THE KENYA NATIONAL EXAMINATIONS COUNCIL

ARTISAN CERTIFICATE

GENERAL FITTER	**MASONRY**
MOTOR VEHICLE MECHANICS	**PLUMBING**
AGRICULTURAL MECHANICS	**GARMENT MAKING**
WELDING AND FABRICATION	**LEATHER WORK TECHNOLOGY**
ELECTRICAL INSTALLATION	**PAINTING AND DECORATION**
CARPENTRY AND JOINERY	

APPLIED GEOMETRY

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
> *Drawing papers size A3;*
> *Drawing instruments;*
> *Scientific calculator.*
*This paper consists of **THREE** sections: **A, B** and **C**.*
*Answer **ALL** the questions in section **A**, **ONE** question from section **B** and **TWO** questions from section **C**.*
***Do not** erase construction lines.*
Write your name and index number on all answer sheets.
Candidates should answer the questions in English.

This paper consists of 13 printed pages.

Candidates should check the question paper to ascertain that
all the pages are printed as indicated and that no questions are missing.

Turn over

*Answer **ALL** questions in this section.*

1. Using the 45° - 60° method, draw a regular pentagon whose side length = 50 mm.   (3 marks)

2. Figure 1 shows a regular pentagon drawn within a circle of diameter 30 mm with a string wound around it to cover its circumference. Plot the path traced by the end of the string, point A, as the hexagon rotates through 360° at 0.   (4 marks)
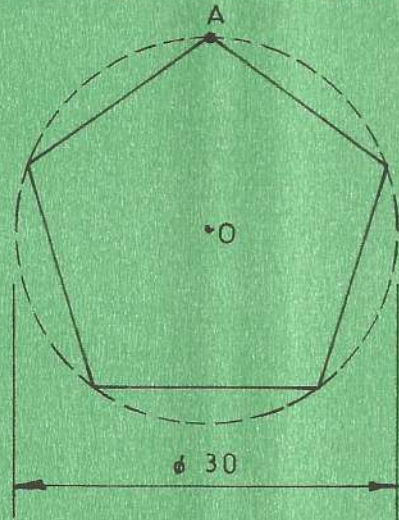

A

•O

ø 30

Fig.1

3. Construct an ellipse of major axis 100 mm and a minor axis 50 mm using concentric circles method.   (5 marks)

4. Draw a tangential arc of radius 80 mm to touch both line AB and the circle as shown in figure 2.   (5 marks)
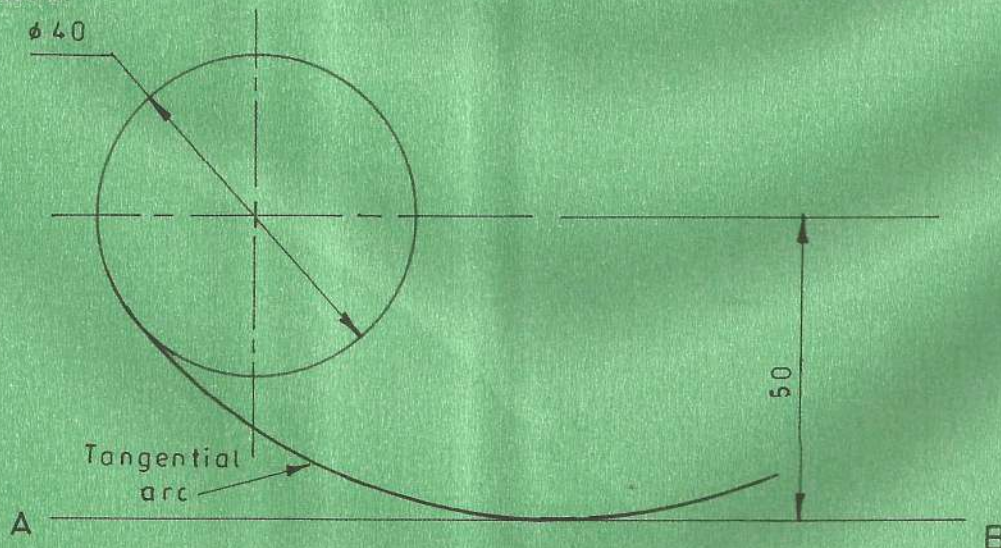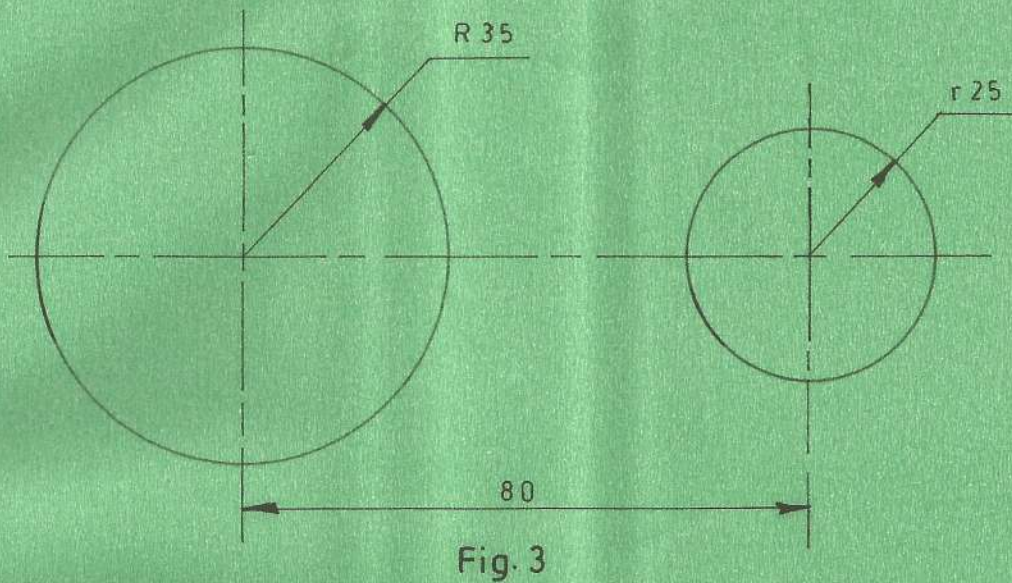

ø 40

50

Tangential arc

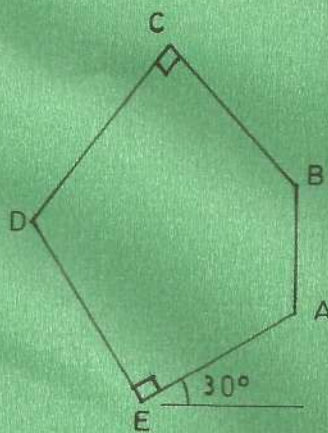A   B

Fig.2

5.   Figure 3 shows two unequal circles. Draw the following:

   (i)   a straight line internal tangent to the two circles;

   (ii)   normal to the tangent.

(5 marks)

Fig. 3

6.   Figure 4 shows an irregular pentagon. Draw a similar pentagon to a scale of 3:2.   (4 marks)

AE = 50 mm
AED = 90°
ED = 30 mm
EDC = 120°
DC = 35°
DCB = 90°

Fig.4

7.   Construct a square equal in area to a triangle whose side length is AB = 80 mm,
     ABC = 30° and BAC = 60°.

(3 marks)

8.   Figure 5 shows the front elevation of a cut equilateral triangular prism of sides 40 mm.
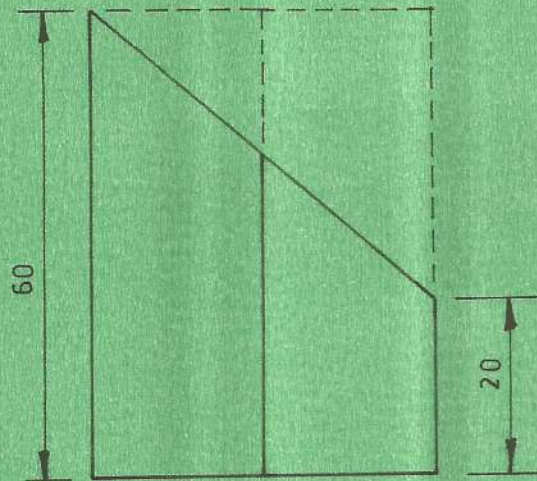

Fig. 5

Draw the following views in 3rd angle projection:

(i)   plan;

(ii)   end elevation.

(4 marks

9.   Figure 6 shows orthographic views of an object drawn in 3rd angle projection.

PLAN

END ELEVATION
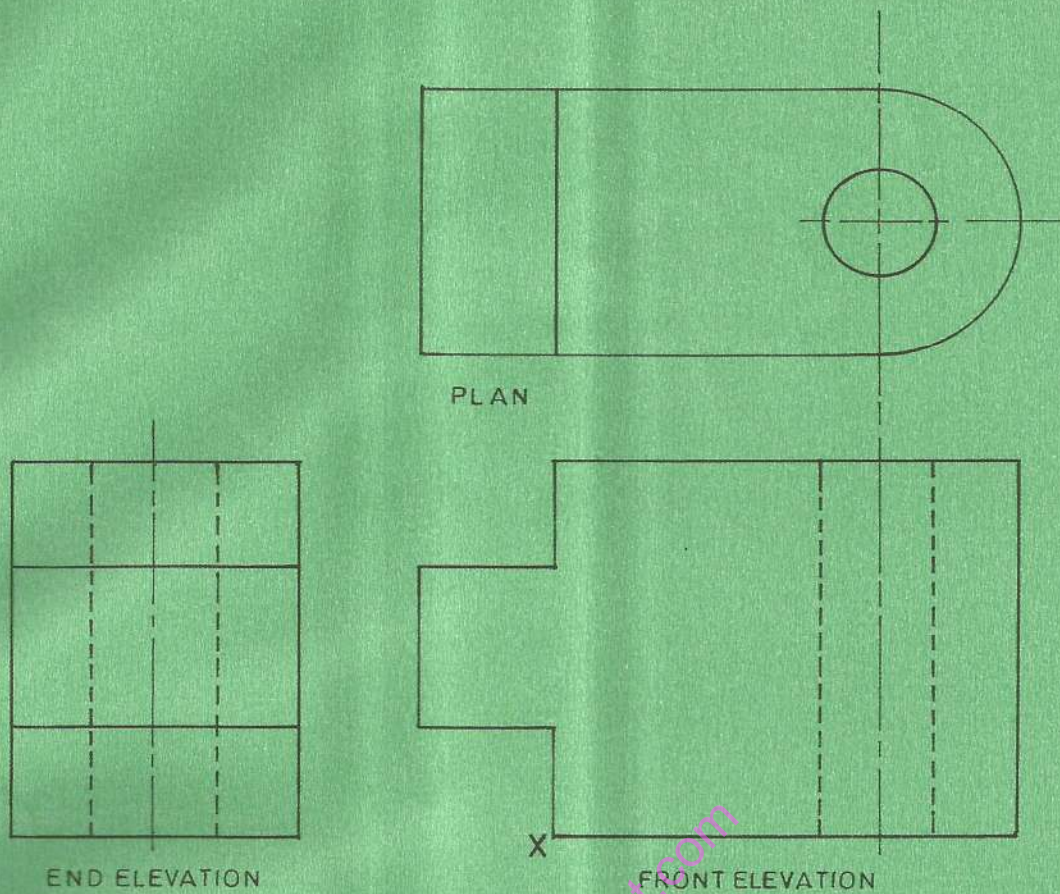
X   FRONT ELEVATION

Fig. 6

Sketch an isometric projection of the object with corner X as the lowest point.   (4 marks)

10.   (a)   Divide a line AB = 140 mm into 8 equal parts.   (1 mark)

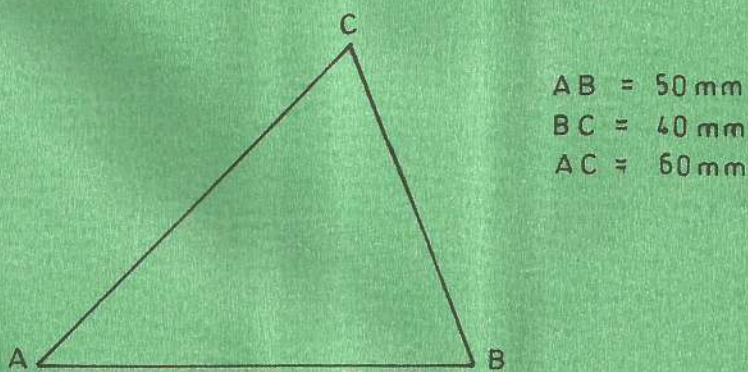   (b)   Circumscribe a circle on the triangle shown in figure 7.   (2 marks)

C

AB = 50 mm
BC = 40 mm
AC = 60 mm

A   B

Fig. 7

*Answer **ONE** question from this section.*

11. Figure 8 shows details of a clamp for a table tennis net. Assemble the parts and draw the following views in 3rd angle projection:

    (a)   front elevation;

    (b)   end elevation viewed in the direction of arrow E.

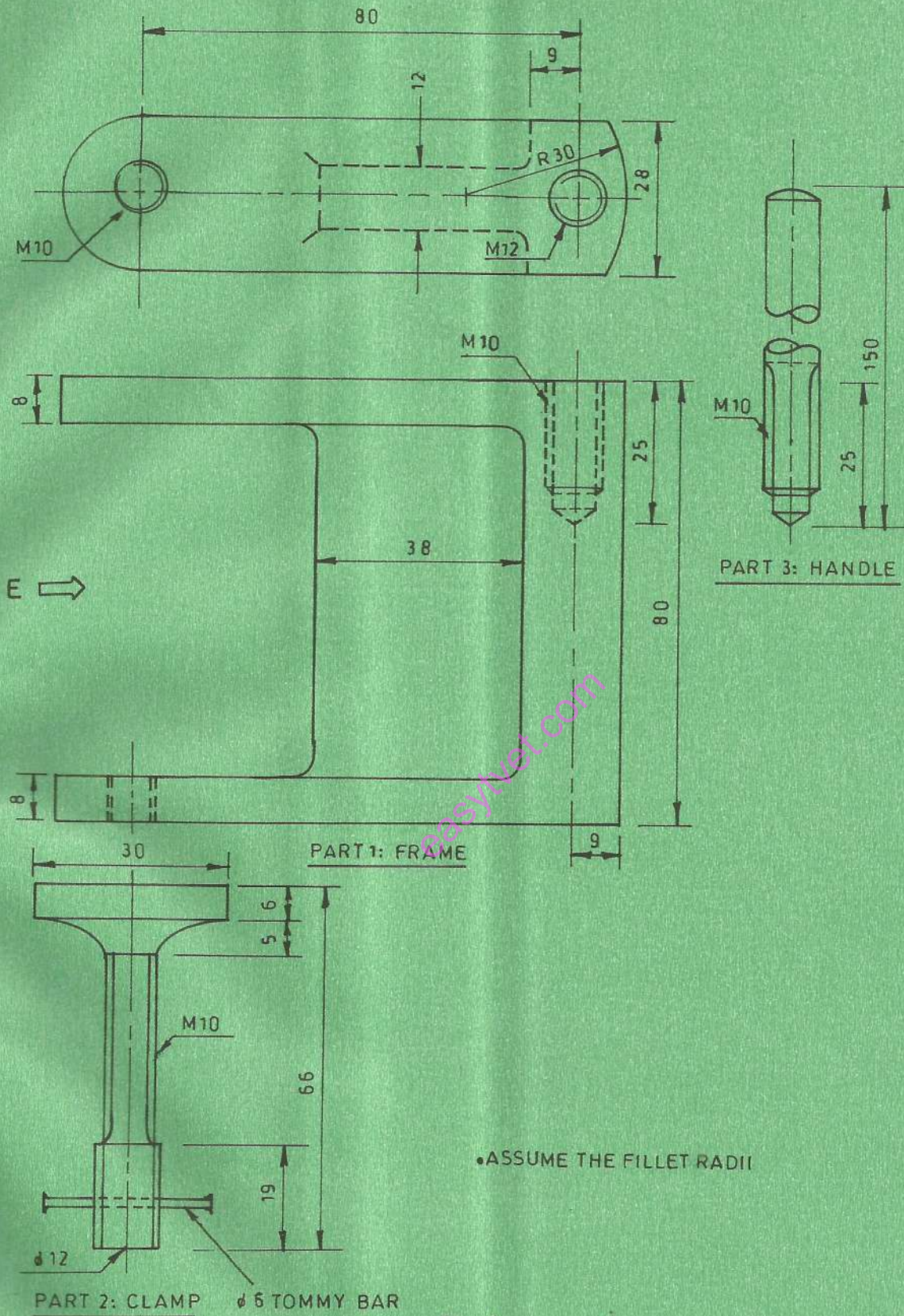   (30 marks)

80

12

9

R 30

28

M10

M12

M 10

PART 3: HANDLE

150

M10

25

8

M 10

25

E ⇒

38

80

8

9

PART 1: FRAME

30

6

5

M10

66

• ASSUME THE FILLET RADII

19

ø 12

ø 6 TOMMY BAR

PART 2: CLAMP

Fig. 8

CLAMP FOR TABLE TENNIS NET

12.   Figure 9 shows a shaped block. Draw full size, in 1st angle projection the following views:

(i)   front elevation viewed in the direction of F;

(ii)   end elevation;

(iii)   plan.
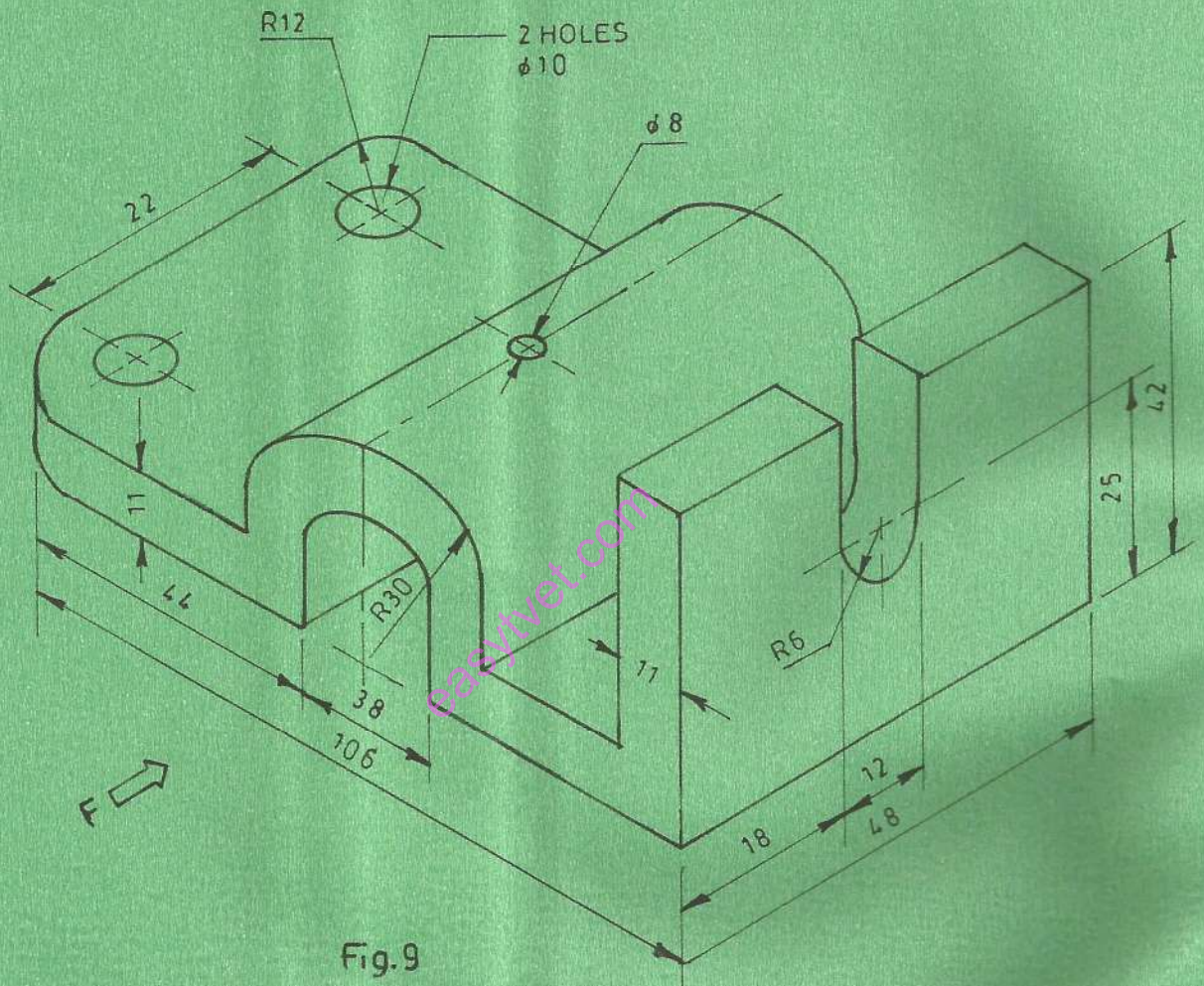
(30 marks)

Fig.9

13. (a) Sketch the symbols for any **three** of the plumbing fittings below:

      (i)   90º elbow;
      (ii)   straight Tee;
      (iii)   P - trap;
      (iv)   wash hand basin.

(6 marks)

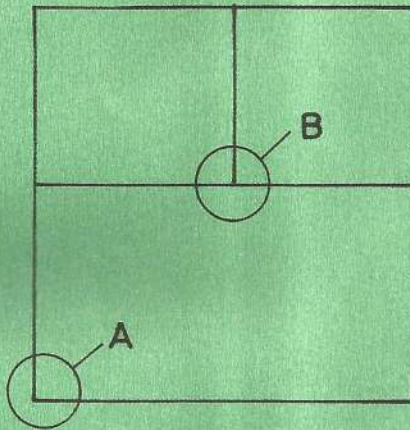(b) Figure 10 shows a line diagram of a wooden window frame.

Fig.10

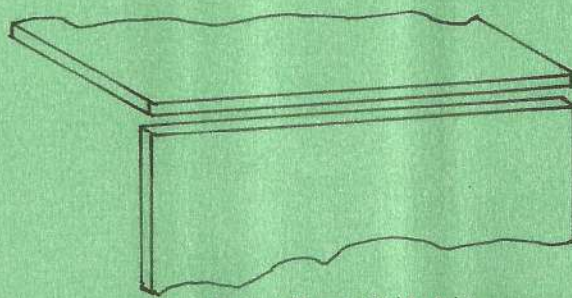Sketch exploded pictorial details of joints at A and B. (10 marks)

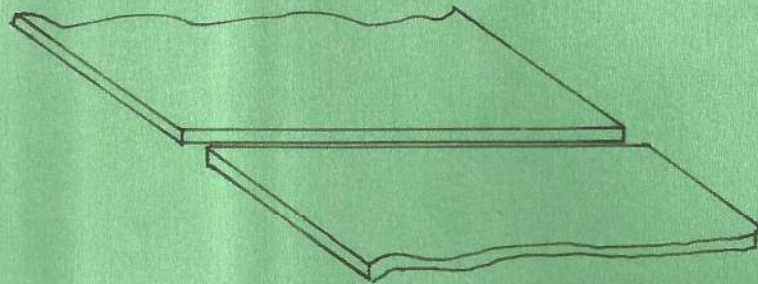(c) (i) Sketch sections of any **three** of the following welded joints:

      (I)   butt joint;
      (II)   lap joint;
      (III)   corner joint;
      (IV)   edge joint;
      (V)   Tee joint.

(ii) Using sketches, show how to stitch the leather joints shown in figure 11.

(14 marks)

Edge Flesh Stitching

Edge Edge Stitching

Fig.11

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

14.   Figure 12 shows orthographic views of an object drawn in 1st angle projection.
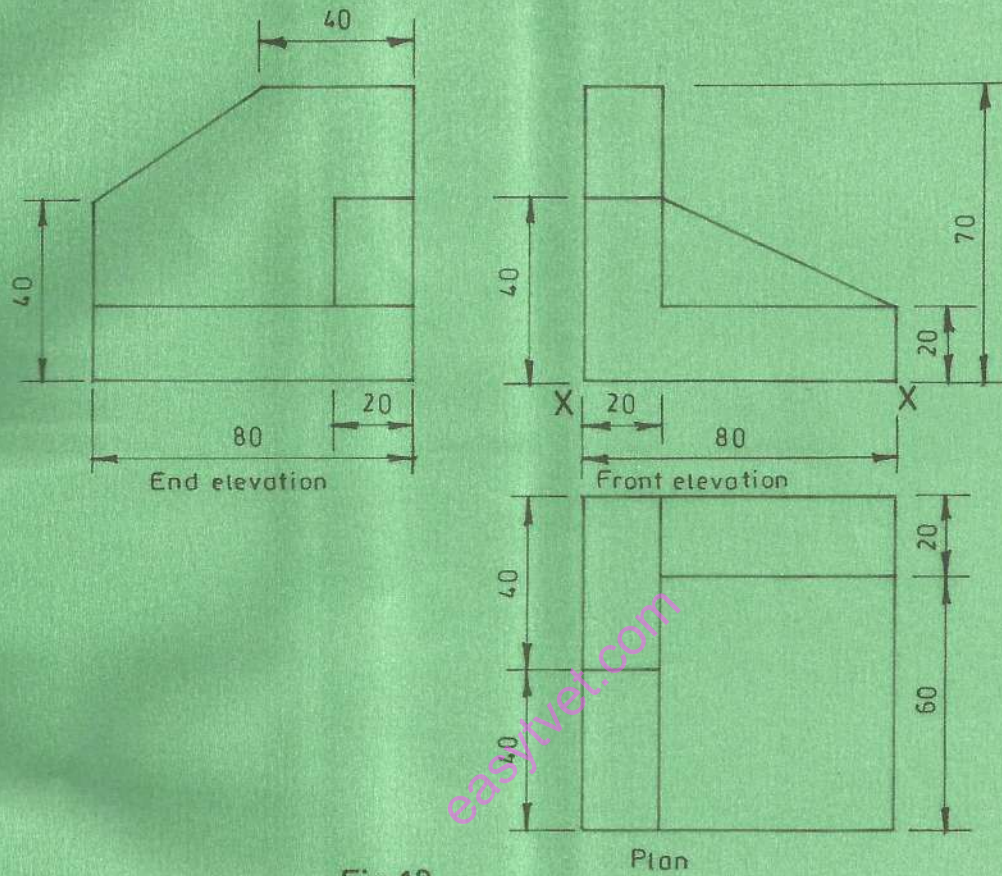

Fig.12

Draw an oblique cavalier projection of the object with X - X as the front side.   (15 marks)

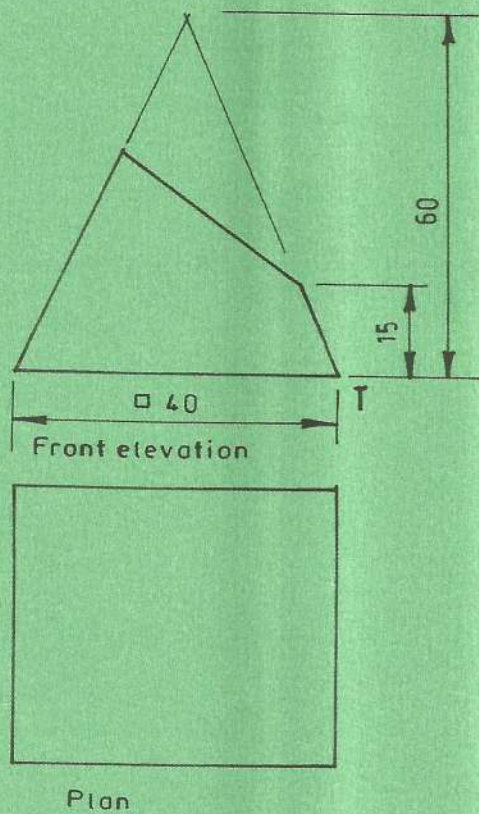15. Figure 13 shows a truncated square prism drawn in 1st angle projection.

Fig. 13

Draw full scale the following:

(i) end elevation;

(ii) complete plan;

(iii) development of the prism when opened at the shorter edge.

(15 marks)

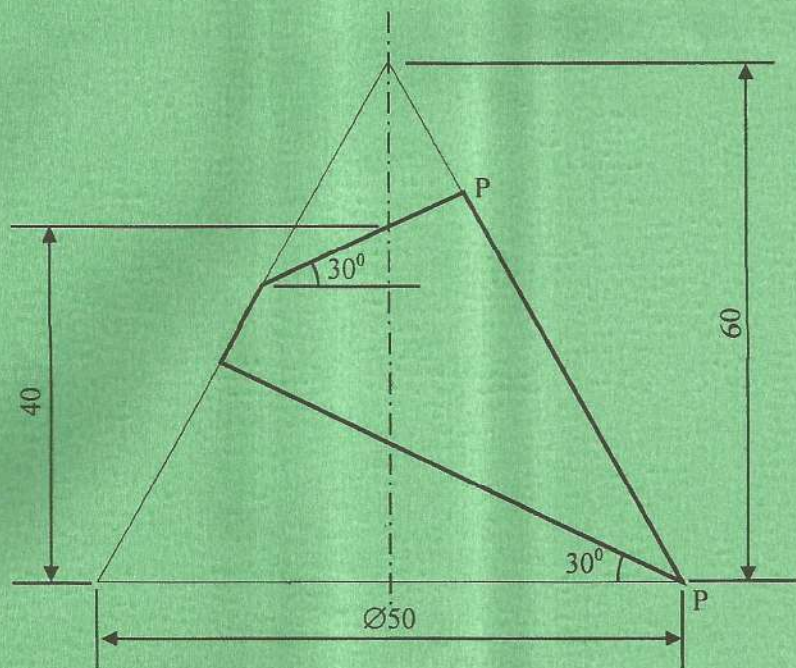16. Figure 14 shows the front elevation of a right cone cut both on the upper part and the lower part.

Fig. 14

Draw the following views to a scale of 1:1:

(i)   the front elevation;

(ii)   end elevation;

(iii) development when opened along P - P.

(15 marks)

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