

SCHOOL OF ENGINEERING

SWARNIM STARTUP & INNOVATION UNIVERSITY

Course	Bachelor of Engineering (60 Seats)
Duration	4 Years
Aim	Our aim is to promote the education and applied research and development of knowledge in the field of electrical engineering.
Objectives	<ul style="list-style-type: none">• To maintain a high standard of education through outstanding teaching, innovative curriculum and research training.• To improve, develop and establish teaching and research programs in lined with industry needs.• To develop and promote quality and market driven academic and professional peruses.
Course Outcome	Electrical engineering, the broadest of all Engineering disciplines. It includes Basic knowledge of Electrical and Electronics equipments. It deals with design and protection of electric supply starting from generation to distribution, machines and all other electrical equipment used in any industry. Electrical engineers use the principles of mathematics, control system, circuit theory, Power system, and Power electronics to design, manufacture and maintain all the electrical equipments. Electrical engineering is concerned with power electronics including design and development, production, installation, operation and maintenance; such as locomotives, Electric Drives, Renewable and alternate energy, solar energy, Hybrid Electric vehicles. We not only design and create new products, but also develop protection scheme for them.

SWARNIM STARTUP & INNOVATION UNIVERSITY
 SCHOOL OF ENGINEERING & TECHNOLOGY
 DEPARTMENT OF CE/EC/EE/EEE/IT/MECH/AUTO/CL/CHEM
 ELEMENTS OF ELECTRICAL ENGINEERING

CODE: _____

B.E. 1st Year

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	-	2	5	5	30	50	70	-	150

Objectives: - The course provides introductory treatment of the field of Electrical Engineering to the students of various branches of engineering.

Prerequisites: - N.A.

Contents:

Sr. No.	Topics	Teaching Hrs.
1	D. C. Circuits:	20
a)	Elementary Concepts: Introduction of Electrical Current, Voltage, Power and Energy; Sources of Electrical Energy – Independent and Dependent Source, Source conversion; Ideal electrical circuit elements - Resistor, Inductor and Capacitor; Fundamental laws of electric circuits - Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel and series-parallel circuits;	08

	Electrostatics:	
b)	Electric charge and Laws of electrostatics; Definitions - Electric field, lines of force, electric field intensity, electric flux and flux density; Electrostatic induction; Gauss's law and its application; Dielectric	04
	Electromagnetism:	
c)	Faradays Laws; Lenz's Law; Fleming's Rules; Effect of magnetic field on current carrying conductor; Magnetic circuits; Statically and dynamically induced EMF; Concepts of self inductance, mutual inductance and coefficient of coupling; Inductance in series and parallel; Hysteresis and Eddy current losses; Energy stored in magnetic	08
2	A. C. Circuits :	20
	Single Phase A.C. Circuits:	
a)	Generation of sinusoidal voltage, Definition of average value, root mean square value, form factor and peak factor; Phasor representation of alternating quantities; Analysis with phasor diagrams of R, L, C, R-L, R-C and R-L-C circuits; Concepts of Real power, Reactive power, Apparent power and Power factor, Series, Parallel and Series -	12
	Three Phase A.C. Circuits:	08
b)	Necessity and Advantages of three phase systems, Generation of three phase power, Phase sequence, Balanced supply and Balanced load; Relationship between line and phase values of balanced three phase circuit; Power Measurement in balanced three phase circuits.	
3	Batteries, wiring, illumination & electrical safety:	08
	Batteries and Fuel Cell: Introduction of Batteries; The Simple cell, E.M.F and internal resistance of a cell; Primary and Secondary cells, Cell capacity; Types & Specifications of Batteries; Charging & Discharging of Battery; Safe disposal of Batteries; Fuel cell: Principle & Types of fuel cell.	02
	Electrical Wiring: Types of wires and cables; Types of Connectors & Switches;System of wiring, domestic and industrial wiring; Simple control circuit in domestic installation.	
b)		02
	Illumination: Types of lamps, fixtures & reflectors; Illumination schemes for domestic, industrial & commercial premises; Lumen requirements for different categories.	
c)		02

	Safety & protection: Safety precautions in handling electrical appliances; Electric shock, First aid for electric shock other hazards of electrical laboratories & safety rules; Grounding & Earthing - Importance of grounding and earthing, equipment for grounding, Methods of earthing; Circuit	
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Learning Outcomes:-

After learning the course the students should be able to Understand electrical current, potential difference, power and energy, sources of electrical energy, resistance and its behavior with temperature. Use the Ohm's Law and the Kirchhoff's Law and star delta transformation for solving resistive series, parallel and series-parallel circuits. Basics of AC Quantities, the mathematical operation on AC waveforms, Draw phasor diagram and waveforms for purely resistive, purely inductive and purely capacitive as well as series and parallel R-L-C circuits and also circuit Resonance and Q-factor and derive resonance frequency for such circuits. Also Understand the different types of wires, cables, connectors & switches used for wiring Different types of domestic and industrial wiring and able to Identify and use of different type of lamps, fixtures & reflectors, Understand the different types of illumination schemes and lumen requirements for different categories also learn about the importance of safety and the precaution to be taken while working with electrical equipments and accessories. Understand the working principle, usage and construction of circuit protection devices such as fuse, MCB, ELCB & Relays.

Teaching & Learning Methodology:-

Direct Instruction, Formal Authority, Expert talk, Personal Model.

Books Recommended:-

1. B.L. Theraja (2012), Electrical Technology, Vol – 1, S. Chand.
2. D.P. Kothari and I.J. Nagrath (2013), Theory and Problems in Basic Electrical Engineering, Prentice Hall, India.
3. John Bird (2012), Electrical Circuit Theory and Technology, Forth edition, Routledge, Taylor and Francis Group.
4. Parker Smith (2003), Problems in Electrical Engineering, CBS Publishers.
5. Surinder P Bali (2013), Electrical Technology, Vol – I, Pearson
6. V. N. Mittal and A. Mittal (2012), Basic Electrical Engineering, Tata McGraw Hill.

E-Resources:-

- 1) Nptel Web Portal, <http://nptel.ac.in/course.php?disciplineId=108>.

Practical List:-

Sr.No.	Practical
1.	General introduction to Electrical Engineering Laboratory and different Electrical and Electronics Symbols
2.	Verification of Kirchhoff's Voltage Law and Kirchhoff's Current Law for AC and DC circuits;
3.	To obtain inductance, power and power factor of the Series R-L circuit with AC supply using Phasor diagram.
4.	To obtain capacitance, power and power factor of the Series R-C circuit with AC supply using Phasor diagram.
5.	To obtain inductance, capacitance, power and power factor of the Series R-L-C circuit with AC supply using Phasor diagram.
6.	Determination of Resonant frequency, Bandwidth and Q factor for RLC network in Series and Parallel resonance.
7.	Verification of current and voltage relations in three phase balanced Star and Delta connected loads.
8.	Measurement of active and reactive power in balanced 3-phase circuit using two-watt meter method.
9.	To study about Different types of Electrical Wiring.
10.	To study about ELCB and MCB.