

TECHNICAL DRAWING - HIGHER LEVEL - PAPER I
(Plane and Solid Geometry)

MONDAY, 22 JUNE - AFTERNOON 2.00 - 5.00

(200 MARKS)

INSTRUCTIONS

- (a) Answer four questions.
- (b) All questions carry equal marks.
- (c) Construction lines must be shown on all solutions.
- (d) Write the number of the question distinctly on the answer paper.
- (e) All dimensions on the question paper are given in millimetres.
- (f) First or third angle projection may be used.

1. Given the horizontal and vertical projections of two planes ABC and ADE.

A	=	290	---	5	---	140
B	=	180	---	115	---	90
C	=	230	---	15	---	10
D	=	170	---	55	---	50
E	=	270	---	85	---	30

- (a) Determine the line of intersection between the planes.
- (b) Determine the dihedral angle between the planes.
- (c) Show the projections of a straight line drawn from B to the line DE and which shall be 85 mm long.
- (d) On a separate diagram, draw the projections of the skew lines AD and BC and show the projections of the shortest horizontal distance between them.

2. Fig. 1 shows an irregular pentagon ABCDE. The triangle ABC is similar to the triangle ACD. The area of the triangle ADE is equal to 1.5 times the area of the quadrilateral ABCD.

- (a) Draw the given figure showing all constructions clearly.
- (b) Divide the area of the pentagon ABCDE into three equal parts by drawing a straight line from C and another straight line from E.

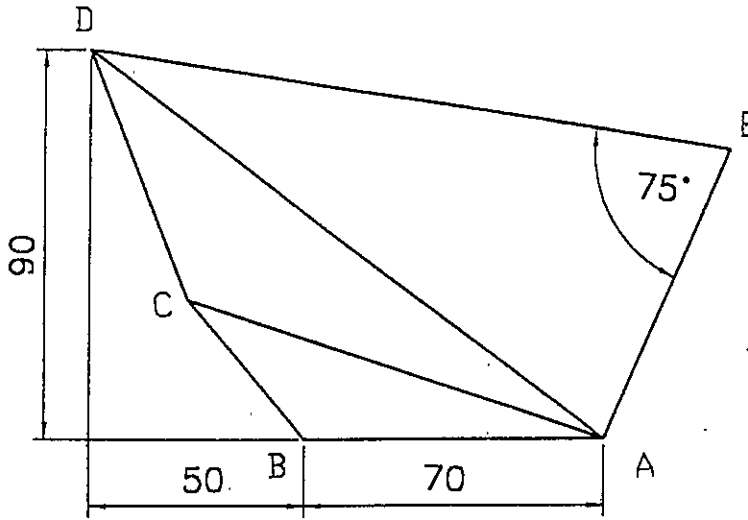


FIG. 1

3. Fig. 2 shows the plan of a sphere A and a right cone B resting on the horizontal plane. The altitude of the cone is 80 mm.

- (a) Draw the plan and elevation of the solids and show the projections of another sphere in the position C so that it rests on the horizontal plane, is in contact with sphere A and touches the cone B at a point 15mm above the horizontal plane.
- (b) Show the projections of another right cone in the position D standing on the horizontal plane so that it is in contact with the base of cone B and touches the sphere A at the point P.

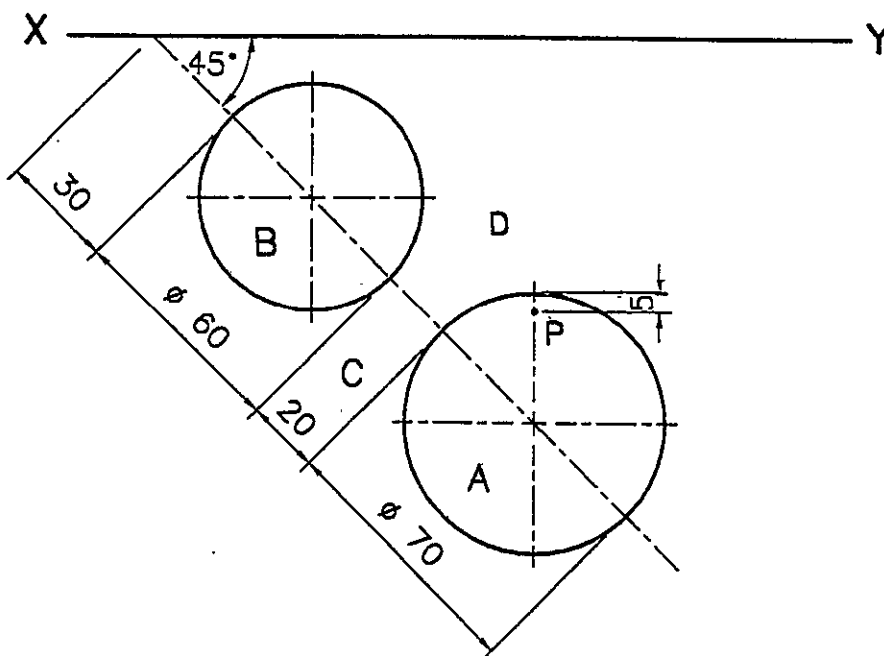


FIG. 2

4. Fig. 3 shows the projections of a square-based right pyramid which has been cut as shown.

Also shown are the projections of an equilateral triangular prism of 60mm side which penetrates the cut pyramid.

Draw the projections of the solids showing all lines of interpenetration.

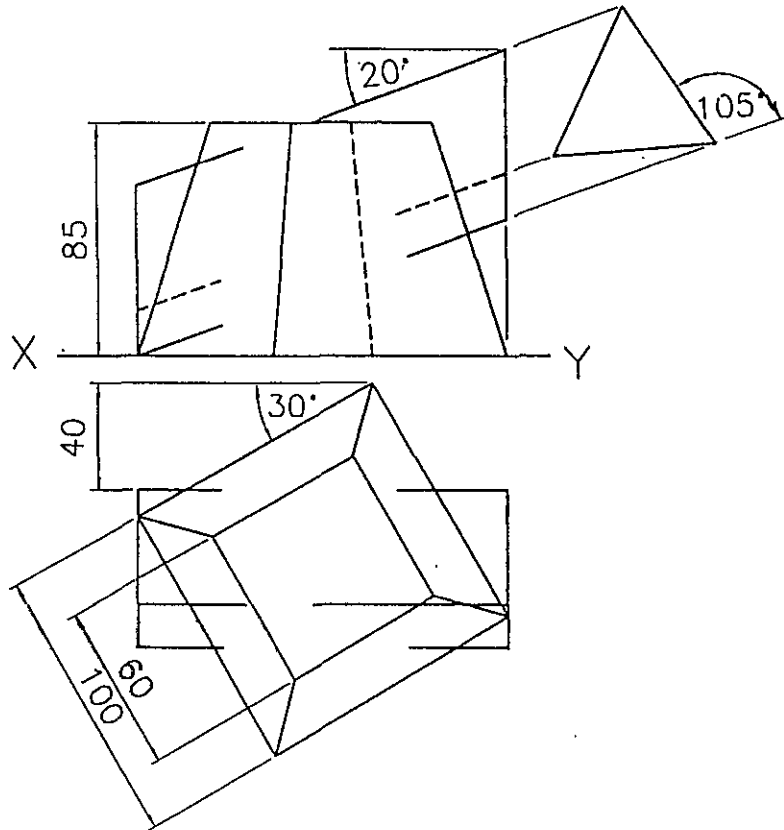


FIG. 3

5. In Fig. 4 the profile PCDE rolls clockwise along the arc AB until the point D reaches the arc AB. During the rolling of the profile, the point P moves along the lines PE and ED to D. Draw the locus of P for the combined movement.

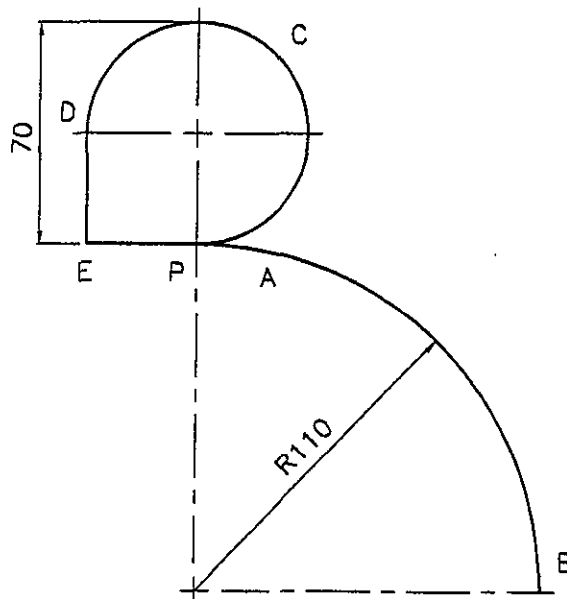


FIG. 4

6. (a) Draw a triangle AFB, where AF is 40mm long, BF is 50mm long and AB is 87mm long. F is the focus of an ellipse and A and B are points on the curve. The eccentricity is 0.75.
- (i) Draw a portion of the curve.
- (ii) Locate a point on the ellipse 90mm from the directrix and find the centre of curvature for that point.
- (b) Two lines PT and VT meet at an angle of 125° . PT is 75 mm long. V is the vertex of a parabola and VT is a tangent to the parabola at the vertex. PT is also a tangent to the curve and P is the point of contact. Locate the focus of the parabola and draw a portion of the curve.

7. Fig. 5 shows the traces of two oblique planes VTH and $V_1T_1H_1$. A square based right pyramid with a side of base 50mm and an altitude of 80mm rests with its base on VTH. One edge of the base lies in the line HT and a corner of the base touches the vertical plane.

- (a) Draw the given traces and the plan and elevation of the pyramid.
- (b) The pyramid is cut by the oblique plane $V_1T_1H_1$. Draw the projections of the pyramid when it has been cut by this plane.

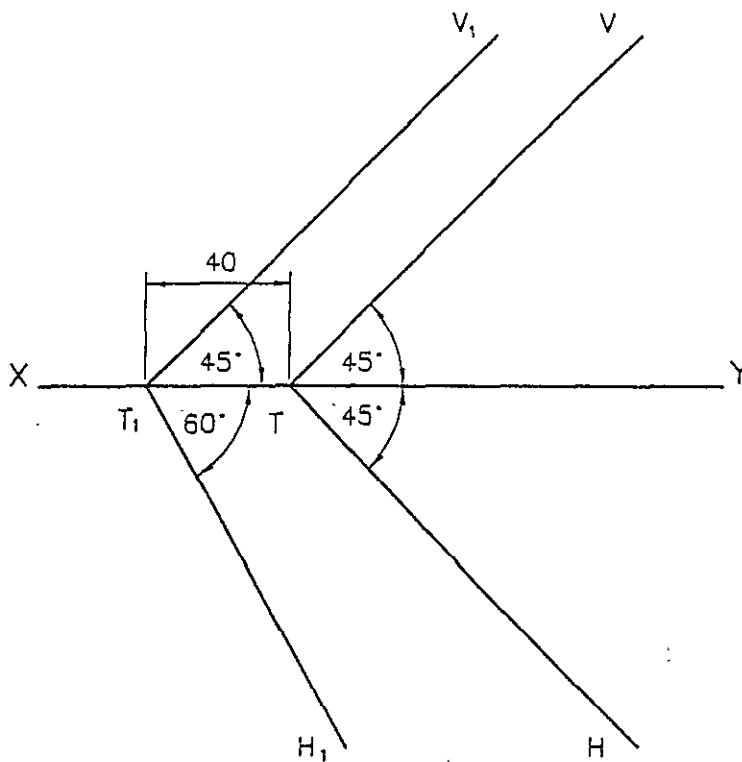


FIG. 5