COURSE TITLE : AUTOMOBILE ELECTRICAL & ELECTRONIC SYSTEMS
COURSE CODE : 4052
COURSE CATEGORY : B
PERIODS/WEEK : 5
PERIODS/SEMESTER : 70
CREDITS : 5

TIME SCHEDULE

Module	Topic	Periods
1	Understand the different features of Battery	17
2	Comprehend the working principle of Dynamo and Alternator Understand the working of Starting system	17
3	Understand the working of Ignition system	17
4	Comprehend the lighting system & other Accessories	19
TOTAL		**70**

GENERAL COURSE OUTCOME

Module	G.O	Student will be able to
1	1	Understand the different features of Auto mobile Battery
	2	Specify Battery ratings
	3	Describe various charging methods of battery.
	4	Suggest the care & maintenance tips for Battery
2	1	Understand the working principle of Dynamo and Alternator
	2	Understand the working of starter motors.
	3	Describe the working of different motor drive machines.
	4	Suggest the care & maintenance for Alternator and starter motors.
3	1	Understand the working of Ignition system
	2	Identify the components in ignition system
	3	Distinguish centrifugal and vacuum spark advance & retard machanisms.
	4	Explain the working of C.D ignition and magneto ignition.
4	1	Comprehend the lighting system & other Accessories
	2	Identify all electrical accessories in auto mobiles.
	3	Describe the working of different gauges and accessories.
	4	Identify dazzle effect and its avoidance.

SPECIFIC COURSE OUTCOME

MODULE I

1.1.0 Understand the different features of Battery

1.1.1 List the parts of Lead Acid battery and state their functions
1.1.2 List the parts and construction of Nickel Iron and Nickel Cadmium Battery
1.1.3 State the changes noticed on charging and discharging of Lead Acid Battery
1.1.4 Specify the ratings 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 Describe the various tests for battery
1.1.9 Suggest the care & maintenance of battery
1.1.10 Discuss the features of Maintenance free battery and Tubular battery.

MODULE II

2.1.0 Comprehend the working principle of Dynamo and Alternator

2.1.1 Explain the need of charging system
2.1.2 Explain the working and constructional details of dynamo
2.1.3 Explain armature reaction and Generator output control methods
2.1.4 Describe the working of current regulator, voltage regulator and cut out relay
2.1.5 Explain the constructional details of Alternator
2.1.6 Suggest the care & maintenance of Alternator

2.2.0 Understand the working of Starting system

2.2.1 Explain the constructional details of starter motor
2.2.2 Discuss the characteristics of starter motor
2.2.3 Explain the necessity of motor drives
2.2.4 Explain the working of motor drive mechanisms - Standard Bendix drive, Folo-thru' Bendix drive, Over running clutch drive, Dyer drive, Pre engaged type drive
2.2.5 Describe the working of starter switches

MODULE III

3.1.0 Understand the working of Ignition system

3.1.1 List the types of ignition system
3.1.2 Explain the working of Battery coil ignition system and components
3.1.3 Identify the need of spark advance & retard mechanism
3.1.4 Explain the working of magneto ignition system - Rotating armature type, Rotating Magnet type, Polar Inductance Magneto
3.1.5 Explain the working of C.D. ignition system
3.1.6 Explain the working of electronic ignition systems - Breaker less Ignition system, Distributor less Electronic Ignition system

MODULE IV

4.1.0 Comprehend the lighting system & other Accessories

4.1.1 List the different types of reflectors and bulbs
4.1.2 Identify dazzle and its avoidance
4.1.3 Outline the importance of focusing of head lamp
4.1.4 Explain the working of Automatic dim & bright circuit
4.1.5 Compile the different types of lighting circuits
4.1.6 Describe the principle of operation of electric horn, electrical fuel pump, Tachometer, Electrical Speedometer etc
4.1.7 Describe the principle of operation of fuel gauges - A.C. Electric balancing coil type fuel gauge, Bimetal type electric fuel gauge
4.1.8 Describe the principle of operation of Oil Pressure Gauge and Water Temperature Gauge
4.1.9 Explain the principle of operation of wind screen wiper mechanisms
4.1.10 List the in-car infotainment systems

CONTENT DETAILS

MODULE – I: BATTERY

Introduction, Types of batteries. 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 overheating, Effect of overcharging, 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, Tubular 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 alternator – Cooling, Lubrication. 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 motor – constructional features – special features of automobile starters, Care & maintenance of starter motors, Starter Motor Drives Necessity, Types of starter motor drives – mechanisms of - Standard Bendix drive, Folo-thru' Bendix drive, Over running clutch drive, Dyer drive, Pre-engaged type. Starter switches- manual, solenoid switch cum shift, solenoid with relay.

MODULE III: SPARK IGNITION SYSTEM

Introduction, Types of ignition system – battery 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 - Rotating armature & rotating magnet type, Polar inductor type. C.D. ignition system, Electronic ignition systems, Computer controlled ignition. Distributor less 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 and High Intensity Discharge types. Electrical fuel pump, electric horn, wind screen wiper – types, constructional features, working, Indicator lights – Electrical & Electronic, Gauges like fuel level indicator, oil pressure gauge, temperature gauge, wind shield wiper and washer, - constructional features & working, list in-car infotainment systems.

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