21BS2111: TRANSFORMATION TECHNIQUES AND COMPLEX VARIABLES

B. Tech II Year I Semester

L	T	P	C
3	1	-	4

Pre-requisites: Mathematics-I & Mathematics-II of B. Tech first year

Course Objectives:

- To Understand Fourier series of periodic functions
- To Express Fourier transform of non-periodic functions
- To Learn the Concept of Laplace transforms and their properties to solve ordinary differential equations
- To Recognize the analyticity of complex valued functions
- To Identify the problems involving complex integration

Course Outcomes: After completion of this course, student would be able to

- Expand any periodic function in terms of Fourier sine and cosine series
- Determine Fourier transform of non-periodic functions
- Use the Laplace transforms techniques for solving ordinary differential equations
- Analyze the complex functions through the analyticity
- Evaluate the engineering problems involving complex integration

UNIT-I: Fourier series:

Introduction, Periodic functions, Fourier series of periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half range sine and cosine series.

UNIT-II: Fourier Transforms:

Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.

UNIT-III: Laplace Transforms:

Laplace Transforms: Laplace Transform of standard functions; first& second shifting theorem; Laplace transforms of functions when they are multiplied and divided by't'. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions.

Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

UNIT- IV: Complex Variables (Differentiation):

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate.

UNIT – V: Complex Variables (Integration):

Line integrals, Cauchy's theorem, Cauchy's Integral formula, Liouville's theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem (without proof).

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2020.
2. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 8th Ed., Mc- Graw Hill, 2017
3. Dennis G. Zill and Patrick Shanahan, A First course in complex analysis with applications, Johns and Bartlett Publishers.

REFERENCES:

1. Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley &Sons, 2010.
2. Saff, E.B. and A.D. Sinder, Fundamentals of Complex Analysis, Pearson Publication.
3. T.K.V.Iyengar, B. Krishna Gandhi, S.Ranganatham, M.V.S.S.N.Prasad, Engineering Mathematics-IV, S.Chand.

21EE2112: ELECTRICAL CIRCUITS

B. Tech II Year I Semester

L	T	P	C
3	1	-	4

Prerequisite: Mathematics –II and Basic Electrical Engineering

Course Objectives:

- To understand the network theorems for AC&DC Excitations.
- To understand Network Topology and Three phase circuits
- To analyze transients in Electrical systems.
- To evaluate Network parameters of given Electrical network
- To analyze Magnetic Circuits, and to design basic filter configurations,

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

- Apply network theorems for the analysis of electrical circuits.
- Analyze Network Topology and Three phase circuits
- Obtain the transient and steady-state response of electrical circuits.
- Analyze two port circuit behavior.
- Analyze Magnetic Circuits and to design basic filter configurations,

UNIT – I

Network Theorems (With A.C. & D.C): Thevinin's, Norton's, Maximum Power Transfer, Tellegen's, Superposition, Reciprocity, Milliman's and Compensation theorems for (AC & D.C) excitations.

UNIT – II

Network Topology: Definitions, Graph, Tree, Basic cutset and Basic Tie set Matrices for Planar Networks, Loop and Nodal methods for analysis of Networks with Dependent & Independent Voltage and Current Sources, Duality & Dual Networks

Three Phase Circuits: Phase sequence – Star and delta connection – Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced 3 phase circuits – Measurement of active and reactive power.

UNIT – III

Transient Analysis: Solution of first and second order differential equations for (series and parallel) R-L, R-C, R-L-C circuits – Initial and final conditions in network elements, forced and free response, time constants ,steady state and transient state response for D.C. and AC excitations using classical and Laplace transform methods.

UNIT – IV

Network Parameters: Network functions driving point and transfer impedance function networks-poles and zeros –necessary conditions for driving point function and transfer function.

Two Port Network Parameters – Z, Y, ABCD and hybrid parameters and their inter relations and inter connections.

UNIT – V

Locus Diagrams: Locus diagrams - series R-L, R-C, R-L-C with variation of various parameters.

Magnetic Circuits and Filters: Faraday's laws of electromagnetic induction – concept of self and

mutual inductance, Ideal Transformer Mutual coupled circuits, Dot convention in coupled circuits. Introduction to filters –low pass – high pass and band pass – RC, RL filters.

TEXT BOOKS

1. "William Hayt and Jack E. Kemmerly", "Engineering circuit analysis", McGraw Hill Company, 6th edition,2016.
2. "C.K Alexander &M.N.O Sadiku", Electric circuits, Mc Graw Hill Company.
3. "D. Roy Chowdary", "Networks and systems", New age international publishers, 2009.
4. "N. C. Jagan& C. Lakshminarayana", "Network Theory", B.S Publications, 2014.
5. "A. Chakrabarthy", Circuit Theory, Dhanpat Rai, 2005.

REFERENCES:

1. "Van Valkenburg", "Network Analysis", PHI, 3rd Edition,2014
2. "Franklin F Kuo," "Network Analysis & Synthesis", Wiley India PVT. Ltd., second Edition, 2006
3. "K.C. A. Smith & R. E. Alley", "Electrical Circuits", Cambridge University Press,1992
4. "K. Rajeswaran", "Electric Circuit theory", Pearson Education, 2004.

21EE2113: ELECTRO MAGNETIC FIELDS

B. Tech II Year I Semester

L	T	P	C
3	-	-	3

Prerequisite: Mathematics-II and Applied Physics

Course Objectives:

- To study and understand the concepts of static electric field
- To study and understand the concepts of Conductors, Dielectrics and Capacitance
- To study and understand the concepts of static magnetic field
- To study and understand the concepts of Time Varying Fields and Maxwell's Equations
- To study and understand the concepts of electromagnetic waves

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

- Discuss the concepts of static electric field and determine electric field due to various charge configurations
- Discuss the concepts of Conductors, Dielectrics and calculate the Capacitance
- Discuss the concepts of static magnetic field and determine magnetic force on current elements
- Discuss the concepts of Time Varying Fields and derive Maxwell's Equations in different forms
- Discuss the concepts of electromagnetic waves and derive wave equation

UNIT – I Static Electric Field:

Review of conversion of a vector from one coordinate system to another coordinate system, Del operator, Divergence, Curl, Gradient, Divergence Theorem, Stoke's theorem, 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 and dipole moment, Electrostatic Energy and Energy density.

UNIT – II Conductors, Dielectrics and Capacitance:

Behavior of conductor in electrostatic field, Dielectric constant and strength –Linear, Isotropic and Homogenous Dielectrics. Current and current density, Ohm's 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:

Magnetization in materials – Classification of materials in terms of their magnetic property
Biot- Savart's Law, Ampere's 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:

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:

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.

TEXT BOOKS:

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

REFERENCES:

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. W. J. Duffin, “Advanced Electricity and Magnetism”, McGraw Hill, 1968.
5. E. G. Cullwick, “The Fundamentals of Electromagnetism”, Cambridge University Press, 1966.
6. B. D. Popovic, “Introductory Engineering Electromagnetics”, Addison-Wesley Educational Publishers, International Edition, 1971.
7. A. Pramanik, “Electromagnetism - Theory and applications”, PHI Learning Pvt. Ltd, New Delhi.

21EE2114: ELECTRICAL MACHINES-I

B. Tech II Year I Semester

L	T	P	C
3	1	-	4

Prerequisite: Basic Electrical Engineering

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 demonstrate the ability to

- Describe the construction and operation of DC machine, interpret the armature reaction and the process of commutation
- Discuss starting methods and speed control methods of DC motors
- Calculate the efficiency of DC machines by different tests
- Describe the construction and operation of single phase transformers
- Calculate the efficiency and regulation of single phase transformers by different tests and discuss poly phase transformers connections

UNIT – I D.C. Generators:

Principle of operation – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – E. M.F Equation. Armature reaction – Cross magnetizing and De-magnetizing AT/pole - compensating winding – interpoles. 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 excite and remedial measures. Characteristics of generators and its applications.

UNIT – II D.C Motors:

Principle of operation – Back E.M.F. - Torque equation – characteristics and applications of separately and self excited motors (shunt, series and compound motors), Armature reaction and commutation. Speed control methods of D.C. shunt & series motors, Motor starters - 3 point and 4 point starters – Electronic starters.

UNIT – III Testing of D.C. Machines:

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

UNIT – IV Single - Phase Transformers:

Principle of operation - Constructional details - Types - EMF equation - Operation on No load and On load with Phasor diagrams - Equivalent circuit – Losses, minimization of hysteresis and eddy current losses , effect of variations of frequency & supply voltage on iron losses - efficiency – All day efficiency – Regulation - Cooling methods of transformers.

UNIT – V Testing of Transformers and Poly-Phase Transformers:

Predetermination of efficiency and regulation by OC and SC tests - Sumpner's test - separation of core losses by experimental method - 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 , open Δ and Scott connection of transformers for phase conversion, use of tertiary winding.

TEXT BOOKS:

1. "I.J. Nagrath& D.P. Kothari", "Electric Machines", Tata Mc Graw Hill Publishers, 3rd edition, 2004.
2. "P.S. Bimbra", "Electrical Machines", Khanna Publishers, 7th Edition, 2014.

REFERENCES:

1. E. Clayton & N. M. Hancock "The Performance and Design Of Direct Current Machines" 3rd Edition Pitman, London1959.
2. "A. E. Fritzgerald, C. Kingsley and S. Umans", "Electric Machinary", McGraw Hill Companies, 6th edition, 2003.
3. "Abhijith Chakrabarthi & SubithaDebnath", "Electrical Machines", Mc Graw Hill, 2015.

21EC2116: ANALOG ELECTRONICS

B. Tech II Year I Semester

L	T	P	C
3	-	-	3

Prerequisite: Applied Physics

Course Objectives:

- To study about components such as diodes, BJTs and FETs their switching characteristics, applications and learn the concepts of high frequency analysis of transistors.
- To study and understand various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To study the basic building blocks of linear integrated circuits.
- To study the concepts of waveform generation and introduce some special function ICs
- To study and understand operational amplifiers

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

- discuss the characteristics and usage of various components like diodes, BJTs and discuss the biasing techniques of Transistor
- discuss the concepts and characteristics of JFET and MOSFET
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Discuss the functioning of OP-AMP and design OP-AMP based circuits with linear integrated circuits.

UNIT-I: DIODE 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 AND MOSFET CIRCUITS

Construction and transfer Characteristics of JFETs. 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, transconductance, 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 edition2010
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.

REFERENCES:

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.

21HS2117: UNIVERSAL HUMAN VALUES-II

B. Tech II Year I Semester

L	T	P	C
2	0	0	2

Pre-requisites: Universal Human Values 1 (desirable)

Course Objective: The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes: By the end of the course, Students

1. Are expected to become more aware of themselves, and their surroundings (family, society, nature).
2. Would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. Would have better critical ability.
4. Would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. Would be able to apply what they have learnt, to their own self in different day-to-day settings.

UNIT - I: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

UNIT - II: Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT - III: Understanding Harmony in the Family and Society- Harmony in Human - Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family):Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

UNIT - IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
- Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT - V: Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics:
  a. Ability to utilize the professional competence for augmenting universal human order
  b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
  a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
  b. At the level of society: as mutually enriching institutions and organizations
- Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

TEXT BOOKS

1. RRGaur, R Asthana, G P Bagaria,"A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. RRGaur, R Asthana, G P Bagaria,"Teachers" Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019.ISBN978-93-87034-53-2

REFERENCE BOOKS

1. Jeevan Vidya: E k Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. A.N.Tripathi,"HumanValues",New Age Intl.Publishers,NewDelhi,2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. F Schumacher. "Small is Beautiful"
6. "Slow is Beautiful"–Cecile Andrews
7. J C Kumarappa "Economy of Permanence"
8. Pandit Sunderlal"Bharat Mein Angreji Raj"
9. Dharampal,"Rediscovering India"
10. Mohandas K. Gandhi, "Hind Swarajor Indian Home Rule"
11. "India Wins Freedom"-Maulana Abdul Kalam Azad
12. Vivekananda-Romain Rolland(English)
13. Gandhi-Romain Rolland(English)

21EE2151: ELECTRICAL CIRCUITS LAB

B. Tech II Year I Semester

L	T	P	C
-	-	2	1

Prerequisite: Basic Electrical Engineering, Electrical Circuits

Course Objectives:

- To design electrical systems
- To analyze a given network by applying various Network Theorems
- To measure three phase Active and Reactive power.
- To understand the locus diagrams

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

- Analyze complex DC and AC linear circuits
- Apply concepts of electrical circuits across engineering
- Evaluate response in a given network by using theorems
- To draw the locus diagrams

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

1. Verification of compensation & Milliman's theorems
2. Verification of Reciprocity and Maximum Power Transfer theorems
3. Measurement of Active Power for Star connected balanced loads.
4. Study of Harmonics for Various lighting loads
5. Locus Diagrams of RL and RC Series Circuits
6. Two port network parameters–Z–Y parameters, Analytical verification.
7. Two port network parameters–A, B, C, D & Hybrid parameters, Analytical verification
8. Separation of Self and Mutual inductance in a Coupled Circuit .Determination of Co-efficient of Coupling.

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

9. Time response of first order RL/RC network for Periodic non –Sinusoidal inputs –Time constant and Steady state error determination.
10. Determination of form factor for non-sinusoidal waveform.
11. Series and Parallel Resonance
12. Measurement of Reactive Power for Star connected balanced loads

TEXT BOOKS:

1. M.E.VanValkenburg,"NetworkAnalysis",PrenticeHall,2006.
2. D.RoyChoudhury,"NetworksandSystems",NewAgeInternationalPublications,1998.

REFERENCE BOOKS:

1. W.H.HaytandJ.E.Kemmerly,"EngineeringCircuitAnalysis",McGrawHillEducation,2013.
2. C.K.AlexanderandM.N.O.Sadiku,"ElectricCircuits",McGrawHillEducation,2004.
3. K.V.V.MurthyandM.S.Kamath,"BasicCircuitAnalysis",JaicoPublishers,1999.

21EE2152: ELECTRICAL MACHINES LAB-I

B. Tech II Year I Semester

L	T	P	C
-	-	2	1

Prerequisite: Basic Electrical Engineering, Electrical Machines-I

Course Objective:

- To expose the students to the operation of D C Generator
- To expose the students to the operation of D C Motor.
- To examine the self excitation in D C generators.
- To control the speed of D C motors

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

- Differentiate between various types of D C Machines.
- Analyze the characteristics of D C Generator.
- Analyze the characteristics of D C Motor.
- Able to control the speed of D C motors.

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

Part – A

1. Magnetization characteristics of DC shunt generator
2. Swinburne's Test on D. C. Shunt Machine
3. Brake test on D. C. Shunt motor
4. Speed control of D. C. Shunt Motor
5. Separation of stray losses of a D.C. Shunt Machine
6. Load Test on D. C. Shunt Generator
7. Load Test on D. C. Series Generator
8. Hopkinson's Test on a Pair of Identical D.C. Shunt Machines

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. Field's Test on a pair of Identical D.C. Series Machines
10. Retardation test on DC shunt motor
11. Load Characteristics of D. C. Compound Generator
12. Brake Test on D. C. Compound Motor

TEXT BOOKS:

1. "I.J. Nagrath& D.P. Kothari", "Electric Machines", Tata McGraw Hill Publishers, 3rd edition, 2004.
2. "P.S. Bimbra", "Electrical Machines", Khanna Publishers, 7th Edition, 2014.

REFERENCE BOOKS:

1. E. Clayton & N. M. Hancock "The Performance and Design Of Direct Current Machines" 3rd Edition Pitman, London1959.
2. "A. E. Fritzgerald, C. Kingsley and S. Umans", "Electric Machinary", McGraw Hill Companies, 6th edition, 2003.
3. "Abhijith Chakrabarthi & Subitha Debnath", "Electrical Machines", McGraw Hill, 2015.

21EC2154: ANALOG ELECTRONICS LAB

B. Tech II Year I Semester

L	T	P	C
0	0	2	1

Prerequisite: Analog Electronics

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.

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

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with & without filters
3. Common Emitter Amplifier Characteristics
4. Common Source amplifier Characteristics
5. Measurement of h-parameters of transistor in CB, CE, CC configurations
6. Adder and Subtractor using OpAmp.
7. Integrator Circuit using IC741.
8. Current Shunt Feedback amplifier
9. RC Phase shift Oscillator
10. Class A power amplifier

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

11. Common Base Amplifier Characteristics
12. Inverting and Non-inverting Amplifiers using Op Amps.
13. Differentiator circuit using IC 741.
14. Hartley and Colpitt's Oscillators

21MC0003: ENVIRONMENTAL SCIENCE

B. Tech II Year I Semester

L	T	P	C
3	-	-	-

Course Objectives:

- To understand the importance of ecological balance for sustainable development.
- To understand the impacts of developmental activities and mitigation measures.
- To understand the environmental policies and regulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

ECOSYSTEMS: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

NATURAL RESOURCES: Classification of Resources: Living and Non-Living resources
Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources.
Land resources: Forest resources.
Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III

BIODIVERSITY AND BIOTIC RESOURCES: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES:
Environmental Pollution: Classification of pollution
Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.
Water pollution: Sources and types of pollution, drinking water quality standards.
Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil.
Noise Pollution: Sources and Health hazards, standards
Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management.
Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation.

Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

ENVIRONMENTAL POLICY, LEGISLATION & EIA: Environmental Protection act, Legal aspects Air Act- 1981,Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules.

EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA),Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt Ltd
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, B. S. Publications.

21EE2211: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

B. Tech II Year II Semester

L	T	P	C
3	-	-	3

Pre-requisite: Basic Electrical Engineering, Network theory & Electromagnetic fields.

Course Objectives:

- To study the basic principles of all measuring instruments
- To study the measurement of voltage, current, Power factor, power, energy and magnetic measurements.
- To study the measurement of power and energy.
- To study AC & DC bridges.
- To study the working of transducers and oscilloscope.

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

- Discuss different types of measuring instruments, their construction, operation and characteristics
- Identify the instruments suitable for typical measurements
- Measure energy using different wattmeter and energy meter.
- Analyze AC and DC bridges
- Apply the knowledge about transducers and instrument transformers to use them effectively.

UNIT – I INTRODUCTION TO MEASURING INSTRUMENTS

Introduction: Objectives of measurements, Performance characteristics, Static and dynamic characteristics, Accuracy, Precision, Type of errors,

Ammeter and Voltmeter: PMMC, MI instruments, expression for deflection and control torque, errors and compensation, extension of range using shunts and series multipliers ; Electro static voltmeter, extension of range of ES voltmeters, rectifier type voltmeters, Digital volt meters(Ramp type and Successive approximation type)

UNIT – II POTENTIOMETERS AND INSTRUMENT TRANSFORMERS

DC Potentiometers: Principle and operation of Crompton potentiometer, standardization, measurement of unknown resistance, current, voltage.

AC potentiometers: polar and coordinate type, standardization, applications.

Instrument transformers: CT and PT, ratio and phase angle error.

UNIT – III MEASUREMENT OF POWER, POWER FACTOR AND ENERGY

Measurement of Power: Single phase dynamometer type wattmeter, LPF and UPF, double elements and three elements dynamometer wattmeter; Expression for deflection and control torque, measurement of Active and reactive power for balanced and unbalanced Systems, Electrodynamometer power factor meter.

Measurement of Energy: Single phase induction type energy meter, driving and braking torques, errors and compensations, testing by phantom loading using RSS meter, three phase energy meter, maximum demand meters, introduction to net energy metering.

UNIT – IV DC AND AC BRIDGES

Measurement of Resistance: Methods of measuring low, medium, high resistance, Wheatstone bridge, carry foster, Kelvin's double bridge, loss of charge method.

Measurement of Inductance: Maxwell's bridge, hay's bridge, Anderson's bridge, Owen's bridge.

Measurement of Capacitance: Desauty's bridge, Wein's bridge, Schering bridge.

UNIT – V TRANSDUCERS AND OSCILLOSCOPES

Transducers: Definition of transducers, classification of transducers, advantages of electrical transducers, characteristics and choice of transducers, principle of operation of LVDT and capacitor transducers, LVDT applications, strain gauge and its principle of operation, gauge factor.

Cathode ray oscilloscope: Cathode ray tube, time base generator, horizontal and vertical amplifiers, CRO probes, applications of CRO, measurement of phase and frequency, Lissajous patterns, sampling oscilloscope, analog oscilloscope.

TEXT BOOKS:

1. E W Golding and F C Widdis, "Electrical measurements and measuring instruments", Wheeler publishing, 5th Edition,2006
2. A K Sawhney, "Electrical and Electronic measurement and instruments", Dhanpat Rai and Sons Publications, 2002.

REFERENCES:

1. Buckingham and Price, "Electrical measurements", PrenticeHall.
2. D V S Murthy, "Transducers and Instrumentation", Prentice Hall of India, 2nd Edition, 2009
3. A S Morris, "Principles of measurement of instrumentation", Pearson/Prentice Hall of India, 2nd Edition,1994
4. H S Kalsi, "Electronic Instrumentation", Tata McGraw-Hill Publications, 1st Edition 1995.

21EE2212: ELECTRICAL MACHINES-II

B. Tech II Year II Semester

L	T	P	C
3	1	-	4

Prerequisite: Basic Electrical Engineering, Electrical Machines-I

Course Objectives:

- To study and understand the construction and working of poly-phase induction motors & induction generator
- To study and understand operation, construction and types of single phase motors and their applications
- To study and understand the construction and working of three phase alternators
- To study and understand various methods to find the performance of three phase alternators
- To study and understand the construction and working of three synchronous motors

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

- Discuss construction and working of poly-phase induction motors & induction generator
- Discuss the operation, construction and types of single phase motors and their applications in house hold appliances and control systems
- Discuss the construction and working of three phase alternators
- Determine the regulation of three phase alternators by using various methods
- Discuss the construction and working of three synchronous motors

UNIT- I POLYPHASE INDUCTION MOTORS

Constructional details – types - production of rotating magnetic field – principle of operation – - rotor EMF and rotor frequency - rotor reactance, rotor current and Power factor at standstill and during operation - phasor diagram – equivalent circuit – Torque equation - starting and maximum torque - maximum output, slip for max. Output, Torque-slip characteristics - effect of rotor resistance – losses and efficiency, Testing - No Load & Blocked Rotor tests, circle diagram – - Methods of starting and starting current and Torque calculations.– Speed control of three phase induction motors, Crawling and Cogging – Applications.

INDUCTION GENERATORS: Induction generator-principle of operation, equivalent circuit and application.

UNIT - II SINGLE PHASE INDUCTION MOTORS & SPECIAL MACHINES

Single phase induction motors – constructional features – Principle of operation – equivalent circuit based on double revolving field theory, Types - split phase type, capacitor start and capacitor run, shaded pole types – Testing of Single phase Induction motor - Applications.

SPECIAL MACHINES: Universal motors - Brushless DC motor (BLDC) – Stepper motor (Qualitative), Applications.

UNIT - III ALTERNATORS:

Principle of operation - Constructional features – Armature windings – distribution, pitch and winding factors – EMF equation –effect of harmonics on EMF equation – armature reaction – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT - IV PERFORMANCE OF ALTERNATORS:

Regulation of alternators, Predetermination of regulation by synchronous impedance method, ampere turn method and Zero Power factor method. Salient pole alternators – Two reaction theory - analysis – experimental determination of Xd and Xq (Slip test), Phasor diagrams – Regulation of salient pole alternators. Expression for power developed as a function of torque angle –.power angle characteristics. Parallel operation and load sharing, synchronizing power, Short circuit ratio (SCR), Single phase Synchronous Generator

UNIT - V SYNCHRONOUS MOTORS:

Theory of operation – Phasor diagram – variation of current and power factor with excitation (V and inverted V curves) – synchronous condenser - Hunting and its suppression– Methods of starting – Short circuit transients in synchronous machine, short circuit under loading conditions.

TEXT BOOKS:

1. "Generalized Machine Theory", Bhimbra, Khanna publishers, 5thedition.
2. "Electrical Machines", I. J. Nagarath & D. P. Kothari., Tata McGraw Hill, 4thedition.
3. "Performance and Design of AC Machines", M. G. Say, Pitman, ELBS.

REFERENCES:

1. 'General Theory of Electrical Machines' , Adkins; Chapman & Hall,1979.
2. 'Electrical Machinery', Fitzgerald A.E. & Kingsley; McGraw-Hill, 6thedition.
3. 'Theory of AC Machinery', Langsdorf A.S.; TataMcGraw-Hill,2001
4. 'Alternating Current Machines', Puchestein, Lloyd & Cenrad, Asia Publishing House,1968
5. 'Electric Machinery Fundamentals', Chapman S.J.; McGraw-Hill,1991

21EE2213: CONTROL SYSTEMS

L	T	P	C
3	1	-	4

B. Tech II Year II Semester

Prerequisite: Mathematics-I, Mathematics-II and Mathematics-III

Course objectives:

- To study and understand the concepts of control Systems and different ways of system representations.
- To study and understand the system performance using time domain analysis and methods for improving it
- To study and understand the system performance using frequency domain analysis and techniques for improving the performance
- To study and understand various controllers and compensators to improve system performance
- To study and understand the State Space Analysis of Continuous Systems

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

- Discuss the concepts of control Systems and different ways of system representations.
- Determine the performance using time domain analysis
- Determine the stability using Root locus and Bode plot techniques
- Determine the stability using polar plot and Nyquist plot and design various compensators
- Discuss the concept of State Space Analysis of Continuous Systems.

UNIT-I: INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations - Impulse Response and transfer functions - Translational and Rotational mechanical systems. Block diagram algebra and system representations – Signal flow graphs - Mason's gain formula. Transfer function of Servo motors.

UNIT-II: TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems, PID Controllers.

UNIT-III: STABILITY ANALYSIS

The concept of stability - Routh stability criterion – qualitative stability and conditional stability. Root Locus Technique: The root locus concept - construction of root locus-Root locus analysis. Frequency domain specifications-Bode diagrams- Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT-IV: STABILITY ANALYSIS IN FREQUENCY DOMAIN

Polar Plots, Nyquist Plots and applications of Nyquist criterion to find the stability - Effects of adding poles and zeros to G(s)H(s) on the shape of the Nyquist diagrams

Compensation techniques – Lag, Lead, and Lead Lag Controllers design in frequency Domain.

UNIT-V: STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties. Controllability and Observability.

TEXT BOOKS:

1. "I. J. Nagrath and M. Gopal", "Control Systems Engineering", New Age International (P) Limited, Publishers, 5th edition,2009
2. "B. C. Kuo", "Automatic Control Systems", John Wiley and sons, 8th edition, 2003.
3. "Nagoor kani" "Control systems Engineering:, RBA Publications, 3rd Edition, 2013.

REFERENCE BOOKS:

1. "N. K. Sinha", "Control Systems", New Age International (P) Limited Publishers, 3rd Edition, 1998.
2. "NISE", "Control Systems Engineering", John wiley, 6 th Edition, 2011.
3. "Katsuhiko Ogata", "Modern Control Engineering", Prentice Hall of India Pvt.Ltd., 3 rd edition, 1998.
4. "A.K Jairath" Problems and solutions of control systems with essential theory 5th Edition.

21EE2214: POWER SYSTEMS – I

L	T	P	C
3	-	-	3

B. Tech II Year II Semester

Prerequisite: BEE, Network Theory

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
- 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.
- Analyze different voltage control techniques for the control reactive power in power system.

UNIT- I GENERATION OF ELECTRIC POWER

Conventional Sources – Layout and major components of Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant.

Non-Conventional Energy Sources: Principles of Solar, Wind and Geothermal Power Generations.

UNIT – II ECONOMIC ASPECTS OF POWER GENERATION: Capital & Operating Cost of different power plants. Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Cost. Desirable Characteristics of a Tariff Methods, Flat Rate, Block-Rate, two-part, three –part, and 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, String efficiency and, Numerical Problems, calculation of string efficiency, Methods for improvement 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 of low power factor, methods of improving the power factor – phase advancing and generation of reactive KVAR using static capacitors – most economical power factor for constant KW load and constant KVA loads, numerical problems. Dependency of voltage on reactive power flow – 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. "C. L. Wadhawa", "Electrical Power Systems", New age International (P) Limited, Publishers1997.
3. "M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakraborti", "A Text Book on Power System 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.
3. "V.K Mehta and Rohit Mehta", "Principles of Power Systems", S. Chand & Company Ltd, New Delhi, 2004.

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21EC2216: DIGITAL ELECTRONICS

L	T	P	C
3	-	-	3

B. Tech II Year II Semester

Prerequisite: Analog Electronics.

Course Objectives:

- To study and understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits
- To study and understand the combinational logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To study and understand PLDs to implement the given logical problem

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

- Discuss the working of logic families and logic gates.
- Design and implement Combinational logic circuits.
- Design and implement Sequential logic circuits
- Discuss the process of Analog to Digital conversion and Digital to Analog conversion.
- Use PLDs to implement the given logical problem.

UNIT-I: FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, examples of IC gates, digital logic families, TTL, Schottky TTL and CMOS logic.

UNIT-II: COMBINATIONAL DIGITAL CIRCUITS

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/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial ladder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices.

UNIT-III: SEQUENTIAL CIRCUITS AND SYSTEMS

A 1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J-K-T and D types flip flops ,applications of flip flops shift registers applications of shift registers ,serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters

design using flip flops, special counter IC's, applications of counters. Introduction to finite state machine, assignment and reduction of state machines.

UNIT-IV: A/D AND D/A CONVERTERS

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs

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), read and write memory(RAM), content addressable memory (CAM), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

TEXT BOOKS:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education,2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. “Roy Choudhary” & “Shail B Jain “ “Linear Integrated Circuits”, 5th Edition,

REFERENCES:

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

21EE2251: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB

B. Tech II Year II Semester

L	T	P	C
-	-	2	1

Prerequisites: Electrical 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.

21EE2252: ELECTRICAL MACHINES LAB-II

B. Tech II Year II Semester

L	T	P	C
-	-	2	1

Prerequisites: Electrical Machines-I and Electrical Machines-II

Course Objectives:

- To understand the performance of a single phase transformers
- To understand the regulation of a synchronous machine
- To understand the equivalent circuit of a single phase induction motor
- To understand the performance of a three phase induction motor
- To understand the performance of a synchronous motor

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

- Determine the efficiency and regulation of a single phase transformers by conducting various tests
- Determine the performance curves of three phase induction motors by conducting various tests
- Analyze the equivalent circuit of a single phase induction motors by conducting various tests
- Determine the regulation of a synchronous machine using different methods
- Analyze the performance curves of a synchronous motor

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

Part – A

1. O.C. & S.C. Tests on Single Phase Transformer
2. Equivalent Circuit of a Single Phase Induction Motor
3. No-Load & Blocked Rotor Tests on Three Phase Induction Motor
4. Regulation of a Three-Phase Alternator by Synchronous Impedance and M.M.F. Methods
5. Sumpner's Test on a Pair of Single Phase Transformers
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

Part – B

9. Separation of Core Losses of a Single Phase Transformer
10. Efficiency of a Three Phase Alternator.
11. Parallel Operation of Single Phase Transformers
12. Scott Connection of Transformers
13. Regulation of Three Phase Alternator by Using Z.P.F Method
14. Vector Grouping of Three Phase Transformers

TEXT BOOKS:

1. “Generalized Machine Theory”, Bhimbra, Khanna publishers, 5th edition.
2. “Electrical Machines”, I. J. Nagarath &D. P. Kothari., Tata McGraw Hill, 4th edition.
3. “Performance and Design of AC Machines”, M. G. Say, Pitman, ELBS.

REFERENCE BOOKS:

1. ‘General Theory of Electrical Machines’, Adkins; Chapman & Hall, 1979.
2. ‘Electrical Machinery’, Fitzgerald A.E. & Kingsley; McGraw-Hill, 6th edition.
3. ‘Theory of AC Machinery’, Langsdorf A.S.; Tata McGraw-Hill, 2001
4. ‘Alternating Current Machines’, Puchestein, Lloyd & Cenrad, Asia Publishing House, 1968
5. ‘Electric Machinery Fundamentals’, Chapman S.J.; McGraw-Hill, 1991

21EC2254: DIGITAL ELECTRONICS LAB

B. Tech II Year II Semester

L	T	P	C
-	-	2	1

Prerequisite: Digital Electronics, Analog Electronics

Course Objectives:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To learn implementation of boolean expressions using logic gates
- To understand the designing of combinational logic circuits and sequential logic circuits
- To learn implementation of Digital to Analog converter Using IC741.
- To learn implementation of synchronous state machines using flip-flops.

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

- Discuss the working of logic families and logic gates.
- Design and implement Combinational logic circuits.
- Design and implement Sequential logic circuits
- Implement Digital to Analog converter Using IC741.
- Design synchronous state machines using flip-flops

List of Experiments: All the experiments are compulsory

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 of Synchronous and Asynchronous counters using flip-flops.
9. Design and realization of Asynchronous counters using flip-flops.
10. Design and realization 8x1 MUX using 2x1 MUX.
11. Design and realization 2 bit comparator.
12. Implementation of 4-bit R-2R Ladder type DAC Using IC741.
13. Realization of logic gates using DTL, TTL, ECL, etc.
14. State machines.

TEXT BOOKS:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. D. Roy Choudhary, “Linear Integrated Circuits”, New Age International Publishers, 2004

21HS2254: SOFT SKILLS FOR PROFESSIONAL SUCCESS

B. Tech II Year II Semester

L	T	P	C
-	-	2	1

Course Objectives:

- To enable students understand the nature and the scope of communication, and overcome the barriers to effective communication
- To empower students understand the correlation between communication and building social relations.
- To enhance the team building and leadership qualities.
- To make the students realize the significance of goal setting.
- To impart interpersonal communication skills and life skills required for students' professional success.

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

- Communicate effectively in academic and social contexts.
- Understand about themselves with reference to self-discovery and self-awareness
- Nurture social behavior, responsibility and accountability leading to the ability to work in teams with diverse groups of people.
- Apply their creative and critical thinking skills for problem solving and decision making.
- Identify their short-term and long-term goals; apply emotional intelligence to enhance leadership skills and professionalism.

UNIT 1

Art of Communication – Communication Cycle – Barriers to Communication – Effective Communication - Assertiveness - Reading a Story/Passage loudly with more focus on meaningful pauses and Accent Neutralization - Inter-Personal Communication - Social and Professional Networking.

Activities: Role Plays/Telephonic Conversations - Introducing Oneself and Others – Greetings – Making Requisitions and Apologies.

UNIT 2

Self-Discovery - Self-Awareness – SWOT - Self Esteem - Self and Professional Discipline –Procrastination - Time Management – Professional Behavior and Attitude.

Activities: Situations/Case Studies related to Self-Awareness, Self Esteem, Time Management, Behavior and Attitude.

UNIT 3

Motivation – Cooperation and Coordination – Team Building – Creative Thinking – Problem Solving - Decision Making – Accountability - and Social Responsibility.

Activities: Situations/Case Studies related to Motivation, Cooperation and Coordination, Team Building and Decision Making

UNIT 4

Emotional Intelligence (EQ) – Critical Thinking - Bonding – Trust Building - Etiquette (Social, Professional) and Email

Activities: Situations/Case Studies related to Trust Building/Etiquette/Film Critiquing

UNIT 5

Leadership - Organizational Skills - Entrepreneurial Skills - Goal Setting - Long-term and Short- term Goals.

Activities: Situations/Case Studies related to Leadership, Organizational Skills, and Goal Setting.

REFERENCES

1. Raju Yadava B, B T Sujatha & C. Murali Krishna. *English for Better Performance*. Orient Blackswan, Pvt., Ltd, 2014.

2. Rajan. *I Love Living*. Mumbai: Jaico Publishers, 2013.

3. Sundararajan, Francis. *Basics of Communication in English: Soft Skills for Listening, Speaking, Reading and Writing*. New Delhi: Macmillan Publishers India Ltd., 2021.

4. Tulgan, Bruce. *Bridging the Soft Skills Gap - How to Teach the Missing Basics to Today's Young Talent*. Jossey-Bass; 1 edition. September 15, 2015.

21MC0004: GENDER SENSITIZATION

B. Tech II Year II Sem.

L	T	P	C
3	-	-	-

Course Objectives:

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 and help them reflect critically on gender violence.
5. To expose students to more egalitarian interactions between men and women.

Course Outcomes: By the end of the course, students

1. Will have developed a better understanding of important issues related to gender such as gender discrimination in our society and how to counter it.
2. 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. Will acquire insight into the gendered division of labour and its relation to politics and economics enabling students and professionals to work and live together as equals
4. Will develop a sense of appreciation of women in all walks of life.
5. Will be empowered to understand and respond to gender violence by familiarizing them with the studies and movements as well as the new laws that provide protection and relief to women, the textbook.

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 election 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 Harassmen t - Further Reading: "*Chupulu".*

Domestic Violence: Speaking Out Is 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.

TEXT BOOKS:

1. All the five Units in the Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

REFERENCES:

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life…and Won."Available online at:http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal.