Gupta, S.C. — International HRM, Macmillan India.2012.
- Ray and French — International HRM, University Press, 2010
- Bartlett, Cand Ghoshal, S. — *Transnational Management: Text, Cases and Readings in Cross Border Management.* Chicago, Irwin, 1995.
- Hofstede, G. — *Cultures Consequence: International Differences in Work Related Values.* London, Sage, 1984.
- Mead, R. — *International Management: Cross Cultural dimensions.* BlackWell, Camb., Mass., 1994.
- Evans, Pucik and Barsoux, — *The Global Challenge- framework for international human resource management,* Tata McGraw-Hill Irwin.
- Dowling, Peter J and Welch, Denice E., — *International Human Resource Management*- Cengage Learning 2010
- Aswathappa, K — *International Human Resource Management*, McGraw Hill 2009
- Tayeb, Monir H. — *International Human Resource Management*, Oxford University Press – 2005
- Rao, P.L. — *International Human resource Management*, Excel Books, 2009

MABE 4th Semester
Paper- MABE 432

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ORGANISATIONAL CHANGE AND DEVELOPMENT

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Human relations and organizational behavior; Background, definitions and related concepts - organisatinal change, Organisational development, organizational health, organizational effectiveness; Objectives of OC & OD; Mapping of Organisational climate; Organizational Design - Various organizational structures and their effects. Approaches to OC & OD.

Unit II

Organizational Change: Nature, meaning and types of organizational Change; Resistance to Change; Managing resistance to change; Implementing Change. Conflict Management. Forces for organizational change; Models of organizational Change- Lewin's Model and System Model of change; Building support for change.

Unit III

Organizational Development: Steps in OD Process, General Competencies for OD Professionals; Values, Assumptions and beliefs in O.D; Ethics of O.D. Professionals; O.D. Interventions- An overview, Nature, major families of O.D. interventions- Interpersonal, Team, Intergroup, Third party & System Interventions, Sensitivity training; Confrontation meeting; Transactional analysis; Contemporary OD Interventions- Learning Organizations, Organization Restructuring, Employee Involvement and Work Design; Future of Organization Development.

Unit IV

Quality Philosophies Concept of Quality, Quality as the basis of market competition, Historical review, Quality philosophy of Deming, Juran, crossby etc., Obstacles, Integrating productivity and Quality. Organization of Quality; **Introduction to TQM;** Benchmarking, Taquchi's Quality Engineering, Total productive maintenance, SQC, Kaizen, Six sigma concept. Introduction to ISO 9000 & ISO 14000; Quality Audit.

Suggested Books:

- Total Quality Management: By Bosterfied el al. Pearson Education India, 2001.
- The Essence of Total Quality Management By Johan Bank, Prentice Hall of India 2000.
- Managing for Total Quality: By Logothelis Prentice Hall of India, 2000.
- Total Quality Management: By Sundra Raju, Tata Mcgraw Hills Publishing Company, 1997.
- TQM and ISO 9000: By K.C. Arora, S.K. Kataria & Sons 2000.

- French and Bell *Organizations Development*. Prentice Hall of India. New Delhi, 1991.
- French, W L. etc *Organization Development theory, Practice and research* 3rd ed. Universal Book Stall, New Delhi, 1990.
- Singh, Kavita *Organizational Change & Development*, Excel Books.2010
- Robbins ,Judge and Vohra *Organisational Behaviour*, Pearson Education India 2011
- Kinicki and Krietner *Organisational Behaviour*, Tata McGraw Hill Publications, 2011

- Newstrom *Organisational Behaviour at Work,* Tata McGraw Hill Publications, 2011.
- Baron and Greenberg *Behaviour in Organisations,* PHI, 2011.
- Jones and Mathew *Organisation Designs, Theory and Change*, Pearson Education, 2011
- Pareek, Udai *Understanding Organisational Behaviour,* Oxford University Press,2012.
- Huse, F E. and Cummings, T G. *Organizations, Development and Change.* 3rd ed. New York, West, 1985.

MABE 4th Semester
Paper- MABE 441

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

INDUSTRIAL ECONOMICS

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

UNIT-I

Concept and Organization of a firm – ownership, control and objectives of the firm; Growth of the firm – Theory and evidence, constraints on firm's growth; Productivity, efficiency and Capacity utilization – concept and measurement; Theories of industrial location – Weber and Sargent theories.

UNIT-II

Sellers' concentration; Product differentiation; Entry conditions; Market structure and profitability; Product pricing – theories and evidence. Methods of project evaluation; Ranking of Projects – NPV and IRR; Theories and empirical evidence on Mergers and Acquisitions (M & A's).

UNIT - III

Industrial Policy in India – evolution and paradigm shift; Recent trends in Indian industrial growth; National manufacturing Policy 2011.Regional industrial growth in India; Industrial economic concentration and remedial measures; Development of Cottage and Small Scale industries; Recent Policy Measures.

UNIT-IV

Industrial Finance; Sources of short term and long term finance; Industrial Financial Institutions: Role and functioning in India; Corporate securities; Ownership and creditorship securities. Structure of Industrial labour; Globalization and labour ; Industrial legislation – Industrial Disputes Act ,1947 and Factories Act, 1948 . Industrial relations – Worker's participation in management and Collective Bargaining; Exit policy and safety nets.

Basic Reading List

- Ahluwalia, I.J. (1985), Industrial Growth in India, Oxford University Press, New Delhi.
- Arun Monappa- Industrial Relations,Tata Mcgraw Hill,1997.
- Barthwal, R.R. (2000), Industrial Economics, Wiley Eastern Ltd. New Delhi.

- Cherunilam, F. (1994), Industrial Economics: Indian Perspective (3rd Edition), Himalaya Publishing House, Mumbai.
- C.S. Venkata Ratnam-Industrial Relations ,Oxford University Press,2008.
- Chadha, V. and G.S. Bhalla (1999), Industrial Development in India: The Post Reform Scene, Kalyanai Publishers, New Delhi.
- Desai, B. (1999), Industrial Economy in India (3rd Edition), Himalaya Publishing House, Mumbai.
- Hajela, F.D. (1998), Labour Restructuring in India : A Critique of the New Economic Policies, Commonwealth Publishers, New Delhi.
- Government of India, Economic Survey (Annual).
- Kuchhal, S.C. (1980), Industrial Economy of India (5th Edition), Chaitanya Publishing House, Allahbad.
- Mishra &Puri-Indian Economy, Himalaya Publishing House ,2008
- Reserve Bank of India, Report on Currency and Finance (Annual).
- Ratna Sen-Industrial Relations in India Shifting Paradigms,Mcmillan,2005
- Website of Labour Ministry (Government of India)

Additional Reading List

- Bains, J.S. (1996), Industrial Organization, Cheltanham, U.K.
- Bagchi, A. and M. Banerjee (Eds.) (1979), Change and Choice in Indian Industry, Bagchi Publications, Calcutta.
- Brahmananda, P.R. and V.R. Panchmukhi (Eds.) (1987), The Development Process of the Indian Economy, Himalaya Publishing, Bombay.
- Chakravarty, S. (1987), Development Planning: The Indian Experience, Oxford University Press, New Delhi.
- Chandra, Prasanna (1995), Projects: Planning Analysis, Selection, Implementation and Review, Tata McGraw Hill Publishing Co. Ltd., New Delhi
- Harndeen, J.B. (1975), The Economics of Corporate Economy, Dunellen Publishers, New York.
- Joshi, V. and I.M.D. Little (1999), India: Macro Economics and Political Economy: 1964-1991, Oxford University Press, New Delhi.
- Jalan, B. (1996), India's Economy Policy, Viking, New Delhi.
- Kemien, M.T. and N.L. Schwartz (1982), Market Structure and Innovation, Cambridge University Press, Cambridge.
- Kelkar, V.L. and V.V. Bhnoji Rao (Eds.) (1996), India Development Policy Imperatives, Tata McGraw Hill, New Delhi.
- Mamoria and Mamoria (2000), Dynamics of Industrial Relations in India (15th Edition), Himalaya Publishing House, Mumbai.
- Sen, R. and B. Chatterjee (2001), Indian Economy: Agenda for the 21st Century (Essays in honour of Professor P.R. Brahmananda), Deep and Deep Publications Pvt. Ltd., New Delhi.

MABE 4th Semester
Paper- MABE 442

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

ECONOMICS OF INFRASTRUCTURE

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Infrastructure – Physical & Social Infrastructure; Infrastructure as a public good; Role of infrastructure in economic development; Issues & policies in financing of infrastructure; Theory of natural monopoly. The peak load-off load problem; Pricing of infrastructure.

Unit II

Components of a transport system - road, rail, air and water transport. Characteristics, advantages and disadvantages of each, Economic analysis of transport: Transport as an economic activity, cost of transport, pricing of transport services, transport policy and development in a changing environment

Unit III

Energy economics – Primacy of energy in the process of economic development. Factors determining energy demand. Effects of energy shortages. Energy conservation, Renewable and non conventional sources of energy. Current Electricity Policies, and programmes.

Unit IV

Education and Economic Growth, Approaches to Educational Planning - Social Demand, Rate of Return and Manpower Balance Approaches. The Case for Universal, Free, Primary Education; The issues & challenges in Indian higher education.

Health Dimensions of Development; Determinants of Health — Poverty, Malnutrition, Illiteracy and Lack of Information; Economic Dimensions of Health Care — Demand and Supply of Health Care; Financing of Health Care and Resource Constraints.

Basic Reading List

- Aronofsky, J., A. Rao and M. Shakeen (Eds.): Energy Policy
- Baru, R.V.: Private Health Care in India: Social Characteristics and Trends.
- Blaug, M. (Ed.): Economics of Education, Vol. I & II.
- Centre for Monitoring Indian Economy: India: Energy Sector.
- Crew, M A and P R Kleindorfer (1979): Public Utility Economics, Macmillan, London.
- Indian Council of Social Science Research (ICSSR) (1976): Economics of Infrastructure Vol. VI, New Delhi.
- McCrakis, M.S. (Ed.): Energy: Demand Conservation and Institution Problems
- McMohan, W W : Education and Development: Measuring the Social Benefits, Oxford University Press, Oxford.
- Misra and Puri, Indian Economy : Himalaya Publishing Co., Mumbai.
- Munty, D. (Ed.): Transport: Selected Readings.
- National Council of Applied Economic Research (NCAER) (1996): India Infrastructure Report: Policy Implications for Growth and Welfare, NCAER
- Nelson, J.R.: Marginal Cost Pricing in Practice.
- Nordhaus, W.D. (Ed.): International Studies of the Demand for Energy.
- Norton, H.S. Modern Transport Economics.
- Pachauri R K (ed) : Energy Policy for India, Macmillan Co. of India.
- Panchamukhi, P R : Economics of Health: A Trend Report in ICSSR, A Survey of Research in Economics, Vol. VI, Infrastructure, Allied Publishers, Delhi.
- Panchamukhi, P.R.: Economics of Health: A Trend Report in ICSSR, A Survey of Research in Economics, Vol. VI, Infrastructure, Allied, Delhi.
- Parikh J (ed) : Energy Models for 2000 and Beyond, Tata McGrw Hill, New Delhi.
- Parikh K S : India Infrastructure Report 2012, Oxford University Press, New Delhi.
- Parikh KS : India Development Report 2009, Oxford University Press, New Delhi.
- Phillips, A. and O.E. Williamson (Eds.): Prices: Issues in Theory, Practice and Public Policy.
- Tata Energy Research Institute (1995): Environmental Considerations and Options in Managing India's Long Term Energy Strategy, Mumbai.
- Turvey, R. and D. Anderson: Electricity Economics.
- Woodhall M : Cost benefit Analysis in Educational Planning, UNESCO, Paris.

MABE 4th Semester
Paper- MABE 451

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

DIRECT TAXES-II

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Computation of Income under the Head Salaries – Salaries and Allowances, Valuation of Perquisites, Deductions.

Unit II

Computation of Income under the Head House Property: Valuation of Property; Annual Value; Deductions.

Unit III

Profits and Gains of Business or Profession – Deductions, Expressly Allowed and Disallowed; Depreciation.

Unit IV

Capital Gains – Transfer; Chargeability; Short-Term and Long-Term Capital Gains; Cost of Acquisition; Capital Gains Exempt from Income Tax.

Base Text Book

- V.K. Singhania: Direct Taxes Law & Practice, Taxman.

Suggested Readings:

- Mehrotra and Goyal: Income Tax Law & Practice, Sahitya Bhavan.
- V.K. Singhania: Direct Taxes Law & Practice, Taxman.
- Bhagawati Prasad: Income Tax Law & Practice.
- Manoharan T.N.: Income Tax Law & Practice.
- Income Tax Act 1956 and Finance Act of the relevant year

MABE 4th Semester
Paper- MABE 452

Total Credit: 5

Time : 3 Hrs.
Max. Marks : 100
External : 80
Internal : 20

CORPORATE TAX PLANNING

Note: (i) Nine Questions will be set in all and students will be required to attempt 5 questions.

(ii) Question No. 1 will be compulsory and will consist of 8 short answer type question of 2 marks each spread over the entire syllabus (2*8=16 marks).

(iii) For the remaining four Questions, students will attempt 1 out of 2 questions from each of the four units (16 marks each).

Unit I

Concept of tax planning ; Tax avoidance and tax evasions; Methods of tax planning; justification of tax; Computation of income for joint stock company including house property, Business and profession, capital gain and income from other sources.

Unit II

Tax Planning and Financial Management Decisions : Tax planning relating to capital structure decision, dividend policy, Inter- corporate dividends and bonus shares.; Tax Planning and Managerial Decisions : Tax planning in respect of own or lease, sale of assets used for scientific research, make or buy decisions; Repair, Replace, renewal or renovation and shutdown or continue decisions.

Unit III

Tax Planning and Compensations Package; Double taxation avoidance agreements; Tax Planning and non-residents; Tax provisions relating to free trade zones, backward area and Infrastructure sectors.

Unit IV

Tax issues relating to amalgamation, merger and acquisition; Tax payment, tax deduction and collection at source, advance Payment of Tax.

Base Text Book

- Ahuja, Girish and Ravi Gupta. Corporate Tax Planning and Management. New Delhi: Bharat Law House, n.d.

Suggested Readings:

- Taxman's students guide to income tax by Dr. Vinod K. Singhania.
- Systematic approach to income tax and central sales tax by Ahuja and Gupta.
- Income tax ready reckoner by V. G. Mehta.
- Service tax law, practice, and procedures by C. Parthasarthy and Agarwal.
- Acharya, Shuklendra and M.G. Gurha. Tax Planning under Direct Taxes. Allahabad: Modern Law Publication, n.d.
- Ahuja, Girish and Ravi Gupta. Corporate Tax Planning and Management. New Delhi: Bharat Law House, n.d.
- Goyal, S.P. Direct Tax Planning. Agra: Sahitya Bhawan, n.d.
- Mittal, D.P. Law of Transfer Pricing. New Delhi: Taxmann, n.d.
- Pagare, Dinkar. Direct Tax Planning and Management. New Delhi: Sultan Chand and Sons, n.d.
- Singhania, Vinod K., Kapil Singhania and Monica Singhania. Direct Taxes Planning and Management. New Delhi: Taxmann, n.d.

DEPARTMENT OF ECONOMICS
KURUKSHETRA UNIVERSITY KURUKSHETRA

M.PHIL. ECONOMICS

Proposed Scheme of Examination w.e.f. 2016-17

No. of Seats: 20

PAPER CODE	**NOMENCLATURE (Compulsory)**	**EXTERNAL**	**INTERNAL**	**TIME**
CORE PAPERS				
M.Phil – 101	Research Methodology in Economics	80	20	3 Hrs.
M.Phil – 102	Seminars (Two)		100	
M.Phil - 103	Dissertation			
ELECTIVE PAPERS				
M.Phil – 104	Choose any one of the followings			
	Option (i) Recent Developments in Economic Theory	80	20	3 Hrs.
	Option (ii) Recent Developments in International Trade and Development Theory	80	20	3 Hrs.
	Option (iii) Current Issues and Policies in Indian Economy	80	20	3 Hrs.
Total		300		

Total Marks : 300

Note: Every Candidate shall submit a Dissertation and appear in Viva-Voce on the Dissertation. Grade will be given to the candidate by the examiner.

M. Phil -101

RESEARCH METHODOLOGY IN ECONOMICS

Time: 3 hours
Max. Marks: 100
External: 80
Internal: 20

Note : Two questions will be set from each unit. Candidates are required to attempt four questions selecting one from each unit.

UNIT-I

Evolution of Scientific Knowledge: Propositions, Syllogism, Hypothesis, Scientific Method; Science as a Theoretical System; Criteria for choice of a Theory; Nature of Social Sciences vis-à-vis other Sciences; Role of values in Scientific Enquiry; Deductive and Inductive Analysis, Mill's Method of Experimental Enquiry, Fallacies; Theoretical system of Economics and its Methodology. Evolution of Economics in terms of Paradigm Shift and MSRP.

UNIT II

Research Design: Nature, types and levels of Research; Research Design and Research Process; Model building: Formulation and Its Empirical Verification; Formulation of Research Proposal; Types of Sampling and Sampling Procedures; Basic Experimental Designs.

Measurement and Scaling Techniques: nominal, ordinal, interval and ratio data; Likert's scale, Semantic differential scale, Thrustone scale.

Basic Hypothesis Testing Procedure; Major Parametric and Non Parametric Tests; Factor analysis, Discriminant analysis, Cluster analysis, Conjoint Analysis,

UNIT-III

Linear Regression Model upto two explanatory variables, OLS Estimates and Their Properties. R^2 and adjusted R^2, Functional forms of Regression Models, Growth Rates; Nature, Test, Consequences and remedial steps of problem of Heteroscedasticity, Multicollinearity and Autocorrelation

UNIT- IV

Time as a variable, Dummy Variable Technique, Use of dummy variables, regression with dummy dependent variables; Logit and Probit Models. Time Series; Stationarity, Unit Roots, Co-Integration, Dicky Fuller Test, Engel Granger Test, Forecasting with ARIMA and VAR Models-Box Jenkins Methodology, Vector Auto Regression (VAR). Introduction to Panel Data Methods: Problems with panel data: Pooled OLS, Random effects and fixed effects models

Reading List

1. Cohen , M.E. and Negel, E. 'Introduction to Logic and Scientific Methods'
2. Kuhn, T.S. 'The Structure of Social Sciences'
3. Alen Ryan ' The Philosophy of Social Sciences'
4. R. Runder ' The Philosophy of Social Sciences'
5. Mishra Vikas ' The Study of Product Behaviour'
6. Goode and Hatt ' Methods of Social research'
7. Speigal, M. R. 'Theory and Prodblems of Statistics'
8. Croxton, F. E., D. Cowden and S. Kliein, Applied General Statistics'
9. Gupta S.C. and V.K. Kapoor, 'Fundamentals of Applied Statistics'
10. Gupta S. C. 'Fundamentals of statistics'
11. Gujarati, D.N. 'Basic Econometrics' (2nd Edition)
12. Intrilligator, M.D. 'Econometric Methods, Techniques and Applications'
13. Johnson J. 'Econometric Methods'
14. Kmenta J. 'Elements of Econometrics'
15. Koutsoyiannis, A. 'Theory of Econometrics'
16. Maddala G.S.(Ed) 'Econometric Methods and application'
17. Pindyck R.S. and D.L. Rubinfield 'Econometric Models and Economic Forecasts'

M. Phil - 104 Option (I)

RECENT DEVELOPMENTS IN ECONOMICS THEORY

Time: 3 hours
Max. Marks: 100
External: 80
Internal: 20

Note : Two questions will be set from each unit. Candidates are required to attempt four questions selecting one from each unit.

UNIT- I

Inefficiency of resource allocation in the presence of externalities; solutions; Coase theorem.; The problem of common property. Markets with Asymmetric information: Issues of Hidden Knowledge; Market signaling; Moral Hazard and Adverse selection in insurance and product markets; theories of efficient provision of public goods; private provision of public goods; preference revelation mechanisms; Club goods.

UNIT – II

Individual behavior towards risk, expected utility and certainty equivalence approaches, risk and risk aversion- sensitivity analysis, gambling and insurance, the economics of insurance, risk pooling and risk spreading, mean-variance analysis and portfolio selection, Markowitz, Sharpe, CAPM, APT; optimal consumption under uncertainty, competitive firm under uncertainty, factor demand under price uncertainty, the efficient market hypothesis, stochastic models of inventory demand.

UNIT – III

Modern Welfare Economics- Social Welfare function. The theory of second best. Democracy and Welfare Economics – Representations, Implementation; Rawls Theory of justice.

Game Theory: Extensive forms and normal forms, dominant strategies and elimination of dominant strategies, Nash equilibrium, cooperative and non- cooperative games, sequential and simultaneous games, Shapely value, backward induction, sub-game perfect equilibrium, Applications with oligopoly markets- Cournot, Bertrand and Stackleberg, product differentiation, cartel.

UNIT – IV

Monetarist- Keynesian debate on Macro Theory and Policy. Monetarists views on Inflation and Trade Cycles; Rational Expectations and the New classical Macro Economics; Real Business Cycle Theory.

New Keynesian models of macroeconomic equilibrium: (a) Real and Nominal Price Rigidity: Coordination Failures. (b) Real and Nominal Wage Rigidity: Insider Outsider Models, Efficiency Wage Model; Hysteresis; Seignorage; Barro- Ricardo and Blinder- Solow Hypotheses; Political Economy of Stabilization and adjustment.

Reading List:

1. Bernstein P, Against the Gods: the Remarkable Story of Risk (Wiley; 1996)
2. Biswas T, Decision-Making under Uncertainty (Part I), (MacMillan; 1997)
3. Hillier B, The Economics of Asymmetric Information (Part II), (MacMillan; 1997)
4. Dionne and Harrington (eds.), Foundations of Insurance Economics (Kluwer; 1992)
5. Hey J and Lambert P J (eds.), Surveys in the Economics of Uncertainty, (Basil Blackwell; 1987)
6. Hey J, (1992), "Uncertainty in economics", Ch 13 in Greenaway et al (eds), Companion to Contemporary Economic Thought sections 1-2
7. Wik, Mette (1996), 'Individual Decision Making Under Risk: Deficiencies of and Alternatives to Expected Utility Theory. http://www.umb.no/ios/Publikasjoner/Fulltekst/D9623.pdf
8. Rees R (1989) "Uncertainty, Information and Insurance" in Current Issues in Microeconomics (ed. J D Hey) MacMillan; London
9. Wisniewski M, Quantitative Methods for Decision Makers (2nd edn), (Pitman; 1997); Ch 6
10. McKenna C J, The Economics of Uncertainty, (Wheatsheaf; 1986); Chs 1 and 2
11. Katz M and Rosen H, Microeconomics (3rd edn), (Irwin; 1998); pp 159-166
12. Hey J, Uncertainty in Microeconomics, (Martin Robertson; 1979); Ch 5
13. Machina M, (1987) "Choice under uncertainty: problems solved and unsolved" Journal of Economic Perspectives. Reprinted in Dionne and Harrington, Foundations of Insurance Economics (1992)
14. Shavell S (1979) "On moral hazard and insurance" Quarterly Journal of Economics 93, 541-562. Reprinted in Dionne and Harrington, Foundations of Insurance Economics (1992)
15. Laffont, Jj, The Economics of Uncertaintyn and Information, MIT Press
16. Samuelson, "Pure Theory of Public Expenditure," Review of Economics and Statistics, Nov 1954, 387-389
17. Samuelson, "Diagrammatic Exposition of a Theory of Expenditures," Review of Economics and Statistics, Nov 1955, 350-356
18. Samuelson, "Pure Theory of Public Expenditure and Taxation," Public Economics, Macmillian, 1969, 492-517
19. Gronberg; Liu. "The Second Best Level of a Public Good. Journal of Public Economic Theory. 4 (3), 2002, 431-453.

20. Deb and Razzolini, Auction-Like Mechanisms for Pricing Excludable Public Goods, Journal of Economic Theory, Oct. 1999, 340-368
21. Groves, T. and J. Ledyard, "Optimal Allocation of Public Goods: A Solution to the Free Rider Problem," Econometrica, 45, 1977, 783-810.
22. Ledyard, John O. and Thomas R. Palfrey, "The Approximation of Efficient Public Good Mechanisms by Simple Voting Schemes," Journal of Public Economics, Feb 2002, 153-173.
23. Andreoni, "Privately Provided Public Goods in a Larger Economy: The Limits of Altruism," Journal of Public Economics, 35(1), Feb 1988, 57-73.
24. Bergstrom, Blume, and Varian. "On the Private Provision of Public Goods," Journal of Public Economics. 29(1), February 1986, 25-49.
25. Besley and Coate, "Centralized Versus Decentralized Provision of Local Public Goods: A Political Economy Approach," Journal of Public Economics. 87(12), Dec 2003, 2611-2637.
26. Bewley, T., "A Critique of Tiebout's Theory of Local Public Expenditures," Econometrica, 49(3), May 1981, 713-740.
27. Brueckner, "A Tiebout/Tax-Competition Model," Journal of Public Economics. 77(2), Aug 2000, 285-306.
28. Tullock, Gordon, Arthur Seldon, and Gordon L. Brady. Government Failure: A Primer on Public Choice. Washington: Cato Institute, 2002.
29. Buchanan, James and Gordon Tullock. The Collected Works of James M. Buchanan, Volume 3: The Calculus of Consent: Logical Foundations of Constitutional Democracy. Indianapolis: Liberty Fund Inc., 1999.
30. D. Muller, Public Choice, Cambridge University Press.
31. Hans van Den Doel, democracy and welfare economics, Cambridge University Press.
32. Per-Olov Johansson, An Introduction to Modern Welfare Economics, Cambridge University Press.
33. William J. Baumol, Welfare Economics and the Theory of the State, Harvard University Press, 1965 (2nd edition)
34. Edgren, John A, On the Relevance of John Rawls's Theory of Justice to Welfare Economics, Review of Social Economy, Vol. 53, No. 3, Fall 1995
35. Pindyck, R.S. Rubinfeld, D L & P.L. Mehta (2005) : Microeconomics (5th Edition), Pearson Education, Delhi
36. Dornbusch, R, S. Fischer, R. Startz (2004) : Macroeconomics, (9th Edition) Tata McGraw Hills Publishing Co. Ltd., New Delhi
37. Katz, M L and Harvey S Rosen (1999) : Microeconomics (3rd Edition) Irwin
38. Jha Raghbendra (2008) : Contemporary Macroeconomic Theory and Policy, New Age International Publications.
39. Verian H. (2000) Microeconomic Analysis, W.W Norton New Yark. •
40. Stigler G. (1996) Theory of Price, 4th Edition, Prentice Hall of India, New Delhi. • Samuelson, P.A. and W.O. Nordhaus (1998), Economics, 16th Edition, Tata McGraw Hill, New Delhi
41. McCallum, B., 'Rational Expectations and Macroeconomic Sprihisation Policy', Formal of Money Credit and Banking, 1980.
42. Good Friend, M. and King, R, 'The New Neoclassical Synthesis and the role of Monetary Policy', NBER Macroeconomics Annual, Cambridge MIT Press.

43. David Romer, Advanced Macroeconomics, 2e, McGraw- Hill International Edition, 2001.
44. Olivier Jean Blanchard and Stanley Fischer, Lectures on Macroeconomics, Prentice- Hall of India Pvt. Ltd., New Delhi, 2000.

M. Phil – 104 Option: (II)

RECENT DEVELOPMENTS IN INTERNATIONAL TRADE AND DEVELOPMENT THEORY

Time: 3 hours
Max. Marks: 100
External: 80
Internal: 20

Note : Two questions will be set from each unit. Candidates are required to attempt four questions selecting one from each unit.

UNIT - I

Recent Developments in Trade Theory: Trade Liberalization, Lessons from trade liberalization in case of developing countries; Globalization and Institutional Economics; Global Trading System; Theory of Preferential trade Agreements; Instruments of Trade Policy; New International Economic order- North- South Dialogue.

UNIT –II

International Economic Integration: Meaning, Course and Future Prospects; Asian Economic Integration. Theories of Exchange Rate Determination; Optimum Currency Area; Global Capital Market: Performance and Policy Problems.

UNIT – III

Trade and Environment; WTO and International Trade; Intellectual Property Rights; Agreement of Agriculture; Technical Barriers to Trade; Anti-Dumping law; Trade and Growth in Developing Economies; Empirical Trends in Trade and Investment; Technical Progress and Trade, Capital Movements and Growth.

UNIT – IV

The Challenge of Economic development; Development perspectives; Trade strategies for Economic development, Human Resources and Economic Development; Market Mechanism and Emerging Market Economies; Transitional Economies; Endogenous Growth, Innovation and Trade; International Banking: Reserves, Debt and Risk.

Reading List

1. World bank, "Proceedings of the World Bank Annual Conference on Development Economics,1990.
2. Sebastian Edwards,"NBER Reprint No. 1245" Structural Adjustment Policies in Highly Indebted Countries.
3. Walfer G. Bollnier,"Structural Adjustment and Policy Reform: Perspectives from International Experiences", published by Indian Council for research on International Economic Relations, 40 Lodhi Estate, New Delhi-110003.
4. Amazon co. uk: Recent Developments in International Trade Theory, 2007.
5. Keith E. Maskus (Edt): " the WTO, International property Right and the knowledge Economy, EE publications 2004,648 P.
6. Edenund Amann (Edt.),"Regulating Development", EE publication, 2006.
7. Growth & Economic Development, Essays in Honour of A. P. Thirwall, Edited by Philip Arestis.
8. Regulating Deveopment, Evidence from Africa and Latin America, Edited by Edmund Amann, University of Manchester, UK, 2006-07.
9. Lynn K. Myteika (Ed.),"Innovation and Economic Development", United Nations University, 2006-07.
10. Giovanni Anania, Mary E. Bohman Colin A. Carter and Alex F. McCalla (Ed.) "Agricultural Policy reform and the WTO", 2006-07.
11. Simon J. Evenett (Ed.),"The WTO and Government Procurement", University of St. Gallen, Switzerland and Bernard Hoekman, 2006-07.
12. Kym Anderson (Ed.),"The WTO's Core Rules and Disciplines", University of Adelaide, Austrialia, 2006-07
13. Chad P. Bown (Ed.)," The WTo, Safegurards, and Temporary Protection from Imports", Brandeis Univeristy, US, 2006
14. Keith E. Maskus (Ed.),"The WTO, Intellectural Property Rights and the Knowedge Economy", 2006-07.
15. Petros C. Mavroidis and Alan O. Sykes (Ed.) " The WTO and Technical Barrieers to Trade", 2006-07
16. Spencer Henson and John S. Wilson (Ed.)"The WTO and Technical Barriers to Trade", 2006-07
17. Bernard Hoekman and Caglar Ozden (Ed.) "Trade Preferences and Differential Treatment of Developing Countries", 2006-07
18. The WTO, Economic Interdependecne, and Conflict, Edited by Edward D. Mansfield and Marc L. Busch.
19. Meier, G. M. (Ed.),"Leading Issues in Economic Development" Latest Edition, Oxford University Press.
20. Todaro, M.P. & Smith,"Economic Development in Thirld World" Orient Langman, Latest Edition.
21. Myrdal, G. (1970),"The Challenge of World Poverty", pantheon, New York
22. Myrdal, G. (1968),"Asian drama", Pantheon, New York.

23. Higgins, B. (1966),"Economic Development Principles, Problems and Policies" Central Book Depot, Allahabad.
24. Myint, H, "Economic Theory and the Underdeveloped Countries", Oxford University Press, New York.
25. Cypher, J.M.and Dietz. J.L. (2003)"The Process of Economic Development" Rutledge
26. Ghatak, Subrate (2003),"Introduction to Development Economies" Routledge
27. Thirwall, A.P. (2003),"The Nature of Economic Growth", Routledge.
28. Streeten, Paul (1981),"Development Perspectives" McMillan London
29. Streeten, Paul (1979),"Trade Strategies for Development" Mcmillan, London
30. Thirwll, A.P. (2003),"Growth and Development with special reference to Developing Economies" Palgrave Macmillan

M. Phil –104 Option (III)

CURRENT ISSUES AND POLICIES IN INDIAN ECONOMY

Time: 3 hours
Max. Marks: 100
External: 80
Internal: 20

Note : Two questions will be set from each unit. Candidates are required to attempt four questions selecting one from each unit.

UNIT-I

Long term Challenges and Policy Measures in Indian economy
Infrastructure in the Indian Economy: Rationale and Challenges
Nature and Extent of unemployment and poverty with latest data
Rationale and Issues for Good Governance in Indian economy
Indian Perspectives of Sustainable Development Goals (SDGs) 2030

UNIT-II

Latest Indian Monetary Policy of the Reserve of India (RBI)
Policy for tackling Inflation in Indian Economy
Autonomy of RBI
Changing patterns and developments in Banking and Financial sector reforms
Latest trends in Indian Fiscal Policy

UNIT-III

Latest Foreign Trade Policy of India
External Borrowing and BOP problem in India
International Financial Institutions (IMF, WB) and the Indian Economy.
WTO and the Indian Economy
Impact of the global economic crisis on the Indian Economy

UNIT-IV

Challenges in Indian Agriculture
Issues in Food security of India
Latest Industrial Policy
National Manufacturing Policy
Challenges and opportunities in Skill India, Digital India and Make in India

Reading list

1. Kapila Uma, Indian Economy, Academic Foundation New Delhi Latest Edition.
2. Latest annual as well as other reports and surveys from Ministry of Finance, Ministry of Industry, Ministry of Agriculture, RBI, IMF,WB,UNO and WTO as per the instructions by teacher concerned
3. Latest Government of India, Economic Survey, (Annual), Ministry of Finance, New Delhi.
4. Latest Government of India, Planning Commission; Five Year Plan.
5. Mishra S.K.and Puri V.K, Indian Economy Himalya Publication House Latest Edition.
6. Garav Dutt and Sundram; Indian Economy, S Chand and Company Latest Edition

7. M.M.Goel: ECONOMICS OF HUMAN RESOURCE DEVELOPMENT IN INDIA (First Edition 2011, Second Edition 2012) *ISBN No 978- 93-5058-014-1 published by VK Global Publications Pvt. Ltd., New Delhi,*
8. M.M.Goel: Monograph: INDIAN ECONOMY Long Term Challenges & Policy Measures, published by Think-Line , Aguna Gaurav Nyas Publication, Nasik No 91 (2014)
9. M.M.Goel: INFORMAL SECTOR OF INDIAN ECONOMY: CHALLENGES AND OPPORTUNITIES, published in The Indian Economic Journal, ISSN0019-4662 Special Issue on Challenges for Transforming the Informal Sector in India,Dec.2014, pp 20 - 25.
10. M.M.Goel& Akhil Bhat: TRADE FACILITATION AGREEMENT OF WORLD TRADE ORGANIZATION –VS FOOD SECURITY IN INDIA: ISSUES AND CONCERNS published in Viewpoint, Vol.5 No 2 July-December, 2014 ISSN 2229-3925- An International Journal of Management and Technology, pp 48-52.
11. M.M.Goel & Archna Chaudhry: ANATOMY OF HUMAN RESOURCES IN RESERVE BANK OF INDIA(RBI) published in Voice of Research , volume 2, issue 1 (June, 2013) ISSN-2277-7733,pages 44-48
12. M.M. Goel & Suraj Walia: ANALYSIS OF AGRICULTUTRAL DEVELOPMENT IN INDIA, published jointly with Mr. Suraj Walia in The Indian Journal of Economics, vol. XXXIIIC No 370 January 2013 ISSN 0019-5170, pp 405-423.
13. M.M.Goel: DEMOGRAPHIC DIVIDEND IN INDIA: OPPORUNITIES, CHALLENEGS AND POLICY MEASURES. published in The Indian Economic Journal, ISSN0019-4662 Special Issue on Human Resource Development and Employment Pattern,Dec.2012, pp 242-247.
14. M.M.Goel & Suinana: FOOD SECURITY & SUSTIANBAILITY OF AGRICULTURE IN INDIA, published in Arthshodh, A bi-annual Journal, University of Rajasthan, Jaipur, ISSN 2230-7877,pp25-42.
15. M.M.Goel: BUSINESS ETHICS AND GOOD GOVERNANCE: AN ACADEMIC PERCEPTION, published in Viewpoint, vol.3 No 1 January-June, 2012 ISSN 2229-3825- An International Journal of Management and Technology, pp 1-2.
16. M.M.Goel & Archna Chaudhry: RATIONALE FOR AUTONOMY OF RESERVE BANK OF INDIA(RBI) published in Proficient – An international Journal of Management, volume iv, issue 1 (January, 2012) ISSN-0975-475X,pages 07-17.

17. EDUCATION AND SKILL DEVELOPMENT IN INDIA: A REVIEW, published in The Indian Economic Journal, ISSN0019-4662 Special Issue on Enhancing Human Resources for Inclusive Growth, Employment and Welfare, December 2011,pp 69-78.
18. M.M.Goel & Archna Chaudhry: MONETARY POLICY OF INDIA: A REVIEW, published in Varta,Vol.XXXII,Oct.2011.No.2,pages 01-11
19. M.M.Goel & Indpreet Kaur : BALANCING BETWEEN CROP DIVERSIFICATION AND FOOD SECURITY, published in Indian Journal of Industrial Economics & Development,Vo.7,issue 1,September,2011
20. GOOD GOVERNANCE: PHILOSOPHICAL AND EMPIRICAL PERSPECTIVES, published in Administrative Change Vol. XXXVII No.2 Vol. XXXVIII NO 1 January –December 2010, cited in HR Abstracts, pp 101-109.
21. GOOD GOVERNANCE : PHILOSOPHICAL AND EMPIRICAL PERSPECTIVES published in edited book' Ethics, Integrity And Values in Public Service' by Ramesh K Arora, 2014 New Age International Publishers, New-Delhi ISBN-978—81-224-3656-3,pp 402-409
22. M.M.Goel & Sanchita: ISSUES IN SUSTAINABLE DEVELOPMENT FOR INDIAN ECONOMY published in edited book' Environment and Sustainable Economic Development' by Raj Kumar Sen, 2011 Deep & Deep Publications, Delhi ISBN-978—81-8450-365-4
23. UNO: Sustainable Development Goals 2030.

Group II: Pedagogy of Social Sciences

(vii) PEDAGOGY OF MUSIC

Time: 3 Hours **Max. Marks: 100**

(Theory: 80, Internal: 20)

NOTE FOR PAPER SETTER

i. **Paper setter will set nine questions in all, out of which students will be required to attempt five questions.**
ii. **Q.No 1 will be compulsory and will carry 16 marks. There will be four short -answer type Questions of 4 marks each to be selected from the entire syllabus.**
iii. **Two long answer type question will be set from each of the four units, out of which the student will be required to attempt one question from each unit. Long- answer type questions will carry 16 marks each.**

Learning Outcomes

After completion of the course the student teacher will be able to:

- Understand the aims of teaching Music
- Understand competencies and skills for teaching of Music
- Develop understanding and awareness of the essentials of Music
- Understand the important evaluation procedures in Music
- Demonstrate Aesthetic Sense, Time Sense, Tolerance & Self-confidence

COURSE CONTENT

Unit-I

1. CONCEPT, OBJECTIVE & IMPORTANCE

- A brief history of Indian Music.
- Need and importance of Music in secondary schools in present context.
- Co-relation of Music with other school subjects.
- Aims & Objectives of teaching Music in schools.
- Knowledge of Swaras-difference of Swaras and Sruti:- division of Swaras in measures of Sruti.

Unit-II

2. ESSENTIALS OF MUSIC

- Information about Voice Culture and Carynx.
- Possibilities of Notation for Indian Music.
- Motion and Rhythm in Music.

Unit-III

3. TEACHING LEARNING RESOURCES

- Importance of various Teaching Aids in Music.
- Concept, need and importance of Lesson Planning in Music.
- Qualities of Music Teachers: Gayak, Vadak and Vadykar.

Unit-IV

4. APPROACHES AND EVALUATION IN TEACHING

- Different Method of Teaching Music.
- Meaning, importance and need of evaluation in Music.
- Types of Evaluation Techniques.
- Importance of Classical Music, Suggestions for the Popularization of Classical Music.

Practicum/Sessionals

Any Two of the following :

I. Every Candidate should be able to sing a fast Khyal or play a rezakhoni Gat with Tanas and Alaps or Jhala and Toras in each of the following Ragas: Bhupali, Bhairvi, Brindavani Sarag, Asawari, Bhimplashi, Malkauns, Kaffi.

Every candidate should be able to sing or play a slow Khal (Vilambit Bara Khyal) or Masti Khayal Gat in Asawari and Malkauns Rag.

II. The following Tals are required to be practiced in. Tha's and Dvigun Laya on Table: Teen Tal, Dadra, Juptal, Dharva, Ektal

III. Tuning of the instrument for the instrument player and tuning of the Janpura for vocal music students.

IV. Candidate shall be able to read, write music notation either of Bhatkhande or Vishnu Digamber Pulskar.

SUGGESTED READINGS

Awasthis. *Teaching of Music(Hindi).* Extension Services, Jallandhar: Govt. Training College
Bhatnagar, S Teaching of Music
Goswami, O. Indian Music
Khande B. Short Historical Survey
Khanna, J.: Teaching of Music
Masan, P.L. Teaching of Music, (Hindi).
Patwardhan, rag Vigvan
Ranaday. Indian Music (Its Physical and Aesthetics)\
Sambamoorthy, P. Teaching of Music

Credit System

B.Ed. Year - 1								
Paper	Nomenclature	Maximum Marks			Periods per week**	Exam Hour	Hours per year	Credits
		Total	External	Internal/Practicum				
Course 6 or 7	Pedagogy of a School Subjects	100	80	20	6	3 hrs.	137.6	10

DEPARTMENT OF LIBRARY & INFORMATION SCIENCE
KURUKSHETRA UNIVERSITY KURUKSHETRA

(Established by the State Legislature Act XII of 1956)
("A" Grade, NAAC Accredited)

SCHEME OF PAPERS
FOR
BACHELOR OF LIBRARY AND INFORMATION SCIENCE
SESSION 2016-17

SEMESTER – I

Paper Code	Nomenclature of Papers	Theory		Practice		Max. Marks
		Internal Assessment	Exam.	Internal Assessment	Exam.	
BLIS01	Library and Information Society	20	80	---	---	100
BLIS02	Library Classification & Cataloguing (Theory)	20	80	---	---	100
BLIS03	Information Sources (Theory and Practice)	10	50	10	30	100
BLIS04	Library Classification & Cataloguing Practice – A Part-I: Colon Classification Part-II: AACR-II	---	---	 10 10	 40 40	100 (50+50)
BLIS05	Library Tour (i) Local Libraries: KUK, NIT, District Library, etc (Any two) (10 marks) (ii) Two Educational tours of one day each **OR** One Educational tour of three days or more (40 marks)	---	---	---	---	50

SEMESTER – II

Paper Code	Nomenclature of Papers	Theory		Practice		Max. Marks
		Internal Assessment	Exam.	Internal Assessment	Exam.	
BLIS06	Management of Libraries and Information Centers	20	80	---	---	100
BLIS07	Users and Information Services (Theory and Practice)	10	50	10	30	100
BLIS08	ICT Applications in LIS (Theory and Practice)	10	50	10	30	100
BLIS09	Library Classification & Cataloguing Practice – B Part-I: Dewey Decimal Classification Part-II: AACR-II (Non-book Material)	---	---	 10 10	 40 40	100 (50+50)
BLIS10	Library Training/Internship for one month (i) Report of Librarian (10 marks) (ii) Report of Training by Student (25 marks) (iii)Presentation of Report (15 marks	---	---	---	---	50

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SCHEME OF PAPERS
FOR
BACHELOR OF LIBRARY AND INFORMATION SCIENCE
SESSION 2016-17

SEMESTER – I

Paper Code	Nomenclature of Papers	Internal Assessment	Max. Marks
BLIS01	Library and Information Society	20	100
BLIS02	Library Classification & Cataloguing (Theory)	20	100
BLIS03	Information Sources (Theory and Practice)	20	100
BLIS04	Library Classification & Cataloguing Practice - A	20	100
BLIS05	Library Tour (iii) Local Libraries: KUK, NIT, District Library, etc (Any two) (10 marks) (iv) Two Educational tours of one day each **OR** One Educational tour of three days or more (40 marks)		50

SEMESTER – II

BLIS06	Management of Libraries and Information Centers	20	100
BLIS07	Users and Information Services (Theory and Practice)	20	100
BLIS08	ICT Applications in LIS (Theory and Practice)	20	100
BLIS09	Library Classification & Cataloguing Practice – B	20	100
BLIS10	Library Training/Internship for one month (iv) Report of Librarian (10 marks) (v) Report of Training by Student (25 marks) (vi) Presentation of Report (15 marks)		50

SEMESTER – I

PAPER – BLIS01: LIBRARY AND INFORMATION SOCIETY

Max. Marks: 100

Internal assessment: 20 Marks (Presentation/ Test – 10 + Attendance – 5+ Class Test – 5)

Theory: 80 Marks **Time: 3 Hours**

Objectives:

(i) To introduce students to the field of Library and Information Science;
(ii) To introduce students to the concepts of information society; and
(iii) To provide an overview of the entire programme.

Note: The paper is divided into **4** Units. The examinees will be required to attempt ***Five*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I – IV). Question 1 will consist of **8** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Concept of Library in Society

- Social and historical foundations of library.
- Development of libraries with special reference to India.
- Different types of libraries - their distinguishing features and functions.

UNIT – II: Normative Principles of Library and Information Science

- Five Laws of Library Science and their Implications on Library and Information Activities.

UNIT – III: Laws relating to Libraries and Information Centres

- Library Legislation in India: Need and essential features.
- Copyright Act and Delivery of Books (Public Libraries) Act.
- Librarianship as a Profession
- Professional ethics

UNIT – IV: Professional Association, Public Relations, Extension Activities and Resource Sharing

- Professional Associations and their role with particular reference to ILA, IASLIC, IFLA and UNESCO
- Definition: Facets and programmes of PR and Extension Services
- Resource Sharing and Library Networking

Books Recommended

1. GARDENER (Frank M). Public Library Legislation: A Comparative Study, Paris, UNESCO, 1971.
2. HARRISON (Colin) and BEENHAM (Rosernary). The Basic of Librarianship. London. Clive-Bengley, 1987.
3. INDIA MINISTRY OF EDUCATION, Report of the Advisory Committee for Libraries, Delhi, Manager of Publications, 1959.
4. JEFFERSON (G). Libraries and Society, London, James Clarks and Co., 1969.
5. KHANNA (J K). Fundamentals of Library Organisation.
6. KHANNA (J K). Library and Society, Kurukshetra; Research Publication, 1987.
7. SAINI (O P). Pustakālaya aura samāja. (Hindi medium)

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PAPER – BLIS02: LIBRARY CLASSIFICATION & CATALOGUING (THEORY)

Max. Marks: 100

Internal assessment: 20 Marks (Presentation/ Test – 10 + Attendance – 5+ Class Test – 5)

Theory: 80 Marks **Time: 3 Hours**

Objectives:

(i) To introduce the structure and attributes of Universe of Knowledge.
(ii) To develop skills in subject analysis and proficiency in using standard schemes of classification and subject cataloguing; and
(iii) To familiarise with the principles and practice of document description including electronic documents.

Note: The paper is divided into **4** Units. The examinees will be required to attempt ***Five*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I – IV). Question 1 will consist of **8** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Library Classification Theory

- Library Classification: Definition, Need and Purpose.
- Modes of Formation of Subjects.
- Notation: Need, Type and Quality.
- Call Number: Class Number, Book Number and Collection Number
- Postulational Approach: Postulates of Facet Analysis and Facet Sequence, Fundamental Categories, Principles of Helpful Sequence and Facet Sequence, Phase Analysis.

UNIT – II: Library Classification Schemes and Current Developments

- Brief history of library classification schemes.
- Standard Schemes of Library Classification: Introduction, features and applications of CC, DDC and UDC.
- Current Trends: Developments in DDC and UDC. WebDewey, OCLC Classify and other sources of readymade class numbers, Folksonomies.

UNIT – III: Bibliographic Description

- Catalogue – Definition, Need and Purpose, Types of Library Catalogue - Physical forms: Conventional and Non-conventional; Kinds of Entries and their functioning according to CCC and AACR-2. ALA Rules for filing Entries

UNIT – IV: Subject Cataloguing

- Definition, Need, Purpose and problems of Subject Cataloguing, Methods of Subject Cataloguing. Chain Procedure and Sears List of Subject Headings. Latest trends - MARC, ISBD, CCF.

Books Recommended

1. CHOUDHURY (G G). Modern information retrieval theory, 1999. Library Association, London.

2. DHYANI (Pushpa). Theory of Library Classification, 2000.VishwaPrakashan, Delhi.
3. FOSKETT (A C). Subject approach to information. 5thEd. 1990. Bingley, London.
4. HUNTER (E J) and BAKEWELL (K G B). Advanced Cataloguing. 1989. Bingley, London.
5. KRISHAN KUMAR. Theory of Library Classification. 1985. Vikas, Delhi.
6. RANGANATHAN (S R) Prolegomena to library classification. 3rd ed. 1967.SardaRanganathan Endowment, Bombay.
7. TRIPATHI (S M) and SHOKEEN (N S). Fundamentals of Cataloguing theory (Hindi Medium). 1998. Y.K. Agra.
8. TRIPATHI (S M) and SHOKEEN (N S). Fundamentals of Library Classification (Hindi Medium). 1988. Y.K. Agra.

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PAPER – BLIS03: INFORMATION SOURCES (THEORY AND PRACTICE)

Max. Marks: 100

Objectives:

(i) To acquaint with various types of information sources.
(ii) To familiarize with different types of reference books.
(iii) To develop evaluative and practical skill in dealing with information sources.

Part-I: Theory

Max. Marks: 60

Internal assessment: 10 Marks (Attendance – 5 (includes attendance of Practical Classes also) + Class Test – 5)

Theory: 50 Marks **Time: 3 Hours**

Note: The paper is divided into **3** Units. The examinees will be required to attempt ***Four*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I – III). Question 1 will consist of **7** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Reference and Information Sources

- Documentary Sources of Information: Print, Non-print
- Categories: Primary, Secondary and Tertiary Information Sources
- Human and Institutional: Nature, types, Characteristics and utility
- Internet as a Source of Information.

UNIT – II: Types and Evaluation of Reference Sources

Different types of reference books and Criteria for evaluation of Encyclopaedias, Dictionaries, Geographical Sources, Biographical Sources, Reference Sources for Current Events and Ready Reference Sources.

UNIT – III: Bibliographical Sources

- Bibliographical Sources: Functions and Types and Branches.

- Uses and criteria for evaluation of National Bibliography, Trade Bibliography, Subject Bibliography, Indexing and Abstracting Sources.

Part-II: Practice

Max. Marks: 40

Section – A

Assignments: 10 Marks

Section – B

Practical Examination: 30 Marks **Time: 2 Hours**

The Distribution of Marks and scheme of examination will be as follows:

The examinees will be required to evaluate ***One*** Information Source.	**Marks: 10**
This part will consist of **10** Information Queries. The examinees must give only ***one*** standard Source of Information (which according to the examinee is the most appropriate) along with complete bibliographical details.	**Marks: 15**
Viva-voce:	**Marks: 05**

Study and Evaluation of following Information Sources:

1. **Bibliographical Sources:**
   Indian National Bibliography, Indian Books-in-Print, Books-in-Print (Bowker), Whitaker's Books-in-Print.

2. **Indexing and Abstracting**
   Guide to Indian Periodical Literature, Library and Information Science Abstracts (LISA), Indian Science Abstracts.

3. **Encyclopaedias:**
   New Encyclopaedia Britannica, Encyclopaedia Americana, Encyclopaedia of Library and Information Science, International Encyclopaedia of Social Sciences, McGraw Hill Encyclopaedia of Science and Technology.

4. **Dictionaries:**
   Oxford English Dictionary, Webster's Third New International Dictionary, SamantarKosh: Hindi Thesaurus, Rogets International Thesaurus.

5. **Geographical Sources:**
   Gazetteer of India, World Geographical Encyclopaedia, Times Atlas of the World, Fodor's India.

6. **Biographical Sources:**
   India Who's Who, International Who's Who, Dictionary of National Biography (India).Chamber's Biographical Dictionary.

7. **Reference Sources for Current Events:**
   Asian News Digest, Keesing's Record of World Events.

8. **Year Books:**

Europa World Yearbook, Statesman's Yearbook, India: A Reference Annual.

9. Directories:
Universities Handbook India, Commonwealth Universities Yearbook, World of Learning.

10. Statistical Sources:
Statistical Abstracts of India, Census of India, UNESCO Statistical Yearbook.

11. Handbooks:
Limca Book of Records, Guinness Book of World Records.

12. Almanacs:
Whitaker's Almanac.

Books Recommended

1. BUNCH (Allan). Basics of information work, 1995. Clive Bingley. London.
2. CHANDLER (G) How to find out: A guide to sources of information for all, Ed. 4. 1971. Pergamon, Oxford.
3. KATZ (William A). Introduction to reference work, Ed. 7 2V, 1996. McGraw Hill, New York.
4. KRISHAN KUMAR, Reference Service, Vikas, New Delhi.
5. TRIPATHI (S M). Modern bibliographical control, Bibliography and documentation. 1992. Y.K. Agra.
6. USHA PAWAN and GUPTA (Pawan Kumar) SandarbhSewa: Saidhantikavomkriyatmak. 1994. RBSA, Jaipur. (Hindi Medium).

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PAPER – BLIS04: LIBRARY CLASSIFICATION & CATALOGUING PRACTICE – A

Max. Marks: 100 (50+50)

Part – I Colon Classification (6th revised edition)

Max. Marks: 50

Internal assessment: 10 Marks (Attendance – 5 (includes attendance of Cataloguing Practical classes also) + Class Test – 5)

Practical Examination: 40 Marks **Time: 2 Hours**

Objectives:

(i) To familiarise with the process of classification.
(ii) To familiarise with various provisions of CC

Note: There will be ***Ten*** Titles and the examinees will be required to classify any ***Eight*** titles only.

Classification of Documents

- Representing Simple Subject.
- Having Common Isolates.
- Representing Compound Subject.
- Representing Complex Subject.

Books Recommended

1. RANGANATHAN (S.R.). Colon Classification, Rev. ed. 6. 1963.

Part – II: AACR – II

Max. Marks: 50

Internal assessment: 10 Marks (Preparation of Cataloguing Copy)

Practical Examination: 40 Marks **Time: 2 Hours**

Objectives:

(i) To familiarise with the process of cataloguing.
(ii) To familiarise with various provisions of AACR - II
(iii) To familiarise with the process of preparation of Entries according to AACR – II

Note:

1. There will be ***Five*** Titles and the examinees will be required to attempt any ***Three*** Titles. All titles carry equal marks.
2. Anglo-American Cataloguing Rules – II

Conventional Documents

- Sections and Skeleton Card of Main and Added entries.
- Basic features, Personal Author(s), Shared Authorship, Collaborator (s).
- Cataloguing of Pseudonym Work.
- Cataloguing of Multivolume documents.
- Cataloguing of Periodical Publications (Simple Periodical Publications)

Books Recommended:

1. ALA and others. Anglo American Cataloguing Rules.Revised ed. 2. 1998.
2. SEARS (ME). Sears List of Subject Headings.Latest edition.

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PAPER – BLIS05: LIBRARY TOUR

Max. Marks: 50

Library Tour

(i) Local Libraries: KUK, NIT, District Library, etc. (Any two) (10 marks)
(ii) Two Educational tours of one day each

OR

One Educational tour of three days or more (40 marks)

Students will maintain a diary of their library tours and shall prepare the report under the guidance of a teacher supervisor. One teacher (preferably teaching the paper LIS-06: Management of Libraries and Information Centres) will accompany the students in local library tours. For tours outside Kurukshetra at least one Male and one Female teacher will accompany the students. The tour reports will be evaluated by the Committee consisting of all the regular teachers of the Department.

SEMESTER – II

PAPER – BLIS06: MANAGEMENT OF LIBRARIES AND INFORMATION CENTRES

Max. Marks: 100

Internal assessment: 20 Marks (Presentation/ Test – 10 + Attendance – 5+ Class Test – 5)

Theory: 80 Marks **Time: 3 Hours**

Objectives:

(i) To introduce environmental factors of Libraries and Information Centres.
(ii) To understand organisational structure.
(iii) To study functions and routines of different sections.

Note: The paper is divided into **4** Units. The examinees will be required to attempt ***Five*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I – IV). Question 1 will consist of **8** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Library Environment

- Organisation, Management and Administration: A Conceptual Framework.
- Relationship of the library with its parent organisation.
- Library Organisational Structure, Ranganathan's Staff Formula
- Library Committee: Types, functions and powers.

UNIT – II: Library Finance and Budgeting

- Sources of Finance.
- Methods of Estimating Library Finance.
- Budget Preparation for different types of Libraries.
- General Administration: Annual Report, Library Statistics, Library Rules.

UNIT – III: Sections of the Library

- Book Selection and Procurement: Principles, Policy, Committee, Tools and Procedure.
- Technical Processing Section.
- Periodicals Section.
- Circulation Section.
- Reference Section

UNIT – IV: Maintenance, Building and Space Management

- Maintenance Section: Stacking, Shelving, Shelf Rectification, Stock Verification, Binding etc.
- Basic elements in designing library building.
- Furniture and Equipments.

Books Recommended

1. Application of Management Techniques to Library and Information Systems, 12th IASLIC Conference, Roorkee, 1979.
2. MITTAL (R L). Library Administration: Theory and Practice. 5thed. New Delhi, Metropolitan, 1983.
3. MOOKERJEE (Subodh Kumar) and SENGUPTA (Beneyendra). Library Organization and Library Administration. Calcutta; World Press, 1972.
4. PANWAR (B S) and VYAS (S D). Library Management; Delhi; R.R. Publishing Corporation, 1986.
5. RANGANATHAN (S R) Library Manual for Authorities, Librarians and Honorary Library Workers. 2nd ed. Bombay; Asia, 1967.
6. SINGH (M). Library and Information Management: Theory and Practice Delhi; IBT, 1983.

7. SINGH (R S P). Fundamentals of Library Administration and Management. Delhi; Prabhat, 1990.
8. STEUART (Robert) and EASTILICK (John T). Libraries Management. 2nd ed. Colorado Libraries Unlimited, 1991.
9. WILSON (A). The Planning approach to Library Management.
10. TRIPATHI (S M). Granthalyaprabandh (Hindi medium).

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PAPER – BLIS07: USERS AND INFORMATION SERVICES (THEORY AND PRACTICE)

Max. Marks: 100

Objectives

(i) To introduce with various categories of Users and their Information Needs.
(ii) To familiarise with different types of Information Services.
(iii) To introduce with various Information Systems.
(iv) To introduce with methods of organising User Education Programmes.
(v) To develop practical skills in preparation of selected Information Products.

Part-I: Theory

Max. Marks: 60

Internal assessment: 10 Marks (Attendance – 5 (includes attendance of Practical Classes also) + Class Test – 5)

Theory: 50 Marks **Time: 3 Hours**

Note: The paper is divided into **3** Units. The examinees will be required to attempt ***Four*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I-III). Question 1 will consist of **7** short Answer (2 marks each) questions (having no internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Information Users and their Information Needs

- Categories of Information Users
- Information Needs: Definition and Characteristics.
- Information Seeking Behaviour: Models
- User Studies: Methods and Techniques.
- Information Literacy and User Education: Concepts and Methods.

UNIT – II: Information Services and Products

- Information Services: Evolution, Types and Trends.
- Current Awareness Type of Services: CAS, SDI, Press Clipping Service.
- Other Services: Indexing and Abstracting Services, Referral Service, Document Delivery and Translation Services.
- Reference Process: Reference Question; Interview; Search Strategy and Reference Service

UNIT – III: Information Systems and their Services

- Overview of National, International and Commercial Information Systems and Networks.

- Introduction to the Background, their Services and Products: DELNET, INFLIBNET, ENVIS, INIS, AGRIS, and OCLC

Part-II: Practice

Max. Marks: 40

Section – A

Assignments: 10 marks

Section – B

Practical Examination: 30 Marks **Time: 2 Hours**

The Distribution of Marks and scheme of examination will be as follows:

Note: There will be ***ONE*** question from the following for each examinee:

1. Preparation of Current Contents List on a specified subject. (Broad Subject Heading arrangement).
2. Preparation of a Subject Bibliography (of about 20 books) on a specified subject. **Marks: 25**
3. Preparation of Newspaper Clippings on a specified subject.
4. Viva-voce: **Marks: 05**

Syllabus:

Preparation of: Current Awareness Bulletin, Newspaper Clippings, Contents List, Subject Bibliography.

Books Recommended

1. ATHERTON (Pauline). Handbook for information systems and services. 1977. UNESCO, Paris.
2. BOPP (Richard E) and SMITH (Linda C), *Ed.* Reference and information services: An Introduction. Rev. ed. 1995. Libraries Un., USA.
3. GUHA (B) Documentation and information. Rev. ed. 2. 1983. World Press Calcutta.
4. KATZ (William A). Introduction to reference work. E 7. 2 V. 1996. Mc Graw Hill, New York.
5. TRIPATHI (S.M.). Documentation, Information Services and Networks. 2 V. (Hindi Medium) 1998. Y.K. Agra.
6. TRIPATHI (S.M.). New Dimensions on Reference and Information Services. (Hindi Medium) 1998. Y.K. Agra.
7. USHA PAWAN and GUPTA (Pawan Kumar). SandarbhSewa :SaidhantikavomKriyatmak 1994. RBSA, Jaipur. (Hindi Medium).

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PAPER – BLIS08: ICT APPLICATIONS IN LIS (THEORY AND PRACTICE)

Max. Marks: 100

Objectives:

(i) To acquaint the students with the basic concepts of computers.
(ii) To understand various aspects of library automation.
(iii) To develop skills in using computers technologies.

Part-I: Theory

Max. Marks: 60

Internal assessment: 10 Marks (Presentation/ Test – 5 + Attendance – 5 (includes attendance of Practical Classes also)

Theory: 50 Marks **Time: 3 Hours**

Note: The paper is divided into **3** Units. The examinees will be required to attempt ***Four*** questions in all, including Question 1, which is compulsory and selecting ***One*** question from each Unit (I – III). Question 1 will consist of **7** short Answer (2 marks each) questions (having no

internal choice) spread over the whole syllabi. The Examiner will set ***Two*** questions from each Unit.

UNIT – I: Overview of Information Communication Technology

- Overview of Computer Technology, Communication Technology, Reprography & Micrograph and Printing and Publishing Technology

UNIT –II: Introduction to Computers and Computer Architecture

- The Evolution of Computers.
- Characteristics of Computers.
- Classification of Computers: Super Computer, Mainframe Computer, Mini Computer and Micro Computer.
- Digital vs. Analog Computers.

Computer Architecture:

- Input Devices, Output Devices, Central Processing Unit. Memory (Auxiliary).

UNIT – III: Software Concept

- **System Software/Operating System (OS)**
  - Definition of OS.
  - Principal functions of the OS.
  - Various Operating Systems: Single and Multiuser.
  - Basic Features of Windows XP.
- **Programming Languages: Concepts and Tools.**
- **Application Software Packages.**
- **Word Processor Software: MS-WORD:**
  - Creating a Document.
  - Editing a Document.
  - Formatting a Document.
  - Maintaining Mailing List.

Part-II: Practice

Max. Marks: 40

Internal assessment: 10 Marks (Presentation/ Test – 5 + Class Test – 5)

Practical Examination: 30 Marks **Time: 3 Hours**

Note: There will be ***One*** question each from the following units. The examinees will be required to attempt ***Two*** questions in all. The candidates will be required to record the steps of database creation on the assigned area.

UNIT – I: Operating System: Introduction to WINDOWS XP

- Important Features of Windows
- Desktop, My Computer, Control Panel, Windows Explorer
- Accessories Applets.

UNIT – II: MS Office

- ***MS WORD:*** Standard Toolbars, Creating a Document, Editing a Document, Formatting a Document, Maintaining Mailing List.
- ***MS POWER POINT:*** Creating Presentation Slides, Formatting/ Adding Graphics. Slide Show. Customizing and Printing.

UNIT – III: WINISIS

- Overview of WINISIS features.
- Installation of WINISIS.
- SYSPAR.PAR Parameters.

- WINISIS Windows and Dialog Boxes.
- Database Creation.
- Formatting Language: Additional Features - Hypertext Link (within a database and among databases), Handling Multimedia.
- Database Searching, Sorting and Printing.

Books Recommended

1. BHARIHOKE (Deepak). Fundamentals of IT. 2nd ed. Excel Books. New Delhi, 2002.
2. BURXTON (Andrew) and HOPKINSON (Alan). The CDS/ISIS for Windows Handbook. UNESCO/CI, Paris, 2001.
3. COLEMAN. Windows XP from A – Z. BPB Publications. New Delhi.
4. LEON (Alexis) and LEON (Mathews). Fundamentals of Information Technology. 2nd Ed. Vikas Publishing House Pvt. Ltd. New Delhi. 2009.
5. Nagpal (D P). Computer Fundamentals. S. Chand. New Delhi. 2008.
6. WINISIS. Library & Information Division , Kerala Institute of Local Administration, India. Available at: http://greenstonesupport.iimk.ac.in/Documents/Winisis%20Archiving%20Guide.pdf
7. ROWLEY (J E). Basics of Information Technology.
8. ROWLEY (Jennifer). Computers for libraries. 3rd ed. Library Association. London. 1993.
9. RUTKOSKY. MS PowerPoint 2007. BPB Publications. New Delhi.
10. RUTKOSKY. MS Word 2007 (W/CD). BPB Publications. New Delhi.
11. JAIN (S). MS PowerPoint 2007- Made Simple. BPB Publications. New Delhi.
12. JAIN (S). MS Word 2007- Made Simple. BPB Publications. New Delhi.
13. SINHA (P K) and Sinha (P). Foundations of computing. BPB Publications. 2008.
14. TAXALI (R K). PC software for Windows made simple. Tata McGraw Hill.
15. UNESCO. CDS/ISIS for WINDOWS ver. 1.5: Reference Manual. Paris. 2004.
16. WEIXEL. Learning Microsoft Office XP. BPB Publications. New Delhi.

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PAPER – BLIS09: LIBRARY CLASSIFICATION & CATALOGUING PRACTICE- B

Max. Marks: 100 (50+50)

Part – I: Dewey Decimal Classification

Max. Marks: 50

Internal assessment: 10 Marks (Attendance – 5 (includes attendance of Cataloguing Practical classes also) + Class Test – 5)

Practical Examination: 40 Marks **Time: 2 Hours**

Objectives:

(i) To familiarise with the process of classification.
(ii) To familiarise with various provisions of DDC.

Note: There will be ***Ten***Titles and the examinees will be required to classify any ***Eight***titles only, using latest available edition of DDC.

Classification of Documents

- Representing Simple Subject.
- Having Common Isolates.
- Representing Compound Subject.
- Representing Complex Subject.

Books Recommended:

1. DEWEY (Melvil). Dewey Decimal Classification, Latest available edition.

Part – II: AACR – II (Non-Book Material)

Max. Marks: 50

Internal assessment: 10 Marks (Preparation of Cataloguing Copy)
Practical Examination: 40 Marks **Time: 2 Hours**
Objectives:

(i) To familiarise with the process of cataloguing.
(ii) To familiarise with various provisions of Non Book Material
(iii) To familiarise with the process of preparation of Entries according to AACR – II

Note: 1. Catalogue any three titles. Each title carries equal marks.

Syllabus: Cataloguing of Non-Book Material

- Atlas: Maps, Globe
- Manuscript
- Musical Works
- Sound Recordings
- Motion Picture and Video Recordings

Books Recommended:

1. ALA and others. Anglo American Cataloguing Rules. Revised ed. 2. 1998.

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PAPER – BLIS10: LIBRARY TRAINING/INERNSHIP FOR ONE MONTH

Max. Marks: 50

Library Training/Internship for one month

(i) Report of the Librarian (10 marks)
(ii) Report of Training (25 marks)
(iii) Presentation of Report (15 marks)

Every student will be required to undergo training/internship in a university/institute library assigned by the Department. All the students will inform the Department their preferred choice of institution for Internship; however, they will be assigned the institution on the basis of merit in the 1st Semester examination and their preference. Every student shall maintain a diary of his/her daily activities performed in the library. After completion of internship, he/she shall prepare and submit a report in the Department. He/she shall also make a presentation on the internship experiences and work performed before the Committee consisting of all the regular teachers of the Department. The librarian of the concerned institution will send a report on the working of the student directly to the Department, which shall be considered by the same Committee. The Department shall devise a standard format for presentation of report by the librarian. During the internship period each student shall be assigned to a teacher of the Department who will provide guidance to the student and maintain liaison with the librarian of the concerned institution.