**AN ROINN OIDEACHAIS**

**LEAVING CERTIFICATE EXAMINATION, 1994**

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

FRIDAY, 17 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.

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1.   Given the horizontal and vertical projections of two planes ABCD and ABE.

| | | | | | | |
|---|---|---|---|---|---|---|
| A | = | 145 | --- | 55 | --- | 5 |
| B | = | 185 | --- | 15 | --- | 85 |
| C | = | 225 | --- | 50 | --- | 90 |
| D | = | 205 | --- | 80 | --- | 40 |
| E | = | 130 | --- | 100 | --- | 45 |

(a)   Determine the dihedral angle between the planes.

(b)   Show the projections of a line drawn from E which shall touch the plane ABCD at a distance of 90 mm from E and which shall be inclined at 45° to the horizontal plane.

(c)   On a separate diagram, draw the projections of the skew lines AD and BE and show the projections of the shortest horizontal distance between them.

2. Fig. 1 shows a quadrilateral ABCD inscribed in a circle whose centre is O.

   (a)   Draw the diagram shown in Fig. 1.

   (b)   Join C to O and continue a line from O which shall divide the area of the quadrilateral ABCD into two equal parts.
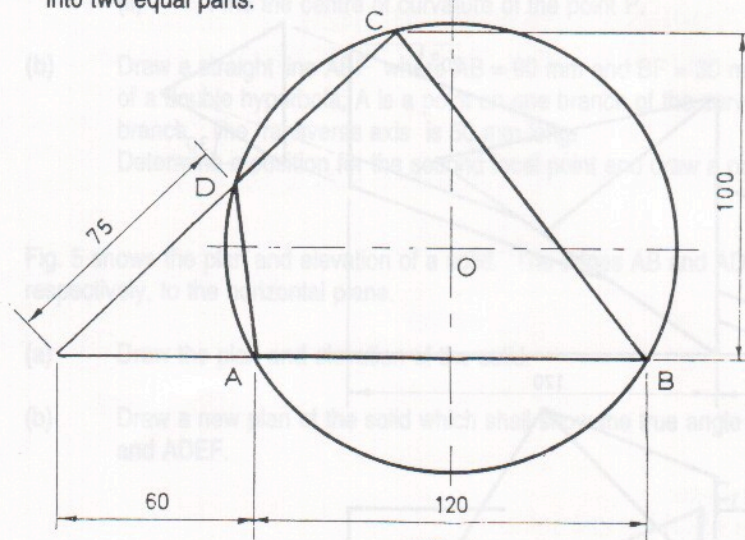


FIG. 1

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 the smallest sphere which rests on the horizontal plane and touches the sphere A and the cone B.

   (b)   Determine the traces of a tangent plane to the sphere A and the cone B and show the point of contact of the plane with sphere A.
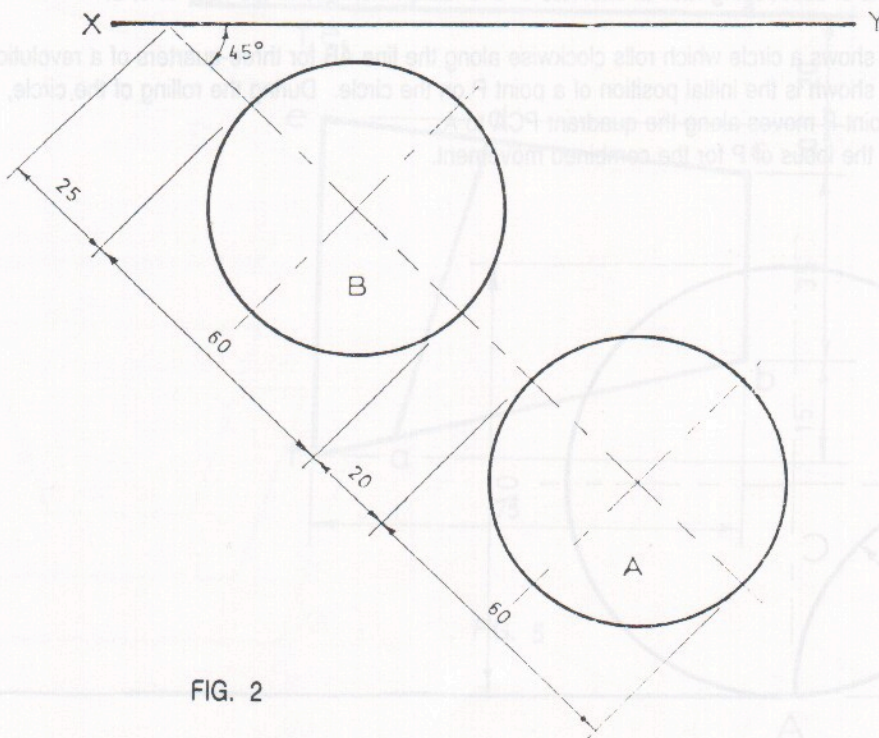


FIG. 2

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4.  A regular pentagonal right pyramid has a side of base 70 mm and an altitude of 75 mm and it rests with one edge of its base on the horizontal plane as shown in plan and elevation in Fig. 3.
Also shown are the projections of an equilateral triangular prism of 45 mm side which penetrates the pyramid.
Draw the projections of the solids showing all lines of interpenetration.
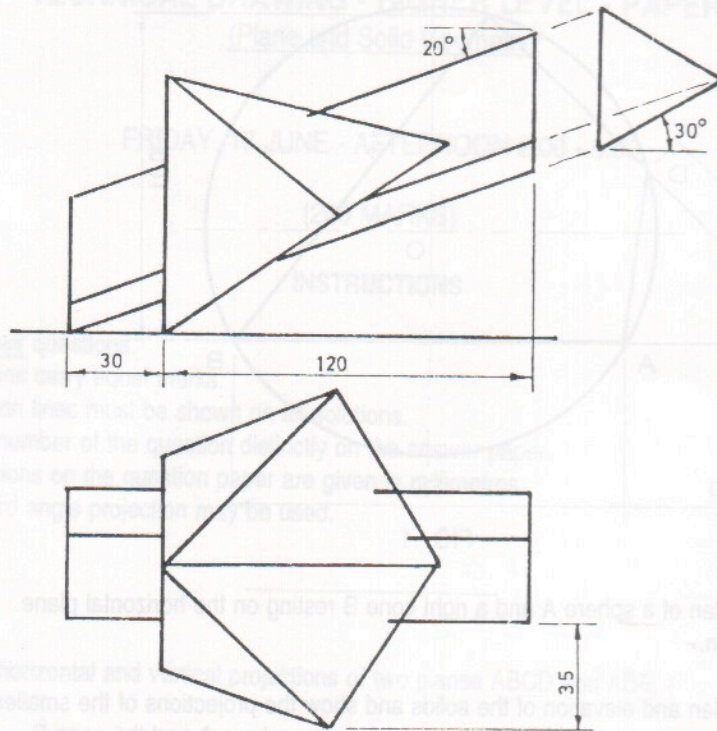
FIG. 3

5.  (a)   Draw one convolution of a logarithmic spiral where the shortest radius is 25 mm and the lengths of succeeding radii at intervals of one radian increase in the ratio of 6: 5.

    (b)   Fig 4 shows a circle which rolls clockwise along the line AB for three-quarters of a revolution. Also shown is the initial position of a point P on the circle. During the rolling of the circle, the point P moves along the quadrant PCA to A.
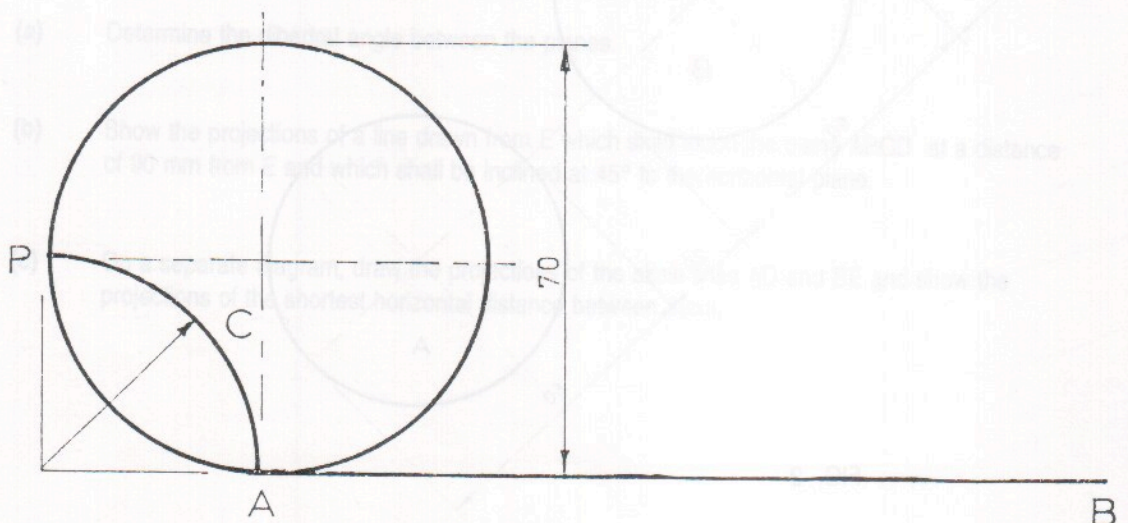Draw the locus of P for the combined movement.

FIG. 4

6.    (a)    A point P on the curve of an ellipse is 45 mm from the focus and 70 mm from the directrix. The vertex of the ellipse is 40 mm from the directrix.

      (i)    Draw a portion of the curve to include the point P.

      (ii)   Find the centre of curvature of the point P.

      (b)    Draw a straight line ABF where AB = 90 mm and BF = 30 mm. F is one of the focal points of a double hyperbola, A is a point on one branch of the curve and B is a point on the other branch. The transverse axis is 50 mm long.
             Determine a position for the second focal point and draw a portion of the double curve.

7.    Fig. 5 shows the plan and elevation of a solid. The edges AB and AD are inclined at 30° and 25°, respectively, to the horizontal plane.

      (a)    Draw the plan and elevation of the solid.

      (b)    Draw a new plan of the solid which shall show the true angle between the surfaces ABCD and ADEF.
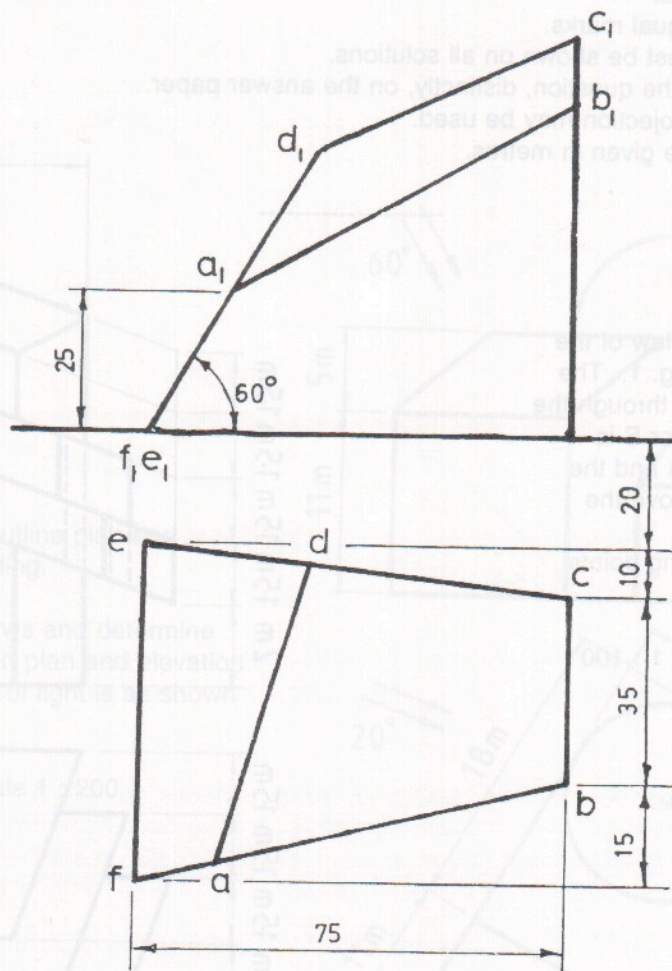


FIG. 5