FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING (FEEE)

SI. No.	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1.		FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING (FEEE)	2	1	0	II	3
2.		FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING (FEEE) (Laboratory)	0	0	2	II	1

	Content (Nameof topic)	Total nos of period/hours required
UNIT 1	**Overview of Electrical Components**	
	1.1 Concept of Passive Components: Resistors, Capacitors, Inductors. 1.2 Different types of signal waveforms: DC/AC, voltage/current, periodic/non-periodic 1.3 Voltage/current sources: Ideal/non-ideal ,independent/dependent , source transformation, 1.4 Simple problems on source transformation.	4
UNIT 2	**Electric and Magnetic Circuits**	
	2.1 Concept of EMF, Current, Potential Difference, Power and Energy 2.2 M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor, BH curve and hysteresis loss, eddy current loss. Analogy between electric and magnetic circuits 2.3 Electromagnetic induction: Faraday's laws , Lenz's law 2.4 Dynamically induced emf; Statically induced emf; Principle of self and mutual inductance 2.5 Energy stored in magnetic circuit 2.6 Flemming's Left Hand Rule and Right Hand Rule, 2.7 Simple problems.	8
UNIT 3	**A.C Circuits**	
	3.1 Concept of Angular speed, Cycle, Frequency, Periodic time, Amplitude, RMS value, Average value, Form Factor, Peak Factor, impedance, phase and phase difference. 3.2 Representation of sinusoidal quantities in (i) exponential form (ii) complex form and (iii) polar form. 3.3 Expressions of voltage and current through pure resistance, inductance and capacitance with sinusoidal excitation and phasor representation. 3.4 Study of simple R-L, R-C, R-L-C series and parallel circuits with sinusoidal excitation and phasor representation. 3.5 Concept of impedance, impedance triangle, power factor, active, reactive and apparent power, power triangle. 3.6 Voltage and Current relationship in Star and Delta connections. 3.7 Simple problems.	10

UNIT 4	**Transformer and Machines**	
	4.1 Transformer and Machines 4.2 General construction and principle of different type of transformers 4.3 Emf equation and transformation ratio of transformers, 4.4 Auto transformers 4.5 Construction and Working principle of motors 4.6 Types of motors and applications 4.7 Simple problems on transformer and electrical machines.	10

UNIT 5	**Overview of Basic Semiconductor Devices**	
	1.1 Energy level diagrams of insulator, conductor & semi conductor. 1.2 Concept of Intrinsic & Extrinsic semiconductor, Idea of Doping concentration, Formation of P-Type and N-Type semiconductor and their properties. 1.3 Formation of P-N junction Diode and their properties. 1.4 Concept of PNP and NPN Transistor with their applications. Concept of FET, MOSFET & CMOS with their applications.	10
UNIT 6	**Overview of Analog Circuits**	10
	2.1 Features of an ideal OPAMP, Pin configuration of 741C, Concept of Virtual Ground & Offset null adjustment. 2.2 Inverting and non-inverting mode and their gain calculation. 2.3 Applications of OPAMP: Amplifier, Adder, Integrator, & Differentiator circuit.	
UNIT 7	**Overview of Digital Electronics**	12
	3.1 Rules and laws of Boolean Algebra, Basic logic circuits-Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, Ex NOR and their truth tables), Universal Logic Gates. 3.2 De-Morgan's theorem, Min term (SOP), Max term(POS), Idea of Karnaugh-Map, Simplification of Logic circuits by Boolean Algebra and Karnaugh Map. 3.3 Basic concept of Flip Flops as a storage element. 3.4 Fundamental concept of Counters-Ripple and synchronous Up-Down Counter 3.5 Introduction to Digital IC Logic gates (TTL only) .	

Sr. No.	Practical Outcome	Total nos of period/hours required
1.	Determine the permeability of magnetic material by plotting its BH curve.	2
2.	Measure voltage, current and power in a 1-phase circuit with resistive load.	2
3.	Visualize phase difference between voltage and current in series R-L and R-C circuits with the help of oscilloscope and plot the phasor diagram.	2
4.	Measure voltage, current, power and power factor in a R-L series circuit.	2

5.	Identify different parts of a single-phase transformer, A.C./D.C. Motor.	4
6.	Determine the transformation ratio of a single-phase transformer and measure no load and full load current of it.	4
7.	Identify various active and passive electronic components in a given circuit	2
8.	Familiarization with multimeter to measure the value of given resistor and to confirm with colour code	2
9.	Use of LCR-Q meter to measure the value of a given capacitor and inductor.	2
10.	Test the PN-junction diodes using digital multimeter and find out their V-I characteristics in forward biased circuit.	2
11.	Identify three terminals of a transistor using digital multimeter and calculate gain in CE mode simple Transistor circuit.	2
12.	Use of Op-Amp in amplifier, differentiator and Integrator circuit	4
13.	Realization of Truth Table of different Logic Gates (TTL only) and verification of De-Morgan's theorem.	4

- **Course outcomes:**
  After completion of this course students will be able to understand basics of electrical and electronics engineering principles in industrial processes as well as functions and applications of different elements like transformers and motors, various active and passive electronic components, op-amp etc.

- **List of recommended Books:**
  1) Basic Electricals and Electronics--------- S.K. Bhattacharya (Pearson Education)
  2) Fundamental of Electrical and Electronics Engineering------ Samarjit Ghosh (PHI)
  3) Basic Electrical and Electronics Engineering------ J.B. Gupta (S.K. Kataria & Sons)
  4) Basic Electrical and Electronics Engineering------- R. Mathusubramanian & S. Salivahanan (McGraw Hill Education)
  5) Principle of Electrical Engineering and Electronics-------- V. K. Mehta & Rohit Mehta (S.Chand)