

BASIC ELECTRICAL ENGINEERING

TH- 4 (A)

Periods/Week: 3

Total Periods: 45

Th - 40 , IA – 10

Exam 1.5 Hrs

Topic wise distribution of periods :

Sl.No	Topics	Periods
1	Fundamentals	05
2	A C Theory	11
3	Generation Elect. Power	04
4	Conversion of Electrical Energy	10
5	Wiring and power billing	06
6	Measuring Instrument	06
7	Secondary storage device	03
	Total	45

OBJECTIVE

1. To be familiar with A.C. fundamental and circuits.
2. To be familiar with basic principle and application of energy conversion devices such as D.C. Machine, A. C. motor (both 1-phase & 3-phase).
3. To be familiar with the generation of electrical power.
4. To be acquainted with wiring and protective device .
5. To be familiar with calculation and commercial billing of electrical power & energy.
6. To have basic knowledge of various electrical measuring instruments & storage batteries

CONTENTS

1. FUNDAMENTALS

- 1.1 Concept of current flow
- 1.2 Concept of source and load.
- 1.3 State Ohm's law and concept of resistance
- 1.4 Relation of V,I & R in series circuit
- 1.5 Relation of V,I & R in parallel circuit
- 1.6 Division of current in parallel circuit.
- 1.7 Effect of power in series & parallel circuit.
- 1.8 State and explain Kirchhoff's law
- 1.9 Solve simple problems on Kirchhoff's laws
- 1.10 State and explain Faraday's laws of electromagnetic induction, Flemings left hand rule

& right hand rule.

2. A. C. THEORY

2.1 Generation of alternating emf.

2.2 Difference between D C & A C

2.3 Define Amplitude, instantaneous value, cycle, Time period, frequency, phase, phase angle, phase difference

2.4 State and explain RMS value, Average value, Amplitude factor & Form factor with simple problems.

2.5 Represent AC values in phasor diagrams

2.6 Explain AC through pure resistance, inductance & capacitance

2.7 Explain AC through RL, RC & RLC series circuits

2.8 Solve simple problems on RL, RC & RLC series circuits

2.9 Explain impedance triangle and power triangle

3. GENERATION OF ELECTRICAL POWER

3.1 State briefly different electrical power generating plants (Thermal , Hydro electrical and Nuclear)

3.2 Draw the block diagram of Hydro electrical, Thermal and Nuclear power plant.

3.3 Concept of transformer and its application.

4. CONVERSION OF ELECTRICAL ENERGY

4.1 Introduction of DC Machines

4.2 Main parts of DC Machine

4.3 Principle of operation of DC generator

4.4 EMF equation of generator

4.5 Simple problem on relation of load current, armature current and field current

Classification of DC generator

4.6 Principle of operation of DC motor

4.7 Motor equation and Simple problem on relation of load current, armature current and field current

4.8 Classification of DC motor

4.9 Uses of different types of DC generators & motors

4.10 Necessity of different types of starter used in DC. motor.

4.11 Principle of operation of single phase induction motors.

4.12 Types and uses of single phase induction motors.

4.13 Main parts of 3-phase induction motors

4.14 Principle of operation of 3-phase induction motors

4.15 Types and uses of 3 phase induction motors

5. WIRING AND POWER BILLING

5.1 Types of wiring and their comparison.

5.2 Draw the layout of household electrical wiring (single line diagram showing all the important component in the system)

5.3 List out the basic protective devices used in house hold wiring .

5.4 Calculate power used in small electrical appliances.

5.5 Calculate power used in small electrical installation.

5.6 Calculate energy consumed in a small electrical installation

5.7 Earthing installation, types and uses (Pipe & plate Earthing).

6. MEASURING INSTRUMENTS

6.1 Introduction to measuring instruments

6.2 Torques in instruments

6.3 State different use of PMMC type of instruments (Ammeter & voltmeter)

6.4 State different use of MI type of instruments(Ammeter & voltmeter)

6.5 Draw the connection diagram of A.C/DC Ammeter, voltmeter, energy meter and wattmeter (Single phase only)

7. STORAGE DEVICES

7.1 Introduction to storage devices.

7.2 Types of storage devices.

7.3 State charging and discharging of lead acid battery.

7.4 State the Maintenance of lead acid battery.

TEXT BOOKS (Electrical)

1. A Text Book of Electrical Techonology volume – I by B. L. Theraja & A. K. Theraja

REFERENCE BOOK

1. Fundamentals of Electrical Engineering and Electronics by J B Gupta

2. Basic Electrical Engineering by V. N. Mittle (TMH)

3. Electrical Technology by Edward Hughes (Pearson Education, New Delhi)

4. Basic Electrical Engineering by Chakraborty (Mgraw Hill..)

5. Basic Electrical Engineering by V.K.Mehata,Rohit Mehata

BASIC ELECTRICAL ENGINEERING PRACTICAL

Periods/Weeks: 2
Total Periods: 30

Marks-25

IMPORTANT: The demonstration plan should be prepared and thoroughly explained (both theory and steps of practice). Five to ten questions should be assigned to the students to assess the overall gain of the objectives.

(Any 11 numbers of practical to be conducted)

1. **Electrical Safety Practice –Rescue a person from live wire.(Artificial Respiration)**
2. **Calculate equivalent resistance in series and parallel combinations and find relation between V,I&R**
3. **Determine the resistance, impedance and inductance of a choke coil.**
4. **Determine the capacitance and capacitive reactance (X_c) of a unknown Capacitor.**
5. **Determine the power factor by direct and indirect methods in a AC single phase RLC series circuit.**
6. **Measure power in single phase-A.C. circuit by help of ammeter, voltmeter and power factor meter.**
7. **Measure Energy of a single phase-A.C. circuit by help of an energy meter.**
8. **Start & run a D.C. Motors.**
9. **Connect and run the 3-phase Induction motor.**
10. **Prepare an electrical switch board to control two light points, one plug socket, one fan point and put a fuse for main.**
11. **Connect and test a fluorescent lamp and Sodium vapour lamp.**
12. **Measure the Earth Resistance of a Pipe Earthing.**
13. **Charge a Lead Acid Battery and record its initial and final voltage.**