

AUTOMOBILE TECHNOLOGY

Class XII

OPTIONAL

ENGINEERING SCIENCE (622)

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THEORY

Time: 3 Hours

Marks: 70

A. Engineering Drawing

40

- (a) **Section of Solids:** Concepts of sectioning. Projection of sections of poly-Hedron including their true shapes. **9**
- (b) **Development of Surfaces:** Development of Poly-Hedron and solids of revolution including their sections. **8**
- (c) **Fasteners:** Introduction of temporary and permanent fasteners, riveted joints and welded joints. Types of screw threads, conventional symbols for Internal and External threads, ISI specifications. Drawing of Bolts, Nuts, studs and locking devices. Their application in Engineering field. **9**
- (d) **Keys and Cotters:** Different types of keys, sleeve and cotter joints, socket and spigot joints, knuckle joints. **7**
- (e) **Couplings:** Solid and split coupling, flanged coupling, simple and protected. **7**

B. Workshop Technology

30

- (a) **Welding:** General characteristics of welded joints, Principle of welding, Types of welding processes and their brief description e.g. gas welding and arc welding, high pressure gas welding and low pressure gas welding. DC welding and AC welding, brief description of resistance welding, spot welding, butt welding, seam welding, submerged arc welding, thermit welding, inert gas welding, tungsten inert gas welding, mig. atomic hydrogen welding.
Gas welding and AC welding tools and equipments, selection of electrodes, fluxes, currents, torches and equipments. Specifications of tools, equipment and materials according to BSI. Different types of flames and their application in welding, Defects in welding and their detection. **15**
- (b) **Metallic and Non-Metallic Coatings:** Necessity of metallic and non-metallic coatings. Principle and processes of electroplating and galvanising, their applications. Properties and uses of varnishes, paints including primers and enamels. **6**
- (c) **Plastics Technology:** Introduction to thermoplastic and thermo-setting plastics, general properties, injection moulding, compression moulding-process and equipment, other plastic moulding methods, Machining plastics. **9**

PRACTICAL

Time: 2 Hours

Marks: 30

1. **Welding Shop:** Are welding-introduction to tools and equipments, safety precautions, use of welding transformer/ welding machine, method of selecting current, choice of electrode. Exercise involving surface and edge preparation, making of simple welding joints.
Gas Welding: Introduction to gas welding equipment, safety precautions, selection of gas pressure, welding torch type of flame, flux, welding rod and welding technique. Exercise involving job preparation and making Single Joints, Brazing practice of brazing by gas.

2. **Machine Shop:** Introduction to various types of Drilling machine (portable Drilling Machine, Pillar type, Bench type, Radial drilling machine).
Simple Exercises involving the use of above machines.
Introduction to Lathe (Job mounting, Tool holding Devices).
Simple exercises on Lathe (Turning, Facing, Parting, Step Turning, Chamfering, Knurling, Groove cutting by Form tool).
3. **Painting and Polishing:** Introduction to paints and allied materials, exercises on surface, preparation, varnishing, spirit polishing painting-using brush and spray, casual painting.

List of Experiments

Machine Shop

1. Drilling at specified position using a bench drilling machine.
2. Drilling holes upto 40 mm diameter, using a radial drilling machine.
3. Use of pillar type drilling machine for drilling hole upto 25 mm diameter.
4. Mounting a job on a lathe machine in the four jaw chuck.
5. Setting of various types of cutting tools in tool post of a lathe machine.
6. Facing, centering, plain turning and chamfering on a lathe machine.
7. Step Turning and parting of job on a lathe machine.
8. Knurling and growing of job on a lathe machine with the help of forming tool.

Welding Shop

A. Arc Welding

1. Introduction of tools and welding transformer for electric arc welding.
2. Safety precautions of arc welding.
3. Introduction to various types of electrodes for arc welding and selection of current.
4. Edge preparation and making a Butt-joint.
5. Making a lap joint with the help of arc welding.
6. Making a T-Joint with the help of arc welding.
7. Making a corner-joint with the help of arc welding.

B. Gas Welding

1. Demonstration of gas welding equipment including.
 - (i) Selection of gas pressure welding torches.
 - (ii) Various types of welding rods, flames and fluxes.
2. Safety precautions in gas welding.
3. Edge preparation and making Butt joint with help of gas welding.
4. Making a lap-joint with the help of gas welding.
5. Making a T-joint with the help of gas welding.
6. Making a Corner-joint with the help of gas welding.
7. Brazing practice with the help of welding-torch.

Painting and Polishing Practices

1. Filling or putty application.

2. Staining.
3. Sand preparing.
4. Varnish Polishing.
5. Spirit Polishing.
6. Brush Painting.
7. Spray Painting.

Note: Each student should perform all the experiments and Practices during the session.

List of Experiments

1. To test safety and operating controls such as Relay, Thermostat, L.P. cut-out, H.P. cut-out, Over-load protector, solenoid valve, oil pressure, Failure Control etc.
2. To carry out electric wiring of Refrigerator and Bottle Cooler.
3. To carry out electric wiring of window type Air Conditioner.
4. To test compressor for efficiency and earthing etc.
5. To service a window type Air Conditioner.
6. To find fault in Refrigerator and Bottle cooler.
7. To find fault in Air Conditioner.
8. To Check Comfort Conditions such as air, temperature, humidity, Air Motion etc.
9. To adjust the Automatic System.
10. To study compressor capacity control methods.

Note: Each student should perform all the experiments during the session.

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