COURSE TITLE : **AUTO ELECTRICAL AND ELECTRONIC EQUIPMENTS**
COURSE CODE : **3047**
COURSE CATEGORY : **B**
PERIODS/WEEK : **5**
PERIODS/SEMESTER : **90**
CREDITS : **5**

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Battery	21
	Test I	1
2	Generator and Alternator Charging system, charging circuits Starter motor Motor drives	22
	Test II	1
3	Ignition system for multi cylinder engines Electronic ignition Magneto ignition & C.D.I	22
	Test III	1
4	Lighting system Other electrical accessories	21
	Test IV	1
	Total	**90**

OBJECTIVES

Upon completion of study of this subject the student should be able to: -

1.1.0 Know the different features of Battery
- 1.1.1 List the parts of Battery and state their functions (Lead Acid)
- 1.1.2 List the parts of Battery and state their functions (Nickel alkaline)
- 1.1.3 State the changes noticed on charging and discharging
- 1.1.4 Specify the rating of Battery
- 1.1.5 Describe the effect of temperature on voltage and capacity
- 1.1.6 Describe the different charging methods
- 1.1.7 Label the different battery defects
- 1.1.8 State the various tests for Battery
- 1.1.9 Suggest the care & maintenance of Battery

2.1.0 Recognize the constructional details of dynamo
- 2.1.1 Explain the constructional details of Alternator
- 2.1.2 Suggest the care & maintenance of Dynamo & Alternator
- 2.1.3 Identify the need of charging system
- 2.1.4 Describe the working of regulators

2.1.5 Explain the constructional details of starter motor
2.1.6 Infer the characteristics of starter motor
2.1.7 Describe the working of starter switch
2.2.0 Recognize the necessity of motor drives
2.2.1 Explain the working of motor drive mechanisms
3.1.0 Understand the working of Ignition system
3.1.1 Discuss the type of ignition system
3.1.2 Explain the working of ignition system components
3.1.3 Defend the need of spark advance & retard mechanism
3.1.4 Explain the working of magneto ignition system
3.1.5 Explain the working of C.D. ignition system
3.1.6 Explain the working of electronic ignition system
4.1.0 Locate the lighting system & other Accessories
4.1.1 Identify reflectors, lenses and bulbs
4.1.2 Identify dazzle and its avoidance
4.1.3 Outline the importance of focusing
4.1.4 Explain the working of Automatic dim & bright circuit
4.1.5 Compile the different types of lights & bulbs
Describe the principle of operation of fuel pump, horn, wind screen wiper, indicator, gauges, power window, solenoid operated valve, etc. .
4.1.5 Explain central locking system.

CONTENT OUTLINE

MODULE – I: BATTERY

Introduction, Types of battery. Brief description of lead acid and alkaline cell, Constructional details of lead acid cell, nickel alkaline cell, Active materials of lead acid cell, Chemical action of lead acid cell, Rating of Battery, Capacity of Battery – ampere hour and watt hour, Efficiency of Battery – ampere hour and watt hour, Effect of discharge rate on voltage and capacity
Effect of temperature on voltage and capacity, Battery charging, Constant voltage, Constant current
Defects - Effect of over heating, Effect of over charging, Dislocation of active material, sulphation,
Internal short circuits, Corrosion / sulphation of terminals.
Testing of Battery - Polarity test, State of charge, Specific gravity test by hydrometer, High rate discharge test by cell tester, Cadmium test, Lamp test
Care and maintenance of battery - Topping up of Battery & other maintenance schedule, Storage of lead acid battery (in dry & wet condition), Maintenance free battery

MODULE II: GENERATOR & ALTERNATOR

Introduction, Constructional details of automobile dynamo – special features of automobile dynamo
Constructional details of alternator – special features of automobile alternator
Care & maintenance of dynamo & alternator – Cooling, Lubrication, Setting of brush,

Cleaning of commutators.
Charging System - Introduction – necessity, Types of Regulators – circuit diagram, Cut out, Voltage
regulator, current regulator, – 3stage, Electronic voltage regulator in alternators
Starter motor & it's drive mechanism
Introduction, Starting of I.C. Engine (Petrol & Diesel) – motor characteristics, Terms like Engine torque – motor torque – cranking speed – motor locked torque etc, Starter switch, Starter motor – constructional features – special features of automobile starters, Care & maintenance of starter motors, Dyno-start system
Starter Motor Drives
Necessity, Types of starter motor drives – mechanisms of - Bendix drive (inboard & Outboard), Over running Clutch, Axial starter (sliding armature), Pre engaged type

MODULE III: SPARK IGNITION SYSTEM

Introduction, Types of ignition system – coil & magneto – study of coil ignition, Component study of ignition system - Ignition coil, Contact breaker points, Cam angle, Condenser, Distributor, Spark plug – types, Spark plug specifications, Spark advance & retard mechanism (centrifugal & vacuum), Magneto ignition system - Low tension & high tension, Rotating armature & rotating magnet type, Polar inductor type
C.D. ignition system, Electronic ignition systems, Magnetic pickup type & hall effect sensor type, Transistorized ignition, Computer controlled ignition. Distributorless ignition system

MODULE IV: LIGHTING SYSTEM & OTHER ELECTRICAL ACCESSORIES

Introduction, Head light – Reflectors, lenses, Bulbs (constructional features), Dazzle and its avoidance, Focusing of head lamps, Automatic dim & Bright circuit, Other lights – parking light, side lamp, tail lamp, roof lamp, fog lamp, brake light, dash board light,Types of bulbs – vacuum, gas filled, halogen.
Introduction, Electrical fuel pump, electric horn, wind screen wiper – types, constructional features, working, Traffic Indicator – Electrical & Electronic, Gauges like, fuel level indicator, oil pressure gauge, temperature gauge, Electrically operated – power window, solenoid operated fuel cut off, wind shield washer, - constructional features & working,Electronically operated central locking system

REFERENCES

1. Automobile Electrical Equipment : Kohli
2. Electrical Equipment of Automobiles : Parker Smith
3. Automobile Electrical Equipment : A.P.Young & Griffith
4. Automobile Electrical Equipment : Khatwate.N.R
5. Automobile Electrical Equipment : W.H.Crouse
6. Automobile Engineering : Anil Chikkara
7. Modern Petrol Engine : A.W.Judge
8. Storage Batteries : G.W.Vinal
9. Automobile Electrical & Electronic Systems : Tom Denton

10. Engineering Metrology : R.K.Jain
11 Automotive electricity , Electronics : Barry Hollembeak ,Delmar publishers
12. Mechatronics : W. Bolton Pearson India Ltd

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