4.7 DRAWING AND DESIGN (449)

4.7.1 Drawing and Design Paper 1 (449/1)

SECTION A (50 marks)

*Answer **all** the questions in this section in the spaces provided.*

1. (a) Give **two** reasons for engineers to study technical drawing. (2 marks)

(b) State **four** uses of computers in technical drawing. (2 marks)

2. (a) (i) State **two** methods of sharpening pencil leads.

(ii) Give the reason for rotating a pencil when drawing. (3 marks)

(b) Sketch the symbols used for each of the following conventions in drawing:

(i) Splined shaft

(ii) Internal screw thread (3 marks)

3. (a) State **four** mechanical properties of metals. (2 marks)

(b) List **four** requirements necessary for starting a small business. (2 marks)

4. Define each of the following terms as used in the design process:

(a) Secondary objective

(b) Realisation (2 marks)

5. Construct the involute of a square of side 30 mm. (5 marks)

6. **Figure 1** shows a block drawn in isometric projection. Draw in good proportion the following views in third angle projection:

(a) The front elevation

(b) The plan (7 marks)

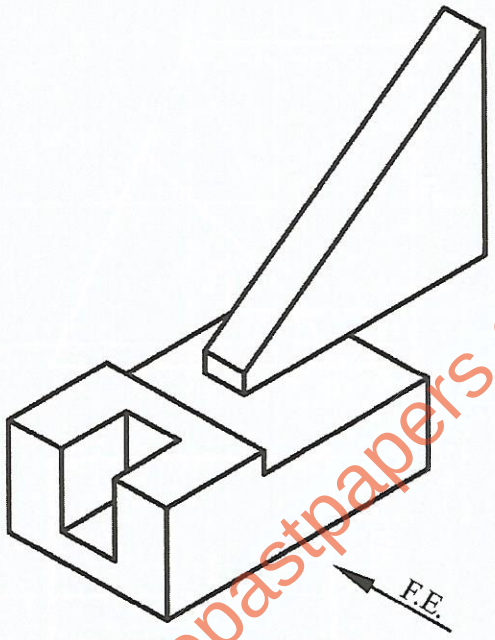

Figure 1

7. **Figure 2** shows an elevation and an incomplete plan of a truncated rectangular pyramid drawn in first angle projection.

(a) Copy the elevation.

(b) Complete the plan. (4 marks)

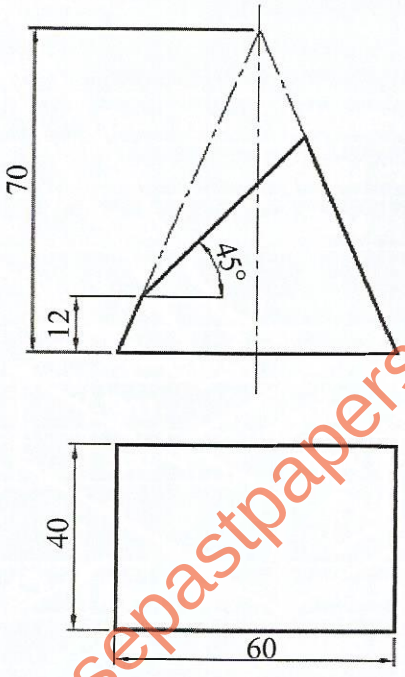

Figure 2

8. **Figure 3** shows three views of a shaped block drawn in first angle projection. Draw the block in isometric projection taking **X** as the lowest point. (6 marks)

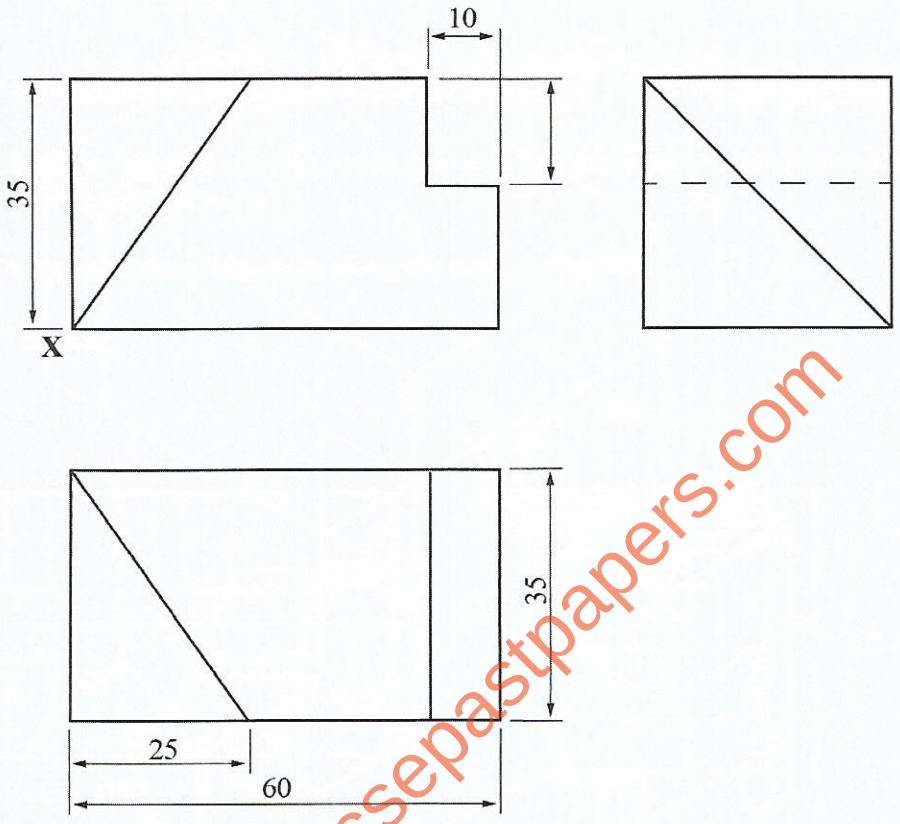

Figure 3

9. Illustrate methods of dimensioning each of the following features:

(a) Large arcs

(b) Semi-circle

(c) Small gaps

(d) Slope (6 marks)

10. **Figure 4** shows an exploded view of a joint. Assemble the parts and draw full size the three orthographic views of the joint, in third angle projection. (6 marks)

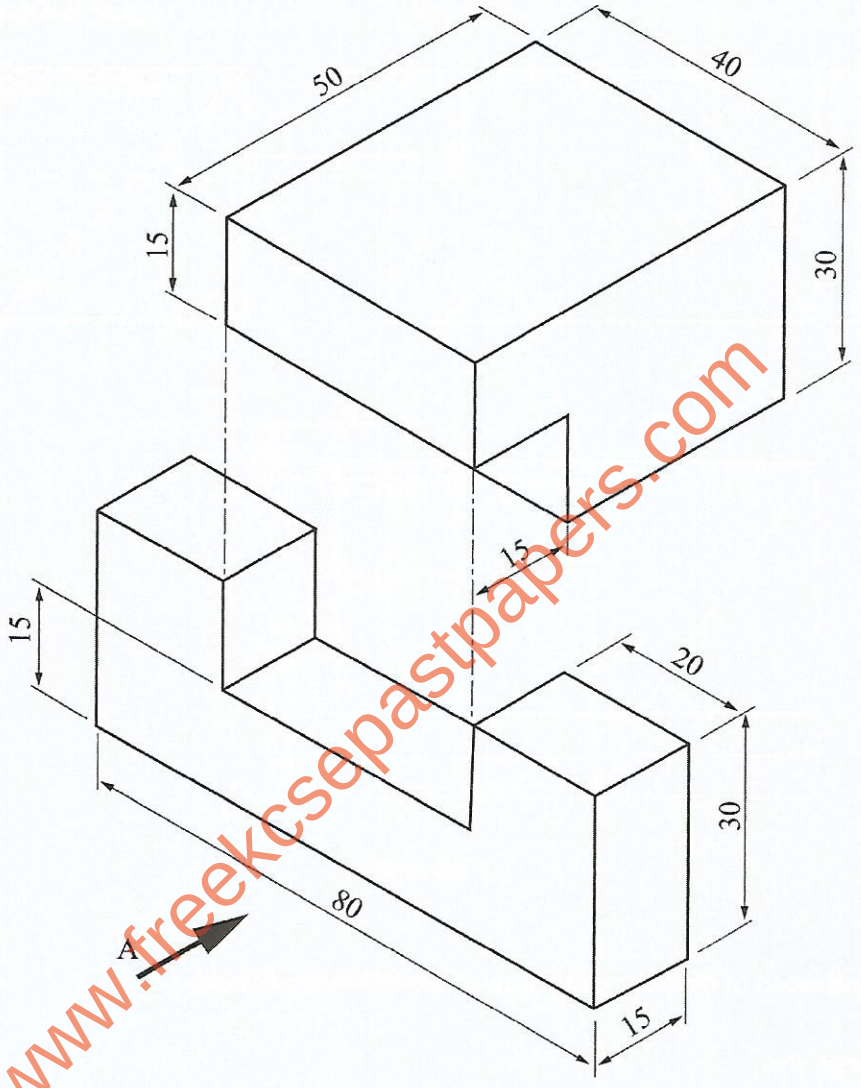

Figure 4

SECTION B (20 marks)

*This question is **compulsory**.*

*It should be answered on the **A3 paper** provided.*
*Candidates are advised to spend **not more than 1 hour on this question.***

11. **Figure 5** shows the parts of a stop cock drawn in first angle projection. Assemble the parts and draw **Full Size** the following:

(a) A sectional front elevation along the cutting plane Y–Y

(b) The plan (20 marks)

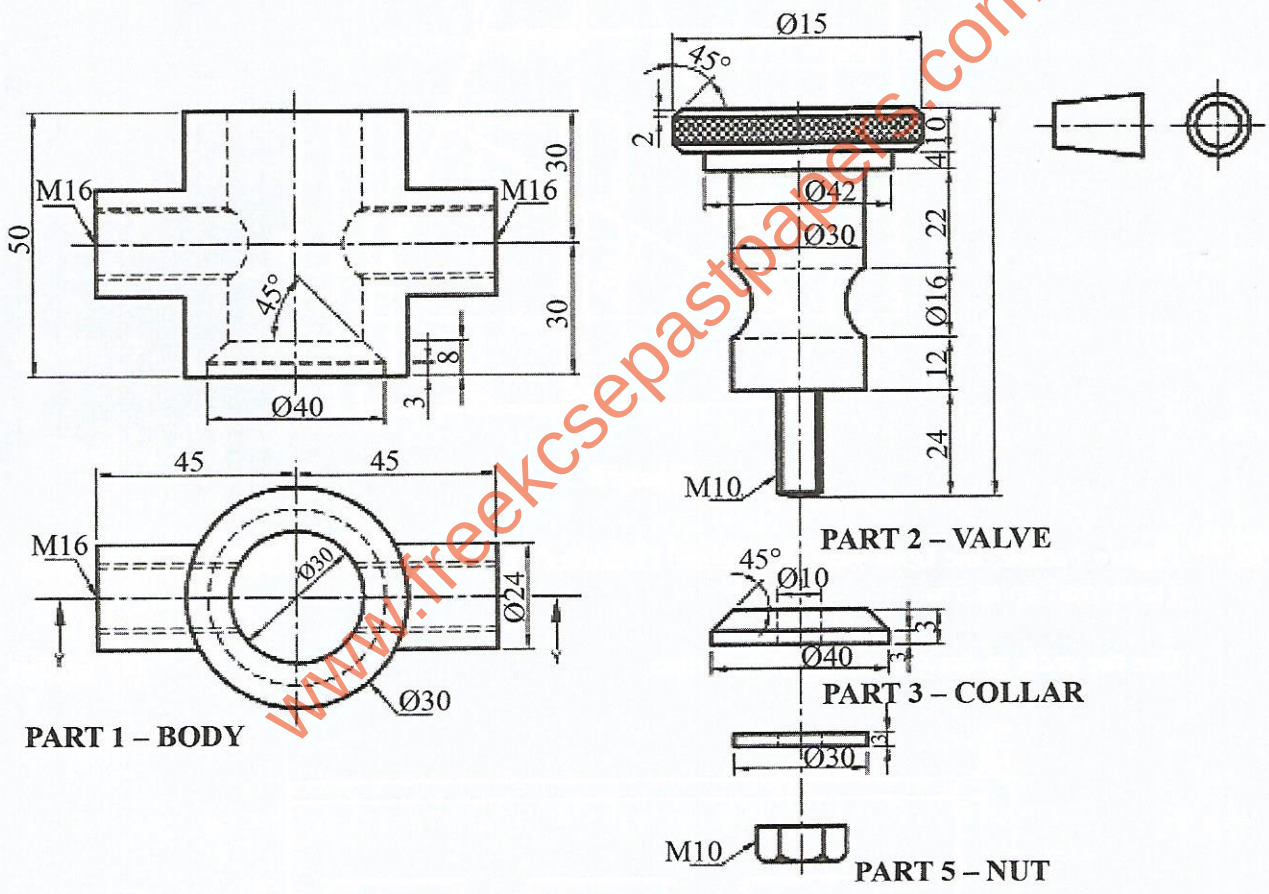

Figure 5

SECTION C (30 marks)

*Answer any **two** questions from this section on the **A3 paper** provided.*

12. **Figure 6** shows a cone truncated at the top and bottom. Copy the figure and draw the surface development of the cone. (15 marks)

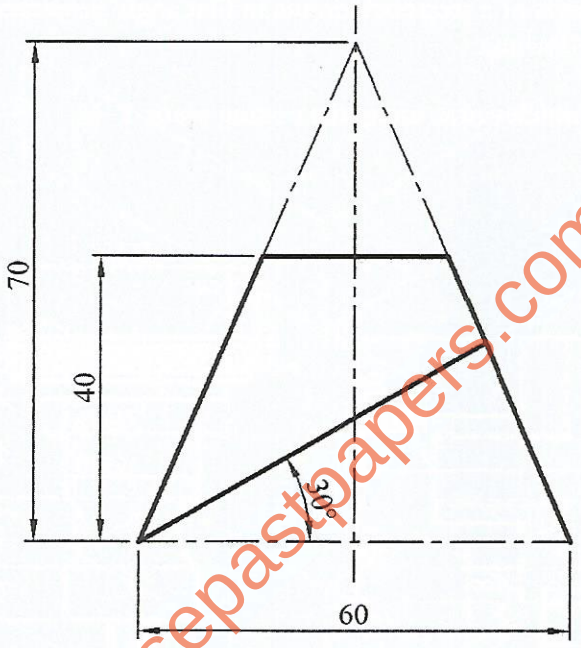

Figure 6

13. **Figure 7** shows the front view of a house. Construct a diagonal scale in which 20 mm represent 1 m to read up to 5 m.

Use the scale to draw the view of the house. (15 marks)

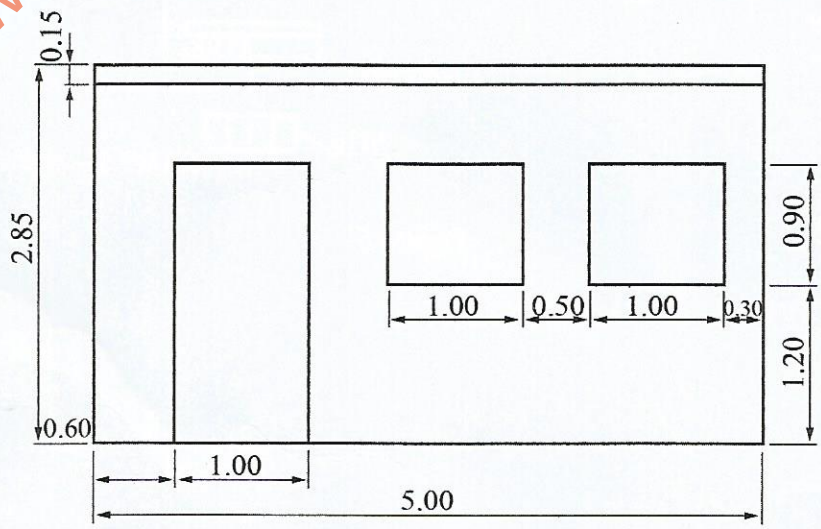

Figure 7

14. **Figure 8** shows three orthographic views of a block drawn in first angle orthographic projection.

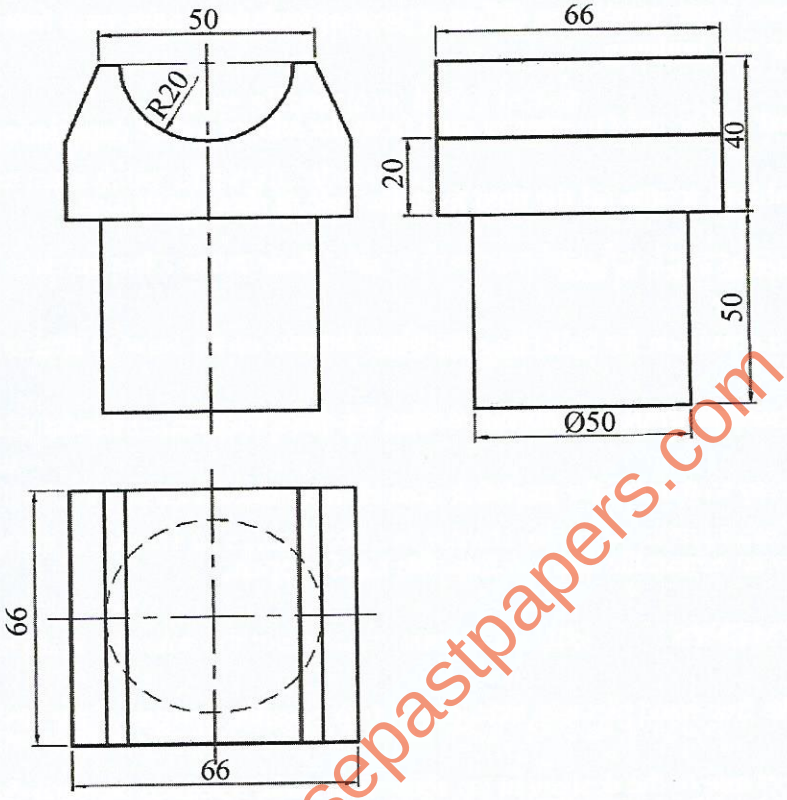

Figure 8

Draw the isometric view of the block. Include hidden details. (15 marks)

4.7.2 Drawing and Design Paper 2 (449/2)

DESIGN PROBLEM (40 marks)

During rainy seasons, some people use different types of tools to remove mud from their shoes before getting into a house or a building.

Design a device that can be used to remove mud from the sole of a shoe considering that it should:

1. be able to scrape off the mud from the sole of shoes with ease.
2. be stable when in use.
3. have provision for collecting the mud.
4. be easy to remove the collected mud for quick disposal.
5. be easy to remove the mud that is stuck from the device.
6. have an adjustable and a collapsible hand support.

REQUIREMENTS

(a) Make free-hand pictorial sketches of **two** possible designs of the device. (6 marks)

(b) Select **one** of the designs in (a) above and make a refined pictorial drawing. (12 marks)

(c) Make detailed sketches to show each of the following:

(i) Consideration 4 (5 marks)

(ii) Consideration 5 (5 marks)

(iii) Consideration 6 (7 marks)

(d) List **two** materials used for making the device and state **one** reason for the choice of each. (3 marks)

(e) Name **one** method of joining the parts and state where it is applied. (2 marks)