3.21 DRAWING AND DESIGN (449)

3.21.1 Drawing and Design Paper 1 (449/1)

SECTION A (50 marks)

*Answer **all** the questions in this section on the answer sheet provided.*

1   (a)   Write the following in full as applied in industrial training:

(i)   TVET;

(ii)   NITA;

(iii)   T.T.I.

(3 marks)

(b)   State **two** uses of a beam compass.   (1 mark)

2   (a)   Define the following terms as used in the design process: (4 marks)

(i)   primary objective;

(ii)   secondary objective;

(iii)   design brief;

(iv)   prototype.

(b)   With the aid of sketches, describe **three** types of dimensions in technical drawing.

(3 marks)

3   State **one** use of each of the following computer components: (2 marks)

(i)   keyboard;

(ii)   mouse;

(iii)   monitor;

(iv)   hard disk.

4   Construct a triangle of perimeter 165 mm whose sides are in the ratio of 3:5:6.   (4 marks)

5   (a)   List **four** factors to consider when lettering.   (2 marks)

(b)   State **three** effects of poor disposal of engineering materials to the environment.

(3 marks)

6   **Figure 1** shows a block drawn in isometric projection. Sketch in good proportion the orthographic views of the block in first angle projection.   (7 marks)
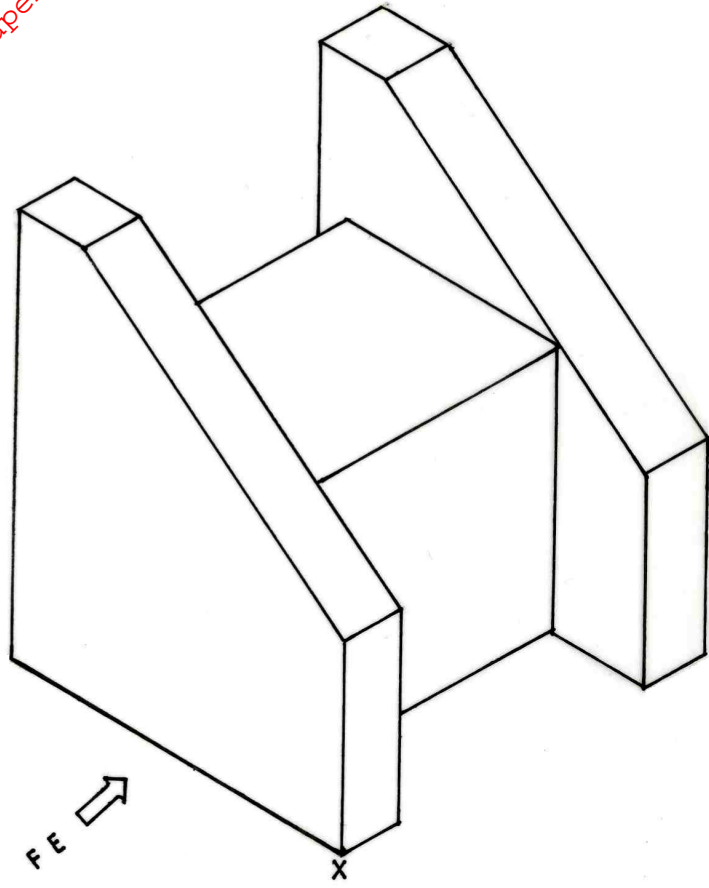

Fig. 1

7   **Figure 2** shows three views of a block drawn in third angle projection.
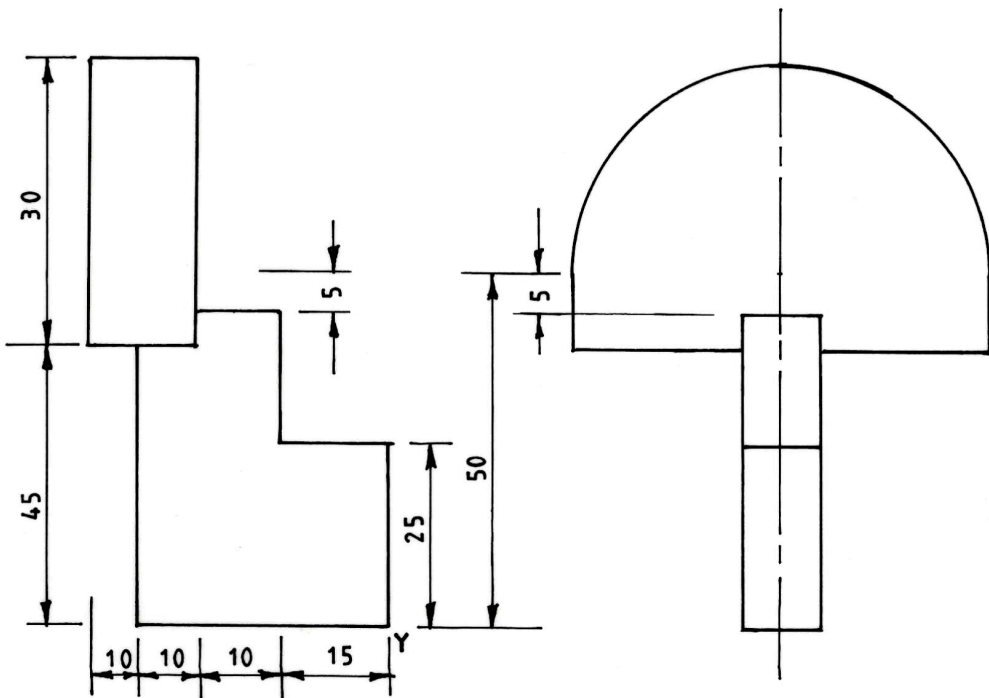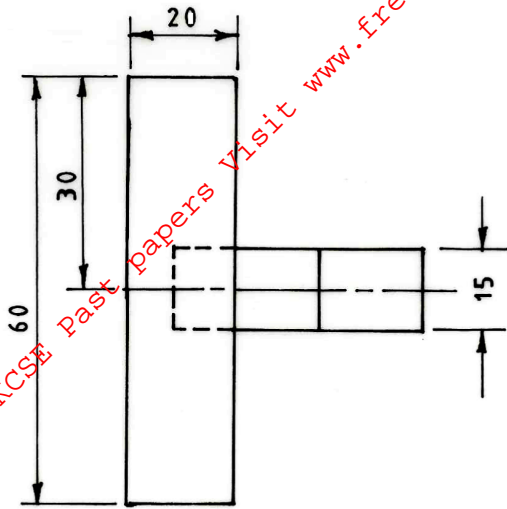
Fig. 2

On the isometric grid paper provided, sketch the pictorial view of the block taking "Y" as the lowest point.

(6 marks)

8   Construct a scale of 10:9 and draw **figure 3** using the scale.   (5 marks)
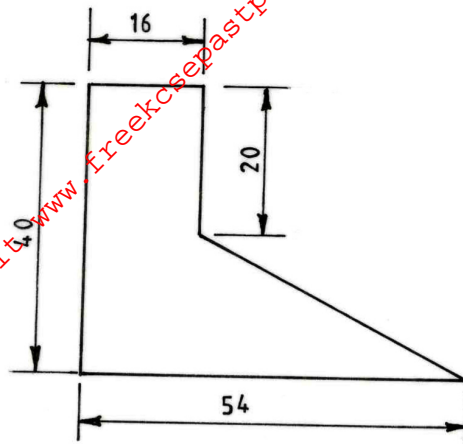

Fig. 3

9   An equilateral triangular prism is intersected by a cylinder at right angles as shown in **figure 4**.
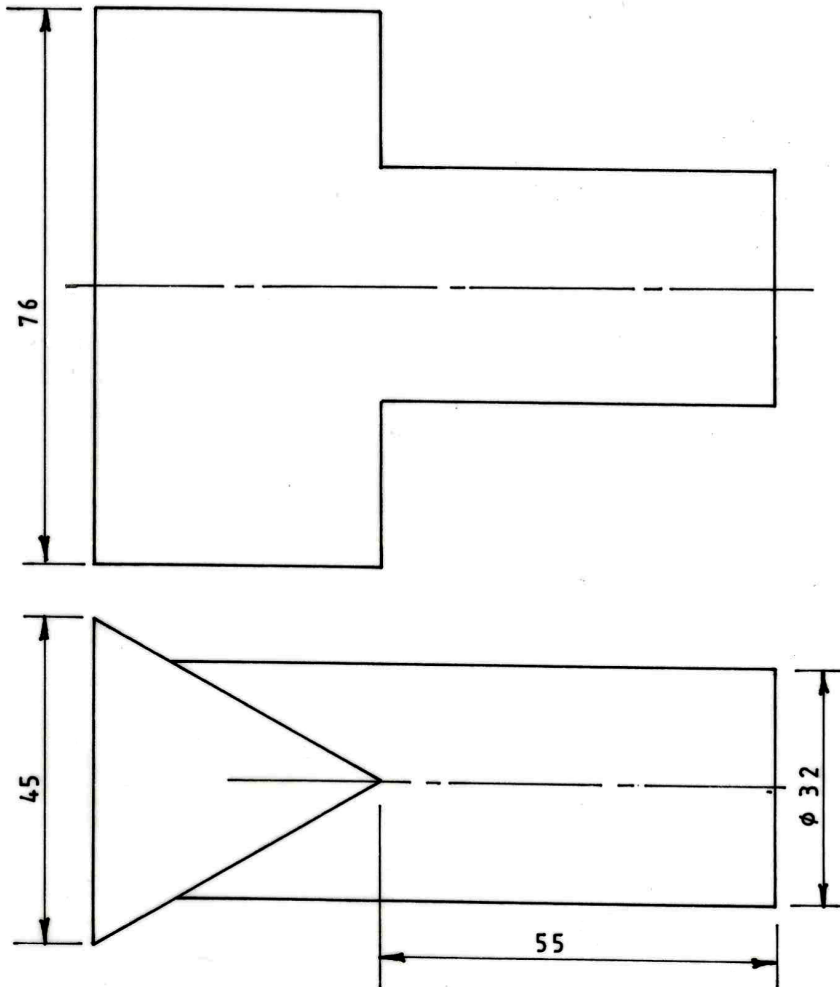

Fig. 4

Draw the line of intersection.   (5 marks)

10   **Figure 5** shows views of two parts of a block drawn in first angle projection.
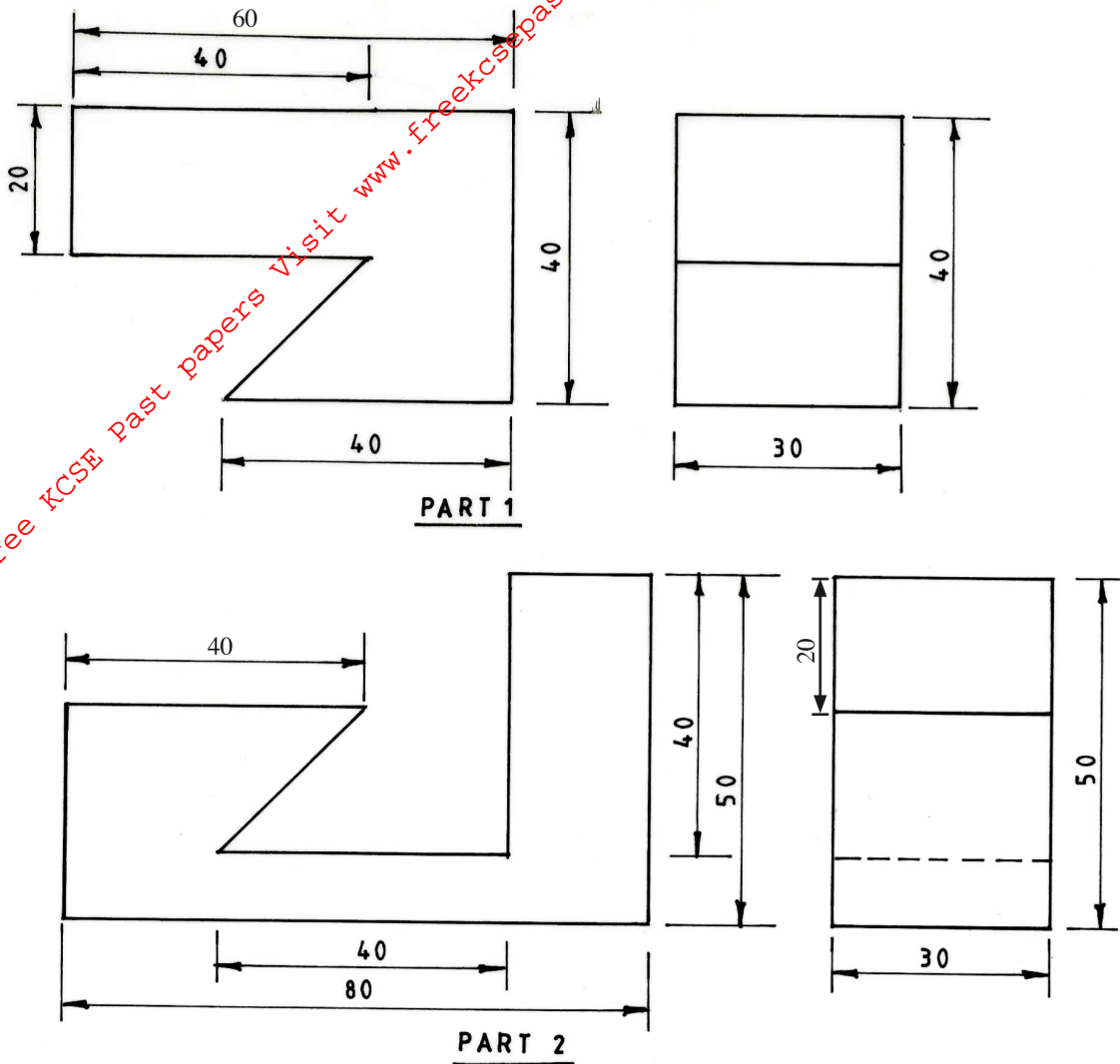

Fig-5

Assemble the parts and sketch in good proportion the oblique projection of the block.

(5 marks)

SECTION B (20 marks)

COMPULSORY QUESTION.

11   **Figure 6** shows parts of a machine component drawn in first angle projection. Assemble the parts and draw FULL SIZE the following:

(a)   sectional front elevation along the cutting plane P - P;

(b)   the plan;
        Hidden details are not required. Unspecified dimensions are left to the candidate's discretion.   (20 marks)

PART 4 NUT

PART 3 - CUP

PART 2 - ARM

PART 1 - STAND
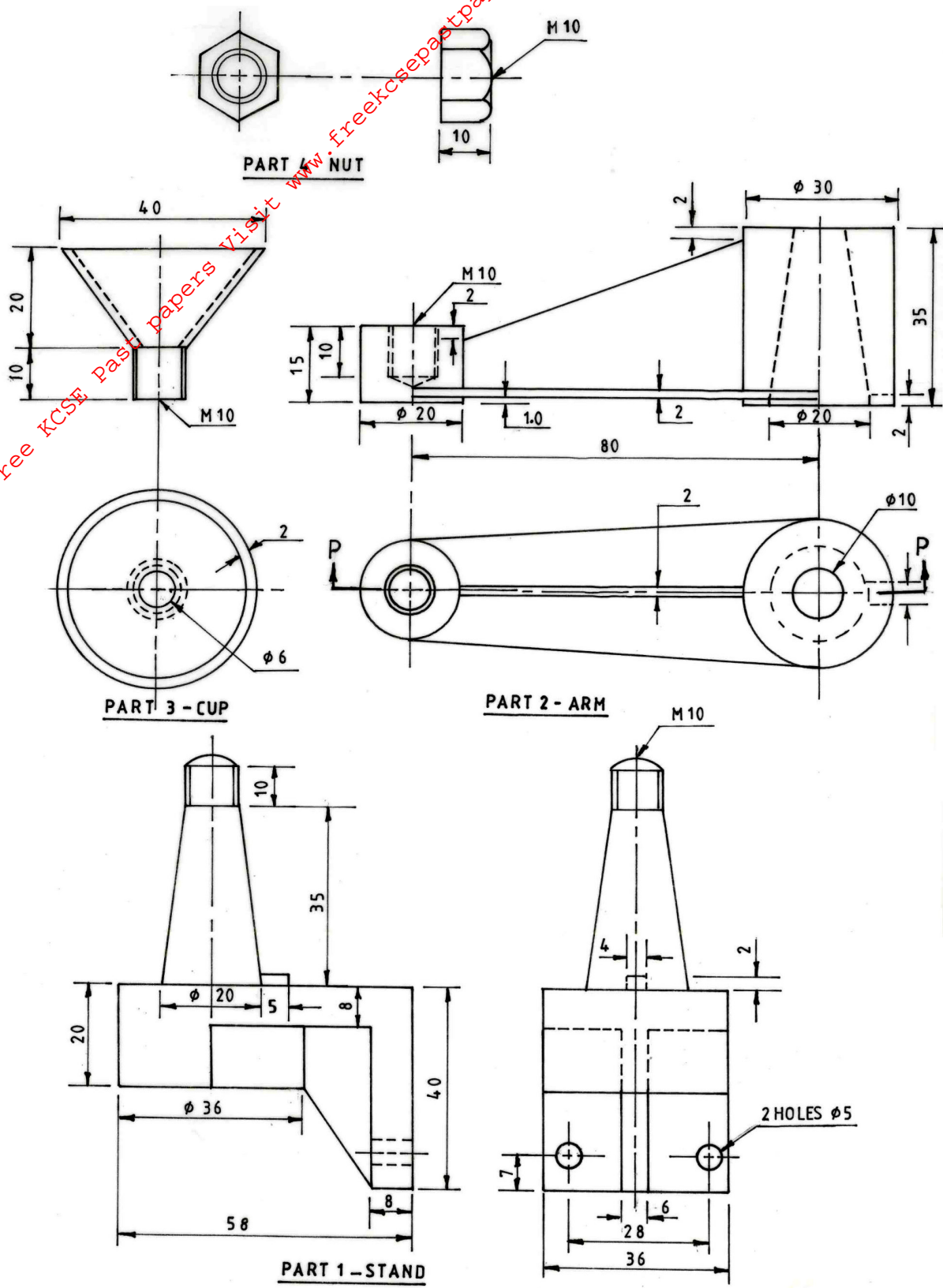
Fig. 6

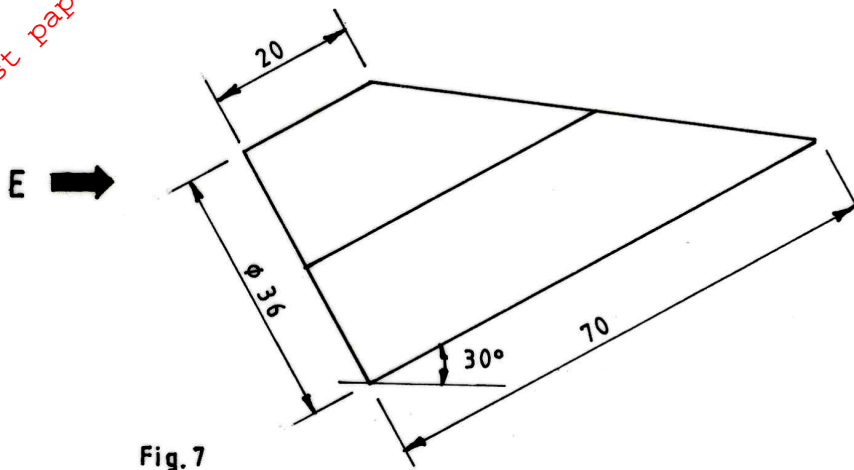*Answer any **two** questions from this section.*

12   **Figure 7** shows the front elevation of a truncated hexagonal prism tilting at an angle of 30°. Copy the given view and draw the following in third angle projection:
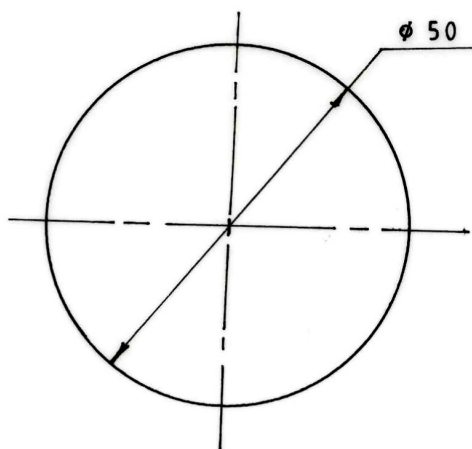
(i)   end elevation in the direction of arrow E;
(ii)   the plan.

(15 marks)

E ➡

20
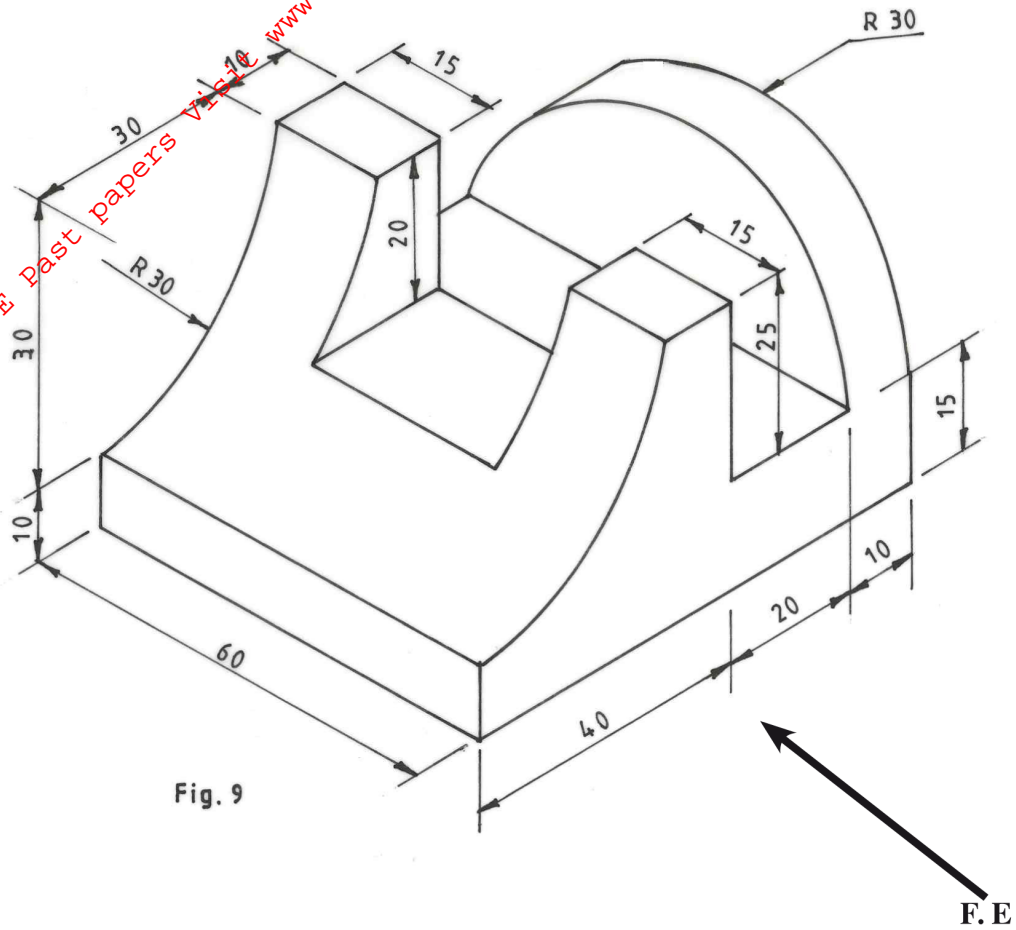
Ø 36

30°

70

Fig. 7

13   **Figure 8** shows the plan of an object. A string attached to its circumference is wound tight. Trace the path followed by a mark P on the string as it unwinds through one revolution.

(15 marks)

Ø 50

Fig 8

14   **Figure 9** shows a block drawn in isometric projection.

Fig. 9

Draw FULL SIZE in first angle projection the three orthographic views of the block.
(15 marks)

3.21.2 Drawing and Design Paper 2 (449/2)

DESIGN PROBLEM: (40 marks)

People have had serious accidents caused by the use of ladders that are poorly designed.

Design a ladder considering the following:

1. It should provide a reasonably strong grip when leaning on a cylindrical column.

2. It should have rungs (steps) that make the user comfortable when working.

3. It should have provision for extension as the working height increases.

4. It should be folded for ease of storage and transportation.

5. Its base should provide a firm grip to the ground.

REQUIREMENTS

(a) Make freehand sketches of **TWO** possible solutions for your design.

(6 marks)

(b) Select **ONE** of the designs in (a) above and make a refined labelled pictorial sketch.

(9 marks)

(c) Make detailed sketches of the mechanisms to allow for each of the considerations 1 to 5 above.

(20 marks)

(d) List **TWO** materials used and state **ONE** reason for the choice of each.

(3 marks)

(e) Name **TWO** methods of joining the parts and state where each is used.

(2 marks)