CH/CE/ME123 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C	Int	Ext
3	-	-	3.0	30	70

Semester II [First Year]

COURSE OBJECTIVES:

1. To introduce fundamental laws, basic electrical elements, sources and their characteristics.
2. To develop the ability to apply circuit analysis to AC circuits.
3. To provide students with fundamental concepts on the construction and operation of transformers and electrical machines.
4. To know the principle of operation and characteristics of diode and transistors.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. Understand the basic electrical elements, circuits and batteries
2. Demonstrate the concepts of AC circuits and transformers
3. Understand the operation of electrical machines
4. Differentiate diodes and transistors with their applications

UNIT I *Text Book - 1,2* [CO:1] **(12)**

Batteries: Lead-acid, Nickel-iron, Nickel-Cadmium batteries (Operation only).

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff`s current and voltage laws, Mesh and nodal analysis of simple dc circuits (independent sources only).

UNIT II *Text Book - 1,2* [CO:2] **(12)**

AC Circuits: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor and peak factor. Analysis of single-phase ac circuits consisting of R, L, C and their series combinations, real power, reactive power, apparent power, power factor.

Transformer: Construction and working principle of single phase transformer (Theoretical concepts only).

UNIT III *Text Book - 1* [CO:3] **(12)**

DC Machines: Construction, working principle of DC generator and motor (Elementary treatment only), torque-speed characteristic of separately excited dc motor (Theoretical concepts only).

AC Machines: Construction and working of a three-phase induction motor, slip equation, Torque-slip characteristics. Construction and working of synchronous generators (Theoretical concepts only).

UNIT IV *Text Book - 1* [CO:4] **(12)**

Semiconductor Diodes: Characteristics and operation of pn-junction and Zener diodes, Half-Wave and Full-Wave rectifiers (without filters) (Theoretical concepts only).

Bipolar Junction Transistor: Transistor operation, Common base configuration, Common emitter configuration, Common collector configuration. Comparison of CB, CE and CC configurations, Transistor as a switch and inverter (Theoretical concepts only).

LEARNING RESOURCES:

TEXT BOOK(s):

1. M.S.Sukhija, T.K.Nagasarkar, "Basic Electrical & Electronics Engineering", 3rd Edition Oxford press, 2017.
2. A. Sudhakar and Shyam Mohan SP, "Circuits and Networks: Analysis and Synthesis", 5th Edition, TMH, 2017.

REFERENCE BOOK(s):

1. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 5th Edition, Schaum`s outline series, TMH, 2017.
2. V.K. Mehta, "Principles of Electrical Engineering and Electronics", S.Chand, 2019.
3. S.Salivahanan, A.Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill Publishers, 2011.
4. "B.L.Theraja& A.K.Theraja,"Textbook of Electrical technology"- S.Chand & Co, 2014.

WEB RESOURCES:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076
3. https://nptel.ac.in/courses/108101091