



SILVER OAK UNIVERSITY

Engineering and Technology (B.Tech.)

All Departments

Subject Name: Basic Electrical Engineering

Semester: 1st Year

Prerequisite: NA

Objective:

Electricity has been the main source of energy for the developing and developed countries. Per capita consumption of electricity of a country can be considered as an indicator of the development of the country. In view of this, it is essential for all engineering graduates to know the basic aspects of electrical engineering. This subject deals with basic circuit solution methods, introduction to electrical machines and basics of domestic electrical installations.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme				Total Marks
L	T	P		Internal		External		
			Th	Pr	Th	Pr		
3	0	2	4	40	50	60	--	150

Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	DC CIRCUITS Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation. Star-Delta transformation, Independent sources and Dependent sources, source transformation, Superposition, Thevenin and Norton Theorems.	8	20
2	AC CIRCUITS Representation of sinusoidal waveforms, peak and RMS values, Phasor representation of AC quantities, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Series and parallel resonance. Three phase balanced circuits, voltage and current relations in star and delta connections, Power measurement in three phase circuits.	10	25

3	ELECTROMAGNETIC INDUCTION BH characteristics, Hysteresis Loop, Magnetic Circuit, Construction and working principle of single phase and three phase transformers. Ideal and practical transformer. Auto-transformer and its applications. kVA rating of transformer.	6	15
4	ELECTRICAL ROTATING MACHINES Fleming's Right Hand Rule and Fleming's Left Hand Rule , Construction and working of DC Machines, Generation of rotating magnetic fields, Construction and working of Three-phase Induction Motor Single-phase Induction Motor, Synchronous generators.	8	20
5	ELECTRICAL INSTALLATIONS COMPONENTS OF LT SWITCHGEAR Switch Fuse Unit (SFU), MCB, ELCB, MCCB. Types of Wires and Cables. Earthing – Types of earthing and its importance. Safety precautions for electrical appliances. Types of Batteries, Important Characteristics for Batteries, Types of Battery Charging. Specification of Battery, Elementary calculations for energy consumption. Basics of power factor improvement.	8	20

Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	Apply concepts in solving complex electrical networks using Thevenin's, Superposition and Norton theorem for solving Complex circuit.	1
CO-2	Analysis of Single Phase and Three phase AC Circuits, the representation of alternating quantities and determining the power in these circuits.	2
CO-3	Realize the requirement of transformers in transmission and distribution of electric power and other applications.	3
CO-4	Acquire knowledge about the constructional details and principle of operation of dc machines, Synchronous Machine, transformers and Induction Motors.	4
CO-5	Acquire the knowledge of different type of Earthing and battery.	5

Teaching & Learning Methodology:-

1. Direct Instruction
2. Flipped Classrooms
3. Kinesthetic Learning

List of Experiments/Tutorials:

1. To analyze Kirchoff's current law & Kirchoff's voltage law
2. To perform & determine the equivalent resistance when resistances are connected in series and in

parallel.

3. Demonstration of cut-section of D.C machines & Induction motor
4. To determine the resistance, capacitance, power and power factor in an R – L series circuit.
5. To determine the resistance, capacitance, power and power factor in R-C series circuit.
6. To plot the resonance curve of Single phase R-L-C series circuit.
7. To plot the magnetization characteristic curve of a Magnetic material.
8. To perform about the relationship between line and phase quantities in star and delta connection for a three phase system
9. To verify the Turn ratio and Voltage ratio of single phase transformer.
10. To study the working of MCB & ELCB.

Major Equipment:

Ammeters, Voltmeters, Wattmeters, Resistors, Capacitors and Inductors of appropriate rating. Multimeters, Digital storage oscilloscope
Cut section models/charts of various machines
Demo units for MCB, ELCB, MCCB etc
Samples of wires and cables
Charts for earthing and safety precautions

Books Recommended:-

- (i) D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
- (ii) Basic Electrical Engineering - Nagsarkar and Sukhija, Oxford University Press
- (iii) B. L. Theraja, “Electrical Technology – Part I and II”, S. Chand and Co. 2012
- (iv) D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
- (v) L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
- (vi) E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
- (vii) V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

List of Open Source Software/learning website:

- I. <https://www.vlab.co.in/>
- II. <https://silveroakuni.ac.in/video-lecture>
- III. <https://nptel.ac.in/courses/108/108/108108076/>
- IV. <https://nptel.ac.in/courses/108/105/108105053/>