



# SILVER OAK UNIVERSITY

## Engineering and Technology (Diploma)

Department of Computer/ IT/ EE

Subject Name: Fundamentals of Electrical & Electronics Engineering

Semester: 2

**Prerequisite:** Zeal to learn the subject.

**Objective:** Fundamentals of electrical and electronics engineering knowledge requires in different occupations. It is therefore necessary for diploma engineering students of almost all the branches to know the fundamentals of electrical and electronics engineering concepts. The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the basic competencies therefore this course has been designed to take care of this need.

### Teaching and Examination Scheme:

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

### Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	<b>BASICS OF ELECTRICAL CIRCUITS</b> Basic Terminology including current, resistance, power, energy, capacitance, inductance, E.M.F, Potential Difference. Ohm's law, Series-Parallel connection of resistance and capacitance. Energy stored in capacitor and inductor, Current and Voltage Division Rules, Conversion of sources, Kirchhoff's law.	6	14
2	<b>ELEMENTARY CONCEPTS OF MAGNETIC CIRCUITS, ELECTROMAGNETIC INDUCTION</b> Basic Terminology including MMF, field strength, flux density, reluctance, statically induced e.m.f and dynamically induced e.m.f – comparison between electric and magnetic circuits. Magnetic materials Faraday's laws, Lenz's law, Self-inductance and mutual inductance, coefficient of coupling, B-H Curve.	7	16

3	<b>A.C CIRCUITS AND SAFETY EQUIPMENTS</b> Basic Terminology including Peak value, Cycle, Frequency, RMS values, Real power, reactive power, Apparent power, Power factor. RL, RC Combination Series resonance. Safety precaution, Difference between fuse and MCB, Energy Bill calculation.	9	24
4	<b>SEMICONDUCTOR DIODES</b> Semiconductor materials- intrinsic and extrinsic types, Ideal Diode, Terminal characteristics of diodes: p-n junction under open circuit condition p-n junction under forward bias and reverse bias conditions p-n junction in breakdown region, Zener diode and applications.	6	14
5	<b>RECTIFIERS</b> Half-wave (HW) rectifier, full-wave (FW) rectifier, bridge rectifier, Comparison of HW, FW and Bridge rectifier, Capacitor and inductor filter circuit, T and $\pi$ Filter circuits. Clipping and Clamping circuits.	6	14
6	<b>TRANSISTORS</b> Introduction of and PNP and NPN Transistor, Working of transistor, different operating regions for transistor, Types of configurations for transistor (Only circuit diagrams) ,Comparison of CB, CE and CC Configurations, Transistor as a switch , Transistor as an amplifier.	8	18

### Course Outcome:

Sr. No.	CO statement	Unit No
<b>CO-1</b>	Apply fundamental electrical laws to electrical circuits	1
<b>CO-2</b>	Apply fundamental Magnetic law to magnetic circuit.	2
<b>CO-3</b>	Analyze single phase and three phase AC circuits.	3
<b>CO-4</b>	Analyze the semiconductor diodes and Rectifier circuits with filters.	4,5
<b>CO-5</b>	Analyze the Transistor and Its Configurations.	6

### Teaching & Learning Methodology:

Practical sessions for developing skills which require in occupation.

Lectures with discussions, question and answer sessions, informal quizzes, video sessions where students have an opportunity to clear concepts and doubts.

E – Resources for the virtual learning environment.

**List of Experiments/Tutorials:**

1. Find out equivalent resistance in series and parallel connection.
2. To verify the Kirchhoff's current and voltage laws.
3. Analyze the magnetic property. (B-H curve).
4. Measure voltage, current and power in single phase R-C series circuit.
5. To verify the resonance in R-L-C circuits.
6. Test the performance of PN junction diode.
7. Test the performance of Zener diode.
8. Test performances of half wave and Full wave rectifier.
9. Test the performance of the bridge rectifier.
10. Test the performance of the  $\pi$ -filter for bridge rectifier.
11. Test performance of transistor as a switch.
12. Demonstration of safety equipments.
13. Measure Voltage, current and power factor of 1-phase A.C R-L series circuit.
14. Measure Voltage, current and power factor of 1-phase A.C R-C series circuit.

**Major Equipment/ Instrument:**

1-Phase voltage regulator

D.C voltage regulator

R-L-C Series Circuit

1-Phase transformer

Rectifier Circuit.

Digital multimeter

**Books Recommended:**

1. Fundamentals of Electrical Engineering and Electronics by B.L. Theraja.
2. Basic electronics by V.K.Mehta S.Chand Publication.
3. A text book of Electrical Technology vol.1 by B.L.Theraja S.Chand Publication.
4. Electrical and Electronic Technology by Hughes, Pearson Education.

**List of Open Source Software/learning website:**

- I. Electronic workbench
- II. MultiSIM
- III. <https://www.vlab.co.in/>
- IV. <https://silveroakuni.ac.in/video-lecture>
- V. <https://nptel.ac.in/courses/108/108/108108076/>
- VI. <https://nptel.ac.in/courses/108/105/108105053/>
- VII. <https://nptel.ac.in/courses/108/101/108101091/>
- VII. <https://nptel.ac.in/courses/108/108/108108112/>