VIGNANA BHARATHI INSTITUTE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

B.Tech. in ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE STRUCTURE & SYLLABUS

(**R22 Regulation**) Applicable from AY 2022-23 Batch

II Year I semester

S. No.	Course Code	Course Title	Category	L	T	P	Credits
1	22BS2113	Numerical Methods and Complex variables	BS	3	1	0	**4**
2	22EE2111	Electrical Machines-I	PC	3	1	0	**4**
3	22EC2116	Analog Electronic Circuits	PC	3	0	0	**3**
4	22EE2112	Power System-I	PC	3	0	0	**3**
5	22EE2114	Electro Magnetic Fields	PC	3	0	0	**3**
6	22EE2151	Electrical Machines Laboratory-I	PC	0	0	2	**1**
7	22EC2154	Analog Electronic Circuits Laboratory	PC	0	0	2	**1**
8	22EE2152	Electrical Simulation tools Laboratory	PC	0	0	2	**1**
9	22MC0004	Gender Sensitization Laboratory	MC	0	0	2	**0**
		Total		15	2	8	**20**

II Year II semester

S. No.	Course Code	Course Title	Category	L	T	P	Credits
1	22ME2216	Solid Mechanics & Hydraulic Machines	PC	3	1	0	**4**
2	22EE2211	Measurements and Instrumentation	PC	3	0	0	**3**
3	22EE2212	Electrical Machines–II	PC	3	0	0	**3**
4	22EC2216	Digital Electronics	PC	2	0	0	**2**
5	22EE2213	Power System-II	PC	3	0	0	**3**
6	22EC2254	Digital Electronics Laboratory	PC	0	0	2	**1**
7	22EE2251	Measurements and Instrumentation Laboratory	PC	0	0	2	**1**
8	22EE2252	Electrical Machines Laboratory-II	PC	0	0	2	**1**
9	22EE2281	Real-time Research Project/ Field Based Project	PW	0	0	4	**2**
10	22MC0003	Constitution of India	MC	3	0	0	**0**
		Total		17	1	10	**20**

22BS2113: NUMERICAL METHODS AND COMPLEX VARIABLES

II B. Tech I Sem

L	T	P	C
3	1	0	4

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

Course Objectives: To learn

- Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
- Various numerical methods to find roots of polynomial and transcendental equations and Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques and solving ordinary differential equations of first order using numerical techniques.
- Differentiation and integration of complex valued functions.
- 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

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

UNIT-I: Fourier series & Fourier Transforms:

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

UNIT-II: Numerical Methods-I:

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 linearsystems 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:

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:

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 theoremswithout Proofs), Conformal mappings, Mobius transformations.

UNIT-V: Complex Integration:

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, 36th 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, 9th Edition, John Wiley & Sons, 2006.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc Graw Hill,2004.

22EE2111: ELECTRICAL MACHINES-I

II B. Tech I Sem

L	T	P	C
3	1	0	4

Prerequisite: Basic Electrical Engineering, Electrical Circuit Analysis-I

Course Objectives:

- To study and understand construction, operation and applications of DC generators
- To study and understand construction, operation and applications of DC Motors
- To study and understand the performance of DC machines by various testing methods
- To study and understand construction, operation of single phase transformers
- To study and understand the performance of single phase transformers by various testing methods and poly phase transformers

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

- Discuss the construction and operation of DC machine
- Discuss the operation, starting and speed control of DC Motor
- Use different tests to calculate the efficiency of DC machines
- Explain the construction and operation of single phase transformers
- Calculate the efficiency and regulation of single phase transformers

UNIT - I:

D.C. GENERATORS:

Principle of operation – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – Derivation of E.M.F Equation, Numerical Problems. Armature reaction - Cross magnetizing and De-magnetizing AT/pole – compensating winding – interpoles. – Commutation - reactance voltage– methods of improving commutation. Types of d c generators – separately excited and self-excited generators – build-up of E.M.F in self excited generator - causes for failure to self-excite and remedial measures - critical field resistance and critical speed, Characteristics and applications of shunt, series and compound generators.

UNIT - II:

D.C MOTORS:

Principle of operation – Significance of Back E.M.F. – Derivation of Torque equation, Numerical Problems. Types of d c motors, Characteristics and Applications of shunt, series and compound motors. Speed control of D.C. Shunt Motors - Armature voltage and field or flux control methods. DC Motor starters - 3 point and 4 point starters.

UNIT - III:

TESTING OF D.C. MACHINES:

Losses - Constant & Variable losses – Efficiency – condition for maximum efficiency, Numerical Problems. Methods of Testing: Direct Test (Brake test), Indirect Test (Swinburne's test) and Regenerative test (Hopkinson's test) - Field's test –separation of stray losses test in d.c.motor.

UNIT - IV:

SINGLE - PHASE TRANSFORMERS:

Working Principle - Constructional details - Types – Derivation of EMF equation and Numerical Problems. Operation on No Load and on Load with Phasor diagrams - Equivalent circuit – Losses, minimization of hysteresis and eddy current losses , - efficiency – condition for maximum efficiency -All day efficiency – Regulation – Numerical Problems. Applications.

UNIT - V:

TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS:

Predetermination of efficiency and regulation by Open Circuit and Short Circuit tests - Sumpner's test – separation of core losses by experimental method - parallel operation withequal 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, open Δ and Scott connection and Applications.

TEXT BOOKS:

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. Abhijith Chakrabarthi & Subitha Debnath, "Electrical Machines", Mc Graw Hill, 2015

2. A. E. Fitzgerald and C.Kingsley, "Electric Machinery", NewYork, McGraw Hill Education, 2013

3. A. 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.

22EC2116: ANALOG ELECTRONIC CIRCUITS

II B. Tech 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
- To 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

- Explain the characteristics, utilization of various components.
- Express the biasing techniques
- Analyze various rectifiers, small signal amplifier circuits.
- Analyze sinusoidal and non-sinusoidal oscillators.
- Apply OP-AMP based circuits with linear integrated circuits.

UNIT-I:

Diode and Bipolar Transistor Circuits: P-N junction diode- Forward and Reverse Bias, I-V characteristics of a diode; Zener Diode as a voltage regulator, review of half-wave and full-wave rectifier. BJT construction and operation, 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 V-I Characteristics, MOSFET structure, Enhancement mode, Depletion mode 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 amplifier.

UNIT-III:

Multi-Stage and Power Amplifiers: Multi stage amplifiers, Coupling - Direct coupled and RC Coupled amplifiers; Power amplifiers - Class A, Class B, Class AB and 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, Waveform generators Square-wave and triangular wave generators.

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition2010
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.

22EE2112: POWER SYSTEM-I

II B. Tech I Sem

L	T	P	C
3	0	0	3

Prerequisite: Electrical CircuitAnalysis-1&Electrical Circuit Analysis-2

Course Objectives:

- To understand the different types of power generating stations
- To understand the economic aspects of power generation and tariff methods
- To understand A.C. and D.C. distribution systems.
- To understand the different grading techniques of insulators and substation concepts.
- To understand the importance of power factor and voltage control methods in power system.

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

- Draw the layout of conventional and nonconventional powers plants and explain its operation.
- Illustrate various economic aspects of the power plant erection, operation and different tariff methods
- Discuss A.C. and D.C. distribution systems and its voltage drop calculations.
- Apply the different grading techniques for the protection of insulators and understand substation concepts.
- Analyze different voltage control techniques for the control reactive power in power system.

UNIT- I GENERATION OF ELECTRIC POWER

Generating stations: Layout and major components of Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant (Qualitative treatment only).
Non-Conventional Energy Sources: Principles of Solar, Wind and Geothermal Power Generations (Elementary treatment only).

UNIT – IIECONOMIC ASPECTS OF POWER GENERATION: Types of loads, connected load, maximum demand. Load curve, load duration and integrated load duration curves-load factor, demand factor, diversity factor, plant capacity factor, utilization and plant use factors- Numerical Problems.
Tariff Methods: Costs of Electrical Energy-Fixed, Semi-fixed and Running Cost. Desirable Characteristics of a Tariff. Types of Tariff: Simple, Flat Rate, Block-Rate, two-part, three –part, power factor tariff methods and Numerical Problems.

UNIT – III 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.

AC DISTRIBUTION

Introduction, AC distribution, 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.

UNIT-IV OVERHEAD LINE INSULATORS:

Types of Insulators, voltage distribution, calculation of string efficiency, Numerical problems. Methods for improving String efficiency-Capacitance grading and Static Shielding.

SUBSTATIONS: Substations classification, Comparison between Indoor and Outdoor substations, Representation of Equipment in Substation, Layout showing the location of all the substation equipment, Bus bar arrangements in the substation: Single bus bar, Sectionalized single bus bar, main and transfer bus bar system.

UNIT-V POWER FACTOR AND VOLTAGE CONTROL:

Causes and disadvantages of low power factor, methods of improving the power factor– most economical power factor for constant KW loads, numerical problems. Methods of voltage control-shunt capacitors, series capacitors, synchronous capacitors, tap-changing and booster transformers.

TEXT BOOKS:

1. "C. L. Wadhawa", "Generation and utilization of Electrical Energy", New age International (P) Limited, Publishers1997.
2. 2. "V.K Mehta and Rohit Mehta", "Principles of Power Systems", S. Chand & Company Ltd, New Delhi, 2004.
3. "M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakraborti", "A Text Book on PowerSystem Engineering", Dhanpat Rai and Co. Pvt. Ltd,1999.

REFERENCE BOOKS:

1. "M.V. Deshpande", "Elements of Power Station design and practice", Wheeler Publishing, 3rd Edition, 1999.
2. "S. N. Singh", "Electrical Power Generation, Transmission and Distribution", PHI, 2003.

22EE2114: ELECTROMAGNETIC FIELDS

II B. Tech I Sem

L	T	P	C
3	0	0	3

Prerequisites: Applied Physics

Course Objectives:

- To study the concepts of static electric field.
- To acquire knowledge on the concepts of Conductors, Dielectrics and Capacitance
- To know the concepts of static magnetic field
- To learn the concepts of Time Varying Fields and Maxwell's Equations
- To study the concepts of electromagnetic waves

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

- Determine the electric field intensity due to various charge configurations
- Discuss the concepts of Conductors, Dielectrics and Capacitance
- Determine the magnetic field intensity due to various current carrying conductors
- Derive Maxwell's Equations in point form and integral form
- Derive electromagnetic wave equation and discuss the propagation of wave indifferent mediums.

UNIT - I:

STATIC ELECTRIC FIELD: Scalar and vector fields, overview of coordinate system, Types of various charge distributions, Coulomb's law, Electrical field intensity, Electrical field intensity due to point charges, Line and Surface(Sheet) charge distributions, Electric flux density, Gauss's law and its applications, Divergence of electrostatic field. Absolute Electric potential, potential difference, Calculation of potential difference due to point and line charge distributions, potential gradient. Electric dipole, Dipole moment, potential and electric field due to an electric dipole. Energy density in Electrostatic field.

UNIT - II:

CONDUCTORS, DIELECTRICS AND CAPACITANCE: Current and current density, Continuity equation, Conductors and their properties, Ohm's Law in Point form. Dielectrics, Boundary conditions between conductor and dielectric, Boundary conditions between two dielectric materials. Capacitance, Capacitance of a parallel plate capacitor, Poisson's and Laplace's equations, Solution of Laplace equation for one dimensional variation.

UNIT - III:

STATIC MAGNETIC FIELDS AND MAGNETIC FORCES: Magnetic field intensity, magnetic flux density, Biot-Savart's law, magnetic field intensity due to straight wire and circular loop carrying steady current. Ampere's Law and its applications, Divergence and curl of Magnetic field, Scalar and Vector Magnetic potentials, Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic materials, Magnetic boundary conditions, Magnetic Circuit, inductance, self Inductance of solenoid and toroid, Mutual Inductance.

UNIT - IV:

TIME VARYING FIELDS AND MAXWELL'S EQUATIONS: Faraday's law, transformer emf and motional emf, Displacement current, Maxwell's equation in Point form,Maxwell's equations in Integral form.

UNIT - V:

ELECTROMAGNETIC WAVES: Derivation of Electromagnetic Wave Equation, Maxwell's equation in Phasor form, Wave equation in Phasor form, Uniform Plane wave in free space and lossy dielectrics, Propagation of EM wave in good conductors. PoyntingN theorem.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
2. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
3. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
4. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, NewDelhi, 2009.
5. B. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley EducationalPublishers, International Edition, 1971.

22EE2151: ELECTRICAL MACHINES LABORATORY-I

II B. Tech I Sem

L	T	P	C
0	0	2	1

Prerequisite: Electrical Machine-I

Course Objectives:

- To conduct various tests on different D C Generators
- To conduct various tests on different D C Motors
- To perform different tests on Single and Three Phase Transformers

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

- Determine the characteristics of different d c generators using different testing methods.
- Determine the performance of different d c motors using different testing methods.
- Calculate Efficiency and Regulation of different Transformers using different testing methods

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

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 Hopkinson's test on two identical DC shunt machines (Predetermination of efficiency)
5 Swinburne's test on DC Machine (Predetermination of efficiencies)
6 Speed control of DC shunt motor using Armature control and Field control Methods
7 Brake test on DC shunt motor (Determination of performance curves)
8 OC and SC Tests on Single Phase Transformer

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

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

TEXT BOOKS:

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. PrithwirajPurkait, 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”, CBSPublishers, 2004.

22EC2154: ANALOG ELECTRONIC CIRCUITS LABORATORY

II B. Tech 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
- To 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.
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

22EE2152: ELECTRICAL SIMULATION TOOLS LABORATORY

II B. Tech I Sem

L	T	P	C
0	0	2	1

Course Objectives:

- To understand basic block sets of different simulation platform used in electrical/electronic circuit design.
- To understand use and coding in different software tools used in electrical/ electronic circuit design.
- To understand the simulation of electric machines/circuits for performance analysis.

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

- Develop knowledge of software packages to model and program electrical and electronics systems.
- Model different electrical and electronic systems and analyze the results.
- Articulate importance of software packages used for simulation in laboratory experimentation by analyzing the simulation results.

Any **ten experiments** need to be performed from the following experiments 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

TEXT BOOKS:

1. M. H. Rashid, Simulation of Electric and Electronic circuits using PSPICE – by M/s PHI Publications.
2. Agam Kumar Tyagi, "MATLAB and SIMULINK for Engineers" OUP Publisher, 2012.
3. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education,1997.
4. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.

REFERENCE BOOKS:

1. "A. K. Sawhney", "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications, 2005.
2. Reference guides of related software's
3. Rashid, Spice for power electronics and electric power, CRC Press

22MC0004: GENDER SENSITIZATION LABORATORY

II B. Tech I Sem

L	T	P	C
0	0	2	0

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course

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

Learning Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- 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.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labor and its relation to politics and economics.
- 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.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I: 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 – II: GENDER ROLES AND RELATIONS

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

Unit – III: 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 – IV: 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 – V: 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 Parks- The Brave Heart.

Note: **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**

- **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".**

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

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

22ME2216: SOLID MECHANICS AND HYDRAULIC MACHINES

II B. Tech II Sem

L	T	P	C
3	1	0	4

Course Objectives:

- To Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
- To Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections.
- To Solve Kinetics and Kinematics problems
- To understand the basics of Hydraulic machinery
- To evaluate the performance of hydraulic turbines and Pumps

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

- Apply the concepts of Engineering Mechanics and Solve the different force systems
- Determine centroid, moment of Inertia and stress, strains of different members
- Solve Kinetics and Kinematics Problems
- Explain the concepts of Hydraulics and Hydraulic Machinery
- Determine the Efficiencies of Hydraulic Turbines and Pumps

UNIT - I:

INTRODUCTION OF ENGINEERING MECHANICS: Basic concepts of System of Forces-Coplanar Forces–Components in Space–Resultant- Moment of Forces and its 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.

UNIT - II:

CENTROID AND CENTER OF GRAVITY: Centroids – Theorem of Pappus- Centroids of Composite figures – Centre of Gravity of Bodies – Area moment of 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, Elastic constants and the relationship between them.

UNIT - III:

KINEMATICS & KINETICS: Introduction – Rectilinear motion – Motion with uniform an variable acceleration–Curvilinear motion– Components of motion– Circular motion Kinetic of a particle – D'Alembert's principle – Motion in a curved path – work, energy and powe Principle of conservation of energy – Kinetics of a rigid body in translation, rotation – wor 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. A.K.Tayal, "Engineering Mechanics" , Umesh Publication
2. M.V. Seshagirirao and Durgaih, "Engineering Mechanics",University Press.
3. P.N Modi and Seth, "Fluid Mechanics and Hydraulic Machinery", standard Book House

REFERENCE BOOKS:

1. B. Bhattacharya, "Engineering Mechanics", Oxford University Publications
2. D.S.Kumar, "Fluid Mechanic & Fluid Power Engineering", Kataria & Sons Publications Pvt. Ltd
3. Banga & Sharma, "Hydraulic Machines" Khanna Publishers.

22EE2211: MEASUREMENTS AND INSTRUMENTATION

II B. Tech II Sem

L	T	P	C
3	0	0	3

Prerequisites: Electrical Circuit Analysis-1, Electrical Circuit Analysis-2, Analog Electronics, Electro Magnetic Fields.

Course Objectives:

- To impart knowledge on Construction, basic principles of all measuring instruments
- To impart knowledge on working principles of Potentiometers and Instrument transformers
- To acquire knowledge on Wattmeter and Energy meter.
- To study different bridge circuits for finding R LC parameters.
- To understand the basic concepts of smart and digital metering

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

- Classify measuring instruments and discuss their construction, operation and characteristics.
- Discuss the Potentiometers and Instrument Transformers
- Demonstrate the working principles of wattmeter and Energy meter
- Calculate all circuit parameters
- Classify Transducers and discuss the concepts of smart and digital metering

UNIT - I:

INTRODUCTION TO MEASURING INSTRUMENTS: 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: 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: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, 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: 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: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle 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.

TEXT BOOKS:

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications, 2005.

2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers 1989.

REFERENCE BOOKS:

1.G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016.

2.R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand andCompany Ltd., 2007

3.E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments",fifth Edition, Wheeler Publishing, 2011.

4. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.

22EE2212: ELECTRICAL MACHINES-II

II B. Tech II Sem

L	T	P	C
3	0	0	3

Pre requisites: Electrical Circuit Analysis-1, Electrical Circuit Analysis-2 & Electrical Machines-I

Course Objectives:

- To impart knowledge on Construction, principle of operation of three phase induction motors.
- To impart knowledge on the performance, Starting and speed control of three phase induction motors.
- To acquire knowledge on the Alternators.
- To study the concept of parallel operation of alternators and synchronous motors
- To understand operation, construction and types of single-phase motors and their applications in household appliances.

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

- Discuss the Construction and the principle of operation of three phase induction motors.
- Determine the performance and discuss the methods of Starting and speed control of three phase induction motors**.**
- Calculate the voltage regulation of different alternators by using different methods**.**
- Discuss the concept of parallel operation of alternators and describe the synchronous motors
- Classify various types of single-phase motors

UNIT - I:

THREE PHASE INDUCTION MOTOR: Constructional details of squirrel cage and slip ring(wound rotor) motors, 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:

CHARACTERISTICS OF THREE PHASE INDUCTION MOTOR: 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. Applications. Induction generator-principle of Operation.

STARTING AND SPEED CONTROL METHODS: Methods of starting, starting current and Torque calculations. Methods of speed control Change of voltage, change of frequency, voltage/frequency, and injection of an EMF into rotor circuit (qualitative treatment only).

UNIT - III:

SYNCHRONOUS GENERATOR: Constructional Features of Cylindrical (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 and Z.P.F. method. Salient pole alternators – two reaction analysis – Experimental determination of X_d and X_q (Slip test), Phasor diagrams – Regulation of salient pole alternators.

UNIT - IV:

PARALLEL OPERATION OF SYNCHRONOUS GENERATORS: 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 reactances 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.

UNIT - V:

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

TEXT BOOKS:

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.

22EC2216: DIGITAL ELECTRONICS

II B. Tech 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.
- Familiarize the Boolean function minimization.
- To implement and design logical operations using combinational logic circuits and sequential logic circuits.
- To implement and design logical operations using sequential logic circuits.
- To understand the semiconductor memories and programmable logic devices.

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

- Understand the working of logic families and logic gates.
- Understand the minimization of Boolean functions.
- Design and implementation of Combinational logic circuits.
- Design and implementation of 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. Digital Logic Families, TTL and CMOS Logic.

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, Q-M method of function realization.

UNIT-III:

Combinational Circuits-II: Adders, Subtractors, Carry look ahead adder, Digital comparator, Parity checker/generator, Code converters, Multiplexer, De-Multiplexer, Priority encoders, Decoders/Drivers for display devices,

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.

22EE2213: POWER SYSTEMS-II

II B. Tech II Sem

L	T	P	C
3	0	0	3

Prerequisite: Power Systems –I and Electro Magnetic Fields

Course Objectives:

- To determine the parameters of transmission line.
- To analyze the performance of transmission lines.
- To interpret the transient phenomenon of transmission lines.
- To know the factors effecting performance of lines
- To interpret the underground cables.

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

- Determine the parameters of transmission line.
- Analyze the performance of transmission lines in terms of voltage regulation and efficiency.
- Interpret the transient phenomenon of transmission lines.
- Explain the factors effecting performance of lines.
- Interpret the underground cables.

UNIT - I:

TRANSMISSION LINE PARAMETERS: Constants of Transmission line - calculation of resistance of a transmission line- calculation of inductance of a single phase two wire line, inductance of three phase single and double circuit line-symmetrical spacing, unsymmetrical spacing but transposed, concept of GMR and GMD, Numerical Problems. Calculation of capacitance ofa single phase 2- wire line, effect of ground on capacitance, capacitance of three phase single and double circuit line-symmetrical spacing, unsymmetrical spacing but transposed, Numerical problems.

UNIT - II:

PERFORMANCE OF OVERHEAD TRANSMISSION LINES: Classification of overhead Transmission Lines – Definitions of Transmission efficiency and voltage regulation. Performance of single-phase short transmission line taking Vr as reference, Medium transmission line: Nominal-T, Nominal-Pie methods and A, B, C, D Constants, Numerical Problems.

Long Transmission Lines: Long Transmission Line - Rigorous Solution, Evaluation of A, B, C, D Constants, Numerical problems, Equivalent T and Pie representation of long lines.

UNIT - III:

TRAVELING WAVES ON TRANSMISSION LINE:

Surge Impedance, Surge Impedance loading, Wave Length and Velocity of Propagation of waves. Production of travelling waves, open circuited line, short circuited line, Line terminated through a resistance-reflection and refraction coefficients, Line terminated through inductance and capacitance. Line terminated by T-junction, Numerical problems.

UNIT - IV:

VARIOUS FACTORS GOVERNING THE PERFORMANCE OF TRANSMISSION LINE: Skin, Proximity and Ferranti effects - Description. Corona - Description of the phenomenon, factors affecting corona, advantages, disadvantages of corona, critical and visual disruptive voltages, and power loss. Numerical problems. Radio Interference definition.

Sag and Tension Calculations: Sag and Tension calculations with equal and unequal heights of towers, Numerical Problems - Stringing chart and sag template and its applications.

UNIT - V:

UNDER GROUND CABLES: Classification of cables, properties of insulating materials of cable, construction of single core cable, calculation of insulation resistance and stress in insulation, numerical problems. Capacitance of single core cable, numerical problems. Grading of cables- capacitance grading, inter-sheath grading.

TEXT BOOKS:

1. M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakraborti, "A Text Book onPower System Engineering", Dhanpat Rai and Co. Pvt. Ltd,1999.

2. "V.K Mehta and Rohit Mehta", "Principles of Power Systems", S. Chand & Company Ltd, New Delhi, 2004.

3. "C. L. Wadhwa", "Electrical power systems", New Age International (P) Limited Publishers, 1998.

REFERENCE BOOKS:

1. "I. J. Nagarath& D. P Kothari" , "Power System Engineering", TMH, 2nd Edition 2010

2. "B. R. Gupta", "Power System Analysis and Design", Wheeler Publishing, 1998.

22EC2254: DIGITAL ELECTRONICS LABORATORY

II B. Tech II Sem

L	T	P	C
0	0	2	1

Prerequisites: Analog Electronics and 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.

22EE2251: MEASUREMENTS AND INSTRUMENTATION LABORATORY

II B. Tech II Sem

L	T	P	C
0	0	2	1

Prerequisite: Measurements and Instrumentation

Course Objectives:

- To understand calibration of LPF Watt Meter, Energy Meter and Power Factor Meter using electro dynamo meter type instrument as the standard instrument.
- To understand calibration of PMMC instrument using D.C potentiometer
- To understand the procedure to know the unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges
- To understand the procedure to know three phase active & reactive powers using single wattmeter method practically
- To understand the procedure to know the ratio and phase angle errors of current transformer and potential transformer.

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

- Calibrate LPF Watt Meter, Energy Meter and Power Factor Meter
- Calibrate PMMC instrument using D.C potentiometer
- Determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges.
- Determine three phase active & reactive power
- Determine the ratio and phase angle errors of current transformer and potential transformer.

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

Part – A

1. Calibration and Testing of Single-Phase Energy Meter.
2. Calibration of Dynamometer Power Factor Meter.
3. Calibration of PMMC voltmeter using Crompton D.C. Potentiometer.
4. Kelvin's Double Bridge – Measurement of Resistance – Determination of Tolerance.
5. Dielectric Oil Testing using H. T. Testing Kit.
6. Measurement of Capacitance using Schering Bridge & Measurement of Inductance using Anderson Bridge.
7. Measurement of 3 – Phase Reactive Power with Single 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.

Part-B

9. Calibration of LPF Wattmeter by Phantom Testing.
10. Transformer Turns Ratio Measurement using AC Bridges.
11. Measurement of 3-Phase Power with Single Wattmeter and Two C.T's
12. Measurement of % Ratio Error and Phase Angle of given C T by Comparison
13. Resistance Strain Gauge – Strain Measurements and Calibration.
14. Measurements of Parameter of Choke Coil using 3-Ammeter and 3-Voltmeter method.

TEXT BOOKS:

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co.
Publications, 2005.
2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers 1989.

REFERENCE BOOKS:

1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand andCompany Ltd., 2007.
3. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments",
fifth Edition, Wheeler Publishing, 2011

22EE2252: ELECTRICAL MACHINES LABORATORY-II

II B. Tech II Sem

L	T	P	C
0	0	2	1

Prerequisite: Electrical Machine-I and Electrical Machines-II

Course Objectives:

- To perform different tests on different Transformers
- To conduct various tests on different Induction motors
- To conduct various tests on different Synchronous Machines

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

- Determine the Performance of different Transformers using different testing methods.
- Determine the performance of different Induction motors using different testing methods.
- Calculate the Regulation and performance of synchronous machines using different testing methods

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

1 Sumpner's test on a pair of single-phase transformers
2 Equivalent Circuit of a single-phase induction motor
3 No-load & Blocked rotor tests on three phase Induction motor
4 Separation of core losses of a single-phase transformer
5 Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
6 Load test on three phase Induction Motor
7 Determination of X_d and X_q of a salient pole synchronous machine
8 'V' and 'Inverted V' curves of a three—phase synchronous motor

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

1 Scott Connection of transformer.
2 Parallel operation of Single-phase Transformers.
3 Heat run test on a bank of 3 Nos. of single-phase Delta connected transformers
4 Vector grouping of Three Transformer.
5 Regulation of three-phase alternator by Z.P.F.
6 Measurement of sequence impedance of a three-phase alternator
7 Efficiency of a three-phase alternator

TEXT BOOKS:

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”, CBSPublishers, 2004.

22MC0003: CONSTITUTION OF INDIA

II B. Tech II Sem

L	T	P	C
3	0	0	0

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- 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.
- 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.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- 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
- Discuss the passage of the Hindu Code Bill of 1956.

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 Zila Panchayat: 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.

SUGGESTED READING:

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