Subject Title : BASIC ELECTRICAL ENGINEERING

Sub.Code: 18EE13/23	No. of Credits:03=02:2:0 (L - T – P)	No. of Lecture Hours/Week : 04
Exam Duration:03 Hrs	CIE+Assignment +SEE=40+5+5+50=100	Total No.of Contact Hours:52

Course Learning Objectives:

1 To introduce the Basic concepts in electrical engineering to all the disciplines of engineering students.

2 Students will learn the fundamentals of electricity and magnetism that serve as the basis for topics like controls, electronics, communication, instrumentation medical electronics etc.,

3 Students will learn the basic working principle of static electromagnetic conversion device such as transformers,.

4 Students will understand the working principle of dc machines, induction motors and ac generators.

5 Solve the simple problems on electromagnetic conversion devices such as transformers, induction motors, Synchronous generators and dc machines.

Unit No	Syllabus Contents	No.of Hours	Blooms Taxnomy level.
1	**1.** (a) Review of D.C. Circuits & Magnetism: Introduction to electrical current, electromotive force and electrical resistance, ohm's law and Kirchhoff's laws, resistances in series & parallel circuits. Power and energy in electrical circuits.Introduction to magnetic field, flux, magnetic field intensity, flux density and mmf. (No Illustrative Examples on D.C. Circuits & Magnetism) 1. (b) Electromagnetism: Faradays laws, Lenz's law. Fleming's Right hand rule & dynamically induced e.m.f.. Statically induced e.m.f.s., concept of self and mutual inductance & coefficient of coupling. Energy stored in magnetic field. Fleming's Left hand rule & force on current carrying conductor. Illustrative examples. 1.(c) AC fundamentals: Generation of sinusoidal voltage, average value, RMS value, form factor and peak factor of sinusoidally varying voltage and current, concept of lagging and leading sinusoids. Phasor representation. TEXT 1 and TEXT 2. Reference 1	13	L1, L2
2	**2.(a) Single-phase AC circuits:** relation between voltage and current, real, reactive, apparent power and power factor in circuits with R, L, C, R-L, R-C, R-L-C elements. Illustrative examples involving series and parallel circuits. **2.(b) Three phase circuits:** Concept of three phase generation, phase sequence, balanced supply and load. Relationship between line and phase values of voltage and current for balanced star and delta connections. Power & power factor in balanced circuits. Illustrative examples on balanced circuits. Advantages of three phase systems. TEXT 1 and TEXT 2 Reference 1	13	L1 –L3
3	**3. (a) Transformers:** introduction, principle of operation and	13	L1-L3

Unit No	Syllabus Contents	No.of Hours	Blooms Taxnomy level.
	construction of single phase core and shell type transformers. Emf. equation, losses and efficiency and definition of voltage regulation. Illustrative problems on emf. equation and efficiency. **3. b) Three phase induction motors:** introduction, concept of rotating magnetic field. Principle of operation, constructional features. Applications of squirrel-cage and slip-ring motors. Necessity of a starter. Illustrative examples on slip calculate TEXT 1 TEXT 2 Reference 1		
4	**4. a) DC machines:** introduction, principle of operation of dc a generator, types, constructional features, emf. equation of generator and illustrative examples. Principle of operation of dc a motor, back emf. and torque equation. Types of motors and their applications. Necessity of starter. Illustrative examples. **4.(b) Synchronous generators:** Introduction, principle of operation. Types and constructional features. Emf. equation, concept of winding factor (excluding derivation). Illustrative examples on emf equation. TEXT 1 and TEXT 2. Reference Book 1	13	L1-L3

Note 1: Unit 1 to 5 will have internal choice

Note 2: a) Two assignments are evaluated for 5 marks: Assignment -1 from Units 1 and 2. Assignment - 2 is from unit 3 and 4

b) Group activity for 5 Marks has to be evaluated through PPT Presentation/Subject Quiz/ Project/Seminar.

Note:3 Out of 5 Units, Unit 4 is a Webinar unit conducted through Google Classroom/Zoom/Cisco Webex etc and will be delivered by subject faculty.

Course Outcomes:

CO1 Define the fundamental laws of electrical engineering.

CO2 Apply fundamental concepts to solve problems on electrical circuits.

CO3 Apply fundamental laws of electromagnetic induction for AC /DC machines.

CO4 Analyze AC /DC machines by applying fundamental laws of electromagnetic induction.

CO5 Solve problems on machines and transformers.

Course Outcomes Mapping with Programme Outcomes.

Sl.No	Course Outcome	Level of Blooms Taxonomy	No. of hours of teaching	Programme Outcome											
				1	2	3	4	5	6	7	8	9	10	11	12
1.	CO1	**1**	**13**	3	2								1	1	1
2.	CO2	**2**	**7**	3	3								1	1	1
3.	CO3	**4**	**8**	3	3				1	1			1	1	1
4.	CO4	**5**	**7**	3	3				1	1			1	1	1

5.	CO5	**5**	**7**	3	3				1	1			1	1	1
Average CO				3	3				1	1			1	1	1

Course Outcomes Mapping with Programme Specific Outcomes.

Course Outcome	PSO1	PSO2	PSO3
CO1	3		
CO2	3		
CO3	3	1	
CO4	2	3	1
CO5	3	2	1
Average CO	**3**	**1**	**1**

Text Books.

1 D C Kulshreshtha, "Basic Electrical Engineering", 4th edition, TMH education private limited, new Delhi, , 2009

Reference Text Books.

1 E. Hughes, "Electrical Technology", 9th edition, International students 9th edition, Pearson , 2005

2 B L Theraja, "Fundamental of Electrical Engineering", 2nd Edition, S Chand Publications,2003

Web Links.

1 https://nptel.ac.in/courses/108/105/108105053/

2 https://nptel.ac.in/courses/108/108/108108076/