SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.
(AUTONOMOUS)
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
(NBA Accredited)

B. Tech R23 - COURSE STRUCTURE AND SYLLABI

SEMESTER I (FIRST YEAR)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23HSM111	Communicative English	2	0	0	2	30	70	100
2	23BSC114	Linear Algebra and Calculus	2	1	0	3	30	70	100
3	23ESC112	Basic Electrical and Electronics Engineering	2	1	0	3	30	70	100
4	23ESC113	Engineering Graphics	1	0	4	3	30	70	100
5	23ESC114	Introduction to Programming	2	1	0	3	30	70	100
6	23HSM112	Communicative English Lab	0	0	2	1	30	70	100
7	23ESC115	Computer Programming Lab	0	0	3	1.5	30	70	100
8	23ESC116	Electrical and Electronics Engineering Workshop	0	0	3	1.5	30	70	100
9	23ESC118	IT Workshop	0	0	2	1	30	70	100
10	23HSM114	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5	-	-	100
Contact Hours per week			9	3	1	-	-	-	-
Total Hours per week			**27**			-	-	-	-
Total credits						**19.5**	-	-	-
Total Marks							**270**	**63**	**1000**

SEMESTER II (FIRST YEAR)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23BSC121	Differential Equations and Vector Calculus	2	1	0	3	30	70	100
2	23BSC111	Applied Chemistry	3	0	0	3	30	70	100
3	23BSC113	Engineering Physics	3	0	0	3	30	70	100
4	23ESC114	Basic Civil and Mechanical	3	0	0	3	30	70	100
5	23EEE121	Electrical Circuit Analysis	2	1	0	3	30	70	100
6	23BSC115	Applied Chemistry Lab	0	0	2	1	30	70	100
7	23BSC117	Engineering Physics Lab	0	0	2	1	30	70	100
8	23ESC117	Engineering Workshop	0	0	3	1.5	30	70	100
9	23EEE122	Electrical Circuits Lab	0	0	3	1.5	30	70	100
10	23HSM113	Health and wellness, Yoga and	0	0	1	0.5	-	-	100
Contact Hours per week			**13**	**2**	**1**	-	-	-	-
Total Hours per week			**26**			-	-	-	-
Total credits						**20.5**	-	-	-
Total Marks							**270**	**630**	**1000**

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B. Tech R23 - COURSE STRUCTURE AND SYLLABI

SEMESTER III (SECOND YEAR):

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23BSC231	Complex Variables & Numerical Methods	3	0	0	3	30	70	100
2	23ESC231	Analog Circuits	2	1	0	3	30	70	100
3	23EEE231	DC Machines and Transformers	3	0	0	3	30	70	100
4	23EEE232	Electromagnetic Field Theory	3	0	0	3	30	70	100
5	23EEE233	Network Theory	3	0	0	3	30	70	100
6	23EEE234	DC Machines and Transformers Lab	0	0	3	1.5	30	70	100
7	23EEE235	Network Theory and Simulation Lab	0	0	3	1.5	30	70	100
8	23CSE235	Python Programming	0	1	2	2	30	70	100
9	23MAC231	Environmental Science	2	0	0	-	30	70	100
Contact Hours per week			**16**	**2**	**8**	**-**	-	-	-
Total Hours per week			**26**			-	-	-	-
Total credits						**20**	-	-	-
Total Marks							**240**	**56**	**900**

SEMESTER IV (SECOND YEAR):

S. No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23HSM231 23HSM232 23HSM233	• Business Environment • Managerial Economics & Financial Analysis • Organizational Behavior	2	0	0	2	30	70	100
2	23HSM234	Universal Human Values-Understanding Harmony and Ethical Human Conduct	2	1	0	3	30	70	100
3	23EEE241	Control Systems	2	1	0	3	30	70	100
4	23EEE242	Induction and Synchronous Machines	2	1	0	3	30	70	100
5	23EEE243	Power Systems-I	2	1	0	3	30	70	100
6	23EEE244	Control Systems Lab	0	0	3	1.5	30	70	100
7	23EEE245	Induction and Synchronous Machines Lab	0	0	3	1.5	30	70	100
8	23CSE244	Data Structures and Algorithm	0	1	2	2	30	70	100
9	23ESC241	Design Thinking & Innovation	1	0	2	2	30	70	100
Contact Hours per week			**11**	**5**	**10**	-	-	-	-
Total Hours per week			**26**			-	-	-	-
Total credits						**21**	-	-	-
Total Marks							**270**	**630**	**900**
Mandatory Community Service Project of 08 weeks duration during summer vacation									

23EEE231	COMPLEX VARIABLES AND NUMERICAL METHODS	L	T	P	C
		2	1	-	3

PRE-REQUISITES: Algebra, Calculus, Differential equations, Real Analysis

COURSE EDUCATIONAL OBJECTIVES:

1. To analyze the functions of complex variable with a review of elementary complex Functions and to learn continuity, differentiability and analyticity of a complex function
2. To understand the Taylor and Laurent expansion with their use in finding out the residue and improper integral.
3. To develop skill to analyze appropriate method to find the root of the Algebraic and Transcendental Equations and to develop skill to apply the concept of interpolation
4. To learn the method of evaluation of numerical derivative, numerical integration
5. To learn the method of evaluation of solve ordinary differential equations numerically using numerical methods.

UNIT I : COMPLEX VARIABLE – DIFFERENTIATION **09**

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method.

UNIT II: Complex Variable – Integration **09**

Line integral, Cauchy's integral theorem (Simple Case), Cauchy Integral formula, Power series expansions: Taylor's series, Laurent's series, zeros of analytic functions, singularities, Residues, Cauchy Residue theorem (without proof).

UNIT III: SOLUTION OF ALGEBRAIC & TRANSCENDENTAL EQUATIONS AND INTERPOLATION **09**

Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae.

UNIT IV: NUMERICAL DIFFERENTIATION, NUMERICAL INTEGRATION AND CURVE FITTING **09**

Numerical differentiation: Newton's forward and backward formulae
Numerical integration: Trapezoidal rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule
Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

UNIT V: SOLUTION OF INITIAL VALUE PROBLEMS TO ORDINARY DIFFERENTIAL EQUATIONS **09**

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

COURSEOUTCOMES:

On successful completion of the course, students will be able to		Pos related to COs
CO1	Analyze limit, continuity and differentiation of functions of complex variables and Understand Cauchy-Riemann equations, analytic functions and various properties of analytic functions.	**PO1,PO2,PO3**
CO2	Understand Cauchy theorem, Cauchy integral formulas and apply these to evaluate complex integrals. Classify singularities and poles; find residues and evaluate complex integrals using the residue theorem.	**PO1,PO2,PO3**
CO3	Apply numerical methods to solve algebraic and transcendental equations and to Derive interpolating polynomials using interpolation formulae.	**PO1,PO2,PO3**
CO4	Demonstrate knowledge in finding the numerical values to derivatives, integrals through different mathematical methods and constructing a curve, or mathematical function, that has the best fit to a series of data points	**PO1,PO2,PO3**
CO5	Demonstrate knowledge in solving ordinary differential equations numerically through various methods	**PO1,PO2,PO3**

TEXT BOOKS:

1. B.S.Grewal,Higher Engineering Mathematics, KhannaPublishers,2017, 44th Edition
2. S.S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2018, 10th Edition.
2. B.V.Ramana, Higher Engineering Mathematics, by Mc Graw Hill publishers
3. R.K.JainandS.R.K.Iyengar,Advanced Engineering Mathematics, Alpha Science International Ltd.,2021 5th Edition(9th reprint).

REFERENCE WEBSITE:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc20_ma50/preview
3. http://nptel.ac.in/courses/111105090

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	3	-	-	-	-	-	-	-	-	-
CO.2	3	3	3	-	-	-	-	-	-	-	-	-
CO.3	3	3	3	-	-	-	-	-	-	-	-	-
CO.4	3	3	3	-	-	-	-	-	-	-	-	-
CO.5	3	3	3	-	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

23ESC231	ANALOG CIRCUITS	L	T	P	C
		2	1	-	3

PRE-REQUISITE: A course on Basic Electronics Engineering

COURSEEDUCATIONALOBJECTIVES:

1. Understand the concepts of diode clipping and clamping circuits, different amplifier configurations, operation of oscillator circuits, operational amplifiers, timers, ADC and DAC
2. Apply the above concepts for different circuit design
3. Analyze various circuit characteristics by using Amplifiers, Transistors, Comparators, Wave form generators, ADC and DAC
4. Analyze various circuit characteristics by using timers, Phase locked loops and operational amplifiers
5. Evaluate different system configurations by using various amplifier, transistor and waveform generators

UNIT-I: DIODE CIRCUITS AND DC BIASING OF BJTS: 09

Diode clipping and clamping circuits: Diode clippers, clipping at two independent levels, Transfer characteristics of clippers, clamping circuit operation.

DC biasing of BJTs: Load lines, Operating Point, Bias Stability, Collector-to-Base Bias, Self-Bias, Stabilization against Variations in VBE and β for the Self-Bias Circuit, Bias Compensation, Thermal Runaway, Thermal Stability.

UNIT-II: SMALL SIGNALS MODELING OF BJT AND FEEDBACK AMPLIFIERS 09

Small Signals Modeling of BJT: Analysis of a Transistor Amplifier Circuit using h-parameters, Simplified CE Hybrid Model, Analysis of CE, CC, CB Configuration using Approximate Model.

Feedback Amplifiers: Classification of Amplifiers, the Feedback Concept, General Characteristics of Negative-Feedback Amplifiers, Feedback topologies- Voltage-Series Feedback, Current-Series Feedback, Current-Shunt Feedback, Voltage-Shunt Feedback.

UNIT-III: OPERATIONAL AMPLIFIERS AND OSCILLATOR CIRCUITS: 09

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

Oscillator Circuits: Barkhausen Criterion of oscillation, Oscillator operation, R-C phase shift oscillator, Wien bridge Oscillator.

UNIT-IV: OP-AMPS APPLICATIONS: 09

Introduction, Basic Op-Amp Applications, Instrumentation Amplifier, V to I and I to V Converter, Log and Antilog Amplifier, Differentiator, integrator.
Comparators and Waveform Generators: Introduction, Comparator, Square Wave Generator, Monostable Multivibrator, Triangular Wave Generator, Sine Wave Generators.

UNIT-V: Timers and Phase Locked Loop 09

Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, PLL block schematic, principles and description of individual blocks, 565 PLL, Applications of VCO (566).

Digital To Analog and Analog to Digital Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, A-D Converters, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

COURSEOUTCOMES:

On successful completion of the course, students will be able to		Pos related to Cos
CO1	Understand the basics of diode circuits and DC Biasing of BJTs	**PO1, PO2**
CO2	Analyze the small signal models and feedback amplifiers using BJT.	**PO1, PO2**
CO3	Understand the basics of Op-Amp and Its applications as Oscillators	**PO1, PO2**
CO4	Analyze and design the Linear circuits using Op-Amp	**PO1, PO2, PO3**
CO5	Understand and analyze the basics of IC 555 timer	**PO1, PO2**

TEXTBOOKS:

1. Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, 8th Edition McGraw Hill, 2013
2. Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N. O. Sadiku, 3Rd Edition, Tata McGraw-Hill, 2019

REFERENCEBOOKS:

1. Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI, 2019.
2. Network Theory, N. C. Jagan and C. Lakshminarayana, 1st Edition, B. S. Publications, 2012.
3. Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyam Mohan S. Palli, 5th Edition, Tata McGraw-Hill, 2017.
4. Engineering Network Analysis and Filter Design (Including Synthesis of One Port Networks)- Durgesh C. Kulshreshtha Gopal G. Bhise, Prem R. Chadha, Umesh Publications 2012.

REFERENCEWEBSITE:

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

CO-POMAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	3	2	-	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-
CO.4	3	2	2	-	-	-	-	-	-	-	-	-
CO.5	3	2	-	-	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

23EEE231	DC MACHINES AND TRANSFORMERS	L	T	P	C
		2	1	-	3

PRE-REQUISITE: A course on Basic Electrical Engineering

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the process of voltage build-up in DC generators and characteristics.
2. Understand the process of torque production, starting and speed control of DC motors and illustrate their characteristics.
3. Obtain the equivalent circuit of single-phase transformer, auto transformer and determine its efficiency & regulation.
4. Apply various testing methods for transformers and speed control of DC motors
5. Analyze various configurations of three-phase transformers.

UNIT-I: DC GENERATORS: **09**

Construction and principle of operation of DC machines – EMF equation for generator – Excitation techniques– characteristics of DC generators –applications of DC Generators, Back-emf and torque equations of DC motor – Armature reaction and commutation, Applications.

UNIT-II: STARTING, SPEED CONTROL AND TESTING OF DC MACHINES: **09**

Characteristics of DC motors – losses and efficiency – applications of DC motors. Necessity of a starter – starting by 3-point and 4-point starters – speed control by armature voltage and field current control – testing of DC machines – brake test, Swinburne's test –Hopkinson's test–Field Test.

UNIT-III: SINGLE-PHASE TRANSFORMERS: **09**

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– equivalent circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – all day efficiency, Applications

UNIT-IV: TESTING OF TRANSFORMERS: **09**

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: THREE-PHASE TRANSFORMERS: **09**

Polyphase connections- Y/Y, Y/Δ, Δ/Y, Δ/Δ, open Δ and Vector groups – third harmonics in phase voltages – Parallel operation– three winding transformers- transients in switching – off load and on load tap changers – Scott connection.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understood the concepts of DC generators and characteristics.	**PO1,PO2**
CO2	Understood the process of torque production, starting and speed control of DC motors and illustrate their characteristics.	**PO1,PO2**
CO3	Obtained the equivalent circuit of single-phase transformer, auto transformer and determine its efficiency & regulation.	**PO1,PO2, PO3**
CO4	Applied the various testing methods for transformers and speed control of DC motors	**PO1,PO2**
CO5	Analyzed various configurations of three-phase transformers.	**PO1,PO2,PO3**

TEXT BOOKS:

1. Dr. P S Bimbhra "Electrical Machinery", 7th edition, Khanna Publishers, New Delhi,1995.
2. M.G. Say "Performance and analysis of AC machines", CBS, 2002.

REFERENCE BOOKS:

1. D. P.Kothari, I .J .Nagarth "Electrical Machines", McGraw Hill Publications, 5th edition
2. Stephen J Chapman "Electrical Machinery Fundamentals" McGraw Hill education 2011.
3. Dr. P S Bimbhra "Generalized Theory of Electrical Machines", 7th Edition, Khanna Publishers, 2021.
4. J.B.Gupta, S.K.Kataria & Sons "Theory & Performance of Electrical Machines",2007.
5. Fitzgerald, A.E., Kingsley, Jr., C., & Umans, S. D "Electric Machinery", 7th edition, McGraw-Hill Education, 2014.

REFERENCE WEBSITE:

1. nptel.ac.in/courses/108/105/108105112
2. nptel.ac.in/courses/108/105/108105155

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3										
CO.2	3	3										
CO.3	3	3	2									
CO.4	3	3										
CO.5	3	3	2									
CO*	3	3	2									

23ESC232	ELECTROMAGNETIC FIELD THEORY	L	T	P	C
		2	1	-	3

PRE-REQUISITE: A course on Electrical circuit Analysis

COURSE EDUCATIONAL OBJECTIVES:

1. Remember the concepts of vector algebra, vector calculus, various fundamental laws, self and mutual inductance.
2. Understand the concepts of electrostatics, conductors, dielectrics, capacitance, magneto statics, magnetic fields, time varying fields, self and mutual inductances
3. Apply vector calculus, Coulomb's law, Gauss's law, Ohm's law in point form, Biot-Savart's law, Ampere's circuital law, Maxwell's third equation, self and mutual inductances, Faraday's laws, Maxwell's fourth equation, Poynting theorem to solve various numerical problems.
4. Analyze vector calculus, electrostatic fields, behavior of conductor in electric filed, Biot-Savart's law and its applications
5. Analyze magnetic force, moving charges in a magnetic field, self-inductance of different cables, mutual inductance between different wires and time varying fields

UNIT-I: VECTOR ANALYSIS: 09

Vector Algebra: Scalars and Vectors, Unit vector, Vector addition and subtraction, Position and distance vectors, Vector multiplication, Components of a vector.
Coordinate Systems: Rectangular, Cylindrical and Spherical coordinate systems.
Vector Calculus: Differential length, Area and Volume. Del operator, Gradient of a scalar, 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's law and Electric field intensity (EFI) – EFI due to Continuous 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 point charge in an electrostatic field (second Maxwell's equation for static electric fields, $\nabla\times\vec{E}=0$), Potential gradient, Laplace's and Poison's equations.

UNIT-II: CONDUCTORS – DIELECTRICS AND CAPACITANCE: 09

Behavior of conductor in Electric field, Electric dipole and dipole moment – Potential and EFI due to 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, Behavior of conductors in an electric field, Polarization, dielectric constant and strength, Continuity equation and relaxation time, Boundary conditions between conductor to dielectric, dielectric to dielectric and conductor to free space, Capacitance of parallel plate, coaxial and spherical capacitors, Energy stored and density in a static electric field, Coupled and decoupled capacitors.

UNIT-III: MAGNETO STATICS, AMPERE'S LAW AND FORCE IN MAGNETIC FIELDS 09

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 a long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors, Magnetic dipole, Magnetic torque, and moment.

UNIT-IV: SELF AND MUTUAL INDUCTANCE: 09

Self and mutual inductance – determination of self-inductance of a solenoid, toroid, coaxial cable 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: TIME VARYING FIELDS: 09

Faraday's laws of electromagnetic induction, Maxwell's fourth equation ($\nabla\times\vec{E}=-(\partial\vec{B})/\partial t$), integral and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement current, Modification of Maxwell's equations for time varying fields, Poynting theorem and Poynting vector.

COURSE OUTCOMES:

On successful completion of the course, students Understood the Concept of		**POs related to COs**
CO1	vector algebra, vector calculus, various fundamental laws, self and mutual inductance	**PO1,PO2**
CO2	electrostatics, conductors, dielectrics, capacitance, magneto statics, magnetic fields, time varying fields, self and mutual inductances	**PO1,PO2**
CO3	Magneto statics, Ampere's Law and Force in magnetic fields	**PO1,PO2, PO3**
CO4	vector calculus, electrostatic fields, behavior of conductor in electric filed, Biot-Savart's law and its applications	**PO1,PO2**
CO5	Magnetic force, moving charges in a magnetic field, self-inductance of different cables, mutual inductance between different wires and time varying fields	**PO1,PO2,PO3**

TEXT BOOKS:

1. Matthew N O Sadiku "Elements of Electromagnetics" Oxford Publications,7th edition, 2018.
2. William H. Hayt & John. A. Buck "Engineering Electromagnetics" Mc. Graw-Hill,7th Editon.2006.

REFERENCE BOOKS:

1. D J Griffiths "Introduction to Electro Dynamics" , Prentice-Hall of India Pvt. Ltd, 2nd edition.
2. Yaduvir Singh "Electromagnetic Field Theory", Pearson India, 1st edition, 2011.
3. Sunil Bhooshan "Fundamentals of Engineering Electromagnetics", Oxford University Press, 2012.

4. Joseph A. Edminister, Mahamood Navi Schaum's Outline of Electromagnetics,4th Edition,2014.
5. H.K.Das,Er.Rajnish Verma, Higher Engineering Mathematics,S.Chand Publications,2014,Third Edition(Reprint-2021)

REFERENCE WEBSITE:

1. https://archive.nptel.ac.in/courses/108/106/108106073/
2. https://nptel.ac.in/courses/117103065

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3										
CO.2	3	3										
CO.3	3	3	2									
CO.4	3	3										
CO.5	3	3	2									
CO*	3	3	2									

23EEE233	NETWORK THEORY	L	T	P	C
		2	1	-	3

PRE-REQUISITE: A course on Electrical circuit Analysis

COURSE EDUCATIONAL OBJECTIVES:

1. Remember the concepts of Laplace transforms, formulation of various circuit topologies (R, L and C components) and basic filters.
2. Understand three phase balanced and unbalanced circuits, different circuit configurations and it's mathematical modeling, network parameters and various filters
3. Apply Laplace transforms to solve various electrical network topologies and filter design concepts various numerical problems.
4. Analyze three phase circuits, transient response of various network topologies, electric circuits with periodic excitations and filter characteristics
5. Design suitable electrical circuits and various filters for different applications

UNIT-I: ANALYSIS OF THREE PHASE BALANCED AND UNBALANCED CIRCUITS: 09

Balanced 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.

Unbalanced circuits:

Loop method, Star-Delta transformation technique, two-wattmeter method for measurement of three phase power.

UNIT-II: LAPLACE TRANSFORMS AND TRANSIENT ANALYSIS: 09

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

Transient Analysis: Transient response of R-L, R-C and R-L-C circuits (Series and parallel combinations) for D.C. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform approach.

UNIT-III: NETWORK PARAMETERS: 09

Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, conversion of Parameters from one form to other, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations-problems.

UNIT-IV: ANALYSIS OF ELECTRIC CIRCUITS WITH PERIODIC EXCITATION: 09

Fourier series and evaluation of Fourier coefficients, Trigonometric and complex Fourier series for periodic waveforms, Application to Electrical Systems – Effective value and average value of non-sinusoidal periodic waveforms, power factor, effect of harmonics.

UNIT-V: FILTERS: **09**

Classification of filters-Low pass, High pass, Band pass and Band Elimination filters, Constant-k filters -Low pass and High Pass, Design of Filters

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Remembered the concepts of Laplace transforms, formulation of various circuit topologies (R, L and C components) and basic filters	**PO1,PO2**
CO2	Understood the three-phase balanced and unbalanced circuits, different circuit configurations and it's mathematical modeling, network parameters and various filters	**PO1,PO2**
CO3	Applied the Laplace transforms to solve various electrical network topologies and filter design concepts	**PO1,PO2, PO3**
CO4	Analyzed three phase circuits, transient response of various network topologies, electric circuits with periodic excitations and filter characteristics	**PO1,PO2**
CO5	Analyzed the suitable electrical circuits and various filters for different applications	**PO1,PO2,PO3**

TEXT BOOKS:

1. William Hayt and Jack E. Kemmerly "Engineering Circuit Analysis", , 8th Edition McGraw-Hill, 2013
2. Charles K. Alexander, Mathew N. O. Sadiku "Fundamentals of Electric Circuits", , 3rd Edition, Tata McGraw-Hill, 2019

REFERENCE BOOKS:

1. M. E. Van Valkenburg "Network Analysis", , 3rd Edition, PHI, 2019.
2. N. C. Jagan and C. Lakshminarayana "Network Theory", , 1st Edition, B. S. Publications, 2012.
3. A. Sudhakar, Shyam Mohan S. Palli "Circuits and Networks Analysis and Synthesis", , 5th Edition, Tata McGraw-Hill, 2017.
4. Durgesh C. Kulshreshtha Gopal G. Bhise, Prem R. Chadha "Engineering Network Analysis and Filter Design" (Including Synthesis of One Port Networks)-, Umesh Publications 2012.
5. A. Chakrabarti, Dhanpat Rai & Co "Circuit Theory Analysis and Synthesis", 2018, 7th Revised Edition.

REFERENCE WEBSITE:

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

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3										
CO.2	3	3										
CO.3	3	3	2									
CO.4	3	3										
CO.5	3	3	2									
CO*	3	3	2									

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.
(AUTONOMOUS)
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
(NBA Accredited)

23EEE234 **DC MACHINES AND TRANSFORMERS LAB**

L	T	P	C
-	-	-	3

PRE-REQUISITE: A course on Basic Electrical Engineering Lab

COURSE EDUCATIONAL OBJECTIVES:

1. Demonstrate starting and speed control methods of DC Machines.
2. Apply theoretical concepts to determine the performance characteristics of DC Machines.
3. Analyze the parallel operation of single-phase transformers
4. Determine the performance parameters of single-phase transformer.
5. Analyze the performance analysis of transformers using various tests

LIST OF EXPERIMENTS:

Any 10 of the following experiments are to be conducted:

1. Speed control of DC shunt motor by Field Current and Armature Voltage Control.
2. Brake test on DC shunt motor- Determination of performance curves.
3. Swinburne's test - Predetermination of efficiencies as DC Generator and Motor.
4. Hopkinson's test on DC shunt Machines.
5. Load test on DC compound generator-Determination of characteristics.
6. Load test on DC shunt generator-Determination of characteristics.
7. Fields test on DC series machines-Determination of efficiency.
8. Brake test on DC compound motor-Determination of performance curves.
9. OC & SC tests on single phase transformer.
10. Sumpner's test on single phase transformer.
11. Scott connection of transformers.
12. Parallel operation of Single-phase Transformers.
13. Separation of core losses of a single-phase transformer.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs**
CO1	Demonstrate the starting and speed control methods of DC Machines	**PO1**
CO2	Analyze the performance characteristics of DC Machines.	**PO2**
CO3	Analyze the parallel operation of single-phase transformers	**PO3**
CO4	Apply basic electrical engineering tools to find the performance parameters of single-phase transformer	**PO5**
CO5	Follow the ethical principles in while doing the exercises.	**PO8**
CO6	Do the exercises effectively as an individual and as a team member in a group	**PO9**
CO7	Communicate verbally among team members and in written form, the understanding about the trade exercises.	**PO10**

CO8	Continue updating their skill related to trades.	**PO12**

TEXT BOOKS:

1. Dr. P S Bimbhra "Electrical Machinery", 7th edition, Khanna Publishers, New Delhi,1995.
2. M.G. Say, "Performance and analysis of AC machines" CBS, 2002.

REFERENCE:

1. https://ems-iitr.vlabs.ac.in/List%20of%20experiments.html

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
CO	**3**	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.
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23EEE235 **NETWORK THEORY AND SIMULATION LAB**

L	T	P	C
-	-	-	3

PRE-REQUISITE: A course on Electrical circuit Analysis Lab

COURSE EDUCATIONAL OBJECTIVES:

1 Understand the power calculations in three phase circuits.
2 Analyze the time response of given network.
3 Determination of two port network parameters.
4 Simulate and analyze electrical circuits using software tools
5 Apply various theorems to solve different electrical networks using simulation tools

LIST OF EXPERIMENTS:

Any 10 of the following experiments are to be conducted:

1. Measurement of Active Power and Reactive Power for balanced loads.
2. Measurement of Active Power and Reactive Power for unbalanced loads.
3. Determination of Z and Y parameters.
4. Determination of ABCD and hybrid parameters
5. Verification of Kirchhoff's current law and voltage law using simulation tools.
6. Verification of mesh and nodal analysis using simulation tools.
7. Verification of super position and maximum power transfer theorems using simulation tools.
8. Verification of Reciprocity and Compensation theorems using simulation tools.
9. Verification of Thevenin's and Norton's theorems using simulation tools.
10. Verification of series and parallel resonance using simulation tools.
11. Simulation and analysis of transient response of RL, RC and RLC circuits.
12. Verification of self-inductance and mutual inductance by using simulation tools.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs**
CO1	Demonstrate the power calculations in three phase circuits	**PO1**
CO2	Analyze the time response of given network.	**PO2**
CO3	Analyze the parallel operation of single-phase transformers	**PO3**
CO4	Apply basic electrical engineering tools to find the two port network parameters	**PO5**
CO5	Follow the ethical principles in while doing the exercises.	**PO8**
CO6	Do the exercises effectively as an individual and as a team member in a group	**PO9**
CO7	Communicate verbally among team members and in written form, the understanding about the trade exercises.	**PO10**
CO8	Continue updating their skill related to trades.	**PO12**

TEXT BOOKS:

1. William Hayt and Jack E. Kemmerly "Engineering Circuit Analysis", , 8th Edition McGraw-Hill, 2013
2. Charles K. Alexander, Mathew N. O. Sadiku "Fundamentals of Electric Circuits", , 3rd Edition, Tata McGraw-Hill, 2019

REFERENCE:

1. https://ems-iitr.vlabs.ac.in/List%20of%20experiments.html

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
CO	**3**	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

23EEE241 **CONTROL SYSTEM**

L	T	P	C
2	1	-	3

PRE-REQUISITE: A course on Electrical circuit Analysis-I

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the concepts of various mathematical representations of control systems, Time response of first order and second order systems, stability, frequency response and fundamentals of modern control systems
2. Apply Block diagram reduction, Signal flow graph, Routh criterion, Root locus, Bode, Polar, Nyquist concepts for solving various numerical problems
3. Analyze time response characteristics, frequency response characteristics, stability analysis of various control systems
4. Design various compensators and controllers for different control systems by using design procedures
5. Create suitable control systems for various real time applications.

UNIT I CONTROL SYSTEMS CONCEPTS **09**

Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

UNIT II TIME RESPONSE ANALYSIS **09**

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, P, PI, PID Controllers.

UNIT STABILITY ANALYSIS IN TIME DOMAIN **09**

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT FREQUENCY RESPONSE ANALYSIS **09**

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis.
Compensation techniques – Lag, Lead, Lag-Lead Compensator design in frequency Domain.

UNIT STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS **09**

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models. The concepts of controllability and observability, Duality between controllability and observability.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand the construction, principle and operation of single phase and three phase induction motors	**PO1,PO2**
CO2	Understand the construction, principle and operation of synchronous generator and synchronous motor	**PO1,PO2**
CO3	Understand various applications of various alternating machines	**PO1,PO2, PO3**
CO4	Apply the above concepts to solve various mathematical and complex problems	**PO1,PO2**
CO5	Analyze the characteristics of induction motor, synchronous motor and synchronous generators	**PO1,PO2,PO3**

TEXTBOOKS:

1. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited Publishers, 5th edition, 2007.

REFERENCE BOOKS:

1. Control Systems Principles & Design by M.Gopal, 4th Edition, Mc Graw Hill Education, 2012.
2. Automatic Control Systems by B. C. Kuo and Farid Golnaraghi, John wiley and sons, 8th edition, 2003.
3. Feedback and Control Systems, Joseph J Distefano III, Allen R Stubberud & Ivan J Williams, 2nd Edition, Schaum's outlines, Mc Graw Hill Education, 2013.
4. Control System Design by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell and Abbas Emami-Naeini, 6th Edition, Pearson, 2010.

WEB RESOURCES:

https://nptel.ac.in/courses/108102043
https://nptel.ac.in/courses/108106098.

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3											
CO.2	3											
CO.3	3	2										
CO.4	3											
CO.5	3	2										
CO*	3	2										

23EEE242 **INDUCTION AND SYNCHRONOUS MACHINES**

L	T	P	C
2	1	-	3

PRE-REQUISITE: A course on DC Machines and Transformers.

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the construction, principle and operation of single phase and three phase induction motors
2. Understand the construction, principle and operation of synchronous generator and synchronous motor
3. Understand various applications of various alternating machines
4. Apply the above concepts to solve various mathematical and complex problems
5. Analyze the characteristics of induction motor, synchronous motor and synchronous generators

UNIT-I: 3-PHASE INDUCTION MOTORS: **09**

Construction of Squirrel cage and Slipring induction motors– production of rotating magnetic field – principle of operation – rotor emf and rotor frequency – rotor current and power factor at standstill and during running conditions– rotor power input, rotor copper loss and mechanical power developed and their inter-relationship –equivalent circuit – phasor diagram, Applications.

UNIT-II: PERFORMANCE OF 3-PHASE INDUCTION MOTORS: **09**

Torque equation – expressions for maximum torque and starting torque – torque-slip characteristics – double cage and deep bar rotors – No load, Brake test and Blocked rotor tests – circle diagram for predetermination of performance- methods of starting –starting current and torque calculations - speed control of induction motor with V/f control method, rotor resistance control and rotor emf injection technique –crawling and cogging – induction generator operation.

UNIT-III: SINGLE PHASE MOTORS: **09**

Single phase induction motors – constructional features – 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, Applications.

UNIT-IV: SYNCHRONOUS GENERATOR: **09**

Constructional features of non-salient and salient pole type alternators- armature windings – distributed and concentrated windings – distribution & pitch factors – E.M.F equation – armature reaction – voltage regulation by synchronous impedance method – MMF method and Potier triangle method – two reaction analysis of salient pole machines - methods of synchronization- Slip test – Parallel operation of alternators.

UNIT-V: SYNCHRONOUS MOTOR: **09**

Synchronous motor principle and theory of operation – Effect of excitation on current and power factor– synchronous condenser –expression for power developed –hunting and its suppression – methods of starting, Applications.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand the construction, principle and operation of single phase and three phase induction motors	**PO1,PO2**
CO2	Understand the construction, principle and operation of synchronous generator and synchronous motor	**PO1,PO2**
CO3	Understand various applications of various alternating machines	**PO1,PO2,PO3**
CO4	Apply the above concepts to solve various mathematical and complex problems	**PO1,PO2**
CO5	Analyze the characteristics of induction motor, synchronous motor and synchronous generators	**PO1,PO2,PO3**

Textbooks:

1. Electrical Machinery, Dr. P.S. Bhimbra, Khanna Publishing, 2021, First Edition.
2. Performance and analysis of AC machines by M.G. Say, CBS, 2002.

Reference Books:

1. Electrical machines, D.P. Kothari and I.J. Nagrath, McGraw Hill Education, 2017, Fifth Edition.
2. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria & Sons,2007.
3. Electric Machinery, A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, McGraw-Hill, 2020, Seventh edition.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/108/105/108105131
2. https://nptel.ac.in/courses/108106072

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3											
CO.2	3											
CO.3	3	2										
CO.4	3											
CO.5	3	2										
CO*	3	2										

23EEE243	POWER SYSTEMS-I	L	T	P	C
		2	1	-	3

PRE-REQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the different types of power plants, operation of power plants
2. Understand the concepts of distribution systems, underground cables, economic aspects and tariff
3. Understand various substations that are located in distribution systems
4. Apply the above concepts to illustrate different power generation layouts
5. Analyze various economic aspects related to power generation and distribution

UNIT-I: HYDROELECTRIC AND THERMAPOWER STATIONS: 09

Selection of site, general layout of a hydroelectric power plant with brief description of major components and principle of operation Selection of site, general layout of a thermal power plant. Brief description of components: boilers, super heaters, economizers and electrostatic precipitators, steam turbines: impulse and reaction turbines, condensers, feed water circuit, cooling towers and chimney.

UNIT-II: NUCLEAR POWER STATIONS: 09

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: SUBSTATIONS: 09

Air Insulated Substations – indoor & outdoor substations, substations layouts of 33/11 kV showing 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 Insulated Substations (GIS) – advantages of gas insulated substations, constructional aspects of GIS, comparison of air insulated substations and gas insulated substations.

UNIT-IV: DISTRIBUTION SYSTEMS: 09

Classification of Distribution systems, A.C Distribution, Overhead versus Underground system, Connection schemes of Distribution system, Requirements of Distribution system, Design considerations in Distribution system.

Underground Cables:

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.

UNIT-V: ECONOMIC ASPECTS & TARIFF: 09

Economic Aspects – load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, plant capacity factor and plant use factor, base and peak load plants.

Tariff Methods– Costs of generation and their division into fixed, semi-fixed and running costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block-rate, two-part, three–part, and power factor tariff methods, Time of Day (TOD) tariff and Time of Use (TOU) tariff

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understood the different types of power plants, operation of power plants	**PO1,PO2**
CO2	Understood the concepts of distribution systems, underground cables, economic aspects and tariff	**PO1,PO2,PO12**
CO3	Understood various substations that are located in distribution systems	**PO1,PO2,PO3**
CO4	Applied the above concepts to illustrate different power generation layouts	**PO1,PO2,PO3**
CO5	Analyzed various economic aspects related to power generation and distribution	**PO1,PO2,PO3, PO12**

TEXT BOOKS:

1. S. N. Singh, Electric Power Generation, Transmission and Distribution, PHI Learning Pvt Ltd, New Delhi, 2nd Edition, 2010
2. J. B. Gupta, Transmission and Distribution of Electrical Power, S. K. Kataria and sons,10th Edition, 2012.

REFERENCE BOOKS:

1. J. Nagarath & D.P. Kothari, Power System Engineering, McGraw-Hill Education, 3rd Edition, 2019.
2. C. L. Wadhwa, Generation, Distribution and Utilization of Electrical Energy, New Age International Publishers, 6th Edition, 2018.
3. V. K. Mehta and Rohit Mehta, Principles of Power System, S. Chand, 4th Edition, 2005.
4. Turan Gonen, Electric Power Distribution System Engineering, McGraw-Hill, 1985.
5. Handbook of switchgear, BHEL, McGraw-Hill Education, 2007.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/108102047

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3											
CO.2	3											2
CO.3	3	2										
CO.4	3	2										
CO.5	3	2										2
CO*	**3**	**2**										**2**

23EEE244 **CONTROL SYSTEMS LAB** **L T P C**
- - - 3

PRE-REQUISITE: A course on Electrical circuit Analysis-I Lab

COURSE EDUCATIONAL OBJECTIVES:

1. Understand how to use feedback control system to determine transfer function of DC servo motor and any other given circuit with R, L and C components
2. Model the systems and able to design the controllers and compensators.
3. Get the knowledge about the effect of poles and zeros location on transient and steady state behavior of second order systems and implement through software tools
4. Determine the performance and time domain specifications of first and second order systems.
5. Understand the stability analysis

List of Experiments:

Any 10 of the Following Experiments are to be conducted.

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC Machine
6. Effect of P, PD, PI, PID Controller on a second order system
7. Lag and lead compensation – Magnitude and phase plot
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor
11. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
12. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
13. State space model for classical transfer function using MATLAB – Verification.

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
CO	**3**	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

23EEE245 INDUCTION AND SYNCHRONOUS MACHINES LAB

L	T	P	C
-	-	-	3

PRE-REQUISITE: A course on Electrical circuit Analysis Lab

COURSE EDUCATIONAL OBJECTIVES:

1. Analyze various performance characteristics of 3-phase and 1-phase induction motors
2. Evaluate the performance of 3-phase Induction Motor by obtaining the circle diagram and equivalent circuit of 3-phase Induction Motor and single-phase induction motor
3. Adapt the power factor improvement methods for single phase Induction Motor
4. Pre-determine the regulation of 3-phase alternator
5. Determine the synchronous machine reactance of 3-phase alternator

List of Experiments:

Any 10 experiments of the following are required to be conducted

1. Brake test on three phase Induction Motor.
2. Circle diagram of three phase induction motor.
3. Speed control of three phase induction motor by V/f method.
4. Equivalent circuit of single-phase induction motor.
5. Power factor improvement of single-phase induction motor by using capacitors.
6. Load test on single phase induction motor.
7. Regulation of a three -phase alternator by synchronous impedance & MMF methods.
8. Regulation of three-phase alternator by Potier triangle method.
9. V and Inverted V curves of a three-phase synchronous motor.
10. Determination of X_d, X_q & Regulation of a salient pole synchronous generator.
11. Determination of efficiency of three phase alternator by loading with three phase induction motor.
12. Parallel operation of three-phase alternator under no-load and load conditions.
13. Determination of efficiency of a single-phase AC series Motor by conducting Brake test.

Reference:

1. https://em-coep.vlabs.ac.in/List%20of%20experiments.html

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
CO	**3**	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**