EEEXXXX   Basic Electrical and Electronics Engineering

4 Credits (3 0 2 4)

DC circuits: KCL, KVL, Mesh and nodal analysis, Network theorems, First order step response - AC Circuits: Single Phase RL, RC, RLC series circuits, Three phase systems, Phasor diagram, Electrical safety - Magnetic circuits: Electromagnetic induction, Dot convention, Energy stored in Magnetic systems, Magnetically coupled circuits - Electrical machines: DC machines, Single phase transformers, Single phase and three phase induction motors, Synchronous generators - Digital Systems: Boolean algebra, Combinational circuits - Semiconductor Devices and Applications: Diodes, Op amps, Rectifiers; Sensors: Characteristics, classifications and working

Course code		Course Name	L	T	P	C
EEEXXXX		**Basic Electrical and Electronics Engineering**	**3**	**0**	**0**	**3**
Pre-requisite	**NIL**		**Syllabus version**			
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Course Objectives

1. Gain expertise with various laws and theorems to solve electric and electronic circuits
2. Provide an overview on working principle of machines
3. Understand the concepts of semiconductor devices, op-amps, digital circuits and sensors

Course Outcomes

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

1. Evaluate DC and AC circuit parameters using various laws and theorems
2. Comprehend the parameters of magnetic circuits
3. Classify and compare various types of electrical machines and their applications
4. Design basic combinational circuits in digital system
5. Analyze the characteristics and applications of semiconductor devices
6. Analyze sensors and their working mechanism

Module:1	**DC Circuits**	**7 hours**

Basic circuit elements and sources; Ohms law; Kirchhoff's laws; Series and Parallel connection of circuit elements; Star-delta transformation; Mesh current analysis; Node voltage analysis; Theorems: Thevenin's, Maximum power transfer and Superposition theorem

Module:2	**AC Circuits**	**8 hours**

Alternating voltages and currents, RMS, average, maximum values, Single Phase RL, RC, RLC series circuits, Power in AC circuits, Power Factor, Three phase balanced systems, Star and delta Connections, Electrical Safety, Fuses and Earthing

Module:3	**Magnetic Circuits**	**6 hours**

Magnetic field; Toroidal core: Flux density, Flux linkage; Magnetic circuit with airgap; Reluctance in series and parallel circuits; Self and mutual inductance; Transformer: turn ratio determination

Module:4	**Electrical Machines**	**6 hours**

Construction, working principle and applications of DC Machines, Transformers, Three phase Induction motors, synchronous generators, single phase induction motors, special machines stepper motor, universal motor and BLDC motor

Module:5	**Semiconductor Devices and Applications**	**6 hours**

Characteristics: PN junction diode, Zener diode, BJT, MOSFET; Applications: Rectifier, Voltage regulator, Operational amplifier

Module:6	**Digital Systems**	**7 hours**

Binary arithmetic; Number base conversion; Boolean algebra: simplification of Boolean functions using K-maps; Logic gates; Design of basic combinational circuits: adders, multiplexers, de-multiplexers

Module:7	**Sensors and Transducers**	**5 hours**

Characteristics: Static and Dynamic Characteristics; Classification; Theory and Principle: Resistive sensors, Capacitive sensors, Inductive sensors, Magnetic sensors, Self-generating sensors

		Total Lecture hours:	**45 hours**

Text Books	
1	Allan R. Hambley, "Electrical Engineering -Principles & Applications", 2019, 6th Edition, Pearson Education
2	V. D. Toro, Electrical Engineering Fundamentals, 2nd edition. PHI, 2014
Reference Books	
1	R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 11th edition. Pearson, 2012
2	DP Kothari & Nagrath, "Basic Electric Engineering", 2019, Tata McGraw Hill

PO's:2,3,4,12

PSO's:1

Recommended by Board of Studies	DD-MM-YYYY		
Approved by Academic Council	No. xx	Date	DD-MM-YYYY