BASIC ELECTRICAL ENGINEERING

Course Code: 18EE1ICBEE /18EE2ICBEE   **Credits: 03**

L:P:T:S: 2:0:2:0   **CIE Marks: 50**

Exam Hours: 03   **SEE marks: 50**

Course Objectives:

Course Objectives are:

1. To provide the basic knowledge about the Magnetic and A.C Circuits.
2. To instill the knowledge of working principle of operation and other concepts of different electrical machines.
3. To impart the basic knowledge about various measuring instruments and domestic wiring.

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Course out comes: At the end of the course, the student will be able to:

CO1	Analyze basic magnetic and A.C circuits.
CO2	Explain the working principles and basic other important concepts of different electrical machines and transformers.
CO3	Classify and discuss the different types of measuring instruments and domestic wiring schemes.
CO4	Build the experimental setup and measure different parameters of electrical quantities.

Mapping of Course Outcomes to Program Outcomes:

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

SYLLABUS			
Unit	Contents of the unit.	Hours	CO's
1	**Introduction to Electromagnetism** Basic definitions, Magnetic field due to electric current flow, force on a current carrying conductor placed in a magnetic field, Faradays laws of electromagnetic induction, Lenz's law, Fleming's rules and its applications. Statically and dynamically induced EMF'S. Self and mutual inductance. Numerical Problems on mutual inductance and coefficient of coupling. Energy stored in magnetic field.	8	CO 1
2	**Single-phase A.C Circuits:** Principle and Generation of sinusoidal voltage, definition of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities. Analysis, with phasor diagrams, of R, L, C, and series R-L-C circuits, real power, reactive power, apparent power and power factor. Illustrative examples.	8	CO1
3	**Basic Instruments:** Introduction, classification of instruments, Principle, Construction & Operation of dynamometer type Wattmeter, Single phase Induction type energy meter. ***Physical demonstration of different basic instruments** . **Three Phase A.C Circuits:**Necessity and advantages of three phase systems, generation of three phase power, definition of Phase sequence, balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. ***Measurement of power by two-wattmeter method with physical demonstration**. Illustrative examples. **Domestic Wiring**: Electric shock, precautions against electric shock, Earthing: Pipe and Plate. ***Two-way and three-way control of a lamp with physical experiment**	8	CO1, CO3,CO4
4	**DC motors:** Construction of DC machine, DC motor working principle, Back EMF and its significance. Torque equation, Problems on Torque equation, Characteristics of DC motors, applications, Necessity of starter. ***Experimental demonstration of torque speed characteristics of d.c motors.** **Synchronous Generators:**	8	CO2, CO4

	Principle of operation. Types and constructional features, EMF equation. Concept of winding factor (excluding derivation of distribution and pitch factors) Illustrative examples on EMF equation. ***Demonstration of cut section of DC Machine.**		
5	**Introduction to Transformers**: Definition, need and classification, Construction, Working principle, EMF equation, losses, Regulation and efficiency, problems on EMF equation and efficiency. ***Demonstration of transformer cut section** **Induction motors**: Construction of induction motor, working principle, types, Slip and its significance, applications, necessity of starter, Star-Delta starter, Illustrative examples on slip calculation. ***Demonstration of induction motor cut section**	**8**	**CO2,CO4**

*The topics will be covered during tutorial classes along with practical exposure/experiments.

NOTE : 1. Questions for CIE and SEE not to be set from self-study component.

2. Assignment Questions should be from self-study component only.

Self Study component:

Unit 1: DC Circuits: Introduction to DC circuits, active and passive two terminal elements, ohms law, behaviour of resistor, inductor, capacitor, Kirchhoff's laws, mesh analysis in simple DC circuits excited by independent voltage sources, concept of power and energy..

Unit-2: Analysis, with phasor diagrams of R-L, R-C circuits, Illustrative examples on series parallel circuits.

Unit-3: Operating principles, essential features of measuring instruments (basics only), Moving coil permanent magnet (PMMC) instruments, Basics of moving iron ammeters and voltmeters, concept of extension of range of ammeter, voltmeter (shunt and multiplier). Service mains, meter board and distribution board. Types of wiring- Cleat, Casing & Capping and conduit (concealed) wiring, Elementary discussion on fuse and Miniature Circuit Breaker (MCB's).

Unit-4:DC Generators: Principle and operation of DC generators. Types of DC generators, EMF equation of DC generator, basics of armature reaction, commutation, Interpoles, 3 point starter.

Unit-5: Phasor diagram of Single-phase Transformer on no-load. Concept of rotating magnetic field.

Text Books:

1. "Basic Electrical Engineering", D.P. Kothari & I.J. Nagrath, Tata Mc Graw Hill Education.
2. "Basic Electrical Engineering" D. C. Kulshreshtha, TMH 1st Edition, Revised.

Reference Books :

1. " Problems in Electrical Engineering" , S.S. Parker Smith & NN Parker Smith.
2. "Basic Electrical Engineering", Jimmie J.Cathey, Syed A. Nasar, Schaum's Outline Series in Engineering, McGraw-Hill Book Company.

3. "Electrical & Electronics Technology", E.Hughes, PHI Publishers, 10th Edition.

Assessment Pattern

CIE – Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignments	AAT 1	AAT 2
Marks (out of 50)	30	10	5	5
Remember	5			
Understand	5			
Apply	10	10	2	2
Analyze	10		1	1
Evaluate			2	2
Create				

SEE- Semester End Examination (50 Marks)

Bloom's Category	Marks (50)
Remember	10
Understand	10
Apply	15
Analyze	10
Evaluate	5
Create	