SILVER OAK UNIVERSITY

College of Technology

Bachelor of Technology

Information Technology

Course Name: Fundamentals of Engineering

Course Code: 1010083113

Semester:1st

Prerequisite:

Basic knowledge of electrical circuits, machines, installations, electronics, and mechanical engineering.

Course Objectives:

1. Students will learn basic circuit solution methods, understand electrical machines, and acquire knowledge of domestic electrical installations.
2. Students will gain a foundational understanding of electronics and become proficient in using electronic test and measurement equipment..
3. Students will learn about various engineering materials, mechanical components, and power transmission systems.

Teaching Scheme:

Teaching Scheme				
L	T	P	Contact Hours	Credit
2	0	4	6	4

Contents:

Unit	Topics	Teaching Hours	% Weightage
1	**ELECTRICAL SUPPLY SYSTEM DC CIRCUITS** Electrical circuit elements (R, L and C), voltage and current sources, Independent sources and Dependent sources, source transformation, Kirchhoff's current and voltage laws **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).	7	23

2	**APPLICATIONS OF ELECTRICAL / ELECTRONICS ENGINEERING:** **ELECTRICAL MACHINES AND BASICS OF SAFETY** Faraday's Law of Electromagnetic Induction, Fleming's Rule, Construction and working of DC Machines, AC Machines & single-phase transformer, MCB, ELCB, Types of earthing and its importance, Primary and Secondary cells **SPECIAL PURPOSE DIODES, TRANSISTORS AND OP AMP** Light emitting diode (LED). Zener diode, Photo diode, Solar cell, Varistors, Seven Segment display, Dot-matrix LED display, Photo transistor, Application of Transistor, Reading datasheet. Ideal Op-amp, Differential amplifier	8	27
3	**Basic Mechanical Engineering:** **Engineering Properties** Mechanical properties, Electrical Properties, Optical Properties, Physical Properties, Thermal Properties and Chemical Properties. **Engineering Materials** Classification of Engineering Materials, Metallic Materials, Non-Metallic Materials, Advance Materials. **Concepts of Thermodynamics** Basics of Heat, Work and Temperature. Laws of Thermodynamics, Latent Heat, Specific Heat, Enthalpy, Entropy.	7	16
4	**Basic Automobile Engineering:** History of Automobile Industry, Major Revolution in Automobile Industry, Steam Engine, four-stroke/ two-stroke cycle Petrol/Diesel engines, Electrical Vehicle. Transmission of Motion and Power: Couplings, Clutches, Brakes, Shaft and axle, Different arrangement and applications of Belt drive; Chain drive; Friction drive and Gear drive.	8	18
5	**Mechanical Devices** Introduction, Global fluid power Scenario, Basic system of Hydraulics, Comparison among Electrical, Hydraulics and Pneumatics System. Introduction, Classification, Working Principle of Pumps, Air Compressors, Refrigeration & Air Conditioning	*	16

***Note: Topic No. 5 of the above syllabus are to be covered in Practical Hours**

Course Outcomes:

Sr. No.	CO Statement	Unit
CO-1	Apply concepts in solving complex electrical networks. Analysis of Single Phase AC Circuits and DC Circuit	1
CO-2	Acquire knowledge of static and rotating Electrical Machines. Analyze the general and special Purpose diode, transistor and Op Amp	2
CO-3	Acquire knowledge of various engineering materials and its properties.	3

CO-4	Understand the basics of Automobile Engineering	4
CO-5	Acquire Essential Demonstration Experience with Mechanical Devices.	5

Teaching & Learning Methodology:

The various methods or tools follows by the faculties to teach the above subject are:

1. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
2. Lectures with live practical example using Projector and Computer.
3. Experiments shall be performed in the laboratory related to course contents.

List of Experiments: Total Hours: 56

Sr. No.	Practical Name
1	To perform & determine the equivalent resistance when resistances are connected in series and in parallel.
2	To analyze Kirchhoff's current law & Kirchhoff's voltage law
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 plot the resonance curve of a Single phase R-L-C series circuit.
6	To plot the resonance curve of a Single phase R-L-C series circuit.
7	Introduction, identification and testing of various diodes using multimeter.
8	Identify segments on pin using multimeter.
9	To perform practical Inverting and Non-inverting circuits using op-amp.
10	To Understand the material's behavior and selection of materials
11	To study the application of various thermodynamics laws
12	To understand construction and working of Hydraulics System
13	To understand construction and working of Pneumatics System
14	To understand construction features of two stroke petrol/diesel engines
15	To understand construction features of four stroke petrol/diesel engines
16	To understand construction and working of different types of air compressors
17	To demonstrate vapor compression refrigeration cycle of domestic refrigerator OR window air conditioner OR split air conditioner
18	To understand construction, working and application of clutches, coupling and brakes
19	To understand different arrangements and applications of various power transmission drives

Major Equipment:

1. Ammeters, Voltmeters, Wattmeters, Resistors, Capacitors and Inductors of appropriate rating. Multimeters,Digital storage oscilloscope
2. Cut section models/charts of various machines Demo units for MCB, ELCB
3. Charts for earthing and safety precautions Function Generator
4. DC Power Supply
5. Bread board and discrete electronics components
6. Models of Hydraulics and Pneumatics Systems
7. Models of various types of IC engines, Single cylinder two stroke /four stroke petrol/ diesel engine,
8. Models of pumps, compressors, Domestic refrigerator/window air conditioner/split air conditioner,

9. Models of various types of brakes, coupling, clutches, drives.

Books Recommended:

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. Nagsarkar and Sukhija, “Basic Electrical Engineering”, Oxford University Press
3. B. L. Theraja, “Electrical Technology – Part I and II”, S. Chand and Co. 2012
4. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
5. J. B. Gupta, “Basic Electrical Engineering”, S.K. Kataria & Sons, 2017.
6. R. L. Boylestad and L. Nashelsky, “Electronic Devices and Circuit Theory”, Pearson Education
7. David A. Bell, “Electronic Devices and Circuits”, Oxford University Press, Fifth edition
8. Jaccob Millman, Chritos Halkias, Chetan D Parikh, “Integrated Electronics”, Tata McGraw-Hill,Second edition
9. Elements of Mechanical Engineering by N M Bhatt and J R Mehta, Mahajan Publishing House
10. Basic Mechanical Engineering by Pravin Kumar, Pearson Education
11. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi
12. Elements of Mechanical Engineering by Sadhu Singh, S. Chand Publication
13. Introduction to Engineering Materials by B.K. Agrawal, McGraw Hill Publication, New Delhi

List of Open-Source Software/learning websites:

1. https://www.vlab.co.in/
2. https://silveroakuni.ac.in/video-lecture
3. https://nptel.ac.in/courses/108/108/108108076/
4. https://nptel.ac.in/courses/108/105/108105053/
5. https://silveroakuni.ac.in/virtual_lab_degree
6. https://archive.nptel.ac.in/courses/112/106/112106310/
7. https://nptel.ac.in/courses/112104122
8. https://nptel.ac.in/courses/112103262

CO-PO-PSO Matrix:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	2	2	2	3	2								1	1
CO-2	3	2	3	2	2								1	1
CO-3	2	2	3	2	2								1	1
CO-4	2	3	2	3	2								1	1
CO-5	2	3	2	3	2								1	1