



K. S. INSTITUTE OF TECHNOLOGY

An Autonomous Institution under VTU, Approved by AICTE
Department of Electronics & Communication Engineering
FIRST / SECOND SEMESTER SYLLABUS

Course : Introduction to Electrical Engineering	Semester	I/II	
Course Code	25BESC 104B /204B	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	Theory		

Course objectives (Course Skill Set)

1. To explain the laws used in the analysis of DC and AC circuits.
2. To explain the behavior of circuit elements in single-phase AC circuits.
3. To explain the construction and operation of transformers, DC Generators and motors and induction motors.
4. To introduce concepts of circuit protecting devices and earthing.
5. To explain electricity billing, equipment and personal safety measures.

Module-1

DC Circuits: Ohm's Law and its limitations. Series, parallel, series-parallel circuits, KCL & KVL, Simple Numerical.

(Text1: 2.1, 2.2,3.6)

Electromagnetic Induction: Definition, Faradays laws, Fleming's RH rule, Lenz's Law, Statically and Dynamically Induced Emf, Self-Inductance, Mutual Inductance and Coefficient of coupling. Force on current carrying conductor placed in a magnetic field, Fleming's Left hand Rule (Text 2: 8.1-8.14)

Number of Hours:8

Module-2

A.C. Fundamentals:

Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions)

Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance.

Analysis of R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power.

Concept of power factor. (Simple Numerical).

(Text1: 4.1 to 4.8, 5.1 to 5.6)

Three Phase Circuits:

Generation of Three phase AC quantity, advantages and limitations; star and delta connection, relationship between line and phase quantities (excluding proof)

(Text1 : 6.1 to 6.5, 6.8)

Number of Hours:8

Module-3

DC Machines:

DC Generator: Principle of operation, constructional details, induced emf expression.

DC Motor: Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics. Applications of DC motors. Simple numerical.

(Text1: 9.1 to 9.7, 9.9 to 9.13)

Speed control (armature & field) of DC motors (series & shunt only).

(Text2 : 13.1 to 13.3)

Special Electrical Machines and Its Applications: Construction and working principle of BLDC Motor, stepper motor and servo motor and their applications.

(Text3: 39.1-39.4, 39.22-39.24)

Number of Hours:8

Module-4
<p>Transformers: Applications of transformer, principle of operation, Types and construction of single phase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical.(Text1: 10.1-10.4, 10.6,10.11)</p> <p>Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, Constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance Simple numerical. (Text1: 12.1 to 12.5, Text 3: 34.7)</p> <p style="text-align: right;">Number of Hours:8</p>
Module-5
<p>Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load.</p> <p>Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, Printers, etc. Definition of “unit” used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.(Text 4)</p> <p>Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), Merits and demerits.</p> <p>Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock. (Text1: 8.18.6 to 8.12)</p> <p style="text-align: right;">Number of Hours:8</p>
<p>Course outcome (Course Skill Set) At the end of the course, the student will be able :</p> <ul style="list-style-type: none"> • To understand and apply various laws used for analysis of DC and AC circuits. • To understand the behaviour of circuit elements in single-phase circuits and analyse it’s working. • To understand and interpret the construction and operation of transformers, DC Machines and induction motors. • To interpret and analyse concepts of circuit protecting devices and earthing. • To understand and outline the concepts of electricity billing, equipment and personal safety measures.
<p>Suggested Learning Resources:</p> <p>Books (Name of the author/Title of the Book/Name of the publisher/Edition and Year) Text Books:</p> <ol style="list-style-type: none"> 1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019. 2. Fundamentals of Electrical Engineering and Electronics by B.L. Theraja, S Chand and Company, reprint edition 2012. 3. A text book of Electrical Technology- by B.L. Theraja, S Chand and Company Vol.2 reprint edition 2007 4. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019. 2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014. 3. K Venkataratnam – Special Electrical Machines, Universities Press, 2014

Web links and Video Lectures (e-Resources): www.nptel.ac.in

(1)Principle of Electrical Sciences, Prof Sanjay Agrawal, Indira Gandhi National Open University.

(2)Electricity and Electrical Wiring, Dr. Antara Mahanta Barua, Krishna Kanta Handiqui State Open University, Guwahati.

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching learning process and facilitate the achievement of course outcomes.

1. Technology Integration, 2. Collaborative Learning, 3. Flipped Classroom, 4. Visual Based Learning

Assessment Structure:

- The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.
- To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.
- To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks.
- Not- withstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

Continuous Comprehensive Assessments (CCA): CCA will be conducted for a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity -1: (Marks- 15)

Learning Activity -2 (optional): (Marks-10)