

COURSE TITLE : **ELECTRICAL & ELECTRONONICS ENGINEERING**
COURSE CODE : **3021**
COURSE CATEGORY : **B**
PERIODS/WEEK : **5**
PERIODS/SEMESTER : **75**
CREDITS : **5**

TIME SCHEDULE

Module	Topic	Periods
1	Electrical circuits and sources	18
2	Electric motors and transformers	19
3	Electrical measurements and power utilization	19
4	Electronics	19
TOTAL		75

GENERAL COURSE OUTCOME

Sl.No.	sub	Student will be able
1	1	Describe the terms related to A.C circuits.
	2	Distinguish between single phase and three phase.
	3	Describe working lead acid cell.
2	1	Understand the working of DC motors.
	2	Draw the connection diagram of 3point starter.
	3	Define transformer ratio.
	4	Classify the transformers.
3	1	Understand working principle of various electrical measurements instruments.
	2	Calculate power in 3 phase A.C system by two wattmeter method.
	3	State the principle of induction heating and die electric heating.
4	1	Distinguish various active and passive electronic components.
	2	Explain the working of diodes, rectifiers, transistors and SCR.
	3	State the functions of logistic gates.
	4	Draw the basic block diagram of control system.

SPECIFIC COURSE OUTCOME

MODULE I

1.1.0. ELECTRIC CIRCUIT

- 1.1.1.To define voltage , current, resistance, power and energy.
- 1.1.2.To describe DC circuits.
- 1.1.3.To state and explain Ohm's law.
- 1.1.4.To solve Problems related to Ohm's law, power and energy.
- 1.1.5.To explain series, parallel and combination connection of resistors.
- 1.1.6.To describe Faraday's laws of electromagnetic induction.
- 1.1.7.To describe Fleming's right hand rule.
- 1.1.8.To explain the working of single loop AC generator.
- 1.1.9.To describe the terms related to AC circuits such as frequency, maximum value, average value, RMS value, form factor and power factor.
- 1.1.10.To explain briefly AC through resistance, inductance and capacitance.

1.2.0. SOURCES OF ELECTRICAL ENERGY

- 1.2.1.To explain the power generation of three phase system.
- 1.2.2.To distinguish between single phase and three phase system.
- 1.2.3.To explain the star and delta connection.
- 1.2.4.To compute line voltage and phase voltage, line current and phase current in star and delta connection.
- 1.2.5.To describe the power in three phase system.

1.3.0. CONSTRUCTION OF DIFFERENT ELECTRICAL SOURCES

- 1.3.1.To describe the working of lead acid cell
- 1.3.2.To explain the constructional details of lead acid cell
- 1.3.3.To state the method of charging and discharging of lead acid cell
- 1.3.4.To define the efficiency and rating of batteries.
- 1.3.5.To identify the various aspects for maintenance of lead acid cell
- 1.3.6.To describe the principle of working of D C Generators
- 1.3.7.To explain the constructional details of a D C generator
- 1.3.8.To explain the classification of D.C. generators based on field connection.
- 1.3.9.To explain the working principle of 3 phase Alternator
- 1.3.10. To explain the constructional details of 3 phase Alternator

MODULE II

2.1.0 DC MOTORS

- 2.1.1 To describe the principle of working of D C Motors
- 2.1.2 To classify the D.C. motors based on field connection.
- 2.1.3 To list the various applications of D.C. motor

2.2.0 AC MOTORS

- 2.2.1 To explain the working principle of 3 phase induction motor
- 2.2.2 To explain the constructional details of 3 phase induction motor
- 2.2.3 To list the various application of induction motors
- 2.2.4 To explain the working principle of single phase induction motor
- 2.2.5 To explain the constructional details of single phase induction motor

2.3.0 STARTERS

- 2.3.1 To state the necessity for a starter
- 2.3.2 To draw the connection and explain the working of 3 Point starter.
- 2.3.3 To explain the working of a star-delta and DOL starter.

2.4.0 TRANSFORMERS

- 2.4.1 To explain the working principle of a single phase transformer
- 2.4.2 To describe the e.m.f equation of transformer.
- 2.4.3 To define the term transformer ratio
- 2.4.4 To Classify the transformers based on function and construction
- 2.4.5 To explain the working principle of Auto transformer
- 2.4.6 To differentiate the welding transformer and power transformer

MODULE III

3.1.0. MEASURING INSTRUMENTS

- 3.1.1.To explain the constructional details of Moving Iron instruments.
- 3.1.2.To explain the constructional details of Moving Coil instruments.
- 3.1.3.To describe the working principle of dynamometer types wattmeter.
- 3.1.4.To explain the power measurement in three phase AC system by two wattmeter method.

3.2.0. UTILISATION OF ELECTRIC POWER

- 3.2.1.To State the principle of heat production from electric power
- 3.2.2.To explain the principle of induction heating.
- 3.2.3.To explain the principle of dielectric heating
- 3.2.4.To list the various industrial application of electric heating.
- 3.2.5.To List the functions of induction furnaces and Arc furnaces

MODULE IV

4.1.0 ELECTRONIC COMPONENTS

- 4.1.2 To explain active and passive components.
- 4.1.3 To explain different types of resistors and capacitors used in electronics.

4.2.0 RECTIFIERS AND TRANSISTORS

- 4.2.1 To describe the working of PN junction diode.
- 4.2.2 To explain the working of diode as a rectifier.
- 4.2.3 To explain the working of full wave rectifier using two and four diodes.
- 4.2.4 To explain working principle of transistor – BJT.
- 4.2.5 To explain the working principle of SCR.
- 4.2.6 To list industrial applications of SCR.

4.3.0 INTRODUCTION TO AUTOMATION

- 4.3.1 To explain the functions of logic gates- OR, AND, NOT, NAND and NOR
- 4.3.2 To explain the advantages of universal gates.
- 4.3.3 To describe automation.
- 4.3.4 To describe the need of automation.
- 4.3.5 To draw the basic block diagram of control system.
- 4.3.6 To explain the application of control system.

CONTENT DETAILS

MODULE - I

Voltage , Current, Resistance, Power and Energy. DC circuits, Ohm's law, Problems related to Ohm's law, Power and Energy. Series, Parellel and Combination connection of resistors. Faraday's laws of electromagnetic induction. Fleming's right hand rule, Single loop AC generator. Terms related to Ac circuits such as frequency, maximum value, average value, RMS value, form factor and Powerfactor. AC through resistance, inductance and capacitance. Power generation of three phase system. Single phase and three phase system, Star and Delta connection in three phase system, , Line voltage and Phase voltage, Line current and Phase current in star and delta connection, Power in three phase system. Lead acid cell, Constructional details of lead acid cell, Method of charging and discharging of lead acid cell, Efficiency and rating of batteries, Maintenance of lead acid cell, Working of D C Generators, Constructional details of a D C generator, Classification of D.C. generators based on field connection. Constructional details - Working of 3 phase Alternator.

MODULE - II

Principle of Working of D C Motors, D.C. motors based on field connection. Applications of D.C. motor .Working principle of 3 phase induction motor, Constructional details of 3 phase induction motor, Application of induction motors, Working principle of single phase induction motor, Constructional details of Single phase induction motor, Necessity for a starter, Connection , working of 3 Point starter. working of star-delta and DOL starter, Working principle of a single phase transformer, E.M.F equation of a transformer, transformer ratio, Classify the transformers based on function and construction, Auto transformer, Welding transformer and power transformer.

MODULE - III

Constructional details of Moving Iron instruments, Constructional details of Moving Coil instruments, Working principle of dynamometer types wattmeter, Power measurement in three phase AC system by two wattmeter method, Heat production from electric power, Induction heating, Dielectric heating, Industrial application of electric heating, Functions of induction furnaces and Arc furnaces.

MODULE - IV

Active and Passive components, Different types of resistors and capacitors used in electronics, PN junction diode, Working of diode as a rectifier, Working of full wave rectifier using two and four diodes, Working principle of transistor – BJT and SCR. Industrial applications of SCR, Functions of logic gates- OR, AND , NOT , NAND and NOR, Advantages of universal gates, Automation, Need of automation, Basic block diagram of control system, Application of control system.

REFERENCE

B.L. Theraja - Fundamentals of Electrical Engineering and Electronics - S.Chand Publications Mittal
- Electronic Devices and Circuits - Khanna Publishsers
Mehta - Electrical Power Utilization - S.Chand Publications