ACE
ENGINEERINGCOLLEGE
Ankushapur, Ghatkesar–501301

B. Tech. in ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE & SYLLABUS (ACER22 Regulations)

II YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	MA301BS	Numerical Methods and Complex variables	3	1	0	4
2	ME302ES	Solid Mechanics & Hydraulic Machines	3	0	0	3
3	EC303ES	Analog Electronics	3	0	0	3
4	EE304PC	Electrical Machines-I	3	1	0	4
5	EE305PC	Electromagnetic Fields	3	0	0	3
6	EE306PC	Electrical Machines Laboratory-I	0	0	2	1
7	EC307ES	Analog Electronics Laboratory	0	0	2	1
8	EE308PC	Electrical Simulation Laboratory	0	0	2	1
9	MC310	Gender Sensitization Laboratory	0	0	2	0
		Total Credits	**15**	**2**	**8**	**20**

II YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	EE401PC	Power Systems-I	3	0	0	3
2	EE402PC	Measurements and Instrumentation	3	0	0	3
3	EE403PC	Electrical Machines–II	3	0	0	3
4	EC404ES	Digital Circuits	2	0	0	2
5	EE405PC	Control Systems	3	1	0	4
6	EC406ES	Digital Circuits Laboratory	0	0	2	1
7	EE407PC	Measurements and Instrumentation Laboratory	0	0	2	1
8	EE408PC	Electrical Machines-II Laboratory	0	0	2	1
9	EE409PC	Research Oriented Mini Project/Field Based Project	0	0	4	2
10	MC409	Constitution of India	3	0	0	0
		Total Credits	**17**	**1**	**10**	**20**

MA301BS: NUMERICAL METHODS AND COMPLEX VARIABLES
(Offered in II B.Tech I Sem - EEE)

B. Tech. II Year I Sem.	L	T	P	C
	3	1	0	4

Pre-requisites: Mathematics courses of first year of study.

Course Objectives: To learn

1. Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
2. Various numerical methods to find roots of polynomial and transcendental equations. Concept of finite differences and to estimate the value for the given data using interpolation.
3. Evaluation of integrals using numerical techniques and Solving ordinary differential equations of first order using numerical techniques.
4. Differentiation and integration of complex valued functions.
5. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
   And Expansion of complex functions using Taylor's and Laurent's series.

Course outcomes: After learning the contents of this paper the student must be able to

1. Express any periodic function in terms of sine and cosine
2. Find the root of a given polynomial and transcendental equations.
3. Estimate the value for the given data using interpolation and find the numerical solutions for a given first order ODE's
4. Analyze the complex function with reference to their analyticity.
5. Analyze the complex function with reference to their integration using Cauchy's integral and residue theorems. And Taylor's and Laurent's series expansions in complex function

UNIT-I: Fourier Series & Fourier Transforms: 10 L

Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.

UNIT-II: Numerical Methods-I 10 L

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton- Raphson method and Regula-Falsi method. Jacobi and Gauss-Seidal iteration methods for solving linear systems of equations.

Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-III: Numerical Methods-II **8 L**

Numerical integration: Trapezoidal rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules. Ordinary differential equations: Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order for first order ODE

UNIT-IV: Complex Differentiation **10 L**

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties. (All theorems without Proofs), Conformal mappings, Mobius transformations.

UNIT-V: Complex Integration: **10 L**

Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem. and their properties. (All theorems without Proofs)

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36^{th} Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCE BOOKS:

1. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and EngineeringComputations, New Age International publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9^{th} Edition, John Wiley & Sons, 2006.

J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7^{th} Edition, Mc-GrawHill, 2004

ME302ES: SOLID MECHANICS AND HYDRAULIC MACHINES

B.Tech. II Year I Sem **L T P C**

3 0 0 3

Course Objectives:

- To identify an appropriate structural system and work comfortably with basic engineering mechanics and types of loading & support conditions that act on structural systems.
- To Understand the meaning of centers of gravity, centroids, moments of Inertia and rigidbody dynamics.
- To Study the characteristics of hydroelectric power plant and Design of hydraulic machinery.

Course Outcomes: After learning the contents of this paper the student must be able to

- Solve problems dealing with forces, beam and cable problems and understand distributedforce systems.
- Solve friction problems and determine moments of Inertia and centroid of practical shapes.
- Apply knowledge of mechanics in addressing problems in hydraulic machinery and its principlesthat will be utilized in Hydropower development and for other practical usages.

Course Objectives	Program Outcomes											
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO5**	**PO6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**
To identify an appropriate structural system and work comfortably with basic engineering mechanics and types of loading & support conditions that act on structural systems.	3	3	3	3	3	3	1	1	2	2	1	3
To Understand the meaning of centers of gravity, centroids, moments of	3	2	3	2	3	3	2	2	2	3	2	3

Inertiaand rigid body dynamics.												
To Study the characteristics of hydroelectric power plant and Design of hydraulic machinery.	3	2	3	1	3	3	1	1	2	2	2	3

Course Outcomes	**Program Outcomes**											
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO6**	**PO 7**	**PO 8**	**PO9**	**PO1 0**	**PO1 1**	**PO12**
Solve problems dealing with forces, beam and cable problems And understand distributed force systems.	3	3	3	3	3	3	3	1	2	1	1	2
Solve friction problems and determine momentsof Inertia and centroid of practical shapes.	3	3	3	3	3	3	3	3	3	3	2	3
Apply knowledge of mechanics in addressing problemsin hydraulic machinery and itsprinciples that will be utilized in Hydropower development and forother practical usages.	3	2	2	2	3	3	3	2	1	3	3	2

UNIT–I:

INTRODUCTION OF ENGINEERING MECHANICS: Basic concepts of System of Forces-Coplanar Forces–Components in Space–Resultant- Moment of Forces andits Application – Couples and Resultant of Force System-Equilibrium of System of Forces-Free body diagrams-Direction of Force Equations of Equilibrium of Coplanar Systems and Spatial Systems – Vector cross product- Support reactions different beams for different types of loading – concentrated, uniformly distributed and uniformly varying loading. Types of friction – Limiting friction – Laws of Friction – static and Dynamic Frictions – Angle of Friction –Cone of limiting friction

UNIT–II:

CENTROID AND CENTER OF GRAVITY: Centroids – Theorem of Pappus-Centroids of Composite figures – Centre of Gravity of Bodies – Area momentof Inertia:– polar Moment of Inertia–Transfer– Theorems - Moments of Inertia of Composite Figures.

SIMPLE STRESSES AND STRAINS ANALYSIS: Concept of stress and strain- St. Venant's Principle- Stress and Strain Diagram - Elasticity and plasticity – Types of stresses and strains- Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Pure shear and Complementary shear - Elastic modulii, Elasticconstants and the relationship between them

UNIT–III:

KINEMATICS & KINETICS: Introduction – Rectilinear motion – Motion with uniform and variable acceleration–Curvilinear motion– Components of motion– Circular motion Kinetics of a particle – D'Alembert's principle – Motion in a curved path – work, energy and power. Principleof conservationof energy – Kinetics of a rigid body in translation, rotation – work done – Principle of work-energy – Impulse-momentum.

UNIT-IV:

BASICS OF HYDRAULIC MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency Elements of a typical Hydropower installation – Heads and efficiencies

UNIT-V:

TURBINES & PUMPS: Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube

– Classification, functions and efficiency. Governing of turbines, Performance of turbines Pump installation details – classification – work done – Manometric head – minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel

TEXT BOOKS:

1. M.V. Seshagirirao and Durgaih, "Engineering Mechanics",University Press.
2. P.N Modi and Seth, "Fluid Mechanics and Hydraulic Machinery", standard Book House

REFERENCE BOOKS:

1. B. Bhattacharya, "Engineering Mechanics", Oxford University Publications.
2. Hibbler, "Engineering Mechanics (Statics and Dynamics)", Pearson Education.
3. Fedrinand L. Singer, "Engineering Mechanics" Harper Collings Publishers.
4. A.K.Tayal, "Engineering Mechanics" , Umesh Publication.
5. Domkundwar & Domkundwar, "Fluid mechanics & Hydraulic Machines", Dhanpat Rai & C
6. R.C.Hibbeler, "Fluid Mechanics", Pearson India Education Servieces Pvt. Ltd
7. D.S.Kumar, "Fluid Mechanic & Fluid Power Engineering", Kataria & Sons Publications Pvt. Ltd.
8. Banga & Sharma, "Hydraulic Machines" Khanna Publishers.

EC303ES: ANALOG ELECTRONICS

B. Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

□ To introduce components such as diodes, BJTs and FETs their switching characteristics, applications

□ Learn the concepts of high frequency analysis of transistors.

□ To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded,

large signal and tuned amplifiers.

□ To introduce the basic building blocks of linear integrated circuits.

□ To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: At the end of this course, students will be able to

□ Know the characteristics, utilization of various components.

□ Understand the biasing techniques

□ Design and analyze various rectifiers, small signal amplifier circuits.

□ Design sinusoidal and non-sinusoidal oscillators.

□ Designs OP-AMP based circuits with linear integrated circuits.

UNIT-I:

Diode and Bipolar Transistor Circuits: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits,

UNIT-II:

FET Circuits: FET Structure and VI Characteristics, MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.

UNIT-III:

Multi-Stage and Power Amplifiers: Direct coupled and RC Coupled multi-stage amplifiers; Differential

Amplifiers, Power amplifiers - Class A, Class B, Class C

UNIT-IV:

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics –Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators,

LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

UNIT-V:

Operational Amplifiers: Ideal op-amp, Output offset voltage, input bias current, input offset current,

slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular- wave generators.

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition 2010

2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.

REFERENCE BOOKS:

1. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, pearson.

2. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.

3. P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.

4. P. R. Gray, R. G. Meyer and S. Lewis, “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons, 2001.

EE304PC: ELECTRICAL MACHINES-I

B.TECH. II YEAR I SEMESTER	L	T	P	C
	3	1	0	4

Prerequisite: Electrical Circuit Analysis-I &II

Course Objectives:

1. To study different types of DC machines and their performance
2. To understand the performance evaluation of DC machines through various testing methods.
3. To understand the operation of single and ploy-phase Transformers
4. To analyze the performance of transformers through various testing methods.
5. To Understand different connections of Poly phase transformers.

Course Outcomes: Upon completing this course, the student will be able to

1. Explain the theory and principle of operation of DC generators.
2. Explain the theory and principle of operation of DC Motors.
3. Analyze the performance of DC machines through various testing methods.
4. Understand the operation of single and ploy-phase Transformers
5. Analyze the performance of transformers through various testing methods.

UNIT: I D.C. GENERATORS 10L

Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation. Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation. Methods of Excitation – separately excited and self-excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self-excited and remedial measures. Load characteristics and applications of shunt, series and compound generators.

UNIT: II D.C MOTORS 10L

Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. Speed control of D.C. Motors - Armature voltage and field flux control methods. Motor starters (3- point and 4- point starters) Testing of D.C. machines - Losses – Constant & Variable losses –calculation of efficiency – condition for maximum efficiency.

UNIT: III TESTING OF DC MACHINES 10L

Methods of Testing – direct, indirect, and regenerative testing – Brake test – Swinburne's test – Hopkinson's test –Field's test - separation of stray losses in a D.C. motor test.

UNIT: IV **SINGLE PHASE TRANSFORMERS** **10L**

Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams and Applications. Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency &supply voltage on iron losses.

UNIT: V **TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS 10L**

Open Circuit and Short Circuit tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers. Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Scott connection and Applications.

TEXTBOOKS:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education,5th Edition, 2017.

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
3. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers,2004.
4. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002

WEB REFERENCES:

1. https://nptel.ac.in/courses/108105155
2. https://nptel.ac.in/courses/108105017

EE305PC: ELECTRO MAGNETIC FIELDS

B.TECH. II YEAR I SEMESTER	L	T	P	C
	3	0	0	3

Prerequisite: Ordinary Differential Equations and Vector Calculus & Applied Physics.

Course Objectives:

1. To introduce the concepts of electric field and magnetic field.
2. To know applications of electric fields in the development of the theory for power transmission lines and electrical machines.
3. To know applications of magnetic fields in the development of the theory for power transmission lines and electrical machines.
4. To study about electromagnetic waves.
5. To learn about poynting Theorem

Course Outcomes: Upon completing this course, the student will be able to

1. Analyze the basic laws of electromagnetism.
2. Obtain the electric and magnetic fields for simple configurations under static conditions.
3. Analyze time varying electric and magnetic fields.
4. Apply Maxwell's equation in different forms and different media.
5. Analyze the propagation of EM waves.

UNIT: I STATIC ELECTRIC FIELD 10L

Review of conversion of a vector from one coordinate system to another coordinate system, Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface, and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density

UNIT: II CONDUCTORS, DIELECTRICS AND CAPACITANCE 10L

Current and current density, Ohms Law in Point form, Continuity equation, Boundary conditions of conductors and dielectric materials. Capacitance, Capacitance of a two-wire line, Poisson's equation, Laplace's equation, Solution of Laplace, and Poisson's equation

UNIT: III STATIC MAGNETIC FIELDS AND MAGNETIC FORCES 10L

Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors. Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic boundary conditions, Magnetic circuits, Self-inductances, and mutual inductances.

Unit: IV TIME VARYING FIELDS AND MAXWELL'S EQUATIONS 10L

Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces.

UNIT: V ELECTROMAGNETIC WAVES 10L

Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane wave in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors. Poynting theorem.

TEXTBOOKS:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.

REFERENCE BOOKS:

1. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
2. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
3. E. G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge UniversityPress, 1966.
4. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers, International Edition, 1971.
5. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi,2009.

WEB REFERENCES:

1. https://nptel.ac.in/courses/108104087
2. https://archive.nptel.ac.in/courses/108/106/108106073/

EE306PC: ELECTRICAL MACHINES – I LABORATORY

B.TECH. II YEAR I SEMESTER

L	T	P	C
0	0	2	1

Prerequisite: Electrical Machines- I

Course Objectives:

1. To expose the students to the operation of DC Generators.
2. To know the operation of various types of DC Motors.
3. To examine the performance of Single-Phase Transformers.
4. To examine the performance of Three Phase Transformers.
5. To observe the different connections of three phase transformer.

Course Outcomes: Upon completing this course, the student will be able to

1. Start and control the Different DC Machines.
2. Assess the performance of different machines using different testing methods
3. Identify different conditions required to be satisfied for self - excitation of DC Generators.
4. Separate iron losses of DC machines into different components
5. The student able to assess the performance of the transformer.

List of Experiments:

The following experiments are required to be conducted as compulsory

1. Magnetization characteristics of DC shunt generator (Determination of critical field resistance and critical speed)
2. Load test on DC shunt generator (Determination of characteristics)
3. Load test on DC series generator (Determination of characteristics)
4. Predetermination of efficiency of DC shunt motor with suitable test and Speed Control of DC Shunt Motor
5. Brake test on DC compound motor (Determination of performance curves)
6. Hopkinson's test on DC shunt machines (Predetermination of efficiency)
7. Determination of Equivalent Circuit Parameters of a Single-Phase Transformer
8. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star Delta, Delta-Delta, Delta-star, Star-Star.

In addition to the above experiments, at least any two of the following experiments are required to be conducted from the following list:

. 1. Brake test on DC shunt motor (Determination of performance curves)
2. Load test on DC compound generator (Determination of characteristics.
3. Fields test on DC series machines (Determination of efficiency)
4. Retardation test on DC shunt motor (Determination of losses at rated speed)
5. Separation of losses in DC shunt motor.
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

WEB REFERENCES:

1.https://ems-iitr.vlabs.ac.in/

EC307ES :ANALOG ELECTRONICS LABORATORY

B. Tech. II Year I Sem.

L	T	P	C
0	0	2	1

Prerequisites: Analog Electronic Circuits

Course Objectives:

□ To introduce components such as diodes, BJTs and FETs their switching characteristics, applications

□ Learn the concepts of high frequency analysis of transistors.

□ To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded,

large signal and tuned amplifiers.

□ To introduce the basic building blocks of linear integrated circuits.

□ To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: At the end of this course, students will demonstrate the ability to

□ Know the characteristics, utilization of various components.

□ Understand the biasing techniques

□ Design and analyze various rectifiers, small signal amplifier circuits.

□ Design sinusoidal and non-sinusoidal oscillators.

□ Design OP-AMP based circuits with linear integrated circuits.

List of Experiments:

1. Draw the VI Characteristics of given PN Junction diode. Determine the Static and Dynamic resistance of the

Diode.

2. Determine the Ripple factor, %Regulation PIV and TUF of the given Rectifier with & without filter.

3. Obtain the I/O Characteristics of CE configurations of BJT. Calculate h-parameters from the Characteristics.

4. Obtain the I/O Characteristics of CB configurations of BJT. Calculate h-parameters from the Characteristics.

5. Obtain the I/O Characteristics of CC configurations of BJT. Calculate h-parameters from the Characteristics.

6. Obtain the Drain and Transfer characteristics of CD,CS configuration of JFET. Calculate gm, rd from the Characteristics Adder and Subtractor using Op Amp.

7. Inverting and Non-inverting Amplifiers using Op Amps
8. Adder and Subtractor using Op Amp
9. Integrator Circuit using IC 741.
10. Differentiator circuit using Op Amp.
11. Current Shunt Feedback amplifier
12. Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for given
    frequency.
13. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.
14. Design transformer coupled class A power amplifier and draw the input and output waveforms, find its
    efficiency

□ **Experiments related to MOSFET may be included**

EE308PC: ELECTRICAL SIMULATION LABORATORY

B.TECH. II YEAR I SEMESTER	L	T	P	C
	0	0	2	1

Prerequisite: Electrical Circuit Analysis I & II

Course Objectives:

1. To understand basic block sets of different simulation platform used in electrical/electronic circuit design.
2. To realize use and coding in different software tools used in electrical/ electronic circuit design.
3. To know about the simulation of electric machines/circuits for performance analysis.
4. To Model the Voltage Regulator using suitable simulation tool.
5. To comprehend the performance Solar of PV model using suitable simulation tool.

Course Outcomes: Upon completing this course, the student will be able to

1. Develop knowledge of software packages to model and program electrical and electronics systems.
2. Model different electrical and electronic systems and analyze the results.
3. Articulate importance of software packages used for simulation in laboratory experimentation by analyzing the simulation results.
4. Analyze the performance of Solar PV model using suitable simulation tool.
5. Analyze the software tool for any engineering and real time applications.

List of Experiments:

The following experiments need to be performed from various subject domains.

1. Introduction to basic block sets of simulation platforms. Basic matrix operations, Generation of standard test signals
2. Solving the linear and nonlinear differential equations
3. Measurement of Voltage, Current and Power in DC circuits.
4. Verification of different network theorems with dependent and independent sources using suitable simulation tools.
5. Verification of performance characteristics of basic Electronic Devices using suitable simulation tools.
6. Analysis of series and parallel resonance circuits using suitable simulation tools
7. Obtaining the response of electrical network for standard test signals using suitable simulation tools.
8. Modeling and Analysis of Low pass and High pass Filters using suitable simulation tools
9. Performance analysis of DC motor using suitable simulation tools
10. Modeling and analysis of Equivalent circuit of transformer using suitable simulation tools.
11. Analysis of single-phase bridge rectifier with and without filter using suitable Simulation tools.
12. Modeling and Verification of Voltage Regulator using suitable simulation tools.
13. Modeling of transmission line using simulation tools.
14. Performance analysis of Solar PV model using suitable simulation tools

Students should be encouraged to use open-source software's such as SCILAB, ORCAD, LTSPICE, Ngspice, Octave, Solve Elec, Simulide, CircuitLab, QElectroTech, Circuit Sims, DcAcLab, Every Circuit, DoCircuitsetc. for carrying out the lab simulation listed below.
Use of Professional Licensed versions of softwares like MATLAB, LabVIEW, NI Multisim, PSpice, PowerSim, TINA etc. is also allowed.

Use of 'Python' platform for simulating components/ circuit behaviour.

MC310: GENDER SENSITIZATION LABORATORY

B.TECH II YEAR I SEMESTER

L	T	P	C
0	0	2	0

PREREQUISITES: No

COURSE OBJECTIVE:

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence and to expose students to more egalitarian interactions between men and women

COURSE OUTCOME: Upon completion of the course, students will be able to:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labor and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals. Students will develop a sense of appreciation of women in all walks of life.

Unit-1 Understanding Gender

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste

Unit-2 Gender Roles And Relations

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender RolesGender Roles and Relationships Matrix-Missing Women-Sex Selection and Its ConsequencesDeclining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit-3 Gender And Labour

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming.

Unit-4 Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit-5 Gender And Culture

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa ParksThe Brave Heart.

TEXT BOOK:

1. "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

ASSESSMENT AND GRADING:**:**

1. Discussion & Classroom Participation: 20%
2. Project/Assignment: 30%
3. End Term Exam: 50%

Note: Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender"

EE401PC: POWER SYTEMS-I

B.TECH. II YEAR II SEMESTER	L	T	P	C
	3	0	0	3

Prerequisite: Solid Mechanics & Hydraulic Machines, Electrical Machines-I &II

Course Objectives:

1. To understand the power generation through conventional and non-conventional sources.
2. To illustrate the economic aspects of power generation and tariff methods.
3. To know about overhead line insulators.
4. To distinguish different types of substations.
5. To understand the concepts of AC & DC distribution systems.

Course Outcomes: Upon completing this course, the student will be able to

6. Understand the operation of conventional and renewable electrical power generating stations.
7. Evaluate the power tariff methods and Economics associated with power generation.
8. Analyze the operations of Overhead transmission lines.
9. Understand the operations AIS & GIS.
10. Analyze the operation of DC and AC Distribution systems.

UNIT: I GENERATION OF ELECTRIC POWER 10L

Conventional Sources (Qualitative): Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant. Non-Conventional Sources (Elementary Treatment):
Solar Energy, Wind Energy, Fuel Cells, Ocean Energy, Tidal Energy, Wave Energy, Cogeneration, Energy conservation and storage.

UNIT: II ECONOMICS OF POWER GENERATION 10L

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

UNIT: III OVER HEAD TRANSMISSION LINES 10L

Line conductors, inductance, and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and effect of earth on capacitance, skin and proximity effects.

OVERHEAD LINE INSULATORS: Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators, Sag and tension calculations.

UNIT: IV SUBSTATIONS 10L

AIR INSULATED SUBSTATIONS (AIS): Indoor & Outdoor substations: Substations layout 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, main and transfer bus bar system with relevant diagrams. GAS INSULATED SUBSTATIONS (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations

UNIT: V DC AND AC DISTRIBUTION 10L

DC DISTRIBUTION: Classification of Distribution Systems. - Comparison of DC vs. AC and Under-Ground vs. Over- Head Distribution Systems. - Requirements and Design features of Distribution Systems. -Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

A.C. DISTRIBUTION: Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

TEXTBOOKS:

1. C.L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", 3rd Edition, New Age International, 2015.
2. A. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Textbook on Power System Engineering", Dhanpat Rai Publishing Company (P) Ltd, 2009.

REFERENCE BOOKS:

1. C.L. Wadhwa, "Electrical Power Systems", 8th Edition, New Age International, 2022.
2. M.V. Deshpande, "Elements of Electrical Power Station Design", 3rd Edition, Wheeler Pub.1998.
3. H. Cotton & H. Barber, "The Transmission and Distribution of Electrical Energy", 3rd Edition, 1970.

WEB REFERENCES:

1. https://nptel.ac.in/courses/108105104
2. https://nptel.ac.in/courses/108105067

EE402PC: MEASUREMENTS AND INSTRUMENTATION

B.TECH. II YEAR II SEMESTER	L	T	P	C
	3	0	0	3

Prerequisite: Electrical Circuit Analysis-I & II, Analog Electronics, Electro Magnetic Fields

Course Objectives:

1. To introduce the basic principles of all measuring instruments
2. To understand the constructional details and principle of operation of basic analog and digital measuring instruments.
3. To deal with the measurement of voltage, current, Power factor, power, energy, and magnetic measurements.
4. To understand the basic concepts of smart and digital metering.
5. To know about the working of Cathode Ray Oscilloscope

Course Outcomes: Upon completing this course, the student will be able to

1. Illustrate different types of measuring instruments, their construction, operation and characteristics
2. Identify the instruments suitable for typical measurements
3. Apply the knowledge about transducers and instrument transformers to use them effectively.
4. Analyze smart and digital metering for industrial applications.
5. Examine the operation of potentiometer for calibration of Instruments.

UNIT: I INTRODUCTION TO MEASURING INSTRUMENTS 10L

Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – extension of range of E.S. Voltmeters.

UNIT: II POTENTIOMETERS & INSTRUMENT TRANSFORMERS 10L

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications. CT and PT – Ratio and phase angle errors

UNIT: III MEASUREMENT OF POWER & ENERGY 10L

Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeters, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems. Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – tri-vector meter, maximum demand meters.

UNIT: IV DC & AC BRIDGES 10L

Method of measuring low, medium and high resistance – sensitivity of Wheatstone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method. Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson's bridge - Owen's bridge. Measurement of capacitance and loss angle – Desaunty's Bridge - Wien's bridge – Schering Bridge.

UNIT: V TRANSDUCERS 10L

Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics, and choice of transducers; Principal operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes. INTRODUCTION TO SMART AND DIGITAL METERING: Digital Multi-meter, True RMS meters, Clamp- on meters, Digital Energy Meter, Cathode Ray Oscilloscope, Digital Storage Oscilloscope.

TEXTBOOKS:

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications,2005.
2. William D. Cooper, Albert D. Helfrick, "Electronic Instrumentation and Measurement Techniques" Prentice Hall; 3rd edition, 1985

REFERENCE BOOKS:

1. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing, 2011
2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers 1989.
3. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition,2016.
4. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd.,2007.
5. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
6. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New AgeInternational (P) Limited Publishers, 1st Edition 2010.

WEB REFERENCES:

1. https://nptel.ac.in/courses/108/105/108105153/
2. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ee44/
3. https://www.classcentral.com/course/swayam-electrical-measurement-and-electronic-instruments-14032

EE403PC: ELECTRICAL MACHINES – II

B.TECH. II YEAR II SEMESTER	L	T	P	C
	3	0	0	3

Prerequisite: Electrical Circuit Analysis-I & II, Electrical Machines-I

Course Objectives:

1. To deal with the detailed analysis of poly-phase induction motors & Alternators.
2. To understand operation, construction, and types of single-phase motors and
3. To understand the applications of in household appliances and control systems.
4. To introduce the concept of parallel operation of alternators.
5. To Know about the working of BLDC motor & its applications.

Course Outcomes: Upon completing this course, the student will be able to

1. Analyze the concept of rotating magnetic fields.
2. Calculate maximum and starting torque
3. Determine Regulation by synchronous impedance method, M.M.F. method
4. Analyze parallel operation and load sharing of synchronous motor
5. Apply concepts of Motors Step Motors.

UNIT: I POLY-PHASE INDUCTION MACHINES 10L

Constructional details of cage and wound rotor machines- production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and Power factor at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation.

UNIT: II INDUCTION MACHINES 10L

Torque equation-expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram - crawling and cogging, No-load Test and Blocked rotor test –Predetermination of performance-Methods of starting and starting current and Torque calculations, Applications. SPEED CONTROL METHODS: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation

UNIT: III SYNCHRONOUS MACHINES 10L

Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics. Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two

reaction analysis – experimental determination of Xd and Xq (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT-IV PARALLEL OPERATION OF SYNCHRONOUS MACHINES 10L

Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing -Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactance's and Applications. SYNCHRONOUS MOTORS: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed. - Hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT: V SINGLE PHASE MACHINES 10L

Single phase induction motor – Constructional Features-Double revolving field theory – split-phase motors – AC series motor- Universal Motor- -Shaded pole motor and Applications.

TEXTBOOKS:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers,2004.

WEB REFERENCES:

1. https://nptel.ac.in/courses/108102146
2. https://onlinecourses.nptel.ac.in/noc22_ee06/preview

EC404ES: DIGITAL CIRCUITS

B. Tech. II Year II Sem. **L T P C**

2 0 0 2

Prerequisites: Analog Electronics

Course Objectives:

□ To learn fundamental concepts of digital system design and common forms of number representations and their conversions.

□ To implement and design logical operations using combinational logic circuits and sequential logic circuits.

□ To understand the semiconductor memories and programmable logic devices.

Course Outcomes: After learning the contents of this paper the student must be able to

□ Understand the working of logic families and logic gates.

□ Design and implement Combinational and Sequential logic circuits.

□ Implement the given logical problems using programmable logic devices.

UNIT-I:

Fundamentals of Digital Systems and Logic Families: Digital signals, Digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, Examples of IC gates, Number systems-binary, Signed binary, Octal hexadecimal number, Binary arithmetic, One's and Two's complements arithmetic.

UNIT-II:

Combinational Circuits-I: Standard representation for logic functions, K-map representation and simplification of logic functions using K- map, Minimization of logical functions, Don't care conditions, Multiplexer, De-Multiplexer

UNIT-III:

Combinational Circuits-II: Adders, Subtractors, Carry look ahead adder, Digital comparator, Parity checker/generator, Code converters, Priority encoders, Decoders/Drivers for display devices, Q-M method of function realization.

UNIT-IV:

Sequential Circuits: Introduction to flip-flops, SR, JK, T and D type's flip-flops, Shift registers, Conversion of flip-flops, Ring counter, Ripple (Asynchronous) counters, Synchronous counters.

UNIT-V:

Semiconductor Memories and Programmable Logic Devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read-only memory (ROM), ROM types, Read and write memory (RAM) types, Programmable logic array, Programmable array logic, Field Programmable Gate Array (FPGA).

TEXT BOOKS:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOKS:

1. R.S. Sedha, "A Textbook of Digital Electronics", S.Chand, 2005
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

EE405PC: CONTROL SYSTEMS

B.TECH. II YEAR II SEMESTER **L T P C**

3 1 0 4

Prerequisite: : Matrices and Calculus, Ordinary Differential Equations and Vector Calculus, Numerical Methods and Complex variables

Course Objectives:

1. To understand the different ways of system representations such as Transfer function representation and statespace representations.
2. To study the characteristics of closed loop control system.
3. To evaluate the system performance using time domain analysis and methods for improving it
4. To assess the system performance using frequency domain analysis and techniques for improving theperformance.
5. To Understand the concepts of controllability and observability

Course Outcomes: Upon completing this course, the student will be able to

1. Analyze closed-loop control systems for stability and steady-state performance.
2. Develop the modeling of linear-time-invariant systems using transfer function and state spaceRepresentations.
3. Evaluate transfer function for a given control system problems.
4. Formulate different types of analysis in frequency domain to explain the nature of the system.
5. Identify the needs of different types of controllers and compensators to ascertain the required dynamicresponse.

UNIT: I MODELLING OF PHYSICAL SYSTEMS 10L

Basic Components of a control Systems, Classification of control systems-Linear &Non-Linear, Time-Variant &Invariant, Continuous & Discrete, Dynamic &Static, andOpen-Loop &Closed-loop systems. Examples and Characteristics of Open Loop and closed Loop Control Systems. Mathematical models of physical systems- Transfer function -Electrical and Mechanical Systems. Block diagram representation and reduction techniques-Signal Flow Graphs.

UNIT: II TIME RESPONSE ANALYSIS 10L

Time response of first and second order systems for standard test inputs. Application of initial and final value theorem, Design specifications for second-order systems based on the time-response. Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems

UNIT: III STABILITY ANALYSIS 10L

Concept of Stability. Routh-Hurwitz Criteria. Relative and Conditional stability analysis – 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: IV FREQUENCY RESPONSE ANALYSIS 10L

Relationship between time and frequency response, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin. Closed loop frequency response

UNIT: V STATE VARIABLS ANALYSIS 10L

State space model. Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability and observability. Effect of Lag, lead and lag-lead compensation on frequency response-Design of Lag, lead and lag & lead compensator using bode plots

TEXTBOOKS:

1. M. Gopal, “Control Systems: Principles and Design”, McGraw Hill Education, 1997.
2. B. C. Kuo, “Automatic Control System”, Prentice Hall, 1995.

REFERENCE BOOKS:

1. K. Ogata, “Modern Control Engineering”, Prentice Hall, 1991.
2. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International, 2009.

WEB REFERENCES:

1. https://en.wikibooks.org/wiki/Control_Systems/Resources

E TEXTBOOKS:

1. https://www.pdfdrive.com/the-control-systems-handbook-control-system-advanced-methods-second- edition-electrical-engineering-handbook-d175616386.html
2. https://www.pdfdrive.com/linear-control-system-analysis-and-design-with-matlab-sixth-edition- automation-and-control-engineering-book-53-d187590194.html

EC406ES: DIGITAL CIRCUITS LABORATORY

B. Tech. II Year II Sem. **L T P C**

0 0 2 1

Prerequisites: Analog Electronics & Digital Electronics

Course Objectives:

□ To learn basic techniques for the design of digital circuits and number conversion systems.

□ To implement simple logical operations using combinational logic circuits.

□ To design combinational logic circuits, sequential logic circuits.

Course Outcomes: After learning the contents of this paper the student must be able to

□ Understand the working of logic families and logic gates.

□ Design and implement Combinational and Sequential logic circuits.

□ **Analyze different types of semiconductor memories.**

List of Experiments:

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND/NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4-bit pseudo random sequence generator using logic gates.
7. Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
8. Design and realization Asynchronous and Synchronous counters using flip-flops
9. Design and realization 8x1 using 2x1 mux
10. **Design and realization 2-bit comparator**
11. Verification of truth tables and excitation tables
12. Realization of logic gates using DTL, TTL, ECL, etc.,

TEXT BOOKS:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOKS:

1. R.S. Sedha, “A Textbook of Digital Electronics”, S.Chand, 2005

2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

EE407PC: MEASUREMENTS AND INSTRUMENTATION LABORATORY

B.TECH. II YEAR II SEMESTER

L	T	P	C
0	0	2	1

Prerequisite: Measurements and Instrumentation

Course Objectives:

1. To calibrate LPF Watt Meter, energy meter, P. F Meter using electro dynamo meter type instrument as the standard instrument
2. To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges
3. To determine three phase powers using single wattmeter method practically
4. To determine the ratio and phase angle errors of current transformer and potential transformer.
5. To perform Dielectric oil testing using H.T. testing Kit

Course Outcomes: Upon completing this course, the student will be able to

1. To select instruments.
2. Analyze any electrical instrument
3. Find the accuracy of any instrument by performing experiment.
4. Calibrate PMMC instrument using D.C potentiometer.
5. Estimate the Strength of Dielectric oil.

List of Experiments:

The following experiments are required to be conducted as compulsory experiments:

1. Calibration and Testing of single-phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit.
6. Schering Bridge & Anderson Bridge.
7. Measurement of 3 - Phase reactive power with single-phase wattmeter.
8. Measurement of displacement with the help of LVDT.

In addition to the above eight experiments, at least any two of the experiments from the following
list are required to be conducted:

1. Calibration LPF wattmeter – by Phantom testing.
2. Measurement of 3-phase power with single watt meter and two CTs.
3. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given CT by Null method.
4. PT testing by comparison – V. G. as Null detector – Measurement of % ratio error and phase angle of the given PT
5. Resistance strain gauge – strain measurements and Calibration.
6. Transformer turns ratio measurement using AC bridges.
7. Measurement of % ratio error and phase angle of given CT by comparison.

WEB REFERENCES: 1. http://vlabs.iitkgp.ernet.in/asnm/exp10/index.html

EE408PC: ELECTRICAL MACHINES – II LABORATORY

B.TECH. II YEAR II SEMESTER

L	T	P	C
0	0	2	1

Prerequisite: Electrical Machines-I & Electrical Machines-II

Course Objectives:

1. To understand the operation of Induction, Synchronous machines and Transformers.
2. To learn the performance analysis of Induction Machines by various testing methods.
3. To study the performance analysis of Synchronous Machines through various testing methods.
4. To analyze the performance of single and 3-phase phase transformer.
5. To determine Xd and Xq parameters of a salient pole synchronous machine

Course Outcomes: Upon completing this course, the student will be able to

1. Assess the performance of different types of AC machines using different testing methods.
2. Analyze the suitability of AC machines for real word applications.
3. Analyze the suitability of Transformers for real word applications.
4. Design the machine models based on the application requirements.
5. Evaluate the Efficiency of a three-phase alternator

List of Experiments:

The following experiments are required to be conducted as compulsory experiments:

1. No-load & Blocked rotor tests on three phase Induction motor
2. Brake test on three phase squirrel cage Induction Motor
3. Equivalent Circuit of a single-phase induction motor
4. Regulation of a three –phase alternator by synchronous impedance method.
5. Regulation of three-phase alternator by Z.P.F method
6. 'V' and 'Inverted V' curves of a three—phase synchronous motor.
7. Determination of Xd and Xq of a salient pole synchronous machine
8. Parallel Operation of Alternators

In addition to the above experiments, at least any two of the following experiments are required to be conducted from the following list:

1. Efficiency of a three-phase alternator
2. Measurement of sequence impedance of a three-phase alternator.
3. Regulation of three-phase alternator by A.S.A method
4. Regulation of a three –phase alternator by m.m.f. method.

WEB REFERENCES:

1. https://ems-iitr.vlabs.ac.in/
2. http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/Sadhya/index.php

EE409PC: Research Oriented Mini Project/Field Based Project

II Year II Semester Real-Time (or) Field-based Research Project course: The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average mark of two Mid-Term examinations is the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the internal committee as per schedule, or (ii) secures less than 40% marks in this course.

MC409: CONSTITUTION OF INDIA

B.TECH II YEAR II SEMESTER

L	T	P	C
3	0	0	0

PREREQUISITES: NILL

COURSE OBJECTIVE: Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.
4. To address the federal structure and distribution of legislative and financial powers between unions and states.
5. Understand the scheme of fundamental rights

COURSE OUTCOME: Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
4. Discuss the passage of the Hindu Code Bill of 1956.
5. Discuss the judicial activism and its historic contributions in the world

Unit - 1

History of Making of the Indian Constitution- History of Drafting Committee.

Unit - 2

Philosophy of the Indian Constitution- Preamble Salient Features

Unit - 3

Contours of Constitutional Rights & Duties - Fundamental Rights: Right to Equality • Right to Freedom • Right against Exploitation • Right to Freedom of Religion • Cultural and Educational Rights • Right to Constitutional Remedies • Directive Principles of State Policy • Fundamental Duties.

Unit - 4

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 5

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Unit - 6

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

REFERENCE BOOKS:

1. Rajeev Bhargava (ed), Ethics and Politics of the Indian Constitution, Oxford University Press, New Delhi, 2008.
2. Granville Austin, The Indian Constitution: Cornerstone of a Nation, Oxford University Press, Oxford, 1966.
3. Zoya Hassan, E. Sridharan and R. Sudarshan (eds), India's Living Constitution: Ideas, Practices, Controversies, Permanent Black, New Delhi, 2002.
4. Subhash C. Kashyap, Our Constitution, National Book Trust, New Delhi, 2011.

WEB REFERENCES:

1. Cec.Ugc. Reference Consortium for Educational Communication, New Delhi, India.
2. https://legislative.gov.in/constitution-of-india.
3. https://www.refworld.org/docid/3ae6b5e20.html.
4. http://164.100.47.193/Refinput/Research_notes/English/04122019_153433_1021204140.pdf.

TEXT BOOKS:

1. An Introduction to the Constitution of India : Author : M.V.Pylee, Vikas Publishing House (PVT) Limited.
2. The Constitution of India, Analysis and Interpretation. Author : Kall Pada Chakravarti, Prentice Halls.
3. Indian Constitution and Indian Polity. Author : S.G.Subramanian, Pearson Publication.