SCHEME OF INSTRUCTION AND EVALUATION

UNIVERSITY COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH., (CBCS) 4-YEARS (8-SEMESTERS) REGULAR PROGRAMME

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING (EEE)

(Applicable from the batch admitted from the Academic Year 2023-24 onwards)

III –Semester

S.No.	Code	CourseTitle	SchemeofInstruction			Contact Hrs/Wk	Scheme of Evaluation			Credits
			L	T	P		Hrs	CIE	SEE	
Theory										
1	BS301MT	Mathematics III	3	-	-	3	3	30	45	3
2	PC301EE	ElectricalCircuits –I	3	-	-	3	3	30	45	3
3	PC302EE	Electrical Machines–I	3	-	-	3	3	30	45	3
4	PC303EE	Electromagnetic Fields	3	-	-	3	3	30	45	3
5	PC304EE	Power systems -I	3	-	-	3	3	30	45	3
6	ES305ME	PMP	3	-	-	3	3	30	45	3
7	PC306EC	Analog Electronics	3	-	-	3	3	30	45	3
Practicals										
8	PC351EE	Electrical Machines–I Lab	-	-	2	2	3	20	30	1
9	PC352EE	DE&LD Lab	-	-	2	2	3	20	30	1
10	ES353ME	MT Lab	-	-	2	2	3	20	30	1
Total			21	-	6	27	30	270	405	24

L: Lectures
T: Tutorials
P: Practical's
CIE: Continuous Internal Evaluation
SEE: Semester End Examination
BSC: Basic Science Course
HS: Humanities and Social Sciences
ESC: Engineering Science Course

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BS 301 MT	ENGINEERING MATHEMATICS-III					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	45 Marks	CIE		30 Marks	

Course Objectives:

- To introduce the concepts of Numerical interpolation approach for differential equations and applications
- To provide the knowledge of Numerical methods.
- To provide the knowledge of Z-Transforms, Fourier- Transforms and Integral transforms.
- To acquire the solving the differential equations using transforms

Course outcomes:

After completion of this course students able to

- Find solutions of the Heat equation, Wave equation and the Laplace equation subject to boundary conditions.
- Solve differential equations using Laplace and Fourier transforms.
- Solve differential equations by using Z-Transforms.

Unit-I:

Numerical methods: Solutions of Algebraic and Transcendental equations - Bisection method, Regula-Falsi method and Newton-Raphson's method, Solution of Linear system of equations, Gauss elimination method, LU Decomposition method, Gauss-Jacobi and Gauss Seidel iterative method.

Unit-II:

Interpolation, Lagrange's interpolation, Newton's divided difference interpolation Numerical differentiation interpolation approach, Solution of differential equations by Euler's method, modified Euler's method and Runge-Kutta Method of 4^{th} order, Numerical integration Trapezoidal rule, Simpson's 1/3 rule.

Unit-III:

Laplace transforms: Introduction to Laplace transforms, sufficient condition for existence of Laplace transform, Laplace transform of derivatives, Laplace transform of integrals Translation theorems(I & II Shifting theorems), differentiation of Laplace transform(Multiplication by t), integration of Laplace transform(Division by t) convolution theorem, solving initial value problems using Laplace transform.

Unit-IV:

Fourier transforms: Introduction, Fourier integrals, Fourier sine and cosine integrals complex form of Fourier integral, Fourier transform, Fourier sine and cosine transforms, Finite Fourier sine and cosine transforms, properties of Fourier transforms, convolution theorem for Fourier transforms.

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Unit-V:

Z- Transform: Introduction, basic theory of Z- Transforms, Z-Transforms of standard sequences, existence of Z- Transform, linearity property, translation theorem, scaling property, initial and final value theorems, differentiation of Z- Transform, convolution theorem, solution of difference equations using 2- Transforms.

Suggested Reading:

1. R.K.Jain, S.R.K.Iyengar, "Advanced Engineering Mathematics", Narosa Publication, 4th Edition, 2014.

2. B.S.Grewal, "Higher Engineering Mathematics", Khanna Publications, 43 Edition, 2014

3. Erwin kreyszig, "Advanced Engineering Mathematics", 9th Edition, 2012.

4. Vasishtha, Gupta, "Integral Transforms", Krishnan Prakashan Publications, 2014

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PC 301 EE	ELECTRICAL CIRCUITS – I					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	45 Marks	CIE		30 Marks	

Course Objectives:

- To acquire knowledge in electrical circuits and to understand the fundamentals of derived circuit laws.
- To acquire knowledge in steady state analysts of single-phase AC circuits.
- To understand network theorems
- To acquire knowledge in Transient analysis of circuits.

Course Outcomes:

After the completion of this course, the students shall be able to

- Apply source transformation, star-delta transformation, and mesh & node analysis to analyze networks.
- Evaluate steady state behavior of single-phase AC networks and design the series and parallel RLC circuits for the required bandwidth, resonant frequency and quality factor.
- Analyze electric circuits using network theorems for AC and DC networks.
- Evaluate steady state behavior of three-phase AC networks and analyze the coupled circuits.
- Evaluate transient and steady response of networks for various excitations by solving differential equations

UNIT I :

Network Elements & Laws: Active elements, Independent and dependent sources. Passive elements — R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and super mesh analysis

UNIT II :

Single-Phase Circuits: RMS and average values of periodic sinusoidal and non-sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series-parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variation of various parameters. Resonance: Series and parallel circuits, Band-width and Q-factor.

UNIT III:

Network theorems: Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem. (AC & DC)

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UNIT IV:

Poly-phase Circuits: Analysis of balanced and unbalanced 3-phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

UNIT V :

Transient analysis: Transient response of RLC circuits, Formulation of integral differential equations, Initial conditions, Response of RL, RC and RLC networks subjected to internal energy, Response to impulse, step, ramp, exponential and sinusoidal excitations.

Suggested Reading:

1. Van Valkenburg M.E., Network Analysis, Pearson education , 3rd Edition, 2019.
2. William Hayt H, Kimmerly Jack E, Steven Durbin M, Engineering Circuit Analysis, McGraw Hill, 7th Edition, 2006.
3. Jagan N.C, Lakshrninarayana C., Network Analysis, B.S. Publications, 3rd Edition, 2019.
4. Chakravarthy A., Circuit Theory Analysis and Synthesis, Dhanpat Rai & Co.Seventh Edition, 2018

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PC302EE	ELECTRICAL MACHINES - I					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	45 Marks	CIE		30 Marks	

Course Objectives:

- To study and understand different types of DC machines and their performance evaluation through various testing methods.
- To understand the operation of single and ploy-phase Transformers
- To analyze the performance of transformers through various testing methods

Course Outcomes:

After learning the contents of this paper the student must be able to Identify different parts of a DC machines & understand their operation.

- Carry out differentexcitation, starting speed control methods and testing of DC machines
- To analyze the performance of transformers through various testing methods

UNIT-I:

D.C. GENERATORS: Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation.

Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

Methods of Excitation – separately excited and self-excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self-excited and remedial measures. Load characteristics and applications of shunt, series and compound generators.

UNIT-II:

D.C MOTORS: Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation.

Speed control of D.C. Motors - Armature voltage and field flux control methods.

Motor starters (3-point and 4-point starters) Testing of D.C. machines - Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency.

UNIT-III:

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

UNIT-IV:

SINGLE PHASE TRANSFORMERS: Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams and Applications.

Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency & supply voltage on iron losses.

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UNIT-V:

TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS:

Open Circuit and Short Circuit tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses testparallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Scott connection and Applications.

Suggested Reading:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010
3. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
4. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
5. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
6. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

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PC303EE	ELECTRO MAGNETIC FIELDS					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	45 Marks	CIE		30 Marks	

Course Objectives:

The course is taught with the objectives of enabling the student to:

- To be able to understand the concepts of electrostatic fields, magneto static fields.
- To understand the concepts of electromagnetic wave propagation in different

Course Outcomes :

On completion of this course, the student will be able to:

- Understand the basic concept of electrostatic field and formulate problems
- Derive expression for the energy stored in electrostatic field, electrostatic
- Understand the basic concept of magnetic field and formulate problems
- Derive expression for Maxwell's equations, energy stored in electric and magnetic field.
- Application of EM wave propagation and calculate the reflection and refraction coefficient of electromagnetic field

UNIT – I:

Review of Vector Analysis: Coulomb's Law, Electric field intensity, Electric field due to different charge distributions. Electric field due to line charge, Sheet charge, Volume charge distribution, Electric flux density, Gauss's law, Divergence theorem. Potential, Potential gradient, Potential field of different charge distributions, Applications of above laws.

UNIT - II :

Energy in electrostatic field: Poisson's and Laplace equations, Uniqueness theorem, Solution of Laplace's equation, Conductors, Conductor properties, Dielectric, Dielectric properties and Boundary conditions, Calculation of capacitance, Boundary conditions for conductors and perfect dielectric materials.

UNIT - III :

Steady magnetic field: Biot-Savart's law, Ampere's law, Stoke's theorem, Magnetic scalar and vector potential, Faraday's law, Self and Mutual inductances, Force on moving charge, Force on differential elements, Magnetic boundary conditions, Magnetic circuits, Analogy with electrical circuits, Applications of above laws.

UNIT - IV :

Maxwell's equations: In Integral form, differential forms, Line and surface integrals, Boundary conditions, Continuity equation, Field equations in vector forms, energy storage in electric and magnetic fields.

UNIT - V :

EM waves: In homogeneous medium solutions for free space conditions,Uniform plane wave propagation, Poisson's and Laplace's equations, Sinusoidally time varying uniform plane waves in free space, Uniform plane waves in dielectrics and conductors, Poynting vector, Power dissipation, Reflection of uniform plane waves, Introduction to method of moments,

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Suggested Reading:

1. Matthew Sadiku N.O., Elements of Electromagnetics, Oxford University Press, 7th Edition, 2018.
2. William. Hayt H, Buck John A., Engineering Electromagnetics, Tata McGraw Hill, 7th Edition, 2003.
3. Nannapaneni Narayana Rao, Elements of Engineering Electromagnetics, PHI, New Delhi, 5th Edition, 2002. Matthew Sadiku N.O., Elements of Electromagnetics, Oxford University Press, 4th Edition, 2006.

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PC304EE	POWER SYSTEMS – I					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	45 Marks	CIE		30 Marks	

Course Objectives:

The course is taught with the objectives of enabling the student:

- To introduce the economic aspects of power generation and tariff methods and understand the concepts of A.C. and D.C. distribution.
- To understand the working of conventional power plants like Thermal, Hydel and Nuclear
- To understand the basic working principles of renewable power plants like Solar, Wind and Gas Turbine power plants.
- To understand about various overhead line components and cables
- To familiarize with transmission line parameter calculations.

Course Outcomes:

On completion of this course, the student will be able to:

- Evaluate various economic aspects of power generation like depreciation fund calculations and Tariffs and perform A.C. and D.C. distribution calculations.
- Understand the operation of conventional power plants.
- Understand the basic working principle of renewable power plants like Solar, Wind, and Gas turbine plants.
- Evaluate the performance of overhead line insulators and underground cables and to perform sag calculations.
- Determine the electrical circuit parameters of transmission line.

UNIT – I

Economics of Power Generation: Load Curve, Load Demand and Diversified factors, Base Load and Peak load operation, Types of costs and depreciation fund calculations, Methods of power factor improvement, Economics of power factor improvement, Tariffs, **Distribution:** 2 wire and 3 wire distributors, Ring mains, AC distribution calculations.

UNIT – II

Steam Power Stations: Choice of site, Layout & various parts of station, Boilers, Turbines, Super Heaters, Economizers, Air pre-heaters etc. and their Pulverized fuel, Coal handling.

Hydro-Electric Power plants: Estimation Hydrograph, Flow duration curve, Mass curve, Storage and pondage, Types electric plants and layouts, Prime movers for hydroelectric plants.

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UNIT – III

Nuclear Power Plants: Fissile materials, working principle of nuclear plants and reactor control, Shielding, Types of reactors. **Non-Conventional Energy Sources:** Basic principles of Wind, solar and gas turbines.

UNIT – IV

Over-Head Lines: Supports sag and tension calculations, Effect of wind and ice, Erection conditions, Insulators: Types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, Testing of insulators. **Insulated Cables:** Conductors for cables, Insulating materials, Mechanical protection, Low voltage cables, Grading of cables, Three phase high voltage cables and Super voltage cables, Capacitance of three-core cables.

UNIT – V

Inductance and Capacitance of Transmission Lines: Inductance and capacitance of overhead line conductors, Single phase and three phase with symmetrical composite conductors, GMR and GMD Spacing, Transposition, Bundled conductors, Effect of earth capacitance.

Suggested Reading:

1. Wadhwa C.L., Electrical Power Systems, New Age International (P) Ltd., 8th Edition, 2022.
2. Wadhwa C.L., Generation, Distribution and Utilization of Electrical Energy, New Age International (P) Ltd., 4th Edition, 2017.
3. Singh S.N., Electrical Power Generation, Transmission and Distribution, Prentice Hall of India, Pvt. Ltd., New Delhi, 2nd Edition, 2008.
4. V.K. Mehta, Principles of Power Systems, S. Chand and Co., 7th Edition, 2021.

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ES305ME	PRIME MOVERS AND PUMPS					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	45 Marks	CIE		30 Marks	

Course Objectives:

- To acquire knowledge of fluid mechanics and governing equations.
- To understand the working principal of hydraulic turbines and pumps.
- To understand the working principle of steam and gas power plants.
- To be able to estimate the power developed in the engine, turbines.

Course Outcomes:

- Knowledge regarding various theories dealing with the flow phenomenon of fluid.
- Ability to define the nature of a fluid, viscosity effects on flow and characteristics of Newtonian and non-Newtonian fluids
- Understanding of basics of the hydraulic, steam and gas turbines, and their components, functions and applications
- Knowledge of different types of boilers, turbines and pump
- Recognize typical designs of turbines and pumps.

UNIT-I

Fluid Mechanics: Properties of fluids, Newtonian and non-Newtonian fluids. Continuity, Momentum and Energy equations. Bernoulli's equation and its applications. Laminar and Turbulent flows. Basic Concept of Boundary layer theory and boundary layer thickness.

UNIT-II

Hydraulic Turbines: Layout of Hydroelectric power plant. Working principle of Pelton, Francis and Kaplan turbines. Draft tube in Reaction turbine. Velocity diagrams for impulse and Reaction turbines. Blade angles and dimensions for Reaction turbines. Work done, power output and efficiencies. Simple problem on Pelton, Francis and Kaplan turbines. Selection of turbines for electric power generation, Specific speed and its ranges for Pelton, Francis and Kaplan turbines. Unit quantities. Performance and characteristics curves. Cavitation and its effects.

UNIT-III

Pumps: Reciprocating Pumps - Working of single and double acting types. Functions and use of Air vessels. Problems on pressure head, work done, power required without and with air vessels. Centrifugal Pumps: Parts and working of CF pumps. Need for priming, pump installation. Velocity diagrams and vane angles. Types of impellers. Work and power required. Manometric and other efficiencies. Simple problems for single stage pumps, Principles of similarity, specific speed and unit quantities. Performance and characteristic curves

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UNIT-IV

Basic Steam Engineering: Generation, properties and dryness fraction of steam. Functions of aboiler. Working of a simple vertical type and Babcock and Wilcox type boilers with simple sketches Boiler Mountings and Accessories and their functions. Rankine cycle, re-heat and regeneration cycles

UNIT-V

Steam & Gas Power Plants: Layout of simple steam power plant and working of its individual units Classification and compounding of steam turbines. Velocity diagrams for single stage impulse andreaction turbines. Simple problems on work done, blade angles, Power output and thermal efficiencies of turbines. Working of reheat and bleeding cycles.

Suggested Readings:

1. Ballaney P.L, "Thermal Engineering", Khanna Publishers, 19th Edition-2003.
2. Yadav R. "Steam and gas Turbines", Galgotia Publishers, 6ª Edition-1992.
3. Rajput," Thermal Engineering", Laxmi Publications (P) Ltd, New Delhi.
4. Bansal R.K," Fluid Mechanics and Hydraulic Machines", Laxmi Publictions (P) Ltd, New Delhi.
5. Kumar D.S. Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 6ª Edition-2003

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PC 306 EE	ANALOG ELECTRONICS					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	45 Marks	CIE		30 Marks	

Course Objectives:

The course is taught with the objectives of enabling the student to:

- To understand the diode characteristics.
- To study the input and out characteristics of different Transistor configurations.
- To understand the design concepts FET and amplifier.
- To understand the concepts of Feedback
- To understand the Applications of Oscillator

Course Outcomes:

On completion of this course, the student will be able to:

- Understand the characteristics of diodes and, Rectifiers
- Design and analyze amplifier circuits
- To be able analyze characteristics of FETS and MOSFET.
- Analyzing of +ve and negative feedback circuits
- Design sinusoidal oscillators.

UNIT – I

Semiconductors & diodes: Energy bands, Intrinsic and Extrinsic Semiconductors, Mobility and Conductivity, Band structure of PN Junction, Volt – Amp Characteristics, Temperature Dependence, Transition and Diffusion Capacitance of PN Junction, Zener Diode, **Diode circuits**: Diode as a rectifierHalf-wave, Full-wave and Bridge Rectifiers, types of Filters, Capacitor and inductor filter, zener diode as a voltage regulator, Ripple Factor and Regulation Characteristics.

UNIT- II

Bipolar Junction Transistor: NPN and PNP junction Transistors, Transistor current componentsCB, CE and CC Configurations and their Characteristics, Saturation, Cutoff and Active Regions Comparison of CE, CB and CC Configurations, Maximum voltage rating, the operating point, fixed bias, emitter stabilized bias circuits, Voltage-divider bias, Stabilization, Thermal Runaway, Therma Stability, High frequency model of a Transistor. The h parameters of the three transistor configurations, Analysis of Transistor Amplifier Circuits using h–parameters.

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UNIT- III

Field Effect Transistors: The Junction field effect transistor, Pinch off Voltage, Volt-ampere characteristics, Drain Saturation Current, Small Signal model of FET, MOSFET – Enhancement and Depletion Modes. The low Frequency common source and common drain amplifiers, FET biasing.

UNIT - IV

Concept of Feedback, Feedback Amplifier Configurations, Circuits,
Advantages of Negative feedback, Analysis of Simple feedback amplifiers using BJT and FET

UNIT - V

Barkhausen Criterion, RC Oscillators: Wien Bridge, Phase shift, LC Oscillators: Hartley and Colpitt's Oscillators, Crystal Controlled Oscillators (analysis of oscillators using BJTs only), stability of oscillators

Suggested Reading:

1. Millman J., Halkias C.C. and Satyabrata Jit, Electronic Devices and Circuits, 3rd edition,Tata McGraw-Hill, 2011.
2. S Salivahanan, N Kumar, and A Vallavaraj, Electronic Devices and Circuits, 2nd ed., McGraw Hill Education, 2007.
3. Millman J., Halkias C.C. and Parikh C, Integrated Electronics, 2nd edition, Tata
4. JB Gupta, Electronic Devices and Circuits, S.K Kataria & sons, 5th Edition, 2012

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PC 351 EE	ELECTRICAL MACHINES LABORATORY – I					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	30 Marks	CIE			20 Marks

Course Objectives:

- To expose the students to the operation of DC Generators
- To know the operation of various types of DC Motors.
- To examine the performance of Single and Three Phase Transformers.

Course Outcomes:

After learning the contents of this paper the student must be able to ❑ Start and control the Different DC Machines.

- Assess the performance of different machines using different testing methods
- Evaluate the performance 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 DC shunt machines (Predetermination of efficiency)
5. Swinburne's test and speed control of DC shunt motor (Predetermination of efficiencies)
6. Brake test on DC compound motor (Determination of performance curves)
7. OC and SC Test on Single Phase Transformer
8. Three Phase Transformer: Verification of Relationship between Voltages and
9. Currents (Star-Delta, Delta- Delta, Delta-star, Star-Star)

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

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

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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.

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PC352EE	DIGITAL ELECTRONICS AND LOGIC LABORATORY					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	30 Marks	CIE			20 Marks

Course Objectives:

The course is taught with the objectives of enabling the student to:

- To verify the operations of various logic gates
- To understand the concepts of code converters
- To impart how to design the switching circuits
- To learn about shift registers and counters
- To know the function of analog-to-digital and digital-to-analog converters

Course Outcomes:

- On completion of this course, the student will be able to :
- Identify and differentiate various logic gates
- Develop the combinational logic circuits
- Design and test the sequential logic circuits
- Realize the shift registers and counters using memory elements
- Analyze the various analog-to-digital and digital-to-analog converters

LIST OF EXPERIMENTS

1. Implementation of Truth Tables of various Logic Gates
2. Implementation of Logic Gates using Universal Gates
3. Implementation of Adders and Subtractors
3. Implementation of Adders and Subtractors
4. Implementation of BCD to Excess- 3 Code Converter
5. Implementation of a 4-bit Shift Register
6. Implementation of a 4-bit Up Counter and Down Counter
7. Implementation of a 4-bit Synchronous and Asynchronous Counter
8. Implementation of a 4-bit Magnitude Comparator
9. Implementation of 8:1 Multiplexer and 2:4 De-Multiplexer
10. Implementation of Encoder and Decoder
11. Implementation of a 4-bit R-2R Digital-to-Analog Converter
12. Implementation of a 8-bit Successive Approximation Analog-to DigitaConverter

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ES 353 ME	MECHANICAL TECHNOLOGY LABORATORY					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	30 Marks	CIE			20 Marks

Course Objectives:

To gain knowledge of working of pelton and diesel engines.

- To be able to estimate the power developed in the engine.
- To understand the working principle of hydraulic turbines and pumps.
- understand the performance of turbines using characteristic curves
- To gain the knowledge of various flow meters and the concept of fluid mechanics

Course Outcomes:

The students will be able to:

- Knowledge regarding components and functioning of engines
- Ability to calculate the power developed, losses in the engines.
- Understanding of viscosity of oils.
- Knowledge of flash and fire point of oils, and its importance
- Knowledge of estimating the power of turbines and pumps.

A) **Thermal Engineering Laboratory:**

1. Determination of heat transfer coefficient under natural convention
2. Determination of thermal conductivity of a composite wall.
3. Determination of volumetric efficiency of multi stage reciprocating air compressor.
4. Performance test on Multi cylinder petrol/ diesel engine.
5. Determination of flash and fire points in lubricants.

B) **Thermal Engineering Laboratory:**

6. Measurement of discharge by Venturi meter.
7. Measurement of discharge by Orifice meter.
8. Measurement of discharge by Rotameter.
9. Measurement of velocity by Pitot tube.
10. Performance test on Pelton wheel turbine.
11. Characteristic curves test on Pelton wheel turbine.
12. Performance test on Francis wheel turbine.
13. Characteristic curves test on Francis turbine.
14. Performance and characteristics of Reciprocating pump.
15. Performance and characteristics of Centrifugal pump.

C) **Study of Construction details of Gear Box,**

Note: At least ten experiments should be conducted in the Semester

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