

**COURSE TITLE** : **ELECTRICAL AND ELECTRONICS ENGINEERING**  
**COURSE CODE** : **3038**  
**COURSE CATEGORY** : **B**  
**PERIODS/WEEK** : **5**  
**PERIODS/SEMESTER** : **90**  
**CREDITS** : **5**

### TIME SCHEDULE

<b>MODULE</b>	<b>TOPICS</b>	<b>PERIODS</b>
1	Lead Acid Cell D.C Generator D.C Motor	21
2	A C Circuits 3 Phase Circuits Transformer	22
	TEST I	2
3	A C Generator and Motor Measuring Instruments Utilization	22
4	Electronics Components Electronics Circuits ,Logic circuit	21
	TEST II	2
	<b>Total</b>	<b>90</b>

### OBJECTIVES

#### MODULE I

##### **1.1.0 Understand the working and construction of lead acid cell**

- 1.1.1 Describe the working of lead acid cell
- 1.1.2 Explain the constructional details of lead acid cell
- 1.1.3 State the method of charging and discharging of lead acid cell
- 1.1.4 Define the efficiency and rating of batteries.
- 1.1.5 Identify the various aspects for maintenance of lead acid cell

##### **1.2.0 Understand the working and construction of D. C. Generator**

- 1.2.1 Describe the principle of working of D C Generators
- 1.2.2 Explain the constructional details of a D C generator &Classify the D.C. generators based on field connection

##### **1.3.0 Understand the working and construction of motors**

- 1.3.1 Describe the principle of working of D C Motors
- 1.3.2 Compare the working principle of D.C. generator and Motor.
- 1.3.3 Classify the D.C. motors based on field connection.
- 1.3.4 State the necessity for a starter
- 1.3.5 Draw the 3 Point starter and connection for D.C. Motor
- 1.3.6 List the various applications of D.C. motor

#### MODULE II

### **2.1.0 Understand the principle of a c circuits, single phase, three phase and transformer.**

- 2.1.1 Compute unknown quantity in a given series, parallel or series – parallel A C circuits containing RLC combination.
- 2.1.2 Study 3 phase power generation
- 2.1.3 Define phase sequence and phase and phase difference in 3 phase system
- 2.1.4 Describe 3 phase connection in star and delta .
- 2.1.5 Compute the value of line voltage and phase voltage, line current and phase current in Star and delta
- 2.1.6 Know the equation of power in a 3 phase system
- 2.1.7 State the working principle of a single phase transformer
- 2.1.8 Study the e.m.f equation
- 2.1.9 Define the term transformer ratio
- 2.1.10 Classify the transformers based on function and construction
- 2.1.11 Explain the working principle of Auto transformer
- 2.1.12 Differentiate the welding transformer and power transformer

## **MODULE III**

### **3.1.0 A C Generator & motor**

- 3.1.1 Explain the constructional details and working principle of 3 phase Alternator
- 3.1.2 Explain the constructional details and working principle of 3 phase induction motor
- 3.1.3 Draw star-delta and DOL starter used for induction motor
- 3.1.4 List the various application of induction motors
- 3.1.5 Explain the constructional details and working principle of single phase induction motor

### **3.2.0 Measuring instruments & utilization**

- 3.2.1 Draw and explain the constructional details of MI and MC instruments.
- 3.2.2 Describe the working principle of dynamometer types wattmeter with sketch
- 3.2.3 State the principle of heat production from electric power
- 3.2.4 Differentiate between induction heating and dielectric heating
- 3.2.5 Write down the various industrial application of electric heating
- 3.2.6 List the functions of induction furnaces and Arc furnaces
- 3.2.7 Describe the working principle of a fluorescent lamp with a neat sketch

## **MODULE IV**

### **4.1.0 Appreciate the use of electronic components and devices**

- 4.1.1 Describe with the sketch, the principle of transistor - different configurations.
- 4.1.2 Describe the various types of transistors – FET , UJT, DIAC , TRIAC ( only brief idea).
- 4.1.3 Explain the working principle of SCR
- 4.1.4 Write down the various industrial applications of SCR

### **4.2.0 Diode circuits**

- 4.2.1 Describe the principle or working of a diode on a rectifier
- 4.2.2 Draw neat circuit of a diagram of half wave and full wave rectifier

### **4.3.0 Understand the various electronic circuits ,logic circuit**

- 4.3.1 Give a brief description of RC coupled amplifier
- 4.3.2 State clearly the principle of oscillation. And condition of oscillation

### **4.4.0 Logic circuit describe**

- 4.4.1 Explain the logic theory and application
- 4.4.2 Give circuit diagram and explain functions of AND, OR,NOT operation and give the logic symbols of each
- 4.4.3 Give the symbols of NAND, NOR operation and discuss the advantages of using Universal Gate

## CONTENT OUTLINE

### MODULE I

#### **Lead Acid Cell, Dc Generators and Motors**

Lead Acid Cell - Construction and materials used – charging – discharging - efficiency and rating – care and maintenance

Constructional details and principle of working of D.C. generator - types – based on field connections – difference between generator and motor.

Principle of working of D.C. motors – need of starter for D.C. motor – applications of d. C. motors.

Stepper motor - Principles of working, construction and classification, applications.

### MODULE II

Representation of alternating quantities, phase difference , inductance, capacitance and impedance. Current calculations in general RLC series circuit. Calculations of power and power factor. .

A.C. 3 phase circuits - star and delta connections - Voltage and current relations, expressions for power

Transformers - Principles of operations of a single-phase transformer - Transformation ratio Methods of cooling transforme. 3-Phase transformer. Autotransformer – principle, uses and advantage.

Welding transformer – use of choke.

Instrumental transformer.

### MODULE III

#### **A.C. Generators And Motors, Measuring Instruments & Utilization.**

Construction and working of A.C. generators - classification. Salient pole and turbo types.

Principle of working of 3 phase induction motor. Types of induction motor. Applications.

Method of starting of squirrel cage and slip ring induction motors.

Principle of working of single phase induction motor – capacitor start type – uses.

Measuring Instruments – Moving coil, moving iron – voltmeter and ammeter - dynamometer type wattmeter

Induction and dielectric heating – principle, advantages and applications –

Induction furnaces, arc furnaces – direct and indirect types.

Discharge lamp- Fluorescent lamp, mercury vapor lamp and sodium vapor lamp.

Effect of shock and burns – procedure to be followed incase of electric shock

### MODULE IV

#### **Introduction to electronics components**

Introduction to electronics –passive components- Resistor-types, capacitor-types, colour coding, inductors-type, symbolic representation of passive components.

Semi conductors-Intrinsic and extrinsic, P-type ,N-type-formation and working of PN junction.

Active components- Diodes, BJT,FET, SCR,Diac, Triac, UJT .

Principle of working of BJT - configurations,

Rectifiers – half wave and Full Wave - C & L filters, ripple factor

#### **Electronic circuits, Logic circuits, instruments**

Amplifier –Gain- Band width, Ocillator- Condition of Ocillator

Fundamentals of digital Electronics- Logic gates- AND, OR, NOT, X-OR- Boolean Algebra – Simplifications of expressions –De Morgan’s theorem - Universal gates –NAND ,NOR

### REFERENCE

1. Electronic devices – Allan Mottershed
2. Electronic devices and circuits – Mittal
3. Electrical Engineering - B .J. Theraja.