

2.14 30293 AUTO ELECTRIC EQUIPMENT

UNIT-1 INTRODUCTION:

- 1.1 Various electrical system and functions
- 1.2 Insulated and earth return system, negative and positive earthing.
- 1.3 6v, 12v, 24v electrical system

UNIT-2 BATTERY:

- 2.1 Function and types of battery
- 2.2 Lead acid battery
 - 2.2.1 Working principle and chemical reaction
 - 2.2.2 Construction detail
 - 2.2.3 Formation of plate
 - 2.2.4 Electrolyte and its specific gravity
 - 2.2.5 Temperature effect on specific gravity of electrolyte
- 2.3 Battery rating:
 - 2.3.1 Cold cranking
 - 2.3.2 20 hour, 4 hour, 25 amp.
 - 2.3.3 Reserve capacity
- 2.4 Battery Charging:
 - 2.4.1 Charging system – constant current and constant voltage
 - 2.4.2 Normal, booster and trickle charging
 - 2.4.3 Charging of sulphated battery
 - 2.4.4 Charging dopes

UNIT-3 BATTERY TEST AND FAILURE:

- 3.1 Battery test
 - 3.1.1 Hydrometer test
 - 3.1.2 Open and short circuit voltage test
 - 3.1.3 Light load test
 - 3.1.4 High discharge test
 - 3.1.5 Cadmium tip test
 - 3.1.6 421 test
- 3.2 Battery failure and rectification
 - 3.2.1 Over charging
 - 3.2.2 Cycling
 - 3.2.3 Sulfation
 - 3.2.4 Internal short circuit
 - 3.2.5 Buckling and cracking
- 3.3 Battery maintenance and storage (dry and wet type)
- 3.4 Alkaline type battery
 - 3.4.1 Nickel – Iron battery
 - 3.4.2 Nickel – Cadmium battery

UNIT-4 ALTERNATORS:

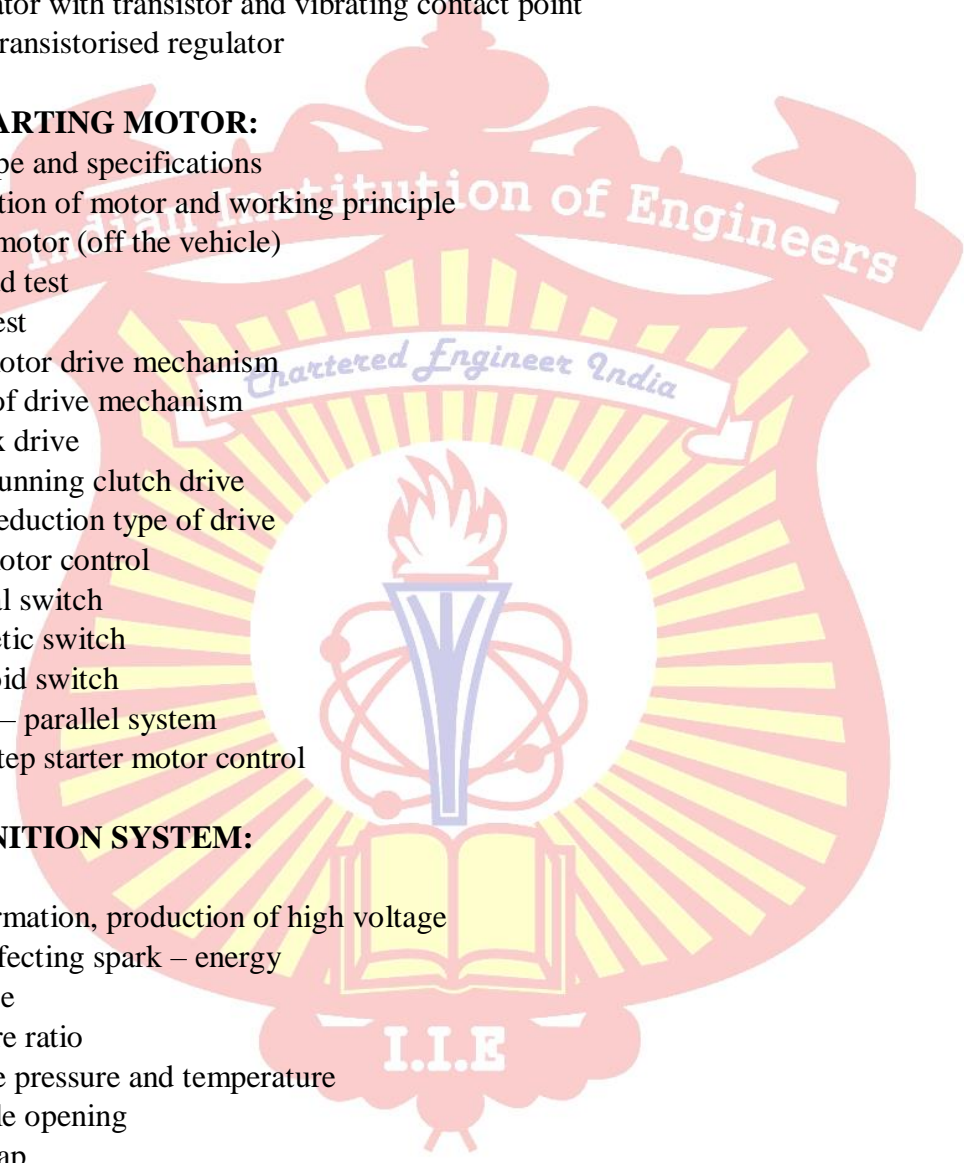
- 4.1 Construction and working principle
- 4.2 Advantage over dynamo
- 4.3 Rectification
- 4.4 Output control
 - 4.4.1 One unit voltage regulator
 - 4.4.2 Two unit voltage regulator
 - 4.4.3 Regulator with transistor and vibrating contact point
 - 4.4.4 Fully transistorised regulator

UNIT-5 STARTING MOTOR:

- 5.1 Motor type and specifications
- 5.2 Construction of motor and working principle
- 5.3 Tests of motor (off the vehicle)
 - 5.3.1 No load test
 - 5.3.2 Start test
- 5.4 Starter motor drive mechanism
 - 5.4.1 Need of drive mechanism
 - 5.4.2 Bendix drive
 - 5.4.3 Over running clutch drive
 - 5.4.4 Gear reduction type of drive
- 5.5 Starter motor control
 - 5.5.1 Manual switch
 - 5.5.2 Magnetic switch
 - 5.5.3 Solenoid switch
 - 5.5.4 Series – parallel system
 - 5.5.5 Two-step starter motor control

UNIT-6 IGNITION SYSTEM:

- 6.1 Principle
- 6.2 Spark formation, production of high voltage
- 6.3 Factor affecting spark – energy
 - 6.3.1 Voltage
 - 6.3.2 Mixture ratio
 - 6.3.3 Charge pressure and temperature
 - 6.3.4 Throttle opening
 - 6.3.5 Plug gap
 - 6.3.6 Electrode temperature
- 6.4 Coil ignition system:
 - 6.4.1 Working principle
 - 6.4.2 Constructional detail of induction coil and distributor
- 6.5 Ignition timing
- 6.6 Ignition advancing mechanism



- 6.6.1 Centrifugal type
- 6.6.2 Vacuum type
- 6.7 Magneto ignition system
- 6.8 Comparison of coil and magneto ignition system

UNIT-7 SPARK PLUG:

- 7.1 Constructional details
- 7.2 Classification according
 - 7.2.1 Heat range
 - 7.2.2 Reach
 - 7.2.3 Operating condition
- 7.3 Effect of leaded fuels
- 7.4 Radio interference
- 7.5 Plug polarity
- 7.6 Care and maintenance

UNIT-8. LIGHTING SYSTEM:

- 8.1 Lighting circuits
- 8.2 Head lamps
 - 8.2.1 Pre focused bulb type
 - 8.2.2 Sealed beam type
 - 8.2.3 Double filament type
- 8.3 Focusing and alignment of head lamp
- 8.4 Four head lamp light system
- 8.5 Fog lamp, back-up light, brake warning light, side light, direction indicator, hazard warning light

UNIT-9 SWITCHES AND WIRING:

- 9.1 Switches (function only)
 - 9.1.1 Tumbler door switch
 - 9.1.2 Head light
 - 9.1.3 Parking light
 - 9.1.4 Combination switch
 - 9.1.5 Horn switch
- 9.2 Wiring
 - 9.2.1 Starting cable and specification
 - 9.2.2 H.T.L.T. cable and specification
 - 9.2.3 Cable connection
 - 9.2.4 Fuse and fuse rating
 - 9.2.5 Cable colour code

UNIT-10 HORN:

- 10.1 Electrical horn

- 10.1.1 Diaphragm type
- 10.1.2 Wind tone type
- 10.1.3 High frequency type
- 10.2 Double horn system
- 10.3 Horn relays
- 10.4 Bulb horn
- 10.5 Air pressure horn

UNIT-11. RECENT ELECTRICAL EQUIPMENT IN AUTOMOBILES:

- 11.1 Electronic magneto ignition system
- 11.2 Electronic fuel injection
 - 11.2.1 E.C.M.
 - 11.2.2 Sensors and their supporting circuits
- 11.3 Indicating devices
 - 11.3.1 Fuel gauge
 - 11.3.2 Engine temperature indicator
 - 11.3.3 Oil pressure indicator
 - 11.3.4 Charge indicator
- 11.4 Power window regulator
- 11.5 Electrical fuel pump control system
- 11.6 Door locks
- 11.7 Heater and defroster
- 11.8 Electrical control circuits of air conditioner for a car.

Reference books:

1. Automotive Electrical Equipment William H Crouse
2. Basic Automobile Engineering C.P.Nakra
3. Automobile Engineering Kirpal Singh
4. Automobile Engineering R.B. Gupta

