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

Course Outcome:

SL.NO.	SUB	STUDENT WILL BE ABLE
1	1	To Understand the fundamentals of Electric Circuits.
	2	To Understand the different sources of Electrical Energy
	3	To know the construction and working of different sources.
2	1	To Understand the working and construction of DC motors.
	2	To Understand the working and construction of AC motors.
	3	To Understand different types of starters.
	4	To understand the working and construction of transformers.
3	1	To understand electrical measurements and instruments.
	2	To understand electrical power utilization in heating and lighting.
4	1	To understand different electronics components.
	2	To understand the working of rectifiers.
	3	To understand the basics of industrial automation.

SPECIFIC 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 resisters.
1.1.6. To define Faraday`s laws of electromagnetic induction.
1.1.7. To define Fleming`s right hand rule.

1.1.8. To describe the terms related to Ac circuits such as frequency, maximum value, average value, RMS value, form factor and power factor.
1.1.9. To explain briefly AC through resistance, inductance and capacitance.

1.2.0. Sources of Electrical Energy

1.2.1. To distinguish between single phase and three phase system.
1.2.2. To explain phase sequence and phase difference in 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, phase current and power in star and delta connection.

1.3.0. Construction of different Electrical Sources.

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

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 capacitor start induction run motor
2.2.5. To explain the constructional details of single phase capacitor start induction run 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 Draw the connection and 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 define the term transformer ratio
2.4.3. To Classify the transformers based on function and construction
2.4.4. To explain the working principle of Auto transformer
2.4.5. 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 by resistance

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 by resistance, induction dielectric and arc methods.
3.2.5. To describe the working principle of a fluorescent lamp.
3.2.6. To list the advantages of halogen lamps and LED lamps

MODULE IV

4.1.0. ELECTRONIC COMPONENTS

4.1.1. To explain active and passive components.
4.1.2. To list 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 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.

CONTENTS

MODULE - I

Voltage, Current, Resistance, Power and Energy. DC circuits, Ohm's law, Problems related to Ohm's law, Power and Energy. Series, Parallel and Combination connection of resistors. Faraday's laws of electromagnetic induction. Fleming`s right hand rule. Terms related to Ac circuits such as frequency, maximum value, average value, RMS value, form factor and Power factor. AC through resistance, inductance and capacitance. Single phase and three phase system, Phase sequence and phase difference in three phase system, Star and Delta connection, Line voltage and Phase voltage, Line current and Phase current and power in star and delta connection. Lead acid cell, Method of charging 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.

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 capacitor start induction run motor, Constructional details of single phase capacitor start induction run motor, Necessity for a starter, Connection and working of 3 Point starter, connection and working of a star-delta and DOL starter,

Working principle of a single phase 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 by resistance, Induction heating, Dielectric heating, Industrial application of electric heating by resistance, Induction, Dielectric ,and Arc methods, Working principle of a fluorescent lamp, advantage of Halogen lamps and LED lamps.

MODULE - IV

Active and Passive components, list 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 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

Electrical Engineering – B.L. Theraja

Electronic Devices and Circuits – Mittal

Electrical Power Utilisation – Metha