			L	T	P	Cr.
B.Tech.(IIIsem.)		**MANAGERIALECONOMICSANDFINANCIAL ANALYSIS**				
		CourseCode: R232101 (Commonto ECE, EEE, &ME)	2	0	0	2

Pre-requisites: Basicknowledgeofeconomicsandfinance

Course Objectives:

- Toinculcatethebasicknowledgeofmicroeconomicsandfinancialaccounting
- Tomakethestudentslearnhowdemandisestimatedfordifferentproducts,input-output relationship for optimizing production and cost
- ToKnowtheVarioustypesofmarketstructureandpricingmethodsandstrategy
- Togiveanoverviewoninvestmentappraisalmethodstopromotethestudentstolearnhowto plan long-term investment decisions.
- Toprovidefundamentalskillsonaccountingandtoexplaintheprocessof preparing financial statements.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C201.1	:	DefinetheconceptsrelatedtoManagerialEconomics,financialaccountingand management(L2)
C201.2	:	UnderstandthefundamentalsofEconomicsviz.,Demand,Production,cost,revenue andmarkets(L2).
C201.3	:	ApplytheConceptofProductioncostandrevenuesforeffectiveBusinessdecision (L3)
C201.4	:	Analyzehowtoinvesttheircapitalandmaximizereturns(L4),Evaluatethecapital budgetingtechniques.(L5)
C201.5	:	Developtheaccountingstatementsandevaluatethefinancialperformanceofbusiness entity(L5)

UNIT–I **13 hrs**

ManagerialEconomics:

Introduction – Nature, meaning, significance, functions, and advantages. Demand - Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting-FactorsgoverningForecasting,Methods.ManagerialEconomicsandFinancialAccountingand Management.

UNIT–II **13 hrs**

ProductionandCostAnalysis:

Introduction–Nature, meaning, significance functions and advantages. Production Function–Least-cost combination–Short run and long run Production Function- Iso quant's and Is costs, Cost & Break-EvenAnalysis-CostconceptsandCostbehavior-Break-EvenAnalysis(BEA)-DeterminationofBreak-EvenPoint(Simple Problems).

UNIT–III		**13**	**hrs**

BusinessOrganizationsandMarkets:

Introduction–FormsofBusinessOrganizations–SoleProprietary-Partnership-JointStock Companies-Public Sector Enterprises. Types of Markets-Perfect and Imperfect Competition-FeaturesofPerfectCompetitionMonopoly-MonopolisticOligopoly-Price-Output Determination-Pricing Methodsand Strategies

UNIT–IV		**12**	**hrs**

Capitl Budgeting:

Introduction–Nature, meaning, significance. Types of Working Capital, Sources of Short-term and Long-term Capital, Estimating Working capital Components, requirements. CapitalBudgeting–Features,Proposals,MethodsandEvaluation.Projects–PayBackMethod, AccountingRateofReturn(ARR)NetPresentValue(NPV)InternalRateReturn(IRR)Method (sample problems)

UNIT–V		**13**	**hrs**

FinancialAccountingandAnalysis:

Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance-FinalAccounts(TradingAccount,ProfitandLossAccountandBalanceSheetwithsimple adjustments).IntroductiontoFinancialAnalysis-AnalysisandInterpretationofLiquidityRatios, ActivityRatios,andCapitalstructureRatiosandProfitability.

TextBooks

1	VarshneyMaheswari:ManagerialEconomics,SultanChand.
2	Aryasri:BusinessEconomicsandFinancialAnalysis,4/e,MGH.

ReferenceBooks

1	AhujaHl ManagerialeconomicsSchand.
2	S.A.SiddiquiandA.S.Siddiqui:ManagerialEconomicsandFinancialAnalysis,NewAge International.
3	JosephG.NellisandDavidParker:PrinciplesofBusinessEconomics,Pearson,2/e,New Delhi.
4	DomnickSalvatore:ManagerialEconomicsinaGlobalEconomy, Cengage.

e-resources	**If any**
1	https://nptel.ac.in/courses/110/105/110105075/
2	https://www.slideshare.net/123ps/managerial-economics-ppt
3	https://www.slideshare.net/rossanz/production-and-cost-45827016

	4	https://www.slideshare.net/darkyla/business-organizations-19917607
	5	https://www.slideshare.net/balarajbl/market-and-classification-of-market
	6	https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
	7	https://www.slideshare.net/ashu1983/financial-accounting

CO-PO/PSOMappingMatrix

	CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
	C201.1										2	3	2			
	C201.2										2	3	2			
	C201.3									2	2	3	3			
	C201.4										2	3	2			
	C201.5										2	3	1			
	Avg.									**2**	**2**	**3**	**2**			

			L	T	P	Cr.
B.Tech.(IIIsem.)		**ANALOG CIRCUITS**				
		CourseCode: R232110 (Commonto ECE, EEE, &ME)	3	0	0	3

Pre-requisites:knowledgeofelectroniccomponentsandsemiconductordevices,Analogsystem Amplifiersandoscillators,555timerApplications.

Course Objectives:

- Tolearnthefundamentaldifferencesbetweenanalogganddigitalsignals.
- ToacquirebasicamplifiercircuitsusingBJTsandMOSFETs.
- ToknowApplicationsUsing555timersandPLLcircuits
- TounderstandADCsandDACs Applications

CourseOutcomes: At theendofthe course, thestudentwill beable to

C202.1	:	Analyzediodeclippingandclampingcircuits,understanddifferenttypesofbiasing circuitsofa Transistor.
C202.2	:	Usesmall signal modelling fortransistor circuit analysis and illustratethe operation offeedback Amplifiers
C202.3	:	Understandoperationof oscillators,operationalAmplifierandApplications
C202.4	:	Use555timersinmultivibrators,SchmitttriggerandPLL Applications
C202.5	:	DescribetheoperationofdifferentADCsand DACs

UNIT–I		13	hrs

Diodeclippingandclampingcircuits: Diodeclippers,clippingattwoindependentlevels, clamping circuit operation.

DCbiasingofBJTs: Loadlines,OperatingPoint,BiasStability,Collector-to-BaseBias,Self-Bias,StabilizationagainstVariationsinV_{BE}andβfortheSelf-BiasCircuit.

UNIT–II		13	hrs

SmallSignalsModellingofBJT: Analysis of a TransistorAmplifier Circuit usingh-parameters, Simplified CE Hybrid Model, Analysis of CE, CC, CB Configuration using approximate Model.

Feedback Amplifiers: ClassificationofAmplifiers,theFeedbackConcept, General Characteristics ofNegative-FeedbackAmplifiers,EffectofNegativeFeedbackuponOutputandInput Resistances.

UNIT–III		13	hrs

OscillatorCircuits:BarkhausenCriterionofoscillation, Oscillatoroperation,R-Cphaseshift oscillator,WienbridgeOscillator,CrystalOscillator.

Operational Amplifiers: Introduction, Basic information of Op-Amp, Ideal Operational Amplifier, Block Diagram Representation of Typical Op-Amp, OP-Amps Characteristics: Introduction, DC and AC characteristics, 741 op-amp & its features.

UNIT–IV		12	hrs

OP-AMPS Applications: Introduction,BasicOp-AmpApplications,InstrumentationAmplifier, AC Amplifier, V to I and I to V Converter, Sample and Hold Circuit, Log and AntilogAmplifier, Multiplier and Divider, Differentiator, integrator.

ComparatorsandWaveformGenerators: Introduction,Comparator,SquareWaveGenerator, MonostableMultivibrator.

UNIT–V		13	hrs

Timers and Phase Locked Loop: Introduction to 555 timer, functional diagram, Mono stable and A stable operations and applications, Schmitt Trigger, PLL block schematic, principles and description of individual blocks, 565 PLL.

Digital to Analog and Analog to Digital Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A-D Converters – parallel ComparatortypeADC,countertypeADC,successiveapproximationADCanddualslopeADC, DACandADCSpecifications.

TextBooks

1	ElectronicDevicesandCircuits-J.Millman,C.Halkias,TataMc-GrawHill,2nd Edition,2010.
2	LinearIntegratedCircuits–D.RoyChoudhury,NewAgeInternational(p)Ltd,2nd Edition,2003.

ReferenceBooks

1	ElectronicDevicesandCircuitTheory–RobertL.BoylestadandLowisNashelsky, Pearson Edition,2021.
2	ElectronicDevicesandCircuits–G.K.Mithal,Khanna Publisher,23rd Edition,2017.

CO-PO/PSOMappingMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C202.1		2													
C202.2	3	2													
C202.3	3	2													
C202.4		2													
C202.5	3	2													
Avg.	**3**	**2**													

		L	T	P	Cr.
B.Tech.(IIIsem.)	**ELECTROMAGNETICFIELDTHEORY**				
	CourseCode: R232111	3	0	0	3

Pre-requisites: ConceptsofDifferentialEquations,VectorCalculusandElectricalCircuit Analysis.

Course Objectives:

- Tostudytheproductionofelectricfieldandpotentialsduetodifferentconfigurationsof static charges.
- To study the properties of conductors and dielectrics, calculate the capacitance of different configurations. Understand the concept of conduction and convection current densities.
- To study the magnetic fields produced by currents in different configurations, application of Ampere's law and the Maxwell's second and third equations.
- TostudythemagneticforceandtorquethroughLorentzforceequationinmagneticfield environment like conductors and other current loops.
- Todeveloptheconceptofselfandmutualinductancesandthe energystored.
- TostudytimevaryingandMaxwell'sequationsindifferentformsandMaxwell'sfourth equation for the induced EMF.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C203.1	**:**	Determineelectricfieldsandpotentialsusingguass'slawandsolvingvariouselectric chargedistributions.
C203.2	**:**	Determinecapacitance andunderstandingtheeffectofElectric Dipole.
C203.3	**:**	Calculatethemagnetic fieldintensitybyusingcurrent,applicationofAmpere'slaw andtheMaxwell's equations.
C203.4	**:**	Determineself,mutual inductances andtheenergystoredinthemagneticfield.
C203.5	**:**	Explaintimevaryingfields,displacement currentandapplyPoynting theorem.

UNIT–I **13 hrs**

VectorAnalysis:

VectorAlgebra:ScalarsandVectors,Unitvector,Vectoradditionandsubtraction,Positionand distance vectors, Vector multiplication, Components of a vector.

CoordinateSystems:Rectangular,CylindricalandSphericalcoordinate systems.

VectorCalculus:Differentiallength,AreaandVolume.Deloperator,Gradientofascalar, Divergence of a vector and Divergence theorem (definition only). Curl of a vector and Stoke's theorem (definition only), Laplacian of a scalar.

Electrostatics: Coulomb'slawand Electric field intensity (EFI) –EFI duetoContinuous charge distributions (line and surface charge), Electric flux density, Gauss's law (Maxwell's first equation, $\nabla . \vec{D} = \rho v$), Applications of Gauss's law, Electric Potential, Work done in moving a pointchargeinanelectrostaticfield(secondMaxwell'sequationforstaticelectricfields,$\nabla \times \vec{E} = 0$),Potentialgradient,Laplace'sandPoison's equations.

	UNIT–II		**13**	**hrs**
	Conductors–DielectricsandCapacitance: Behavior of conductor in Electric field, Electric dipole and dipole moment –Potential and EFI dueto an electric dipole, Torque on an Electric dipole placed in an electric field, Current density-conduction and convection current densities, Ohm's law in point form, Behaviour of conductors in an electric field,Polarization,dielectricconstantandstrength,Continuityequation and relaxation time, Boundary conditions between conductor to dielectric, dielectric to dielectric and conductor to free space,Capacitanceofparallelplate,coaxialandsphericalcapacitors,Energystoredanddensityin astaticelectricfield.			
	UNIT–III		**13**	**hrs**
	Magnetostatics,Ampere'sLawandForceinmagneticfields: Biot-Savart's law and its applications viz. Straight current carrying filament, circular, square, rectangle and solenoid current carrying wire – Magnetic flux density and Maxwell's second Equation($\nabla.\vec{B}=0$), Ampere's circuital law and its applications viz. MFI due to an infinite sheet, long filament, solenoid, toroidal current carrying conductor, point form of Ampere's circuital law, Maxwell's third equation ($\nabla \times \vec{H}=\vec{J}$). Magnetic force, moving charges in a magnetic field –Lorentz force equation, force on a current element in a magnetic field, force on a straight and along current carrying conductor in a magnetic field,forcebetweentwostraightlongandparallelcurrentcarryingconductors,Magneticdipole, Magnetictorque, andmoment.			
	UNIT–IV		**12**	**hrs**
	Selfandmutualinductance: Self and mutual inductance – determination of self-inductance of a solenoid, toroid, coaxialcable and mutual inductance between a straight long wire and a square loop wire in the same plane– Energy stored and energy density in a magnetic field.			
	UNIT–V		**13**	**hrs**
	TimeVaryingFields: Faraday's laws of electromagnetic induction, Maxwell's fourth equation($\nabla\times\vec{E}=-6\vec{B}$), 6tntegral and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement current,ModificationofMaxwell'sequationsfortimevaryingfields,Poyntingtheoremand Poynting vector.			
	TextBooks			
	1	"ElementsofElectromagnetics"byMatthewNOSadiku,OxfordPublications,7th edition, 2018.		
	2	"EngineeringElectromagnetics"byWilliamH.Hayt&John.A.BuckMc.Graw-Hill,7th Editon.2006.		
	ReferenceBooks			
	1	"IntroductiontoElectro Dynamics"byDJGriffiths,Prentice-Hallof India Pvt.Ltd,2nd edition.		
	2	"ElectromagneticFieldTheory"byYaduvirSingh, Pearson India,1st edition,2011.		

	3	"FundamentalsofEngineeringElectromagnetics" bySunil Bhooshan,OxfordUniversity Press,2012.
	4	SchaumsOutlineofElectromagneticsbyJosephA.Edminister, Mahamood Navi,4th Edition,2014.

	e-resources	**If any**
	1	https://archive.nptel.ac.in/courses/108/106/108106073/
	2	https://nptel.ac.in/courses/117103065/

CO-PO/PSOMappingMatrix

	CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
	C203.1	2	3											3		
	C203.2	2	3											3		
	C203.3	2	3											3		
	C203.4	2	3											3		
	C203.5	2	3											3		
	Avg.	**2**	**3**											**3**		

			L	T	P	Cr.
B.Tech.(IIIsem.)		**ELECTRICALCIRCUITANALYSIS-II**				
		CourseCode: R232112	3	0	0	3

Pre-requisites: AnalysisofDCandSingle-phaseACCircuits,Conceptsofdifferentiationandintegration.

Course Objectives:

- Tounderstand threephasecircuits
- Toanalyzetransientsinelectrical systems
- Toevaluatenetworkparametersofgivenelectrical network
- ToapplyFourieranalysistoelectricalsystems
- Tounderstand graphtheory forcircuit analysisand tounderstand thebehavior offilters

CourseOutcomes: At theendofthe course, thestudentwill beable to

C204.1	:	Understandthebalanced andunbalanced3phase circuitsforpowercalculations.
C204.2	:	Applythetransientbehaviorofelectricalnetworksindifferent domains.
C204.3	:	EstimatevariousNetwork parameters.
C204.4	:	ApplytheconceptofFourierseriestoelectricalsystems.
C204.5	:	Analyzethe filtercircuitforelectricalcircuits.

UNIT–I 13 hrs

AnalysisofThreePhaseBalanced Circuits:
Phase Sequence, Star and Delta Connection of Sources and Loads, Relation Between Line and Phase Quantities, Analysis of Balanced Three Phase Circuits, Measurement of Active and Reactive Power.

AnalysisofThreePhaseUnbalanced Circuits:
Loop method, Star-Delta transformation technique, two-wattmeter method for measurement ofthree phase power.

UNIT–II 13 hrs

Laplace transforms– Definition and Laplace transforms of standard functions–Shifting theorem– Transforms of derivatives and integrals, Inverse Laplace transforms and applications.

TransientAnalysis: TransientresponseofR-L,R-CandR-L-Ccircuits(Seriesandparallelcombinations)forD.C.andsinusoidalexcitations–Initialconditions-Solutionusingdifferential equationapproachandLaplacetransformapproach.

UNIT–III 13 hrs

Network Parameters: Impedance parameters, Admittance parameters, Hybrid parameters, Transmission(ABCD)parameters,conversionofParametersfromoneformtoother,Conditionsfor ReciprocityandSymmetry,InterconnectionofTwoPortnetworksinSeries,ParallelandCascaded configurations-problems

UNIT–IV 12 hrs

Analysis of Electric Circuits with Periodic Excitation: Fourier series and evaluation of Fourier coefficients, Trigonometric and complex Fourier series for periodic waveforms, Application to ElectricalSystems–Effectivevalueandaveragevalueofnon-sinusoidalperiodicwaveforms, powerfactor,effectofharmonics

UNIT–V		13	hrs

Filters: Classificationoffilters-Lowpass,Highpass,BandpassandBandEliminationfilters, Constant-kfilters-LowpassandHighPass,DesignofFilters.

TextBooks

1	EngineeringCircuit Analysis,William HaytandJackE.Kemmerly,8th EditionMcGraw-Hill,2013
2	"FundamentalsofElectricCircuits,CharlesK.Alexander,MathewN. O.Sadiku,3rd Edition, TataMcGraw-Hill,2019

ReferenceBooks

1	"NetworkAnalysis,M.E.VanValkenburg,3rd Edition,PHI,2019.
2	NetworkTheory,N.C.JaganandC.Lakshminarayana,1st Edition,B.S.Publications,2012.
3	CircuitsandNetworksAnalysisandSynthesis,A.Sudhakar,ShyamMohanS.Palli,5th Edition, TataMcGraw-Hill,2017.
4	EngineeringNetworkAnalysisandFilterDesign(IncludingSynthesisofOnePortNetworks)-DurgeshC.Kulshreshtha GopalG.Bhise,PremR.Chadha,UmeshPublications2012.
5	CircuitTheory:AnalysisandSynthesis,A.Chakrabarti,DhanpatRai&Co.,2018,7th Revised Edition.

e-resources	Ifany
1	https://archive.nptel.ac.in/courses/117/106/117106108/
2	https://archive.nptel.ac.in/courses/108/105/108105159/

CO-PO/PSOMappingMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C204.1	2	3											3		
C204.2	2	3											3		
C204.3	2	3											3		
C204.4	2	3											3		
C204.5	2	3											3		
Avg.	**2**	**3**											**3**		

		L	**T**	**P**	**Cr.**
B.Tech.(IIISem.)	**DCMACHINES& TRANSFORMERS**				

	CourseCode:R232113	3	0	0	3

Pre-requisites: PrinciplesofElectromechanicalEnergyConversion,Electromagneticfieldsand Electrical Circuit Analysis.

CourseObjectives: Studentswillgetexposureto

- Understandthecharacteristicsandapplicationsof DCMachines.
- Developproblem solvingskillsaboutthestarting,speed controlandtestingofDC Machines.
- Understandtheconceptsofefficiencyandregulationofatransformerbyobtainingequivalent circuit.
- Analyzetheperformanceofsingle-phasetransformersandtounderstandtheconnection diagramsofthree-phase transformers.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C205. 1	:	Understandtheprocessofvoltagebuild-upinDCgeneratorsand characteristics.
C205.2	:	Understandtheprocessoftorqueproduction, startingandspeedcontrolof DC motors andillustratetheircharacteristics.
C205.3	:	Obtaintheequivalentcircuitofsingle-phasetransformeranddetermineitsefficiency& regulation.
C205.4	:	Applyvarioustestsofsingle-phasetransformerstoobtainperformance.
C205.5	:	Understandvariousconfigurationsofthree-phasetransformers.

UNIT–I		13	hrs

DC Generators:
ConstructionandprincipleofoperationofDCmachines–EMFequationforgenerator–Excitation techniques–characteristicsofDCgenerators–applicationsofDCGenerators,Back-e.m.fandtorque equationsofDCmotor–Armaturereactionandcommutation.

UNIT–II		13	Hrs

Starting,SpeedControlandTestingofDC Machines:
Characteristics of DC motors– losses and efficiency–applications of DC motors. Necessity of a starter –startingby3-point and 4-pointstarters– speedcontrolbyarmaturevoltageand field currentcontrol – testing of DC machines – brake test, Swinburne's test –Hopkinson's test–Field Test.

UNIT–III		13	hrs

Single-phase Transformers:
Introduction to single-phase Transformers (Construction and principle of operation)–emf equation–operation on no-load and on load–lagging, leading and unity power factors loads–phasor diagrams–equivalentcircuit–regulation–lossesandefficiency–effectofvariationoffrequencyandsupply voltageonlosses–all-day efficiency.

UNIT–IV		12	hrs

Testingof Transformers:
Open Circuit and Short Circuit tests– Sumpner's test– separation of losses—Parallel operation with equal and unequal voltage ratios–auto transformer–equivalent circuit–comparison with two winding transformers.

UNIT–V		13	hrs

Three-PhaseTransformers:
Polyphaseconnections-Y/Y,Y/Δ,Δ/Y,Δ/Δ,openΔandVectorgroups–thirdharmonicsinphase voltages–Paralleloperation–threewindingtransformers-transientsinswitching–offloadandonload tapchangers–Scott connection.

TextBooks

1	ElectricalMachinerybyDr.PSBimbhra,7th edition,KhannaPublishers,NewDelhi,1995.
2	PerformanceandanalysisofACmachinesbyM.G.Say,CBS,2002.

ReferenceBooks

1	ElectricalMachinesbyD.P.Kothari,I.J. Nagarth,McGrawHillPublications, 5thedition
2	ElectricalMachineryFundamentalsbyStephenJChapmanMcGrawHilleducation2011.
3	GeneralizedTheoryofElectricalMachinesbyDr.PSBimbhra,7thEdition,Khanna Publishers, 2021.
4	Theory&PerformanceofElectricalMachinesbyJ.B.Gupta,S.K.Kataria&Sons,2007.

e-resources	Ifany
1	nptel.ac.in/courses/108/105/108105112
2	nptel.ac.in/courses/108/105/108105155

CO-PO/PSOMappingMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3.
C205.1	2	3											3		
C205.2	2	3											3		
C205.3	2	3											3		
C205.4	2	3											3		
C205.5	2	3											3		
Avg.	**2**	**3**											**3**		

			L	T	P	Cr.
B.Tech.(IIISem.)		**ELECTRICALCIRCUITANALYSIS-IIAND SIMULATIONLAB**				
		CourseCode:R232114L	0	0	3	1.5

Pre-requisites: Basicelectriccircuit knowledge.

Course Objectives:

- TomeasurethreephaseActiveandReactivepower
- Toanalyzetransient behaviorofcircuits
- Todetermine2-portnetworkparameters
- Toanalyzeelectricalcircuitsusingsimulationtools

CourseOutcomes: At theendofthe course, thestudentwill beable to

C206.1	:	Compilethedata,Organizeandanalyzeitfordiscussionandreportthefindingsand observationsformexperimentallearningactivitiesinthe laboratory
C206.2	:	Buildholisticdevelopmentandpleasingdispositionbyreviewingandcorrectingthe performancetobecomeindependentand autonomous thinker
C206.3	:	Understandthepowercalculationsinthreephasecircuits,timeresponseofgivennetwork andevaluatetwoport network parameters.
C206.4	:	Simulateanddrawtheresponsesofdifferentelectricalandpowerelectronicconverters usingPSPICE software.

List ofExperiments

Any10ofthefollowingexperimentsaretobe conducted:

1	MeasurementofActive PowerandReactivePowerforbalancedloads.
2	MeasurementofActive PowerandReactivePowerforunbalancedloads
3	DeterminationofZandY parameters.
4	DeterminationofABCDandhybridparameters
5	VerificationofKirchhoff'scurrentlawandvoltagelawusingsimulationtools.
6	Verificationofmeshand nodalanalysisusingsimulationtools.
7	Verificationofsuperpositionandmaximum powertransfertheoremsusing simulationtools.
8	VerificationofReciprocityandCompensationtheoremsusingsimulationtools.
9	VerificationofThevenin'sandNorton'stheorems usingsimulation tools.
10	Verificationofseries and parallelresonanceusingsimulationtools.
11	Simulationandanalysisoftransientresponseof RL,RC,andRLC circuits
12	Verificationofselfinductanceandmutualinductancebyusingsimulation tools

References

1 "NetworkAnalysis,M.E.VanValkenburg,3rdEdition,PHI,2019.

	2	NetworkTheory,N.C.JaganandC.Lakshminarayana,1st Edition,B.S.Publications,2012.

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C206.1									3	2					3
	C206.2								2	3	2					3
	C206.3	2			3					3						3
	C206.4	2			3					3						3
	Avg.	**2**			**3**				**2**	**3**	**2**					**3**

			L	T	P	Cr.
B.Tech.(IIISem.)		**DCMACHINES&TRANSFORMERSLAB**				
		CourseCode:R232115L	0	0	3	1.5

Pre-requisites:

Course Objectives:

- Toconducttheexperimentandplotthecharacteristicsandapplicationsof DC machines.
- Toperformthestarting,speedcontrolandtestingmethodsofDCMachines.
- Todetermine/Predetermineefficiencyandregulationofthetransformerthroughequivalentcircuit.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C207.1	:	Compilethedata,Organizeandanalyzeitfordiscussionandreportthefindingsand observationsformexperimentallearningactivitiesinthe laboratory
C207.2		Buildholisticdevelopmentandpleasingdispositionbyreviewingandcorrectingthe performancetobecomeindependentand autonomous thinker
C207.3	:	Demonstratestartingand speedcontrolmethodsofDC Machines.
C207.4	:	Determinetheperformancecharacteristicsof DC machinesandsingle-phase transformer

List ofExperiments

Any10ofthefollowingexperimentsaretobeconducted:

1	Speedcontrolof DCshuntmotor byFieldCurrent andArmature Voltage Control.
2	BraketestonDCshuntmotor-Determinationof performance curves
3	Swinburne'stest-PredeterminationofefficienciesasDCGeneratorandMotor
4	Hopkinson'stestonDCshunt Machines.
5	Loadteston DCcompoundgenerator-Determinationof characteristics
6	LoadtestonDCshuntgenerator-Determinationofcharacteristics
7	FieldstestonDCseriesmachines-Determination of efficiency
8	BraketestonDCcompoundmotor-Determinationofperformancecurves
9	OC&SCtestsonsinglephase transformer
10	Sumpner'stestonsinglephasetransformer
11	Scottconnectionof transformers.
12	ParalleloperationofSingle-phase Transformers
13	Separationofcorelossesofasingle-phasetransformer

ReferenceBooks:

1	ElectricalMachinesbyD. P.Kothari,I.J. Nagarth,McGrawHillPublications, 5thedition
2	ElectricalMachinery FundamentalsbyStephenJ ChapmanMcGrawHilleducation2011.

CO-PO/PSOMappingMatrix																
	CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
	C207.1									3	2					3
	C207.2								2	3	2					3
	C207.3	2			3					3						3
	C207.4	2			3					3						3
	Avg.	**2**			**3**				**2**	**3**	**2**					**3**

			L	T	P	Cr.
B.Tech.(III_Sem.)		**PYTHONPROGRAMMINGLAB**				
		CourseCode:232108 (CommontoCSE,IT,CSE-AIML,EEE)	0	1	2	2

Pre-requisites: BasicMathematicsKnowledge

Course Objectives:

- Toacquireknowledgeof Programmingincore Python.
- ToacquireunderstandingonObjectOrientedprogrammingin Python.
- Todeveloptheabilityof designingGraphicalUserInterfaceinPython.
- TodevelopabilitytowritePythonprogramsforvariousdatastructures.
- Tolearnthe conceptsof Exceptionhandlingand File InputandOutput.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C208.1	Compilethedata,organizeandanalyzeitfordiscussionandreportthefindingsand observationsfromexperimentallearningactivitiesinthe laboratory.
C208.2	Buildholisticdevelopmentandpleasingdispositionbyreviewingandcorrectingthe performancetobecomeindependentand autonomous thinker.
C208.3	Buildvariouspythonprogramsusingdatastructures,loopsandoperatorsofpython
C208.4	DeveloppythonprogramsbyusingFileI/OandOOPs concepts.

List ofExperiments

(Anyofthe10experimentsarerequiredtobeconducted)

1	a) RunninginstructionsinInteractiveinterpreterand aPythonScript b) Writeaprogramtopurposefullyraise IndentationErrorandCorrectit
2	a) Writeaprogramtocomputedistancebetweentwopointstakinginputfromtheuser (Pythagorean Theorem) b) Writeaprogramadd.pythattakes2numbersascommandlineargumentsandprintsits sum.
3	a) WriteaProgram forchecking whetherthe givennumberisaeven numberor not. b) Usingaforloop,writeaprogramthatprintsoutthedecimalequivalentsof1/2,1/3,1/4,. . . , 1/10
	c) Writeaprogramusinga forloopthat loopsoverasequence.Whatissequence? d) Writeaprogramusingawhileloopthatasks theuserforanumber,andprintsa countdown from that number to zero.

	4	a) Findthesumofalltheprimesbelowtwo million. b) Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: c) 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ... d) ByconsideringthetermsintheFibonaccisequencewhosevaluesdonotexceedfour million, find the sum of the even-valued terms.
	5	a) Writeaprogramtocountthenumbersofcharactersinthestringandstorethemina dictionary data structure b) Writeaprogramtousesplitandjoinmethodsinthestringandtraceabirthdaywitha dictionarydatastructure.
	6	a) Writeaprogramcombinelists that combinestheselists intoadictionary. b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?
	7	a) Writeaprogram toprinteachlineofafilein reverse order. b) Writeaprogramto computethenumberof characters,wordsand linesinafile.
	8	a) Write a function ball collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding. Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius If(distancebetweentwoballscenters) <=(sumof theirradii)then(theyarecolliding) b) Findmean, median, modeforthe givenset of numbersin a list.
	9	a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b. b) Writeafunctiondupstofindallduplicatesinthe list. c) Writeafunction uniqueto findallthe uniqueelementsofa list.
	10	a) Writeafunctioncumulative_product tocomputecumulativeproduct ofalistof numbers. b) Writeafunction reverseto reversealist. Withoutusing thereversefunction. c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.
	11	a) Writeaprogram thatdefinesamatrixand prints b) Writeaprogram toperform addition oftwo squarematrices
		c)Writeaprogram to performmultiplication oftwosquare matrices

	12	a) Installpackagesrequests,flaskandexplorethem.using(pip). b) Writeascriptthatimportsrequestsandfetchcontentfromthepage.Eg.(Wiki) c) Writeasimplescript thatservesasimple HTTPResponse andasimpleHTML Page
	13	a) Classvariablesandinstancevariableandillustrationoftheselfvariable i) Robot ii) ATMMachine
	14	a) WriteaGUIforanExpressionCalculatorusing tk b) Writeaprogram toimplement thefollowing figuresusing turtle
	15	a) Write a test-case to check the function even numbers which return True on passing a listof all even numbers b) Writeatest-casetocheckthefunction reversestringwhichreturnsthe reversedstring
	16	a) Buildanyoneclassicaldata structure. b) Writeaprogramtosolve knapsack problem.
	ReferenceBooks:	
	1	FundamentalsofPythonFirstPrograms, 3rdEditionKenneth.A.Lambert,Cengage
	2	PythonProgramming:AModernApproach,VamsiKurama,Pearson2018

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C208.1									3	2					
	C208.2								2	3	2					
	C208.3				3					3						
	C208.4				3					3						
	Avg.				**3**				**2**	**3**	**2**					

			L	T	P	Cr.
B.Tech.(III_Sem.)		**ENVIRONMENTALSCIENCE**				
		CourseCode: 232109 (CommontoCSE,AIML,IT&EEE)	2	0	0	0

Pre-requisites: BasicKnowledgeinEnvironment andprotection.

Course Objectives:

- Overallunderstandingof thenaturalresources
- Basicunderstandingoftheecosystemanditsdiversity.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- Anunderstandingofthe environmentalimpactof developmentalactivities.
- Awarenessonthesocialissues,environmental legislationandglobal treaties.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C209.1	:	Describethescope,importanceofsustainability,structureandfunctionof Ecosystem.
C209.2	:	ExplaintheimportanceofNaturalResourcesforthesustenanceoflifeand conservationofNatural resources.
C209.3	:	Describehowbiodiversityisinextinctionin Indiaandtheneedofconservation practices
C209.4	:	Illustratetheadverseeffectsofpollutionandremedial solutions
C209.5	:	Analyzeissuesbothinruralandurbanenvironmentandassessthepossiblestepstobe takentocombatthechallenges

UNIT–I — 10 hrs

MultidisciplinarynatureofEnvironmentalStudies:

Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information technology in environment and human health. Ecosystems: Concept of an ecosystem. -Structure and function of an ecosystem; Producers, consumers and decomposers. -Energy flow in the ecosystem -Ecological succession. -Foodchains,foodwebsandecologicalpyramids;Introduction,types,characteristicfeatures, structureandfunctionofForestecosystem,Grasslandecosystem,Desertecosystem,Aquatic ecosystems.

UNIT–II — 10 hrs

Naturalresourcesandassociated problems:

Forest resources: Use and over –exploitation, deforestation –Timber extraction –Mining, dams and other effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water –Floods, drought, conflicts over water, dams –benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.Landresources:Landasaresource,land degradation,Wastelandreclamation,maninduced landslides,soilerosionanddesertification;Roleofanindividualinconservationofnatural resources;Equitableuse of resourcesforsustainable lifestyles.

UNIT–III		10	hrs

Biodiversityandits conservation:

Definition: genetic, species and ecosystem diversity-classification -Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as mega-diversity nation -Hot-sports of biodiversity -Threats to biodiversity: habitat loss, man-wildlife conflicts.-EndangeredandendemicspeciesofIndia–Conservationofbiodiversity:conservationof biodiversity.

UNIT–IV		10	hrs

EnvironmentalPollution:

Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. -Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being. Solid Waste Management:Sources,Classification,effectsandcontrolmeasuresofurbanandindustrialsolid wastes.Consumerismandwasteproducts,Biomedical,Hazardousand e–wastemanagement.

UNIT–V		10	hrs

SocialIssuesandtheEnvironment:

Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental 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.

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus –Green businessand Green politics. The student should Visit an Industry / Ecosystem and submit a report individuallyonanyissuesrelatedtoEnvironmentalStudiescourseandmakeapowerpoint presentation.

TextBooks

1	EnvironmentalstudiesbyAnubhaKaushikandC.P.Kaushik.

	2	EnvironmentalStudiesbyP.N.Palanisamy,P.Manikandan,A.Geetha, andK.ManjulaRani;
		Pearson Education,Chennai
	ReferenceBooks	
	1	TextBookofEnvironmentalStudiesby DeeshitaDave& P.UdayaBhaskar,Cengagelearning.
	2	GlimpsesofEnvironmentby K.V.S.G.MuraliKrishnaPublishedbyEnvironmental Protection Society,Kakinada,A.P.

CO-PO/PSOMappingMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C209.1	3					2	3	2							
C209.2	3					2	3	2							
C209.3	3					2	3	2							
C209.4	3					2	3	2							
C209.5	3					2	3	2							
Avg.	**3**					**2**	**3**	**2**							

			L	T	P	Cr.
B.Tech. (IVSem.)		**COMPLEXVARIABLESAND NUMERICAL METHODS**				
		CourseCode:R232211	3	0	0	3

Pre-requisites: BasicknowledgeinMathematics.

Course Objectives:

- Toelucidatethedifferentnumericalmethodstosolvenonlinearalgebraicequations
- Todisseminatetheuseofdifferentnumericaltechniquesforcarryingoutnumerical integration.
- Tofamiliarizethecomplex variables.
- Toequipthestudentstosolveapplicationproblemsintheirdisciplines.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C210.1	:	Applynumericalmethodstofindthesolutionofequationsandinterpolatethe polynomials.
C210.2	:	Applynumericalmethodstofindthesolutiontoinitialvalueproblemsand integrations.
C210.3	:	Findthecontinuity,analyticityoffunctionsofcomplexvariablesanddifferenttypes ofcomplexintegrals.
C210.4	:	EvaluatetheTaylor'sandLaurentseriesexpansions,residuesforcomplexfunctions.
C210.5	:	Explainthepropertiesofvarioustypesofconformalmappings.

UNIT–I 10 hrs

Iterative Methods:
Introduction – Solutions of algebraic and transcendental equations: Bisection method – Secant method – Method of false position – General Iteration method – Newton-Raphson method (Simultaneous Equations)
Interpolation:Newton'sforwardandbackwardformulaefor interpolation–withunequalintervals –Lagrange'sinterpolationformula

UNIT–II 10 hrs

Numerical integration, Solution of ordinary differential equations with initial conditions:
Trapezoidalrule–Simpson's1/3rdand3/8thrule–SolutionofinitialvalueproblemsbyTaylor'sseries–Picard'smethodofsuccessiveapproximations–Euler'smethod–Runge-Kuttamethod(secondandfourth order)–Milne'sPredictorandCorrectorMethod.

UNIT–III 10 hrs

FunctionsofacomplexvariableandComplexintegration:
Introduction – Continuity – Differentiability – Analyticity –Cauchy-Riemann equations in Cartesianand polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method.
Complexintegration:Lineintegral–Cauchy'sintegraltheorem–Cauchy'sintegralformula–Generalizedintegralformula(allwithoutproofs)andproblemsonabove theorems.

UNIT–IV		10	hrs

SeriesexpansionsandResidueTheorem:
Radius of convergence – Expansion of function in Taylor's series, Maclaurin's series and Laurent series.
TypesofSingularities:Isolated–Essentialsingularities–Poleoforderm–Residues–Residue theorem(withoutproof)–Evaluationofrealintegralofthetypes $\int_{-\infty}^{\infty} f(x)dx$ and $\int_{c}^{c+2\pi} f(\cos\theta,\sin\theta)d\theta$

UNIT–V		10	hrs

Conformalmapping:
Transformationby e^z, $\log z$, z^2, z^n ($n$ispositiveinteger), $\sin z$, $\cos z$, $z+az$ Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio –properties –invariance of circles and cross ratio –determination of bilinear transformation mapping 3 given points.

TextBooks

1	**B.S.Grewal,**Higher EngineeringMathematics,44th Edition,KhannaPublishers.
2	**SS Sastry**,Introductory MethodsofNumericalAnalysis,PHILearningPrivateLimited.

ReferenceBooks

1	ErwinKreyszig,AdvancedEngineeringMathematics, JohnWiley&Sons, 2018,10th Edition.
2	B.V.Ramana,HigherEngineeringMathematics,byMcGraw Hillpublishers
3	R.K.JainandS.R.K.Iyengar,Advanced EngineeringMathematics, Alpha ScienceInternationalLtd.,20215thEdition(9threprint)

E-RESOURCES:

1	https://swayam.gov.in/nd1_noc19_ma21/preview
2	https://onlinecourses.nptel.ac.in/noc20_ge20/preview
3	https://archive.nptel.ac.in/courses/111/103/111103070
4	https://onlinecourses.nptel.ac.in/noc20_ma50/preview

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C210.1	3	2													
	C210.2	3	2													
	C210.3	3	2													
	C210.4	3	2													
	C210.5	3	2													
	Avg.	**3**	**2**													

			L	T	P	Cr.
B.Tech(IVSem)		**UNIVERSALHUMANVALUES-UNDERSTANDING HARMONY&ETHICALHUMAN CONDUCT**				
		CourseCode:R232202 (CommontoECE,EEE,ME,CE,CSE(AIDS,DS)	2	1	0	3

Pre-requisites:

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS'toensuresustainedhappinessandprosperitywhicharethecoreaspirations of allhuman beings.
- TofacilitatethedevelopmentofaHolisticperspectiveamongstudentstowardslife and profession as well as towards happiness and prosperity based on a correct understandingoftheHumanrealityandtherestofexistence.Suchholistic perspectiveformsthebasisofUniversalHumanValuesandmovementtowards value-based living in a natural way.
- TohighlightplausibleimplicationsofsuchaHolisticunderstandingintermsof ethical human conduct,trustfulandmutuallyfulfillinghumanbehaviorandmutuallyenrichinginteraction with Nature.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C211.1	:	DefinethetermslikeNaturalAcceptance,HappinessandProsperity
C211.2	:	Identifyone'sself,andone'ssurroundings(family,societynature)
C211.3	:	Applywhattheyhavelearnttotheirownselfindifferentday-to-daysettingsinreal life
C211.4	:	Relatehumanvalueswithhumanrelationshipandhumansociety.
C211.5	:	Justifytheneedforuniversalhumanvaluesandharmonious existence.

UNIT–I		10	hrs

IntroductiontoValueEducation(6lecturesand3tutorialsforpractice session)

Lecture1:RightUnderstanding,RelationshipandPhysicalFacility(HolisticDevelopmentand the Role of Education)

Lecture2:Understanding ValueEducation

Tutorial1:PracticeSession PS1SharingaboutOneself

Tutorial2:PracticeSessionPS2 ExploringHumanConsciousness

Tutorial3:PracticeSessionPS3ExploringNaturalAcceptance Lecture 3: self-exploration as the Process for Value Education

Lecture4:ContinuousHappinessandProsperity–theBasicHumanAspirations

Lecture5: Happiness and Prosperity– Current Scenario

Lecture6:MethodtoFulfill theBasicHuman Aspirations

UNIT–II		10	hrs

	HarmonyintheHumanBeing(6lecturesand3tutorialsforpractice session. Lecture7:UnderstandingHumanbeingastheCo-existenceoftheselfandthebody. Lecture8: Distinguishing between the Needs of the self and the body Tutorial4:PracticeSessionPS4ExploringthedifferenceofNeedsofselfand body Lecture 9: The body as an Instrument of the self Lecture10: UnderstandingHarmony intheself Tutorial5:PracticeSessionPS5ExploringSourcesofImaginationintheself Lecture 11: Harmony of the self with the body Lecture12:Programmetoensureself-regulationandHealth Tutorial6:PracticeSessionPS6 ExploringHarmonyofselfwiththebody.			
	UNIT–III		10	hrs
	HarmonyintheFamilyandSociety(6lecturesand3tutorialsforpracticesession) Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction Lecture 14: 'Trust' – the Foundational Value in Relationship Tutorial7:PracticeSessionPS7ExploringtheFeelingofTrust Lecture 15: 'Respect' – as the Right Evaluation Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect Lecture16:OtherFeelings,JusticeinHuman-to-HumanRelationship Lecture 17: Understanding Harmony in the Society Lecture18:Visionforthe UniversalHumanOrder Tutorial9:PracticeSessionPS9ExploringSystemstofulfilHumanGoal			
	UNIT–IV		08	hrs
	HarmonyintheNature/Existence(4lecturesand2tutorialsforpracticesession) Lecture19: Understanding Harmony in the Nature Lecture20:Interconnectedness,self-regulationandMutualFulfillmentamongtheFour Orders of Nature Tutorial10:PracticeSessionPS10ExploringtheFourOrdersofNature Lecture 21: Realizing Existence as Co-existence at All Levels Lecture22: The Holistic Perception of Harmony in Existence Tutorial11:PracticeSessionPS11ExploringCo-existenceinExistence.			
		UNIT–V	08	hrs
	ImplicationsoftheHolisticUnderstanding–aLookatProfessional Ethics (6lecturesand3tutorialsforpracticesession) Lecture 23: Natural Acceptance of Human Values Lecture24:Definitivenessof(Ethical)HumanConduct			

	Tutorial12:PracticeSessionPS12ExploringEthicalHumanConduct Lecture25:ABasisforHumanisticEducation,HumanisticConstitutionandUniversalHuman Order Lecture26:CompetenceinProfessionalEthics Tutorial13:PracticeSessionPS13ExploringHumanisticModelsin Education Lecture27:HolisticTechnologies,ProductionSystemsandManagementModels-Typical Case Studies Lecture28:StrategiesforTransitiontowardsValue-basedLifeandProfession Tutorial14:PracticeSessionPS14ExploringStepsofTransitiontowardsUniversalHumanOrder	
	TextBooks	
	1	TheTextbookRRGaur,RAsthana,GPBagaria,*AFoundationCourseinHumanValues and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
	2	TheTeacher'sManualRRGaur,RAsthana,GPBagaria,*Teachers'ManualforA Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN978-93-87034-53-2
	ReferenceBooks	
	1.	*JeevanVidya:E kParichaya*,ANagaraj,JeevanVidyaPrakashan,Amarkantak,1999
	2.	*HumanValues*,A.N.Tripathi,NewAgeIntl.Publishers,NewDelhi,2004.*TheStoryof Stuff*(Book)
	3.	*TheStoryofMyExperimentswithTruth*-byMohandasKaramchandGandhi
	4.	*SmallisBeautiful*-E.F Schumacher
	e-resources	
	1.	https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
	2.	https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
	3.	https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

CO-PO/PSOMappingMatrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
C211.1							2	3	2			2			
C211.2							2	3	2			2			
C211.3							2	3	2			2			
C211.4							2	3	2			2			
C211.5							2	3	2			2			
Avg.							**2**	**3**	**2**			**2**			

			L	T	P	Cr
B.Tech.(IVSem.)		**POWERSYSTEMS–I**				
		CourseCode:R232212	3	0	0	3

Pre-requisites: ElectricalCircuitAnalysis.

Course Objectives:

- Tostudytheprincipleof operationofdifferentcomponentsofathermalpowerstations.
- Tostudytheprincipleofoperationofdifferentcomponentsofa Nuclearpowerstations.
- To study the constructional and operation ofdifferent components ofan Airand Gas Insulated substations.
- Tostudytheconstructionaldetailsofdifferenttypesof cables.
- Tostudydifferenttypesofloadcurvesandtariffsapplicabletoconsumers.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C212.1	:	Explaintheoperationof hydroelectricpowerplantandthermalpower plant.
C212.2	:	Describetheoperation of nuclearPower plant.
C212.3	:	Comparetheair andgasinsulatedsubstations.
C212.4	:	ExplaintheConstructionofcablesanddescribedistribution systems.
C212.5	:	IllustratetheEconomical aspectsofpower generation.

UNIT–I		10	hrs

HydroelectricPowerStations:
Selectionofsite,generallayoutofahydroelectricpowerplantwithbriefdescriptionofmajor components and principle of operation

ThermalPower Stations:
Selectionofsite,general layoutofathermalpowerplant.Briefdescriptionofcomponents:boilers, superheaters,economizersandelectrostaticprecipitators,steamturbines:impulseandreaction turbines,condensers,feedwatercircuit,coolingtowersandchimney.

UNIT–II		10	hrs

NuclearPower Stations:
Location of nuclear power plant, working principle, nuclear fission, nuclear fuels, nuclear chain reaction, nuclear reactor components: moderators, control rods, reflectors and coolants, types of nuclear reactors and brief description of PWR, BWR and FBR. Radiation: radiation hazards and shielding, nuclear waste disposal.

UNIT–III		10	hrs

Substations:

Air Insulated Substations – indoor & outdoor substations, substations layouts of 33/11 kVshowing the location of all the substation equipment. Bus bar arrangements in the sub-stations: simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams.

Gas InsulatedSubstations(GIS)–advantagesofgasinsulatedsubstations,constructional aspects of GIS, installation and maintenance of GIS, comparison of air insulated substations and gas insulated substations.

UNIT–IV		14	hrs

UndergroundCables:

Types of cables, construction, types of insulating materials, calculation of insulation resistance, stress in insulation and power factor of cable. Capacitance of single and 3-Core belted Cables: Grading of cables – capacitance grading and inter sheath grading.

DistributionSystems:

Classification of Distribution systems, A.C Distribution, overhead versus Underground system, connectionschemesofDistributionsystem,RequirementsofDistributionsystem,requirementsofa Distributionsystem,DesignconsiderationsinDistributionsystem.

UNIT–V		10	hrs

EconomicAspectsofPowerGeneration&Tariff:

Economic Aspects –load curve, load duration and integrated load duration curves, discussion on economicaspects:connectedload,maximumdemand,demandfactor,loadfactor,diversityfactor, power capacity factor and plant use factor, base and peak load plants.

TariffMethods–costsofgenerationandtheirdivisionintofixed,semi-fixedandrunningcosts, desirablecharacteristicsofatariffmethod,tariffmethods:simplerate,flatrate,block-rate,two part, three–part, and power factor tariff methods.

TextBooks

1	ATextBookonPowerSystemEngineeringbyM.L.Soni,P.V.Gupta,U.S.BhatnagarandA. Chakrabarti,DhanpatRai &Co.Pvt. Ltd.
2	Generation,DistributionandUtilizationofElectricEnergybyC.L.WadhawaNewage International(P)Limited, Publishers.

ReferenceBooks

1	ElectricalPowerDistributionSystemsbyV.Kamaraju,TataMcGrawHill,New Delhi.
2	ElementsofElectricalPowerStationDesignbyM VDeshpande,PHI,New Delhi.

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C212.1	2	3											3		
	C212.2	2	3											3		
	C212.3	2	3											3		
	C212.4	2	3											3		
	C212.5	2	3											3		
	Avg.	**2**	**3**											**3**		

			L	T	P	Cr.
B.Tech.(IVSem.)		**INDUCTIONANDSYNCHRONOUSMACHINES**				
		CourseCode:R232213	3	0	0	3

Pre-requisites:
PrinciplesofElectromechanicalEnergyConversion,andElectricalCircuitAnalysis.

Course Objectives:

- Characteristics,startingandtestingmethodsofInductionMotor
- TorqueproductionandperformanceofInductionMotor.
- IndeterminingtheperformanceparametersofInductionMotor.
- workingofsynchronousmachines

CourseOutcomes: At theendofthe course, thestudentwill beable to

C213.1	:	Illustrateofacmotorsanddissectperformanceofthreephaseinductionmotors.
C213.2	:	Evaluatetorque-speed characteristicsofinductionmotor.
C213.3	:	Determinethetesting performanceofsingle-phase induction motor.
C213.4	:	Analyzetheperformanceofsynchronous generators.
C213.5	:	Analyzetheperformanceofsynchronous motor.

UNIT–I		10	hrs

Three-phaseinductionmotors:
Construction details of cage and wound rotor machines – production of rotating magnetic field – principle of operation – rotor emf and rotor frequency – rotor current and power factor at standstill andduringrunningconditions–rotorpowerinput,rotorcopperlossandmechanicalpower developedandtheirinterrelationship –equivalent circuit–phasordiagram

UNIT–II		10	hrs

PerformanceofThree-Phaseinductionmotors:
Torque equation – expressions for maximum torque and starting torque – torque slip characteristic– double cage and deep bar rotors – crawling and cogging – speed control of induction motor with V/f control method –no load and blocked rotor tests – circle diagram for predetermination of performance–methodsofstarting–startingcurrentandtorquecalculations–inductiongenerator operation.

UNIT–III		8	hrs

SinglePhaseMotors:
Single phase induction motors – constructional features and –double revolving field theory, Cross field theory - equivalent circuit, starting methods: capacitor start capacitor run, capacitor start induction run, split phase & shaded pole, AC series motor

UNIT–IV		12	hrs

SynchronousGenerator:
Constructional features of non-salient and salient pole type armature windings – distributed and concentrated windings – distribution, pitch and winding factors – E.M.F equation – improvements of waveform and armature reaction – voltage regulation by synchronous impedance method – MMF method and Potier triangle method – phasor diagrams – two reaction analysis of salient pole machinesandphasordiagram-methodsofsynchronization-Sliptest–Paralleloperationof alternators.

UNIT–V		8	hrs

Synchronousmotor:
Synchronous motor principle and theory of operation – Effect of excitation on current and powerfactor–synchronouscondenser-expressionforpowerdeveloped–huntinganditssuppression–methodsofstarting.

TextBooks

1	ElectricalMachinesbyP.S.Bhimbra,Khanna Publishers
2	ElectricMachinerybyA.E.Fitzgerald,Charleskingsley,StephenD.Umans,TMH

ReferenceBooks

1	ElectricalMachinesbyD.P. Kothari,I.J. Nagarth,McGrawHillPublications,4thedition
2	ElectricalMachinesbyR.K.Rajput,Lakshmipublications,5thedition
3	ElectricalMachinery byAbijithChakrabarthiand SudhiptaDebnath, Mc GrawHilleducation 2015
4	ElectricalMachinery FundamentalsbyStephenJ ChapmanMcGrawHilleducation2010

CO-PO/PSOMappingMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C213.1	2	3											3		
C213.2	2	3											3		
C213.3	2	3											3		
C213.4	2	3											3		
C213.5	2	3											3		
Avg.	**2**	**3**											**3**		

			L	T	P	Cr.
B.Tech.(IVSem.)		**CONTROL SYSTEMS**				
		CourseCode:R232214	3	0	0	3

Pre-requisites: BasicEngineering Mathematics

Course Objectives:

- Toobtainthemathematicalmodelsofphysicalsystemsand
- Todeterminethe timeresponse ofsystemsand analysesystem stability.
- Toanalysesystemstabilityusingfrequencyresponse methods.
- Todesigncompensators usingBode diagrams.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C214.1	:	Derivethetransferfunctionofphysicalsystemsanddeterminetheoverall transfer functionusingblockdiagramalgebraandsignalflowgraphs.
C214.2	:	Obtainthetimeresponseoffirstandspecificationsofsecondordersystemsand determineerrorconstants. Analyzethe absolute and relative stability ofLTIsystems using Routh's stability criterion and root locus method.
C214.3	:	AnalyzethestabilityofLTIsystemsusingfrequencyresponse methods.
C214.4	:	DesignLag,Lead,Lag-Leadcompensatorstoimprovesystem Performancefrom Bodediagrams.
C214.5	:	Apply state space analysis concepts to represent physical systems as state models, derivetransferfunctionanddeterminetheresponse.Understandtheconceptsof controllabilityandobservability.

UNIT–I		10	hrs

MathematicalModelingofControlSystems:
Classification of control systems, open loop and closed loop control systems and their differences, Feedback characteristics, transfer function of linear system, differential equations of electrical networks, translational and rotational mechanical systems, transfer function of DC servo motor – ACservomotor–synchro,transmitterandreceiver–blockdiagramalgebra–representationby signalflowgraph–reductionusingMason'sgainformula.

UNIT–II		10	hrs

TimeResponse Analysis
Standardtestsignals–timeresponseoffirstandsecondordersystems–timedomain specifications,steadystateerrorsanderrorconstants,effectsofproportional(P)-proportional integral(PI)-proportionalderivative(PD)proportionalintegralderivative(PID)systems.

StabilityandRootLocus Technique:
Theconceptofstability–Routh'sstabilitycriterion–limitationsofRouth'sstability,Rootlocus concept – construction of root loci (simple problems). Effect of addition of poles and zeros to thetransfer function.

UNIT–III		10	hrs

	FrequencyResponseAnalysis: Introductiontofrequencydomainspecifications–Bodediagrams–transferfunctionfromthe Bodediagram–Polarplots,Nyquiststabilitycriterion–stabilityanalysisfromBodeplots(phase marginandgainmargin).			
	UNIT–IV		8	hrs
	ClassicalControlDesign Techniques: Lag,lead,lag-leadcompensators-physicalrealization-designofcompensatorsusingBodeplots.			
	UNIT–V		8	hrs
	StateSpaceAnalysisofLTI Systems: Concepts of state, state variables and state model, state space representation of transfer function: ControllableCanonicalForm-ObservableCanonicalForm-DiagonalCanonicalForm-diagonalizationusinglineartransformation,solvingthetimeinvariantstateequations,State TransitionMatrixandit'sProperties,conceptsofcontrollabilityandobservability.			
	TextBooks			
	1	ModernControlEngineeringbyKotsuhikoOgata, PrenticeHallofIndia.		
	2	AutomaticcontrolsystemsbyBenjaminC. Kuo,PrenticeHallof India,2ndEdition.		
	ReferenceBooks			
	1	ControlSystemsprinciplesanddesignbyM.Gopal,TataMcGrawHilleducationPvtLtd., 4th Edition		
	2	ControlSystemsbyManikDhaneshN,Cengage publications.		
	3	ControlSystemsEngineeringbyI.J.NagarathandM.Gopal,NewageInternational Publications,5thEdition.		
	4	ControlSystemsEngineeringbyS.Palani,TataMcGrawHillPublications		
	5	ControlSystemsprinciplesanddesignbyM.Gopal,TataMcGrawHilleducationPvtLtd., 4th Edition		
	E-RESOURCES:			
	1	https://archive.nptel.ac.in/courses/107/106/107106081/		
	2	https://archive.nptel.ac.in/courses/108/106/108106098/		
	3	https://nptelvideos.com/video.php?id=1423&c=14		

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C214.1	2	3											3		
	C214.2	2	3											3		
	C214.3	2	3											3		
	C214.4	2	3											3		
	C214.5	2	3											3		
	Avg.	**2**	**3**											**3**		

			L	T	P	Cr.
B.Tech.(IVSem.)		**INDUCTIONANDSYNCHRONOUSMACHINES LABORATORY**				
		CourseCode:R232215L	0	0	3	1.5

Pre-requisites: ElectricalMachines-II

Course Objectives:

- Tocontrol thespeed of threephaseinduction motors.
- Todetermine/predeterminetheperformancethreephaseandsingle-phaseinduction motors.
- Toimprovethe power factorof single-phaseinduction motor.
- Topredeterminetheregulationofthree–phasealternatorbyvariousmethods,findXd/Xq ratio of alternator and asses the performance of three–phase synchronous motor.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C215.1	:	Compilethedata,organizeandanalyzeitfordiscussion andreportthefindingsand observationsfromexperimentallearningactivitiesinthe laboratory.
C215.2	:	Buildholisticdevelopmentandpleasingdispositionbyreviewingandcorrectingthe performancetobecomeindependentand autonomous thinker.
C215.3	:	Drawtheperformancecharacteristicsofthreephase&single-phaseinduction motorsbyconductingsuitable tests.
C215.4	:	Pre-determinetheregulationofthree–phasealternatorbyvarious methods.

LISTOFEXPERIMENTS

Any10ofthefollowingexperimentsaretobe conducted:

1	Braketestonthreephase InductionMotor.
2	Circlediagramofthreephaseinductionmotor.
3	Regulationofathree–phasealternatorbysynchronousimpedance&M.M.F.Methods
4	Regulationof three–phasealternator byPotiertriangle method
5	VandInvertedVcurves ofathree—phasesynchronous motor
6	DeterminationofXd,Xq&Regulationofaofasalientpolesynchronous generator
7	Equivalentcircuitofsingle-phaseinduction motor
8	Speedcontrol of inductionmotor byV/f method.
9	Determinationofefficiencyofthree-phasealternatorbyloadingwiththree phase induction motor.

	10	Powerfactorimprovementofsingle-phaseinductionmotorbyusingcapacitorsandload test onsingle-phaseinduction motor.
	11	Paralleloperationofthree-phase alternatorunderno-loadandloadconditions.
	12	Determinationofefficiencyofasingle-phaseACseriesMotorbyconductingBrake test
	13	Loadtestonsinglephaseinduction motor.
	E-RESOURCES:	
	1	https://em-coep.vlabs.ac.in/List%20of%20experiments.html

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C215.1									3	2					3
	C215.2								2	3	2					3
	C215.3									3						3
	C215.4	3			3					3						3
	C215.5	3			3					3						3
	Avg.	**3**			**3**				**2**	**3**	**2**					**3**

			L	T	P	Cr.
B.Tech.(IVSem.)		**CONTROLSYSTEMS LABORATORY**				
		CourseCode:R232216L	0	0	3	1.5

Pre-requisites: Control Systems

Course Objectives:

- To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors and Synchros.
- Tounderstand timeand frequency responsesof controlsystemwithand withoutcontrollers and compensators.
- ToknowthedifferentlogicgatesandBooleanexpressionsusingPLC.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C216.1	:	Compilethedata,organizeandanalyzeitfordiscussionandreportthefindingsand observationsfromexperimentallearningactivitiesinthe laboratory.
C216.2	:	Buildholisticdevelopmentandpleasingdispositionbyreviewingandcorrectingthe performancetobecomeindependentand autonomous thinker.
C216.3	:	Demonstrate the performance of basic control system components such as magnetic amplifiers,D.C.servomotors,A.C.Servomotors,steppermotorandpotentiometer andexaminethetruthtableoflogicgatesusingPLC.
C216.4	:	Analyzetimeandfrequencyresponsesofcontrolsystemwithandwithout controller'sdesignofPIDcontrollerandcompensator.

LISTOF EXPERIMENTS

Any10ofthefollowingexperimentsaretobe conducted:

1	AnalysisofSecond order system intime domain.
2	Characteristicsof Synchros
3	EffectofP,PD,PI,PIDControlleronasecondorder systems
4	DesignofLagandleadcompensation –Magnitudeandphaseplot
5	Transferfunctionof DCmotor
6	BodePlot,Rootlocus,NyquistPlotsforthetransferfunctionsofsystemsupto5thorder using MATLAB.
7	Kalman'stestofControllabilityandObservabilityTestusingMATLAB.
8	TemperaturecontrollerusingPID
9	Characteristicsofmagneticamplifiers
10	CharacteristicsofACservomotor

	11	CharacteristicsofDCservomotor
	12	Studyandverifythe truthtableof logicgates andsimple Booleanexpressionsusing PLC

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C216.1									3	2					3
	C216.2								2	3	2					3
	C216.3									3						3
	C216.4				3					3						3
	C216.5				3					3						3
	Avg.				**3**				**2**	**3**	**2**					**3**

			L	T	P	Cr.
B.Tech.(IVSem.)		**DATASTRUCTURESLAB**				
		CourseCode:R232208	0	1	2	2

Pre-requisites: BasicEngineering Science

Course Objectives:

- Thecourseaimstostrengthentheabilityofthestudentstoidentifyandapplythesuitabledata structure for the given real-world problem.
- Itenablesthemtogainknowledgeinpracticalapplicationsofdatastructures.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C217.1	:	Compilethedata,organizeandanalyzeitfordiscussionandreportthefindingsand observationsfromexperimentallearningactivitiesinthe laboratory.
C217.2	:	Buildholisticdevelopmentandpleasingdispositionbyreviewingandcorrectingthe performancetobecomeindependentand autonomous thinker.
C217.3	:	DevelopCprogramsusingstackstohandlerecursivealgorithms,manageprogram states,andsolverelatedproblems
C217.4	:	Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs; distinguish between deques, priority queues, and hashing, and applythemappropriatelytosolvedatamanagementchallengesanddesignhash-basedsolutionsforspecificproblems.

ListofExperiments

1	**Exercise1**:**ArrayManipulation** i) Writeaprogramto reversean array. ii) CProgramstoimplementtheSearchingTechniques–Linear&Binary Search ii)CProgramstoimplementSortingTechniques –Bubble,Selectionand InsertionSort
2	**Exercise2:LinkedlistImplementation** i) Implement asinglylinked listandperforminsertionanddeletionoperations. ii) Developaprogramtoreversealinkedlistiterativelyand recursively. iii)Solveproblemsinvolvinglinkedlisttraversalandmanipulation.
3	**Exercise3:LinkedListApplications** i) Createaprogramtodetectandremoveduplicates fromalinked list. ii) Implementalinkedlisttorepresentpolynomialsandperformaddition.
	iii)Implement adouble-endedqueue(deque)withessentialoperations.

	4	**Exercise4:DoubleLinkedListImplementation** i) Implementadoublylinkedlistandperformvariousoperationstounderstandits properties and applications. ii) Implementacircularlinkedlistandperform insertion,deletion,andtraversal.
	5	**Exercise5:StackOperations** i) Implementastackusing arraysandlinkedlists. ii) Writeaprogramto evaluateapostfixexpression usingastack. iii) Implementaprogram tocheckforbalancedparenthesesusinga stack.
	6	**Exercise6:Queue Operations** i) Implement aqueueusing arrays andlinkedlists. ii) Developaprogramtosimulateasimpleprinterqueuesystem. iii) Solveproblemsinvolvingcircularqueues.
	7	**Exercise7:StackandQueue Applications** i) Useastack toevaluateaninfixexpression andconvert itto postfix. ii) Createaprogramto determinewhether agivenstringisapalindromeornot. iii) Implementastackor queuetoperformcomparisonandcheckfor symmetry.
	8	**Exercise8:BinarySearchTree** i) ImplementingaBSTusingLinkedList. ii) TraversingofBST.
	9	**Exercise9: Hashing** i) Implement ahashtable withcollisionresolution techniques. ii) Writeaprogramto implementa simplecacheusing hashing.

TextBooks

1	DataStructuresandalgorithmanalysisinC,MarkAllenWeiss,Pearson,2ndEdition.
2	FundamentalsofdatastructuresinC,EllisHorowitz,SartajSahni,SusanAndersonFreed, SiliconPress,2008

CO-PO/PSOMappingMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C217.1									3	2					
C217.2								2	3	2					
C217.3	2	2		3					3						
C217.4	2	2		3					3						
Avg.	**2**	**2**		**3**				**2**	**3**	**2**					

			L	T	P	Cr.
B.Tech.(IV_Sem.)		**DESIGNTHINKINGANDINNOVATION**				
		CourseCode:R232209	1	0	2	2

Pre-requisites: BasicKnowledgeofDesignthinkingandInnovation

Course Objectives:

- Toexplainthebasicsofdesignanddesignthinking
- Tobringawarenessondesignthinkingprocessandnewproductdevelopment
- Tofamiliarizethe roleof innovationand creativity
- Totrainhowto identifytheneedsof societyandconvertinto product
- Tointroducehowdesignthinkingapplied inbusiness&strategicinnovation tobuild start-ups

CourseOutcomes: At theendofthe course, thestudentwill beable to

C218.1	:	UnderstandtheimportanceofDesign Thinking
C218.2	:	UnderstandandapplytheprocessofDesignThinkingindevelopingaproduct
C218.3	:	Learntheimportanceof innovationandcreativity indesigningaproduct
C218.4	:	Acquireandapplytheknowledgeofprinciplesofproductdevelopmentindesigninga newproduct.
C218.5	:	Applytheknowledgeofdesignthinkinginanalyzingbusinessideasandstrategic innovationtodevelopStart-ups

UNIT–I — 10 hrs

IntroductiontoelementsandprinciplesofDesign,basicsofdesign-dot,line,shape,formas fundamentaldesigncomponents.Principlesofdesign.Introductiontodesignthinking,historyof DesignThinking,NewmaterialsinIndustry.

UNIT–II — 13 hrs

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer,journey map, brainstorming, product development

Activity:Everystudentpresentstheirideainthreeminutes,everystudentcanpresentdesignprocess in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT–III — 13 hrs

Artofinnovation,Differencebetweeninnovationandcreativity,roleofcreativityandinnovationin organizations.CreativitytoInnovation.Teamsforinnovation,Measuringtheimpactandvalueof creativity.

Activity:Debateoninnovationandcreativity,Flowandplanningfromideatoinnovation,Debateon value-basedinnovation.

UNIT–IV — 13 hrs

	Problemformation,introductiontoproductdesign,Productstrategies,Productvalue,Product planning, product specifications. Innovation towards product design Case studies. Activity:Importanceof modeling,howtosetspecifications,Explainingtheirownproductdesign.			
	UNIT–V		15	hrs
	Design Thinking applied in Business & Strategic Innovation, Design Thinking principles thatredefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testingprototypes. Activity:Howtomarketourownproduct,about maintenance,Reliability andplanforstartup.			
	TextBooks			
	1	TimBrown,Changebydesign,1/e,HarperBollins, 2009.		
	2	IdrisMootee,DesignThinkingforStrategicInnovation,1/e,AdamsMedia, 2014.		
	ReferenceBooks			
	1	DavidLee,DesignThinkingintheClassroom,Ulyssespress,2018.		
	2	ShrrutinNShetty,DesigntheFuture,1/e, NortonPress,2018.		
	3	Williamlidwell,Kritinaholden,&Jillbutter,Universalprinciplesofdesign,2/e, RockportPublishers,2010.		
	4	Chesbrough.H,Theeraofopeninnovation,2003.		

CO-PO/PSOMappingMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C218.1						2	3								
C218.2						2		2			2				
C218.3							3					2			
C218.4						2		2			2				
C218.5							3		2			2			
Avg.						**2**	**3**	**2**	**2**		**2**	**2**			

			L	T	P	Cr.
B.Tech.(VSem.)		**POWERELECTRONICS**				
		CourseCode: R2331XXX	3	0	0	3

Pre-requisites: ElectricalCircuitAnalysis,SemiconductorPhysics,ControlSystems

Course Objectives:

- Toknowthecharacteristicsofvariouspowersemiconductor devices.
- Tolearntheoperationofsingle-phasecontrolledconvertersandperformharmonic analysis of input current.
- Tolearntheoperationof threephase-controlled convertersandAC/ACconverters.
- Tolearntheoperationof differenttypesofDC-DCconverters andcontroltechniques.
- Tolearntheoperationof PWMinvertersforvoltagecontrolandharmonicmitigation.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C301.1	:	IllustratethestaticanddynamiccharacteristicsofSCR,Power-MOSFETand Power- IGBT.
C301.2	:	Analyzetheoperationofphase-controlledrectifiers.
C301.3	:	Analyzetheoperationofthree-phasefull–waveconverters,ACVoltageControllers andCycloconverters.
C301.4	:	Examinetheoperationand designofdifferent typesofDC-DC converters.
C301.5	:	AnalyzetheoperationofsquarewaveinvertersandPWMinvertersforvoltage control.

UNIT–I	10	hrs

PowerSemi-ConductorDevices:
Silicon controlled rectifier (SCR) – Two transistor analogy - Static and Dynamic characteristics – Turn on and Turn off Methods - Triggering Methods (R, RC and UJT) – Snubber circuit design. StaticandDynamicCharacteristicsofPowerMOSFETandPowerIGBT-Numericalproblems.

UNIT–II	10	hrs

Single-phaseAC-DCConverters:
Single-phasehalf-wavecontrolledrectifiers-RandRLloadswithandwithoutfreewheelingdiode - Single-phasefullycontrolledmid-pointandbridgeconverterwithRload,RLloadandRLEload - ContinuousandDiscontinuousconduction-EffectofsourceinductanceinSingle-phasefully controlledbridgerectifier–Expressionforoutputvoltages–Single-phaseSemi-ConverterwithR load- RL load and RLE load – Continuous and Discontinuous conduction - Dual converter and its mode of operation - Numerical Problems.

UNIT–III	10	hrs

Three-phaseAC-DCConverters&AC–AC Converters:

Three-phasehalf-waveRectifierwithRandRLload -Three-phasefullycontrolledrectifierwithR and RL load - Three-phase semi converter with R and RL load - Expression for Output Voltage - Numerical Problems.

Single-phaseAC-ACpowercontrolbyphasecontrolwithRandRLloads-ExpressionforRMS outputvoltage–Single-phasestepdownandstepupCycloconverter-NumericalProblems.

UNIT–IV		10	hrs

DC–DCConverters:

Operation of Basic Chopper – Analysis of Buck, Boost and Buck-Boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) - Output voltage equationsusingvolt-secbalanceinCCM&DCM–Expressionsforoutputvoltageripple and inductorcurrentripple–controltechniques– IntroductiontoPWMcontrol-NumericalProblems.

UNIT–V		10	hrs

DC–ACConverters:

Introduction - Single-phase half-bridge and full-bridge inverters with R and RL loads – Phase Displacement Control – PWM with bipolar voltage switching, PWM with unipolar voltage switching - Three-phase square wave inverters - 120^0 conduction and 180^0 conduction modes of operation-SinusoidalPulseWidthModulation-CurrentSourceInverter(CSI)-Numerical Problems.

TextBooks

1	PowerElectronics:Converters,ApplicationsandDesignbyNedMohan,ToreMUndeland, WilliamP Robbins,JohnWiley&Sons,2002.
2	PowerElectronics:Circuits,DevicesandApplications–byM.H.Rashid,PrenticeHallof India,2nd edition,2017.

ReferenceBooks

1	ElementsofPowerElectronics–PhilipT.Krein.OxfordUniversityPress;Secondedition, 2014.
2	PowerElectronics–byP.S.Bhimbra,KhannaPublishers.
3	ThyristorisedPowerControllers–byG.K.Dubey,S.R.Doradla,A.JoshiandR.M.K. Sinha,NewAge International(P)LimitedPublishers,1996.

E-RESOURCES:

1	https://archive.nptel.ac.in/courses/108/101/108101126

CO-PO/PSOMappingMatrix

	CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
	C301.1	2	3											3		
	C301.2	2	3											3		
	C301.3	2	3											3		
	C301.4	2	3											3		
	C301.5	2	3											3		
	Avg.	**2**	**3**											**3**		

			L	T	P	Cr
B.Tech.(VSem.)		**DIGITAL CIRCUITS**				
		CourseCode: R2331XXXX	3	0	0	3

Pre-requisites: Knowledgeofelectroniccomponentsandsemiconductordevices,number systems,binaryarithmetic,Booleanorswitchingalgebraandlogic gates.

Course Objectives:

- ToknowthesimplificationmethodsofBoolean functions
- Tounderstandtherealizationofarithmetic, dataroutingandmemorylogiccircuits.
- Toknowtheoperationanddesignofvariouscountersandregisters.
- Tounderstandtheanalysisanddesignofsynchronoussequentialcircuits.
- Tounderstandthebasicconceptsofdigitalintegrated circuits.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C302.1	:	UsetheconceptsofBooleanalgebra,K-map,tabulationmethodinminimizationof switchingfunctionsandabletodesignthearithmeticcombinationalcircuits.
C302.2	:	Realizedifferenttypesof dataroutingcombinationalcircuitsandPLDs.
C302.3	:	Applyknowledgeofflip-flopsindesigningofregistersandcounters.
C302.4	:	Analyzesynchronoussequentialcircuitsandapplydifferentmethodsforthedesign ofsynchronoussequentialcircuits.
C302.5	:	Understandthelogicfamiliesintheformofdigitalintegrated circuits.

UNIT–I 10 hrs

Combinationallogiccircuits –I:

Definition of combinational logic, canonical forms, Generation of switching equations from truth tables, simplification of logic functions using Boolean theorems, NAND and NOR implementations, Karnaugh maps – 3,4,5 variables, Incompletely specified functions (Don‘t care terms), Simplifying Max term equations, Quine-McCluskey minimization technique, General approachtocombinationallogicdesign,Lookaheadcarryadder,Cascadingfulladders,4-bit adder-subtractorcircuit, BCDaddercircuit,Excess3adder,Binary comparators.

UNIT–II 10 hrs

Combinationallogiccircuits –II:

Decoders,BCDdecoders,7segmentdecoder,higherorderdecoder,multiplexer,higherorder multiplexing,de-multiplexers, higherorderde-multiplexing, realization ofBoolean functions using decoders,multiplexers,encoders,priorityencoder,ReadonlyandRead/WriteMemories, ProgrammableROM,PAL,PLA-Basicsstructures,programmingtablesofPROM,PAL,PLA, realization of Boolean functions.

UNIT–III 10 hrs

Sequentiallogiccircuits:

Timing considerations of flip-flops, master-slave flip-flop, edge triggered flip-flops, characteristic equations, flip-flops with reset and clear terminals, excitation tables, conversion from one flip-flop to another flip-flop, design of asynchronous and synchronous counters, design of modulus-N counters,Johnsoncounter, ring counter,designofregisters- buffer register,controlbuffer register, shiftregister,bi-directionalshiftregister,universalshiftregister.

UNIT–IV		14	hrs

SequentialCircuit Design:

MealyandMooremodels,Statemachinenotation,SynchronousSequentialcircuitanalysis, Constructionofstatediagrams,Analysisofclockedsequentialcircuits,realizationofsequence detectorcircuit,statereductionandassignments,designprocedure.

UNIT–V		10	hrs

Digitalintegrated circuits:

Logic levels, propagation delay time, power dissipation, fan-out and fan-in, noise margin, logic families – RTL and DTL Circuits, TTL, Emitter-Coupled Logic, Metal-Oxide Semiconductor, Complementary MOS, CMOS Transmission Gate Circuits.

TextBooks

1	SwitchingandfiniteautomatatheoryZvi.Kohavi,3rd edition,CambridgeUniversityPress, 2010.
2	M.MorrisMano andM.D. Ciletti,"DigitalDesign", 4thEdition,Pearson Education,2006.

ReferenceBooks

1	Fundamentalsof LogicDesignby CharlesH.Roth Jr, Jaico Publishers,5thEdition, 1992.
2	SwitchingTheoryandLogicDesignbyA.AnandKumar,PrenticeHallIndiaPvt.,Limited, ThirdEdition, 2016.

E-RESOURCES:

1	https://nptel.ac.in/courses/117106086.
2	https://nptel.ac.in/courses/108105113

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C302.1	3	2													
	C302.2	3	2													
	C302.3	3	2													
	C302.4	3	2													
	C302.5	3	2													
	Avg.	**3**	**2**													

			L	T	P	Cr.
B.Tech.(VSem.)		**POWERSYSTEMS-II**				
		CourseCode: R2331XXXX	3	0	0	3

Pre-requisites: PowerSystems-I, ElectricalcircuitAnalysis.

Course Objectives:

- TounderstandtheconceptsofGMD&GMRtocomputeinductance&capacitanceof transmission lines.
- Todistinguishthemodelsofshort,mediumandlonglengthtransmissionlinesand analyzes their performance.
- Tolearntheeffectoftravellingwavesontransmissionlineswithdifferentterminal conditions.
- Tolearntheconceptsofcorona,thefactorseffectingcoronaandeffectsoftransmission lines.
- Todesignthesagandtensionoftransmissionlinesaswellastolearntheperformanceof lineinsulators.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C303.1	:	Calculateparametersoftransmissionlinesfordifferentcircuitconfigurations.
C303.2	:	Analyzetheperformance ofshort,mediumandlongtransmission lines.
C303.3	:	Analyzethe effect oftravellingwavesontransmission lines.
C303.4	:	Estimatetheeffectsof coronaintransmission lines.
C303.5	:	Calculatesagand tensionoftransmission linesanddesign thelineinsulators.

UNIT–I		10	hrs

TransmissionLineParametersCalculations:

Conductor materials – Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for Single-phase and Three-phase single and double circuit lines– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors, Skin and Proximity effects.

Calculationofcapacitancefor2wireand3wiresystems–Effectofgroundoncapacitance–

Capacitance calculations for symmetrical and asymmetrical single and Three-phase single and double circuit lines without and with Bundled conductors.

UNIT–II		10	hrs

PerformanceAnalysisofTransmissionLines:

Classification of Transmission Lines – Short, medium, long lines and their model representation – Nominal-T, Nominal-π and A, B, C, D Constants for symmetrical Networks.

RigorousSolutionforlonglineequations–RepresentationofLonglines–EquivalentTand

Equivalent π network models - Surge Impedance and Surge Impedance Loading of Long Lines - Regulation and efficiency for all types of lines – Ferranti effect.

UNIT–III		10	hrs

PowerSystem Transients:
TypesofSystemTransients–PropagationofSurges–Attenuation–Distortion–Reflectionand Refraction Coefficients.
Terminationoflineswithdifferenttypesofconditions:OpenCircuitedLine–ShortCircuitedLine,
Line terminated through a resistance and line connected to a cable. Reflection and Refraction at a T-Junction.

UNIT–IV		14	hrs

Corona&Effectsoftransmissionlines:
Description of the phenomenon – Types of Corona - critical voltages and power loss – Advantages and Disadvantages of Corona - Factors affecting corona - Radio Interference.

UNIT–V		10	hrs

SagandTensionCalculationsandOverheadLineInsulators:
SagandTensioncalculationswithequalandunequalheightsoftowers–EffectofWindandIce weight on conductor – Stringing chart and sag template and its applications.
TypesofInsulators–Voltagedistributioninsuspensioninsulators–Calculationofstringefficiency andMethodsforStringefficiencyimprovement–CapacitancegradingandStaticShielding.

TextBooks

1	ElectricalPowerSystems –byC.L.Wadhwa,NewAge International(P) Limited,1998.
2	PowerSystemEngineeringbyI.J.NagarathandD.P.Kothari,TataMcGrawHill,3rd Edition,2019.

ReferenceBooks

1	PowersystemAnalysis–byJohnJGraingerWilliamDStevenson,TMCCompanies,4th edition
2	PowerSystemAnalysisandDesign byB. R.Gupta,Wheeler Publishing.
3	ATextBookonPowerSystemEngineeringbyM.L.Soni,P.V.Gupta,U.S.BhatnagarA. Chakrabarthy,Dhanpat RaiCoPvt.Ltd.2016.
4	ElectricalPowerSystemsbyP.S.R.Murthy,B.S.Publications,2017.

E-RESOURCES:

1	https://archive.nptel.ac.in/courses/108/105/108105104
2	https://archive.nptel.ac.in/courses/108/102/108102047

CO-PO/PSOMappingMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

	C303.1	2	3										3		
	C303.2	2	3										3		
	C303.3	2	3										3		
	C303.4	2	3										3		
	C303.5	2	3										3		
	Avg.	**2**	**3**										**3**		

		PROFESSIONALELECTIVE-I	**L**	**T**	**P**	**Cr.**
B.Tech.(VSem.)		**RENEWABLEANDDISTRIBUTEDENERGY TECHNOLOGIES**				
		CourseCode: R23PEXXXX	3	0	0	3

Pre-requisites: Toimpartknowledgeonvariousrenewablesourcessuchassolar,windandhydel perspectives.Toknowtherequirementsofvarioushybridsourcesasdistributedenergytechnologies.

Course Objectives:

- Tounderstandthebasicconceptsonwindenergy systems.
- Tounderstandthevariousrelationsbetweenspeed,powerandenergyinthe windsystems.
- Toanalyzethesolarenergysystems,variouscomponentsofsolarthermalsystems, applications in the relevant fields and design of PV systems.
- To design the Hydel system components and to get an idea on different other sources like tidal, geothermal and gas-based units.
- Tounderstandtheconceptsofhybridrenewablesystems.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C304A.1	:	Illustratebasicconceptsofrenewableanddistributedsourcesofwind energy.
C304A.2	:	Demonstratethecomponentsofwindenergyconversion systems.
C304A.3	:	ModelPVsystemsandanalyseMPPTTechniques.
C304A.4	:	Illustratetheconceptof EnergyProductionfromHydro -Tidaland Geothermal.
C304A.5	:	Explaintheaspectsofhybridrenewableenergysystems.

UNIT–I		10	hrs

Introductionandwindenergysystems:
Brief idea on renewable and distributed sources - their usefulness and advantages; Wind Energy Systems: Estimates of wind energy potential - wind maps - Instrumentation for wind velocity measurements-Aerodynamicandmechanicalaspectsofwindmachinedesign-Conversionto electricalenergy -Aspectsoflocationofwind farms.

UNIT–II		10	hrs

Windpowerandenergy:
Windspeedandenergy-Speedandpowerrelations-Powerextractionfromwind-Tipspeedratio (TSR)-Functionalstructureofwindenergyconversionsystems-Pitchandspeedcontrol-Power speed-TSRcharacteristics-Fixedspeedandvariablespeedwindturbinecontrol-Power optimization - Electrical generators - Self-Excited and Doubly-Fed Induction Generators operation and control.

UNIT–III		10	hrs

SolarPVsystems:

Solar PV Systems: Present and new technological developments in photovoltaic - estimation of solarirradiance - components ofsolar energy systems -solar-thermal system applications to power generation - heating - Types of PV systems - Modelling of PV cell - current-voltage and power-voltage characteristics - Effects of temperature - Solar array simulator - Sun tracking - Peak power operations-PVsystem-MPPTtechniques-Effectsofpartialshadingonthecharacteristiccurves andassociatedMPPTtechniques-Solarparkdesignoutline.

UNIT–IV		14	hrs

Smallhydroandother sources:

HydelPower:Waterpowerestimates-useofhydrographs-hydraulicturbine-characteristicsand part load performance - design of wheels - draft tubes and penstocks - plant layouts; Brief idea of other sources viz. - tidal - geothermal - gas-based - etc.

UNIT–V		10	hrs

Hybridrenewablesystems:

Requirements of hybrid/combined use of different renewable and distributed sources - Need of energy storage; Control of frequency and voltage of distributed generation in Stand-alone andGrid-connectedmode -useofenergy storageandpower electronicsinterfacesfortheconnection to gridandloads-Designandoptimization ofsizeofrenewablesourcesandstorages.

TextBooks

1	MathJ.Bollen-FainanHassan 'Integrationof DistributedGenerationinthe Power System'-IEEEPress- 2011.

ReferenceBooks

1	Studies'Craig AndersonandRudolfI. Howard'Windand HydropowerIntegration:Concepts -ConsiderationsandCase-NovaPublisher-2012.
2	AmandaE.NiemiandCoryM.Fincher'HydropowerfromSmallandLow-HeadHydro Technologies'- NovaPublisher-2011.
3.	D.YogiGoswami-FrankKreithandJanF.Kreider'PrinciplesofSolarEngineering'-Taylor&Francis 2000.
4.	MathJ.Bollen-FainanHassan 'Integrationof DistributedGenerationinthe Power System'-IEEEPress- 2011.
5.	S.HeierandR.Waddington'Grid Intergration ofWindEnergy ConversionSystems'–Wiley -2006.

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C304A.1	2	3											**3**		
	C304A.2	2	3											**3**		
	C304A.3	2	3											**3**		
	C304A.4	2	3											**3**		
	C304A.5	2	3											**3**		
	Avg.	**2**	**3**											**3**		

		PROFESSIONALELECTIVE-I	**L**	**T**	**P**	**Cr.**
B.Tech.(VSem.)		**COMPUTERARCHITECTUREANDORGANIZATION**				
		CourseCode: R23PEXXXX	3	0	0	3

Pre-requisites: Basicknowledgeindigitalelectronics,fundamentalsofcomputers.

Course Objectives:

- Toexplain the basic workingof adigital computer.
- Tounderstandtheregistertransferlanguageand micro-operators.
- Tolearnvariousaddressingmodessupportedbythe processors.
- Tobefamiliarwithperipheralinterfacingwithprocessors.
- Tounderstandmemoryhierarchyincomputers.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C304B.1	:	Demonstratetheinstructioncycleofa computer.
C304B.2	:	Understandvariousmicro-operationsandregistertransferlanguage.
C304B.3	:	Describeparallelprocessingandpipe-lining.
C304B.4	:	Interfacedifferentperipheralswith processors.
C304B.5	:	Knowtheadvantagesofcacheandvirtualmemory.

UNIT–I	10	hrs

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions,TimingandControl,InstructionCycle,Memory-ReferenceInstructions,Input-OutputandInterrupt,CompleteComputerDescription,DesignofBasicComputer,Designof AccumulatorLogic.

UNIT–II	10	hrs

Register Transfer and Micro operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, ArithmeticLogicShiftUnit.MicroprogrammedControl:ControlMemory,AddressSequencing, MicroprogramExample, Designof ControlUnit.

UNIT–III	10	hrs

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, ReducedInstructionSetComputer(RISC)PipelineandVectorProcessing:ParallelProcessing, Pipelining,ArithmeticPipeline,InstructionPipeline,RISKPipeline,VectorProcessing,Array Processors.

UNIT–IV	14	hrs

	Input/outputOrganization:PeripheralDevices,I/Ointerface,Asynchronousdatatransfer,Modes oftransfer,priorityInterrupt,Directmemoryaccess,Input-OutputProcessor(IOP),Serial Communication.			
	UNIT–V		10	hrs
	MemoryOrganization:MemoryHierarchy,Mainmemory,Auxiliarymemory,AssociateMemory, CacheMemory, andVirtualmemory,MemoryManagementHardware.			
	TextBooks			
	1	ComputerSystemArchitecture,M.MorrisMano,PrenticeHallofIndiaPvt.Ltd.,3rdEdition, Sept.2008.		
	ReferenceBooks			
	1	ComputerArchitectureandOrganization,WilliamStallings,PHIPvt.Ltd.,EasternEconomy Edition,SixthEdition, 2003.		
	2	ComputerOrganizationandArchitecture,LindaNull,JuliaLobur,NarosaPublicationsISBN 81-7319-609-5		
	3	ComputerSystemOrganizationbyJohn.P.Hayes.		

CO-PO/PSOMappingMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C304B.1	2	3											**3**		
C304B.2	2	3											**3**		
C304B.3	2	3											**3**		
C304B.4	2	3											**3**		
C304B.5	2	3											**3**		
Avg.	**2**	**3**											**3**		

		PROFESSIONALELECTIVE-I	**L**	**T**	**P**	**Cr.**
B.Tech.(VSem.)		**COMMUNICATIONSYSTEMS**				
		CourseCode: R23PEXXXX	3	0	0	3

Pre-requisites: Basicknowledgeindigitalelectronics.

Course Objectives:

Analyzetheperformance ofanalogmodulationschemesintimeandfrequency domains.

- Analyzetheperformance ofanglemodulatedsignals.
- Characterizeanalogsignalsintimedomainasrandomprocessesandnoise
- Characterizetheinfluenceof channelonanalogmodulated signals
- DetermineTheperformanceofanalogcommunicationsystemsintermsofSNR
- Analyzepulseamplitudemodulation,pulsepositionmodulation,pulsecodemodulation and TDM systems.

CourseOutcomes: At theendofthe course, thestudentwill beable to

C304C.1	:	Explainthefundamentalconceptsofanalogand digitalcommunicationsystems.
C304C.2	:	Analyzeamplitude,frequency,andphasemodulationtechniques.
C304C.3	:	Applysamplingtheoremandpulsemodulationtechniquesincommunication.
C304C.4	:	Evaluatetheperformanceofcommunicationsystemsundertheinfluence of noise.
C304C.5	:	Designsimpleanalogand digitalcommunicationsystemsforpracticalapplications.

UNIT–I		10	hrs

Basictoolsforcommunication,FourierSeries/Transform,Properties,Autocorrelation,Energy SpectralDensity,ParsevalsRelation,AmplitudeModulation(AM), Spectrumof AM,Envelope Detection, Power Efficiency, Modulation Index.

UNIT–II		10	hrs

DoubleSidebandSuppressedCarrier(DSB-SC)Modulation,Demodulation,CostasReceiver, SingleSidebandModulation(SSB),HilbertTransform,ComplexPre-envelope/Envelope, DemodulationofSSB,VestigialSidebandModulation(VSB)

UNIT–III		10	hrs

AngleModulation,FrequencyModulation(FM),PhaseModulation(PM),ModulationIndex, Instantaneous Frequency, Spectrum of FM Signals, Carsons Rule for FM Bandwidth, Narrowband FM Generation, Wideband FM Generation via Indirect Method, FM Demodulation

UNIT–IV		14	hrs

	Introduction to Sampling, Spectrum of Sampled Signal, Aliasing, Nyquist Criterion, Signal Reconstruction from Sampled Signal, Pulse Amplitude Modulation**,** Quantization, Uniform Quantizers–MidriseandMidtread,Quantizationnoise,NonuniformQuantizers,Delta Modulation,DifferentialPulseCodeModulation(DPCM)			
	UNIT–V		10	hrs
	BasicsofProbability,ConditionalProbability,MAPPrinciple,RandomVariables,Probability DensityFunctions,ApplicationsinWirelessChannels,BasicsofRandomProcesses,Gaussian RandomProcess,Noise.			
	TextBooks			
	1	SimonHaykin,CommunicationsSystems,4thEdition.JohnWileyandSons,Inc		
	2	Fundamentalsof WirelessCommunicationbyDavidTse		

CO-PO/PSOMappingMatrix

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	C304C.1	2	3											3		
	C304C.2	2	3											3		
	C304C.3	2	3											3		