Mahatma Gandhi Institute of Technology (A)
B.Tech. in Electrical and Electronics Engineering
Scheme of Instruction and Examination
(Choice Based Credit System)
Applicable for the batches admitted from Academic Year 2022-23

III SEMESTER

S.No.	Course Code	Course Title	Instruction Hours per week			Examination Max. Marks		Examination Duration of SEE in Hours	Credits
			L	T	P	CIE	SEE		
1	MA301BS	Numerical Methods and Complex variables	3	1	0	40	60	3	4
2	EE301PC	Electrical Machines - I	3	1	0	40	60	3	4
3	EC333PC	Analog Electronic Circuits	3	0	0	40	60	3	3
4	EE302PC	Power Systems - I	3	0	0	40	60	3	3
5	EE303PC	Electro Magnetic Fields	3	0	0	40	60	3	3
6	EE351PC	Electrical Machines Laboratory - I	0	0	2	40	60	3	1
7	EE352PC	Electrical Simulation Tools Laboratory	0	0	2	40	60	3	1
8	EC363PC	Analog Electronic Circuits Laboratory	0	0	2	40	60	3	1
9	MC351HS	Gender Sensitization Laboratory	0	0	2	40	60	3	0
		Total	**15**	**2**	**8**	**360**	**540**		**20**

IV SEMESTER

S.No.	Course Code	Course Title	Instruction Hours per week			Examination Max. Marks		Examination Duration of SEE in Hours	Credits
			L	T	P	CIE	SEE		
1	ME431PC	Fluid Mechanics and Hydraulic Machines	3	0	0	40	60	3	3
2	EE401PC	Measurements and Instrumentation	3	0	0	40	60	3	3
3	EE402PC	Electrical Machines - II	3	0	0	40	60	3	3
4	EC431PC	Digital Electronics	2	0	0	40	60	3	2
5	EE403PC	Power Systems - II	3	0	0	40	60	3	3
6	EE451PC	Measurements and Instrumentation Laboratory	0	0	2	40	60	3	1
7	EE452PC	Electrical and Electronics Design Laboratory	0	0	2	40	60	3	1
8	EC461PC	Digital Electronics Laboratory	0	0	2	40	60	3	1
9	ME461PC	Fluid Mechanics and Hydraulic Machines Laboratory	0	0	2	40	60	3	1
10	MC401HS	Constitution of India	3	0	0	40	60	3	0
11	EE453PC	Real-time Research Project / Field Based Project	0	0	4	50	-	-	2
		Total	**17**	**0**	**12**	**450**	**600**		**20**

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. III Semester

MA301BS: NUMERICAL METHODS AND COMPLEX VARIABLES

(EEE & ECE)

L	T	P	C
3	1	0	4

Course Objectives

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

Course Outcomes: After completion of the course the students will be able to:

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

UNIT-I: NUMERICAL METHODS-I

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton- Raphson method and Regula-Falsi method.

Interpolation: Finite differences, Forward differences, backward differences, central differences - Interpolation using Newton's forward and backward difference formulae – Central difference interpolation: Gauss's forward and backward formulae - Lagrange's method of interpolation.

UNIT-II: NUMERICAL METHODS-II

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

UNIT-III: COMPLEX DIFFERENTIATION

Limit, Continuity and Differentiation of Complex functions - Cauchy-Riemann equations in Cartesian and Polar co-ordinates (without proof), Milne- Thomson methods - analytic functions, harmonic functions, finding harmonic conjugate, Mobius transformation.

UNIT-IV: COMPLEX INTEGRATION:

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

UNIT-V:FOURIERSERIES:

Periodic Function, Dirichlet's Conditions, Determination of Fourier Coefficients (without proof) - Fourier expansion of periodic function in a given interval of length 2π - Fourier series in an arbitrary interval - Fourier series of even and odd functions - Half-range Fourier sine and cosine series.

Suggested Readings:

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

Reference Books:

1. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and EngineeringComputations, New Age International publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill,2004.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
III Semester Syllabus
EE301PC: ELECTRICAL MACHINES - I

L	T	P	C
3	1	0	4

Prerequisite: Principles of Magnetism**,** Electrical Circuit Analysis-I and Electrical Circuit Analysis-II.

Course Objectives:

1. To study and understand different types of DC Generators - their construction, operation, and applications.
2. To study the effect of Armature Reaction, Commutation process and methods of improving commutation.
3. To study and understand load characteristics of different types of DC Generators and Parallel Operation of DC Generators.
4. To study and understand different types of DC Motors, construction, applications and speed control of DC motors.
5. To understand different types of losses, testing of DC Machines to determine efficiency.

Course Outcomes:

After completion of the course, students will be able to:

1. Identify different parts of a DC Generators & understand it's operation
2. Understand the effect of armature reaction and methods of improving commutation
3. Able to analyze different types of DC generators and their characteristics.
4. Able to explain operational characteristics of DC motor and speed control methods of DC motor.
5. Able to calculate various losses in DC machines and calculation of efficiency by various testing methods.

Course Objectives	**Program Outcomes**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
To study and understand different types of DC Generators - their construction, operation, and applications.	2	1	2	-	2	-	-	-	-	-	-	-
To study the effect of Armature Reaction, Commutation process and methods of improving commutation.	3	3	2	2	3	-	-	-	-	-	-	-
To study and understand load characteristics of different types of DC Generators and Parallel Operation of DC Generators.	2	3	3	2	2	-	-	-	-	-	-	-

To study and understand different types of DC Motors, construction, applications and speed control of DC motors.	3	3	2	2	2	2	-	-	-	-	-	-
To understand different types of losses, testing of DC Machines to determine efficiency.	3	2	2	3	2	-	-	-	-	-	-	-

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Identify different parts of a DC Generators & understand it's operation.	2	1	2	-	2	-	-	-	-	-	-	-
Understand the effect of armature reaction and methods of improving commutation.	3	3	2	2	3	-	-	-	-	-	-	-
Able to analyze different types of DC generators and their characteristics.	2	3	3	2	2	-	-	-	-	-	-	-
Able to explain operational characteristics of DC motor and speed control methods of DC motor.	3	3	2	2	2	2	-	-	-	-	-	-
Able to calculate various losses in DC machines and calculation of efficiency by various testing methods.	3	2	2	3	2	-	-	-	-	-	-	-

UNIT-I: DC GENERATORS

Introduction to DC Machines, Principle of operation, constructional Details and features, Action of commutator, Armature winding terms, Types of armature windings – lap and wave windings, simplex and multiplex windings, Progressive and Retrogressive Winding, use of laminated armature, E.M.F Equation. Problems.

UNIT-II: ARMATURE REACTION IN DC GENERATORS

Introduction, effect of Armature Reaction, Cross magnetizing and de-magnetizing Conductors, Calculation of Cross magnetizing and de-magnetizing AT/pole, compensating winding, commutation, Ideal Commutation, reactance voltage, methods of improving commutation – Resistance Commutation, e.m.f Commutation, Problems.

UNIT-III: TYPES OF DC GENERATORS & LOAD CHARACTERISTICS

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. Load characteristics of shunt, series and compound generators, applications of DC generators, Necessity of Parallel operation of DC Generators, Conditions for Parallel operation of Generators, parallel operation of DC shunt, series and Compound Generators, Problems.

UNIT-IV: DC MOTORS AND SPEED CONTROL METHODS

Introduction, Principle of operation, Back e.m.f, Speed Equation, Torque equation, Types of DC Motors, Characteristics and applications of Shunt, Series and Compound motors, Armature reaction in DC motor, Problems.

Speed control of DC Motors: Necessity of starter for starting DC Motor, Principle of 3-point and 4-point starters, Construction, Protective Devices. Armature voltage and flux control methods, Ward-Leonard system, Problems.

UNIT-V: TESTING OF DC MACHINES

Losses in DC Machines, Power stages in DC Machines, Calculation of Efficiency, Condition for maximum Efficiency, Methods of Testing – direct, indirect, and regenerative testing, Brake test, Swinburnes test, Hopkinson's test, Series Field's test, separation of stray losses in a DC motor test, Retardation Test, Problems.

Suggested Readings:

1. J. B. Gupta, "Theory and Performance of Electrical Machines", S. K. Kataria and Sons
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
3. V. K. Mehta, Rohit Mehta, "Principles of Electrical Machines", S. Chand Publishing.
4. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

Reference Books:

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

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
III Semester Syllabus
EC333PC: ANALOG ELECTRONIC CIRCUITS

L	T	P	C
3	0	0	3

Course Objectives:

1. To introduce components such as diodes, BJTs and FETs their switching characteristics,applications
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of basic and feedback amplifier circuits such assmall signal, cascaded, large signal and tuned amplifiers.
4. To introduce the basic building blocks of linear integrated circuits.
5. To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes:

1. Know the characteristics, utilization of various components.
2. Understand the biasing techniques
3. Design and analyze various rectifiers, small signal amplifier circuits.
4. Design sinusoidal and non-sinusoidal oscillators.
5. Designs OP-AMP based circuits with linear integrated circuits.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	3	2	-	1	-	-	-	-	-	1	1	1
CO2	3	2	3	2	-	1	-	-	-	-	-	1	1	1
CO3	3	2	3	2	-	1	-	-	-	-	-	1	2	2
CO4	3	2	3	2	-	1	-	-	-	-	-	1	2	2
CO5	3	2	3	2	-	1	-	-	-	-	-	1	2	2

UNIT-I-DIODE AND BIPOLAR TRANSISTOR CIRCUITS:

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

UNIT-II-FET CIRCUITS:

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

UNIT-III -MULTI-STAGE AND POWER AMPLIFIERS:

Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers, Power amplifiers - Class A, Class B, Class C.

UNIT-IV-FEEDBACK AMPLIFIERS:

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

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

UNIT-V-OPERATIONAL AMPLIFIERS:

Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular- wave generators.

Suggested Readings:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition2010
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.

Reference Books:

1. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, pearson.
2. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.
3. P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.
4. P. R. Gray, R. G. Meyer and S. Lewis, “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons, 2001.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
III Semester Syllabus
EE302PC: POWER SYSTEMS - I

L	T	P	C
3	0	0	3

Prerequisite: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2 and Electrical Machines-I

Course Objectives:

1. To understand the power generation through coal and gas.
2. To understand the power generation through water and nuclear fuels.
3. To illustrate the economic aspects of power generation and tariff methods.
4. To know about air insulated and gas insulated substations.
5. To know about AC and DC distribution systems.

Course Outcomes:

After completion of the course, students will be able to:

1. Understand the operation of thermal and gas electrical power generating stations.
2. Understand the operation of hydro and nuclear electrical power generating stations.
3. Evaluate the Economics associated with power generation and power tariff methods.
4. Analyze the operations of air insulated and gas insulated substations.
5. Analyze the operations of AC and DC distribution systems.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To understand the power generation through coal and gas	2	1	3	1	1	1	2	2	1	1	-	1
To understand the power generation through water and nuclear fuels	2	1	3	1	1	3	2	2	1	1	-	1
To illustrate the economic aspects of power generation and tariff methods	3	3	1	2	2	3	2	2	1	1	1	-
To know about air insulated and gas insulated substations	3	3	1	3	1	2	1	3	1	2	1	-
To know about AC and DC 1distribution systems	2	1	3	1	1	2	1	2	1	2	1	1

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand the operation of thermal and gas electrical power generating	2	1	3	1	1	1	2	2	1	1	0	1

Understand the operation of hydro and nuclear electrical power generating stations	2	1	3	1	1	3	2	2	1	1	0	1
Evaluate the Economics associated with power generation and power tariff	3	3	1	2	2	3	2	2	1	1	1	0
Analyze the operations of air insulated and gas insulated substations	3	3	1	3	1	2	1	3	1	2	1	0
Analyze the operations of AC and DC distribution systems	2	1	3	1	1	2	1	2	1	2	1	1

UNIT-I: THERMAL AND GAS POWER STATIONS:

Thermal Power Stations: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components: Coal and Ash handling plant, Steam generating plant - Boilers, Super heaters – Economizers - Air Preheaters, Turbine, Condensers, Alternator, Feed water circuit and Cooling water circuit.

Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)

UNIT-II: HYDRO AND NUCLEAR POWER STATIONS:

Hydro Electric Power Stations: Layout of storage type Hydro station and its Elements – Reservoir, Dam, Spill ways, Intake, Forebay, Penstock, Surge Tank, Prime mover, Power house and Draft tube.

Nuclear Power Stations: Schematic Arrangement of Nuclear Power Station, Principle of operation of Nuclear reactor and its Components: Core, Moderators, Reflectors, Control rods, Coolants and Shielding.

UNIT-III: ECONOMICS OF POWER GENERATION:

Introduction, definitions of connected load, maximum demand, demand factor, load curve, load factor, diversity factor, coincidence factor, load duration curve, integrated load duration curve, plant factor, utilization factor, plant use factor - Numerical Problems. Cost of electrical energy - fixed cost and running cost. Tariff, Desirable Characteristics of Tariff, Tariff Methods: Flat Rate, Block - Rate, Two - Part, Three - Part and Power Factor Tariff Methods and Numerical Problems.

UNIT-IV:ELECTRICAL SUBSTATIONS:

AIR INSULATED SUBSTATIONS (AIS): Selection of site for substation, Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

GAS INSULATED SUBSTATIONS (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, Comparison of Air insulated substations and Gas insulated substations.

UNIT-V: DC AND AC DISTRIBUTION:

DC DISTRIBUTION: Classification of Distribution Systems, Comparison of DC (vs.) AC and Under-Ground (vs.) Over-Head Distribution Systems, Requirements and Design features of Distribution Systems, Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the

following cases:

Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

A.C. DISTRIBUTION: Introduction, AC distribution, Single phase, 3-phase, Voltage Drop Calculations (Numerical Problems) in AC Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

Suggested Readings:

1. C.L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", 2nd Edition, New Age International, 2009.
2. V.K Mehta and Rohit Mehta, "Principles of Power Systems", S. Chand & Company Ltd, New Delhi, 2004.
3. J.B.Gupta, A Course in Power Systems" Katson Books, 11th Edition, 2016.

Reference Books:

1. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Text book on Power System Engineering", Dhanpat Rai Publishing Company (P) Ltd, 2008.
2. M.V. Deshpande, "Elements of Electrical Power Station Design", 3rd Edition, Wheeler Pub. 1998.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
III Semester Syllabus
EE303PC: ELECTROMAGNETIC FIELDS

L	T	P	C
3	0	0	3

Prerequisites: Mathematics and Applied Physics

Course Objectives:

1. To introduce the concepts of electric field and magnetic field
2. To know the applications of electric fields in the development of the theory for power transmission lines and electrical machines
3. To study the applications of magnetic fields in power systems and electrical machines
4. To acquire basic knowledge about force between conductors in uniform fields
5. To study about Maxwell's equations for time varying fields

Course Outcomes:

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

1. Understand the basic laws of electromagnetism
2. Obtain the electric fields for simple configurations under static conditions
3. Analyze the static magnetic fields for simple configurations
4. Describe the behavior of magnetic materials and interpret the force between conductors
5. Analyze time varying electric and magnetic fields

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To introduce the concepts of electric field and magnetic field	3	1	1	1	3	3	3	1	1	1	0	3
To know the applications of electric fields in the development of the theory for power transmission lines and electrical machines	3	3	2	2	2	3	0	1	1	1	0	2
To study the applications of magnetic fields in power systems and electrical machines	3	3	2	2	2	3	0	1	1	1	0	2
To acquire basic knowledge about force between conductors in uniform fields	3	3	2	2	2	3	0	1	1	1	0	2
To study about Maxwell's equations for time varying fields	3	3	3	2	2	3	0	1	1	1	0	2

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand the basic laws of electromagnetism	3	3	3	3	3	3	3	3	1	1	1	2
Obtain the electric fields for simple configurations under static conditions	3	3	2	2	2	3	2	2	1	1	1	2
Analyze the static magnetic fields for simple configurations	3	3	2	2	2	3	2	2	1	1	1	2
Describe the behavior of magnetic materials and interpret the force between conductors	3	3	2	2	1	3	2	2	1	1	1	2
Analyze time varying electric and magnetic fields	3	3	3	3	3	3	3	3	1	1	1	2

UNIT-I: STATIC ELECTRIC FIELD

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

UNIT-II: CONDUCTORS, DIELECTRICS AND CAPACITANCE

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

UNIT-III: STATIC FIELDS

Biot-Savart Law, Ampere's Circuital Law and it's applications. Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors.

UNIT-IV: MAGNETIC FORCES

Lorentz force equation. Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic boundary conditions. Behavior of magnetic materials, magnetic energy, magnetic forces in uniform magnetic fields.

UNIT-V: TIME VARYING FIELDS AND MAXWELL'S EQUATIONS

Self and Mutual inductance. Determination of self-inductance of a solenoid and toroid. Faraday's law of Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive force, Maxwell's equation in Phasor form, Poynting theorem.

Suggested Readings:

1. K. A. Gangadhar, “Electromagnetic Field Theory”, Khanna Publishers
2. M. N. O. Sadiku, “Elements of Electromagnetics”, Oxford University Publication, 2014.

Reference Books:

1. W. Hayt, “Engineering Electromagnetics”, McGraw Hill Education, 2012.
2. A. Pramanik, “Electromagnetism-Problems with solution”, Prentice Hall India, 2012.
3. A. Pramanik, “Electromagnetism - Theory and applications”, PHI Learning Pvt. Ltd, New Delhi, 2009.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
III Semester Syllabus
EE351PC: ELECTRICAL MACHINES LABORATORY- I

L	T	P	C
0	0	2	1

Prerequisite: Electrical Machines-I

Course Objectives:

1. To conduct load test on DC machines
2. To conduct brake test on DC machines
3. To determine the efficiency of DC machines using different methods
4. To determine the losses of DC machines using different methods
5. To determine critical field resistance and critical speed of DC machines

Course Outcomes:

After completion of the course, students will be able to:

1. Conduct load test on DC machines
2. Conduct brake test on DC machines
3. Determine the efficiency of DC machines using different methods
4. Determine the losses of DC machines using different methods
5. Determine critical field resistance and critical speed of DC machines

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To conduct load test on DC machines	3	3	3	3	3	3	1	1	1	1	-	3
To conduct brake test on DC machines	3	3	3	3	3	3	1	1	1	1	-	3
To determine the efficiency of DC machines using different methods	3	2	3	2	3	3	1	1	1	1	-	3
To determine the losses of DC machines using different methods	3	2	3	2	3	3	1	1	1	1	-	3
To determine critical field resistance and critical speed of DC machines	3	2	3	1	3	3	1	1	1	1	-	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Conduct load test on DC machines	3	3	3	3	3	3	1	1	1	1	-	3
Conduct brake test on DC machines	3	3	3	3	3	3	1	1	1	1	-	3
Determine the efficiency of DC machines using different methods	3	2	3	2	3	3	1	1	1	1	-	3

Determine the losses of DC machines using different methods	3	2	3	2	3	3	1	1	1	1	-	3
Determine critical field resistance and critical speed of DC machines	3	2	3	1	3	3	1	1	1	1	-	3

The following experiments are required to be conducted as 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. Swinburne's test and speed control of DC shunt motor (Predetermination of efficiencies)
5. Load test on DC compound generator (Determination of characteristics)
6. Fields test on DC series machines (Determination of efficiency)
7. Brake test on DC compound motor (Determination of performance curves)
8. Hopkinson's test on DC shunt machines (Predetermination of efficiency)

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. Retardation test on DC shunt motor (Determination of losses at rated speed)
3. Separation of losses in DC shunt motor (Determination of losses)

Suggested Readings:

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

Reference Books:

1. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
III Semester Syllabus
EE352PC: ELECTRICAL SIMULATION TOOLS LABORATORY

L	T	P	C
0	0	2	1

Prerequisites: Elements of Electrical Engineering

Course Objectives:

1. To understand basic block sets of different simulation platform used in electrical/electronic circuit design.
2. To understand use and coding in different software tools used in electrical circuit design.
3. To understand use and coding in different software tools used in electronic circuit design.
4. To understand the simulation of electric circuits for performance analysis.
5. To understand the simulation of electric machines and Solar PV model for performance analysis.

Course Outcomes:

After completion of the course, students will be able to:

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

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To understand basic block sets of different simulation platform used in electrical/electronic circuit design.	3	3	3	3	3	3	2	2	1	2	2	1
To understand use and coding in different software tools used in electrical circuit design.	3	3	3	1	1	3	1	2	1	2	2	1
To understand use and coding in different software tools used in electronic circuit design.	3	3	3	1	1	3	1	2	1	2	2	1
To understand the simulation of electric circuits for performance analysis.	3	3	2	1	2	3	2	1	2	1	2	3
To understand the simulation of electric machines and Solar PV model for performance analysis.	3	2	-	-	2	-	1	-	2	-	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Develop knowledge of software packages to model electrical and electronics systems.	3	3	1	3	2	3	2	3	1	2	2	3
Develop knowledge of software packages to program electrical and electronics systems.	3	3	2	1	2	3	2	1	2	1	2	3
Model different electrical and analyze the results.	3	2	2	1	2	1	2	1	2	2	2	3
Model different electronic systems and analyze the results.	3	2	2	1	2	1	2	1	2	2	2	3
Articulate importance of software packages used for simulation in laboratory experimentation by analyzing the simulation results.	3	2	-	-	2	-	1	-	2	-	2	3

LIST OF EXPERIMENTS/DEMONSTRATIONS:

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

Any Ten Experiments are to be conducted using open-source software like ORCAD, Circuitlab, SCILAB, Ngspice, Octave, Simulid etc OR any Licensed simulation tools software like ORCAD PSPICE, MATLAB, NI Multisim, PowerSim, TINA, Python etc.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
III Semester Syllabus
EC363PC: ANALOG ELECTRONIC CIRCUITS LABORATORY

L	T	P	C
0	0	2	1

Course Objectives:

1. To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of basic and feedback amplifier circuits such assmall signal, cascaded, large signal and tuned amplifiers.
4. To introduce the basic building blocks of linear integrated circuits.
5. To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes:

1. Know the characteristics, utilization of various components.
2. Understand the biasing techniques
3. Design and analyze various rectifiers, small signal amplifier circuits.
4. Design sinusoidal and non-sinusoidal oscillators.
5. Design OP-AMP based circuits with linear integrated circuits.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	1	-	-	-	-	-	1	1	1
CO2	3	2	2	-	-	1	-	-	-	-	-	1	1	1
CO3	3	2	2	3	1	1	-	-	-	-	-	1	2	2
CO4	3	2	3	3	1	1	-	-	-	-	-	1	2	2
CO5	3	2	3	3	1	1	-	-	-	-	-	1	2	2

List of Experiments:

1. Draw the VI Characteristics of given PN Junction diode. Determine the Static and Dynamic resistance of the Diode.
2. Determine the Ripple factor, % Regulation PIV and TUF of the given Rectifier with & without filter.
3. Obtain the I/O Characteristics of CE configurations of BJT. Calculate h-parameters from the Characteristics.
4. Obtain the I/O Characteristics of CB configurations of BJT. Calculate h-parameters from the Characteristics.
5. Obtain the I/O Characteristics of CC configurations of BJT. Calculate h-parameters from the Characteristics.
6. Obtain the Drain and Transfer characteristics of CS configuration of JFET. Calculate gm, rd from the Characteristics.
7. Inverting and Non-inverting Amplifiers using Op Amps
8. Adder and Subtractor using Op Amp

9. Integrator Circuit using IC 741.
10. Differentiator circuit using Op Amp.
11. Current Shunt Feedback amplifier
12. Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for given frequency.
13. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.
14. Design transformer coupled class A power amplifier and draw the input and output wave forms, find its efficiency.
    - Experiments related to MOSFET may be included

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)

B. Tech. III Semester Syllabus

MC351HS: GENDER SENSITIZATION LABORATORY

(EEE, CSE, IT, CSD & CSB)

L	T	P	C
0	0	2	0

Course Objectives:

This course aims:

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

Course Outcomes:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

COURSE DESCRIPTION

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

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

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.

UNIT-II: GENDER ROLES AND RELATIONS

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

UNIT-III: GENDER AND LABOUR

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

UNIT–IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing-Coping with Everyday Harassment- Further Reading: "Chupulu".

Domestic Violence: Speaking 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.

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

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

Suggested Readings:

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

Assessment and Grading:

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

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
IV Semester Syllabus
ME431PC: FLUID MECHANICS AND HYDRAULIC MACHINES

L	T	P	C
3	0	0	3

Course Objectives:

1. Study the properties of fluids and classification of fluids
2. Identify different types of flows and analysis of various equations of fluid flow.
3. Understand the concepts of losses in flow and analysis of impact of jet on vanes.
4. Analyze the performance of various Turbines.
5. Analyze the performance of various Pumps.

Course Outcomes:

After the completion of the course student should be able to

1. Understand the basic properties of fluid flow and the concepts of pressure
2. Understand classifications of fluid flow and apply the broad principles of kinematics and dynamics.
3. Understand the various minor and major losses in pipe flow and to analyze the impact of jet on various vanes
4. Acquire knowledge on different types of turbines and its principles that will be utilized for practical usages.
5. Acquire knowledge on Centrifugal pumps and its principles that will be utilized for practical usages.

Course Objectives	**Program Outcomes**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
To Study the properties of Fluids and classification of fluids.	2	1	2	-	-	-	-	-	-	-	-	-
To identify different types of flows and analysis of various equations of fluid flow.	3	3	2	2	3	-	-	-	-	-	-	-
To understand the concepts of losses in flow and analysis of impact of jet on vanes.	2	3	3	2	2	-	-	-	-	-	-	-
To analyze the performance of various Turbines.	3	3	2	2	2	-	-	-	-	-	-	-
To analyze the performance of various Turbines.	3	2	2	3	2	-	-	-	-	-	-	-

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand the basic properties of fluid flow and the concepts of pressure.	2	1	2	-	2	-	-	-	-	-	-	-
Understand classifications of fluid flow and apply the broad principles of kinematics and dynamics.	3	3	2	2	3	-	-	-	-	-	-	-
To understand the various minor and major losses in pipe flow and to analyze the impact of jet on various vanes.	2	3	3	2	2	-	-	-	-	-	-	-
Acquire knowledge on different types of Turbines and its principles that will be utilized for practical usages.	3	3	2	2	2	2	-	-	-	-	-	-
Acquire knowledge on Centrifugal pumps and its principles that will be utilized for practical usages.	3	2	2	3	2	-	-	-	-	-	-	-

UNIT I - PROPERTIES OF FLUIDS

Dimensions and units: physical properties of fluids –density, specific weight, specific gravity, viscosity - vapour pressure - atmospheric gauge and vacuum pressure - measurement of pressure – manometers – Piezometer, U-tube & Differential Manometers.

UNIT II - FLUID KINEMATICS

Basic definition of stream line, path line and streak lines and classification of flows, steady unsteady, uniform, non-uniform, laminar, turbulent, rotational, and irrotational flows - equation of continuity for 1- dimensional flow.

Fluid dynamics: Surface and body forces - Euler's and Bernoulli's equations for flow along a stream line, Measurement of flow: Venturimeter, Orifice meter. Notches and its types

UNIT III - CLOSED CONDUIT FLOW

Darcy Weisbach equation-Minor losses in pipes – Pipes in series and in parallel - total energy line - hydraulic gradient line. Momentum Equation.

Basics of Turbo Machinery: Hydro dynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams and work done.

UNIT IV - HYDRAULIC TURBINES

Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine – working proportions, work done and efficiencies, function of draft tube.

Performance of Hydraulic Turbines: Definitions of Unit Quantities and Specific speed, Characteristic Curves, Cavitation, Water Hammer.

UNIT V - CENTRIFUGAL PUMPS:

Centrifugal pump: Definition and classification, components, work done, manometric head, various losses and efficiencies, minimum starting speed, specific speed. Multistage pumps-pumps in series and parallel, performance of pumps, NPSH.

Reciprocating Pumps: Classification, working principles of single acting Reciprocating pump.

Suggested Readings:

1. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, 2009.
2. Bansal R. K, Fluid Mechanics and Hydraulic Machines, Laxmi Publication Pvt. Ltd, 2010
3. Rajput R.K., Fluid Mechanics and Hydraulic machines, S.Chand & Company, 2010.

Reference Books:

1. Jain A. K., Fluid Mechanics including Hydraulic Machines, Khanna Publishers , 2004.
2. Subramanya K., Fluid Mechanics and Hydraulic Machines problems and solutions, McGraw Hill Education Pvt.Ltd,2014

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
IV Semester Syllabus
EE401PC: MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

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

Course Objectives:

1. To introduce the basic principles of all measuring instruments.
2. To deal with the measurement of voltage, current, power factor, power, and energy
3. To deal measurements with the measurement of RLC parameters using the bridges.
4. To understand the operation of different types of transducers and their applications.
5. To understand the basic concepts of smart and digital metering.

Course Outcomes:

After completion of this course, the student will be able to

1. Understand different types of measuring instruments, their construction, operation, and characteristics.
2. Identify the instruments suitable for typical measurements.
3. Understand the resistance measurement through DC Bridge, capacitance and inductance through AC bridges.
4. Apply the knowledge about transducers and instrument transformers to use them effectively.
5. Apply the knowledge of smart and digital metering for industrial applications.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To introduce the basic principles of all measuring instruments	3	3	3	3	3	3	1	1	2	2	1	3
To deal with the measurement of voltage, current, power factor, power and energy measurements	2	1	2	2	2	2	2	1	1	1	2	3
To deal with the measurement of RLC parameters using the bridges	2	1	2	2	2	2	2	1	1	1	2	3
To understand the operation of different types of transducers and their applications	2	1	2	2	2	2	2	1	1	1	2	3
To understand the basic concepts of smart and digital metering	2	1	2	2	2	2	2	1	1	1	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand different types of measuring instruments, their construction, operation and characteristics	2	1	2	2	2	2	2	1	2	1	2	3
Identify the instruments suitable for typical measurements	2	1	2	2	2	2	2	1	2	1	2	3
Understand the resistance measurement through DC Bridge, capacitance and inductance through AC bridges	2	1	2	2	2	2	2	1	2	1	2	3
Apply the knowledge about transducers and instrument transformers to use them effectively	2	1	2	2	2	2	2	1	2	1	2	3
Apply the knowledge of smart and digital metering for industrial applications	2	1	2	2	2	2	2	1	2	1	2	3

UNIT- I: INTRODUCTION TO MEASURING INSTRUMENTS

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

UNIT- II: POTENTIOMETERS & INSTRUMENT TRANSFORMERS

Principle and operation of D.C. Crompton's potentiometer, standardization - Measurement of unknown resistance, current, voltage, A.C Potentiometers: polar and coordinate types, standardization, applications.

Instrument transformers: CT and PT, Ratio and phase angle errors, CT testing using mutual inductor method by null technique.

UNIT- III: MEASUREMENT OF POWER & ENERGY

Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques - Extension of range of wattmeter using instrument transformers, Measurement of active and reactive powers in balanced and unbalanced systems.

Single phase induction type energy meter - driving and braking torques, errors and compensations, testing by phantom loading using R.S.S. meter, three phase energy meter, tri-vector meter, maximum demand indicator.

UNIT- IV: DC & AC BRIDGES

Method of measuring low, medium and high resistance - Sensitivity of Wheat-stone's bridge, Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance using loss of charge method.

Measurement of inductance - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge, Mmeasurement of capacitance and loss angle - Desauty's Bridge, Wien's bridge, Schering bridge.

UNIT-V: TRANSDUCERS AND DIGITAL METERING

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, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

Introduction to Smart and Digital Metering: Digital Multi-meter, True RMS meters, Clamp-on meters, Digital Energy Meter, Prepaid meter, Net metering, bi-directional meter, Cathode Ray Oscilloscope, Digital Storage Oscilloscope.

Suggested Readings:

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

Reference Books:

1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd., 2007.
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
4. Buckingham and Price, "Electrical Measurements", Prentice – Hall, 1988.
5. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
6. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing, 2011.
7. C.T. Baldwin, "Fundamentals of Electrical Measurements", Kalyani Publications, 2001.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
IV Semester Syllabus
EE402PC: ELECTRICAL MACHINES - II

L	T	P	C
3	0	0	3

Prerequisite: Electrical Machines-I

Course Objectives:

1. To study and understand 1-phase Transformer - their construction, operation, and applications
2. To analyze the performance of transformers through various testing methods.
3. To study and understand Auto and Poly-phase Transformers - their winding connections, operation, and applications.
4. To deal with the detailed analysis of poly-phase Induction Motors.
5. To study and understand concepts of Circle Diagram and Speed Control of Three phase Induction motors.

Course Outcomes:

After completion of the course, students will be able to:

1. Understand the concepts and constructional aspects of 1-phase Transformer.
2. Carry out different testing methods to determine the efficiency of Single-Phase Transformer.
3. Understand the concepts and winding connections of auto and poly-phase Transformers.
4. Identify different parts of a poly-phase Induction Motor & understand it's operation
5. Understand the concepts of Circle Diagram through testing and carry out different speed control methods of 3-phase Induction Motor.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To study and understand 1-phase Transformer - their construction, operation, and applications	3	2	3	-	3	3	-	-	-	-	-	-
To analyze the performance of transformers through various testing methods.	3	3	2	2	3	3	-	-	-	-	-	-
To study and understand Auto and Poly-phase Transformers - their winding connections, operation, and applications.	2	3	3	2	3	3	-	-	-	-	-	-
To deal with the detailed analysis of poly-phase Induction Motors.	3	3	2	2	2	2	-	-	-	-	-	-
To study and understand concepts of Circle Diagram and Speed Control of Three phase Induction motors.	3	2	2	3	2	2	-	-	-	-	-	-

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand the concepts and constructional aspects of 1-phase Transformer	2	2	3	-	2	2	-	-	-	-	-	-
Carry out different testing methods to determine the efficiency of Single-Phase Transformer.	3	3	3	2	3	2	-	-	-	-	-	-
Understand the concepts and winding connections of auto and poly-phase Transformers.	2	3	3	2	2	2	-	-	-	-	-	-
Identify different parts of a poly-phase Induction Motor & understand it's operation	3	3	3	2	2	2	-	-	-	-	-	-
Understand the concepts of Circle Diagram through testing and carry out different speed control methods of 3-phase Induction Motor.	3	2	3	3	2	2	-	-	-	-	-	-

UNIT-I: SINGLE PHASE TRANSFORMERS

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

UNIT-II: TESTING OF TRANSFORMERS

Testing of 1-phase transformers: OC and SC tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios.

UNIT-III: AUTO & POLY-PHASE TRANSFORMERS

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, Third harmonics in phase voltages-three winding transformers-tertiary windings-determination of Zp, Zs and Zt transients in switching - off load and on load tap changing; Scott connection.

UNIT-IV: POLY-PHASE INDUCTION MOTORS

Poly-phase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and pf at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation- torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging.

UNIT-V: CIRCLE DIAGRAM & SPEED CONTROL OF INDUCTION MOTORS

Circle diagram-no load and blocked rotor tests-predetermination of performance-methods of starting and starting current and torque calculations.

Speed control: change of frequency; change of poles and methods of consequent poles; cascade connection. Injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

Suggested Readings:

1. Electrical Machines, P.S. Bimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.

Reference Books:

1. Electric Machines, I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.
2. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
3. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
4. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
5. Electrical Machines, R. K. Srivastava, Cengage Learning.
6. Performance and Design of AC Machines, MG.Say, BPB Publishers.
7. Theory of Alternating Current Machinery, Langsdorf, Tata McGraw- Hill Companies.
8. Electric machinery, A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
IV Semester Syllabus
EC431PC: DIGITAL ELECTRONICS

L	T	P	C
2	0	0	2

Course Objectives:

1. To learn fundamental concepts of digital system design and common forms of numberrepresentations and their conversions.
2. To implement and design logical operations using combinational logic circuits and sequential logic circuits.
3. To understand the semiconductor memories and programmable logic devices.

Course Outcomes:

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

1. Understand the working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Implement the given logical problems using programmable logic devices.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	1	2	3	3	1	1	1	1	1	1
CO2	2	2	1	2	3	1	2	2	2	1	1	1	1	1
CO3	3	2	2	2	2	2	2	1	1	1	1	1	1	1

UNIT-I:FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES:

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

UNIT-II:COMBINATIONAL CIRCUITS-I:

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

UNIT-III:COMBINATIONAL CIRCUITS-II:

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

UNIT-IV:SEQUENTIAL CIRCUITS:

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

UNIT-V:SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES:
Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read-only memory (ROM), ROM types, Read and write memory (RAM) types, Programmable logic array, Programmable array logic, Field Programmable Gate Array (FPGA).

Suggested Readings:

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

Reference Books:

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

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
IV Semester Syllabus
EE403PC: POWER SYSTEMS - II

L	T	P	C
3	0	0	3

Prerequisite: Power Systems – I and Electromagnetic Fields

Course Objectives:

1. To evaluate the transmission line parameters.
2. To study the performance of transmission lines.
3. To study the travelling waves.
4. To understand the overhead line insulators and concept of corona.
5. To evaluate the sag and tension and study the underground cables.

Course Outcomes:

After completion of the course, students will be able to:

1. Determine the parameters of transmission lines.
2. Analyze performance of transmission lines.
3. Understand the travelling waves.
4. Understand the concept of corona and determine the voltage distribution across insulators.
5. Calculate sag of transmission line and analyze the underground cables.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To evaluate the transmission line parameters	3	3	3	3	3	2	-	-	-	-	1	-
To study the performance of transmission lines	3	3	3	3	3	2	1	-	-	-	-	-
To study the travelling waves	3	3	3	3	3	1	2	2	-	-	-	-
To understand the overhead line insulators and concept of corona	3	3	3	3	3	3	2	-	-	-	-	-
To evaluate the sag and tension and study the underground cables.	3	3	3	2	2	1	2	1	-	-	-	-

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Determine the parameters of transmission lines	3	3	3	3	3	2	-	-	-	-	1	-
Analyze performance of transmission lines	3	3	3	3	3	2	1	-	-	-	-	-
Understand the travelling waves	3	3	3	3	3	1	2	2	-	-	-	-

Understand the concept of corona and determine the voltage distribution across insulators	3	3	3	3	3	3	2	-	-	-	-	-
Calculate sag of transmission line and analyze the underground cables	3	3	3	2	2	1	2	1	-	-	-	-

UNIT-I: TRANSMISSION LINE PARAMETERS

Types of conductors, Bare Aluminum conductors – AAC, ACSR, AAAC and ACAR.

Calculation of inductance for single phase and three phase, single and double circuit lines, Transposition of power lines, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems.

Calculation of capacitance for single phase and three phase, single and double circuit lines, symmetrical and asymmetrical conductor configuration, effect of ground on capacitance, Numerical Problems.

UNIT-II: PERFORMANCE OF SHORT, MEDIUM AND LONG LENGTH TRANSMISSION LINES

Classification of Transmission Lines - Short, medium and long lines, Mathematical solution to estimate regulation and efficiency of short and medium lines, Nominal-T, Nominal-Pie, Evaluation of A, B, C, D constants, Numerical Problems. Long Transmission Line-Rigorous Solution, evaluation of A, B, C, D constants, Interpretation of Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models, Numerical Problems, Ferranti effect.

UNIT-III: POWER SYSTEM TRANSIENTS AND INSULATION COORDINATION

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions – Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions, Numerical Problems, Introduction to Bewley's Lattice Diagrams, Insulation coordination, Volt-time curves.

Various Factors Governing the Performance of Transmission Line

Skin and Proximity effects – Description of the phenomenon, Corona - Description of the phenomenon, critical voltages and power loss, factors affecting corona, Bundle conductors.

UNIT-IV: OVERHEAD LINE INSULATORS AND CORONA

Types of Insulators-Pin, Suspension, Strain and Shackle, Voltage distribution across string, calculation of string efficiency, Capacitance grading and Static Shielding, Numerical Problems.

Skin and Proximity effects – Description of the phenomenon, Corona - Description of the phenomenon, critical voltages and power loss, factors affecting corona, Bundle conductors.

UNIT-V: SAG-TENSION CALCULATIONS AND UNDERGROUND CABLES

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems.

Types of Cables, Construction of a 3-core cable, Electrostatic Stress in Single Core Cable, Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading, Calculations of Insulation resistance, Capacitance of Single and 3-Core belted cables, Numerical Problems.

Suggested Readings:

1. C.L. Wadhwa, “Electrical Power Systems”, New Age International (P) Limited, Third Edition, 2001.
2. V.K Mehta and Rohit Mehta, “Principles of Power Systems”, S. Chand & Company Ltd, New Delhi, 2004.

Reference Books:

1. J.B.Gupta, A Course in Power Systems” Katson Books, 11th Edition, 2016.
2. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, “A Text book on Power System Engineering”, Dhanpat Rai Publishing Company (P) Ltd, 2008.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
IV Semester Syllabus
EE451PC: MEASUREMENTS AND INSTRUMENTATION LABORATORY

L	T	P	C
0	0	2	1

Prerequisites: Measurements and Instrumentation

Course Objectives:

1. To calibrate LPF Wattmeter, energy meter, PF meter using electro dynamo meter type instrument as the standard instrument.
2. To determine unknown inductance, resistance, and capacitance by performing experiments on DC Bridges & AC Bridges.
3. To determine three phase active & reactive powers using single wattmeter method practically.
4. To determine the displacement and strain using transducers.
5. To determine the ratio and phase angle errors of current transformer.

Course Outcomes:

After completion of this course, the student will be able to

1. To choose instruments.
2. Test any instrument.
3. Find the accuracy of any instrument by performing experiment.
4. Calibrate PMMC instrument using DC potentiometer.
5. Understand the measurement of displacement using LVDT and measurement of strainusing resistance strain gauge.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To calibrate LPF Wattmeter, energy meter, PF meter using electro dynamo meter type instrument as the standard instrument	3	3	3	3	3	3	1	1	2	2	1	3
To determine unknown inductance, resistance, capacitance by performing experiments on DC Bridges & AC Bridges	3	2	3	2	3	3	2	2	2	3	2	3
To determine three phase active & reactive powers using single wattmeter method practically	3	2	3	2	3	3	2	2	2	3	2	3
To determine the displacement and strain using transducers	3	2	3	2	3	3	2	2	2	3	2	3
To determine the ratio and phase angle errors of current transformer	3	2	3	1	3	3	1	1	2	2	2	3

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To choose instruments	3	3	3	3	3	3	3	1	2	1	1	2
Test any instrument	3	3	3	3	3	3	3	1	2	1	1	2
Find the accuracy of any instrument by performing experiment	3	3	3	3	3	3	3	3	3	3	2	3
Calibrate PMMC instrument using DC potentiometer	3	2	2	2	3	3	3	2	1	3	3	2
Understand the measurement of displacement using LVDT and measurement of strain using resistance strain gauge	3	2	2	2	3	3	3	2	1	3	3	2

Any Ten experiments are required to be conducted from the following list of experiments.

1. Calibration and Testing of single-phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Crompton DC Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit.
6. Schering Bridge & Anderson Bridge.
7. Measurement of 3 - Phase reactive power with single-phase wattmeter.
8. Measurement of displacement with the help of LVDT.
9. Calibration of LPF wattmeter by Phantom testing.
10. C.T. testing using mutual Inductor - Measurement of % ratio error and phase angle of given CT by Null method.
11. Resistance strain gauge – strain measurements and Calibration.
12. Measurement of parameters of a choke coil using 3-voltmeter and 3-ammeter methods.

Suggested Readings:

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

Reference Books:

1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd.,2nd Edition, 2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd., 2007.
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
4. Buckingham and Price, "Electrical Measurements", Prentice – Hall, 1988.
5. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New

Age International (P) Limited Publishers, 1st Edition 2010.

6. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing, 2011.
7. C.T. Baldwin, "Fundamentals of Electrical Measurements", Kalyani Publications, 2001.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
IV Semester Syllabus
EE452PC: ELECTRICAL AND ELECTRONICS DESIGN LABORATORY

L	T	P	C
0	0	2	1

Course Objectives:

1. To enhance practical knowledge related to different subjects
2. To develop hardware skills such as soldering, winding etc.
3. To develop debugging skills.
4. To enhance employability of a student.
5. To prepare students for working on different hardware projects**.**

Course Outcomes:

After completion of the course, students will be able to:

1. Get practical knowledge related to electrical engineering
2. Fabricate basic electrical circuit elements/networks
3. Trouble shoot the electrical circuits
4. Get hardware skills such as wiring, etc.
5. Get debugging skills.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To enhance practical knowledge related to different subjects	3	3	3	3	1	3	-	-	-	-	-	3
To develop hardware skills such as soldering, winding etc.	3	3	2	2	0	2	-	-	-	-	-	3
To develop debugging skills.	3	3	3	3	0	3	-	-	-	-	-	3
To enhance employability of a student.	3	3	2	3	1	3	-	-	-	-	-	3
To prepare students for working on different hardware projects.	3	3	2	2	1	2	-	-	-	-	-	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Get practical knowledge related to electrical engineering.	3	3	3	3	1	3	-	-	-	-	-	3
Fabricate basic electrical circuit elements/networks.	3	3	2	2	0	2	-	-	-	-	-	3

Trouble shoot the electrical circuits.	3	3	3	3	0	3	-	-	-	-	-	3
Get hardware skills such as wiring, etc.	3	3	2	3	1	3	-	-	-	-	-	3
Get debugging skills.	3	3	2	2	1	2	-	-	-	-	-	3

List of Experiments:

1. Design and fabrication of reactor/ electromagnet for different inductance values.
2. Design and fabrication of single phase Induction/three phase motor stator.
3. Start delta starter wiring for automatic and manual operation.
4. Wiring of distribution box with MCB, ELCB, RCCB and MCCB.
5. Wiring of 40 W tube, T-5, LED, Metal Halide lamps and available latest luminaries.
6. Assembly of various types of contactors with wiring.
7. Assembly of DOL and 3 point starter with NVC connections and overload operation.
8. Design and development of 5 V regulated power supply
9. Microcontroller Interface circuit for temperature measurement.
10. Peak detector using op-amplifiers.
11. Design and development of precision rectifier.
12. Design and development of first order/ second order low pass/high pass filters with an application.

Any 10 experiments from the above list must be conducted.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
IV Semester Syllabus
EC461PC: DIGITAL ELECTRONICS LABORATORY

L	T	P	C
0	0	2	1

Course Objectives:

1. To learn basic techniques for the design of digital circuits and number conversion systems.
2. To implement simple logical operations using combinational logic circuits.
3. To design combinational logic circuits, sequential logic circuits.

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

1. Understand the working of logic families and logic gates.
2. Define Postulates of Boolean algebra and to minimize combinational functions
3. Design and implement Combinational and Sequential logic circuits.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	2	1	-	-	1	-	-	2	2	2
CO2	3	2	2	1	2	1	-	-	1	-	-	2	2	2
CO3	2	3	3	2	2	1	-	-	1	-	-	1	2	2

List of Experiments:

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

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering
IV Semester Syllabus
ME461PC: FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

L	T	P	C
0	0	2	1

Course Objectives:

1. Verify the Bernoulli's equation and to calculate pressure heads along pipe flow
2. Determine the coefficient of discharge for venturi meter, orifice meter.
3. Find out the major losses in flow through pipes.
4. Study the characteristic of a centrifugal and reciprocating pump
5. Evaluate the coefficient of impact of jet on different kinds of vanes and also to study the performance of hydraulic turbines

Course Outcomes:

After successful completion of the course, student will:

1. Understand on calibration of venturi meter and orifice meter
2. Understand about different coefficients of discharges for different flow devices
3. Obtain the knowledge on design of turbines with the available heads and speeds
4. To estimate performance parameters of a given centrifugal and reciprocating pump
5. To analyze the losses of a fluid flow in pipes

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To Verify the Bernoulli's equation and to calculate pressure heads along pipe flow.	2	1	2	-	2	-	-	-	-	-	-	-
To determine the coefficient of discharge for Venturi meter, Orifice meter	3	3	2	2	3	-	-	-	-	-	-	-
To find out the major losses in flow through pipes.	2	3	3	2	2	-	-	-	-	-	-	-
To study the characteristics of a centrifugal and reciprocating pump.	3	3	2	2	2	2	-	-	-	-	-	-
Evaluate the coefficient of impact of jet on different kinds of vanes and also to study the performance of hydraulic turbines.	3	2	2	3	2	-	-	-	-	-	-	-

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand on calibration of venturi meter and orifice meter	2	1	2	-	2	-	-	-	-	-	-	-
Understand about different coefficients of discharges for different flow devices.	3	3	2	2	3	-	-	-	-	-	-	-
Obtain the knowledge on design of turbines with the available heads and speeds.	2	3	3	2	2	-	-	-	-	-	-	-
To estimate performance parameters of a given centrifugal and reciprocating pump.	3	3	2	2	2	2	-	-	-	-	-	-
To analyze the losses of a fluid flow in pipes.	3	2	2	3	2	-	-	-	-	-	-	-

List of Experiments:

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Calibration of V- Notch and Rectangular Notch.
12. Verification of Bernoulli’s Theorem.

Any Ten experiments are to be conducted.

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electrical and Electronics Engineering

IV Semester Syllabus

MC401HS: CONSTITUTION OF INDIA (EEE, CSE, IT, CSD & CSB)

L	T	P	C
3	0	0	0

Course Objectives:

1. Students will get to know about the history of Indian Constitution.
2. Students will get to know about President Election and his Power.
3. Students will get to know about Council of Ministers and their election procedureand their powers and responsibilities.
4. Students will get to know about Judicial System in India.
5. Students will get to know about Panchayat-raj System in India.

Course Outcomes:

1. This enables the Students to know about the Rights of Citizen.
2. This enables the Students to know about Fundamental Duties of People.
3. This enables the Students to Know the Directive principles of State Policy.
4. This enables the Students to know about Functioning of Parliament and its Powers.
5. This enables the Students to know about various Constitutional bodies in India.

Course content

1. Meaning of the constitution, law and constitutionalism
2. Historical perspective of the Constitution of India
   - Drafting Committee
3. Salient features and characteristics of the Constitution of India
   - Preamble
   - Salient Features
   - Major Sources of Indian Constitution
4. Scheme of the fundamental rights
   - Article 13 to 32
   - Scheme of the Fundamental Right to Equality
   - Scheme of the Fundamental Right to certain Freedom
   - Scope of the Right to Life and Personal Liberty
5. The scheme of the Fundamental Duties and its legal status
   - List of Fundamental Duties
   - Justifiability of Fundamental Duties
6. The Directive Principles of State Policy – Its importance and implementation
   - Categories - Gandhian, Socialist and Liberal Principles

- Significance of Directive Principles of State Policy
- Relation between Fundamental rights and Directive Principles of State Policy

7. Federal structure and distribution of legislative and financial powers between theUnion and the States
   - Union List
   - State List
   - Concurrent List
   - Residuary Powers
8. Parliamentary Form of Government in India.
9. The constitutional powers and status of the President of India vs the constitutionalpowers and status of the Council of ministers headed by the Prime Minister
10. Amendment of the Constitution and its Procedure
    - Procedure of Amendment to Constitution of India
    - Important Amendments
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
    - Urban local Self Government
    - Rural local Self Government
13. Important Constitutional Bodies
    Election Commission of India
    Finance Commission of India
    Union Public Service Commission
    C-AG

Suggested Readings:

1. Subhash Kashyap, Our Constitution, National Book Trust, 5th Edition, Reprint- 2017.
2. V. N Shukla, The Constitution of India, Law literature Publication, 11th Edition, 2020.

Reference Books:

1. M P Jain, Indian Constitutional Law, Lexis Nexis, 8th Edition, 2018.
2. Samar Aditya Pal, Indian Constitution-Origin& Evolution, Lexis Nexis, 1st Edition,2019.