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LEAVING CERTIFICATE EXAMINATION, 1995

TECHNICAL DRAWING - HIGHER LEVEL - PAPER I

(Plane and Solid Geometry)

FRIDAY, 16 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 ABC and ADE.

A	=	140	---	100	---	10
B	=	130	---	15	---	70
C	=	215	---	40	---	35
D	=	160	---	45	---	85
E	=	205	---	10	---	45

(a) Determine the line of intersection between the planes.

(b) Determine the dihedral angle between the planes.

(c) Draw the plan and elevation of the perpendicular from D to the plane ABC. Hence, or otherwise, determine the inclination of AD to the plane ABC.

(d) On a separate diagram, draw the projections of the skew lines AB and DE and show the projections of the shortest horizontal distance between them.

OVER→

2. In Fig. 1 the triangle ACD is similar to the triangle ABC.

(a) Draw the given figure.

(b) On a separate diagram draw a triangle equal in area to the quadrilateral ABCD, having one side 100 mm long and the lengths of the other two sides in the ratio of 7 : 4.

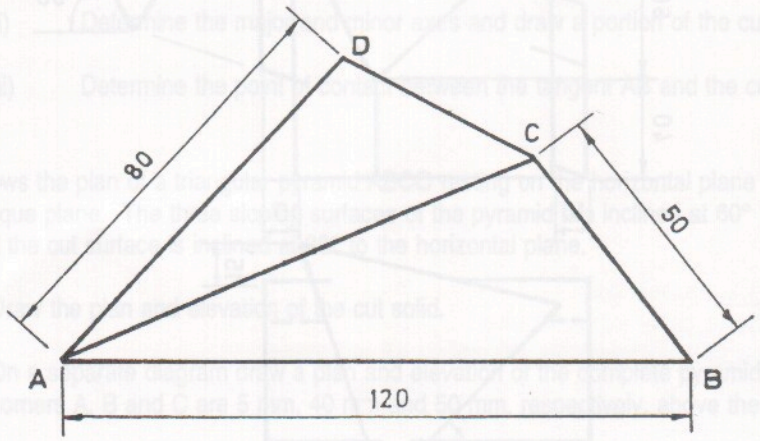

FIG. 1

3. Fig. 2. shows the elevation of two spheres and a right cone in contact with one another.

(a) Draw the elevation and plan of the solids in contact.

(b) Draw the traces of a plane which passes through the point P on the cone, touches the sphere A and has an inclination of 75° to the horizontal plane.

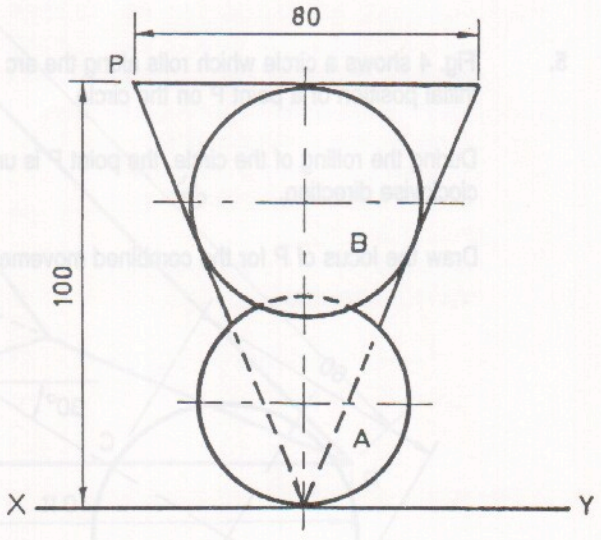

FIG. 2

4. Fig. 3 shows the incomplete projections of an equilateral triangular prism of 100 mm side which stands on the horizontal plane and which is penetrated by an equilateral triangular prism of 65 mm side.

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

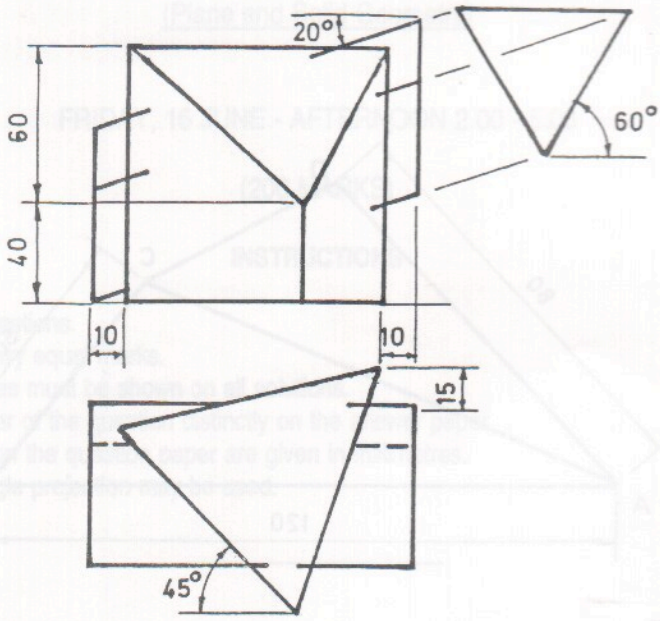

FIG. 3

5. Fig. 4 shows a circle which rolls along the arc PAB for one complete revolution. Also shown is the initial position of a point P on the circle.

During the rolling of the circle, the point P is unwound as an involute of the circle from P to C in a clockwise direction.

Draw the locus of P for the combined movement.

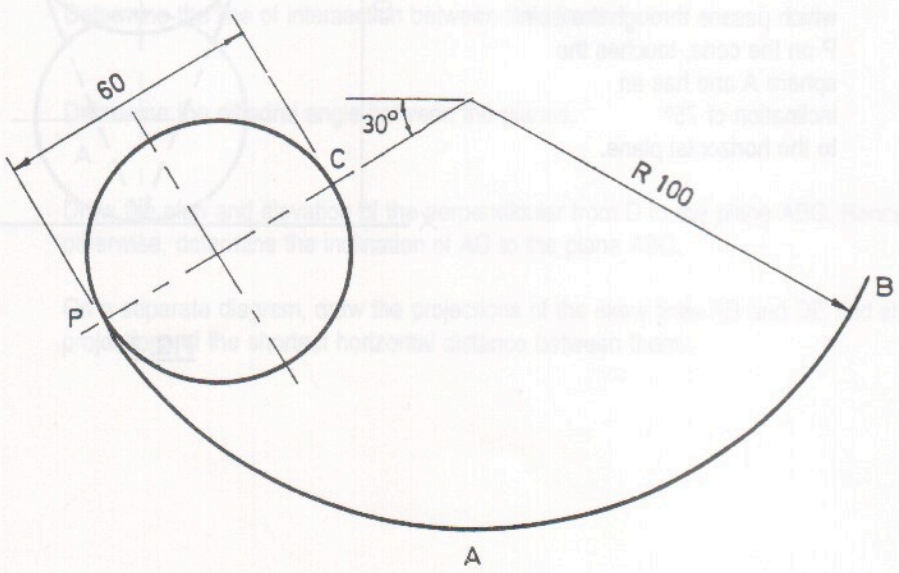

FIG. 4

OVER→

6. (a) Draw a straight line DFP where DF = 70 mm and FP = 75 mm. F is one of the focal points of an ellipse, P is a point on the curve, D is on the directrix and the eccentricity is 0.6.

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

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

(b) Two lines AB and AF meet at an angle of 35°. AF is 100 mm long. A point V on the line AF is 45 mm from F. An ellipse has F as one of its focal points, V is the vertex and AB is a tangent to the curve.

(i) Determine the major and minor axes and draw a portion of the curve.

(ii) Determine the point of contact between the tangent AB and the curve.

7. Fig. 5 shows the plan of a triangular pyramid ABCO resting on the horizontal plane and which is cut by an oblique plane. The three sloping surfaces of the pyramid are inclined at 60° to the horizontal plane and the cut surface is inclined at 30° to the horizontal plane.

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

(b) On a separate diagram draw a plan and elevation of the complete pyramid ABCO when the corners A, B and C are 5 mm, 40 mm and 50 mm, respectively, above the horizontal plane.

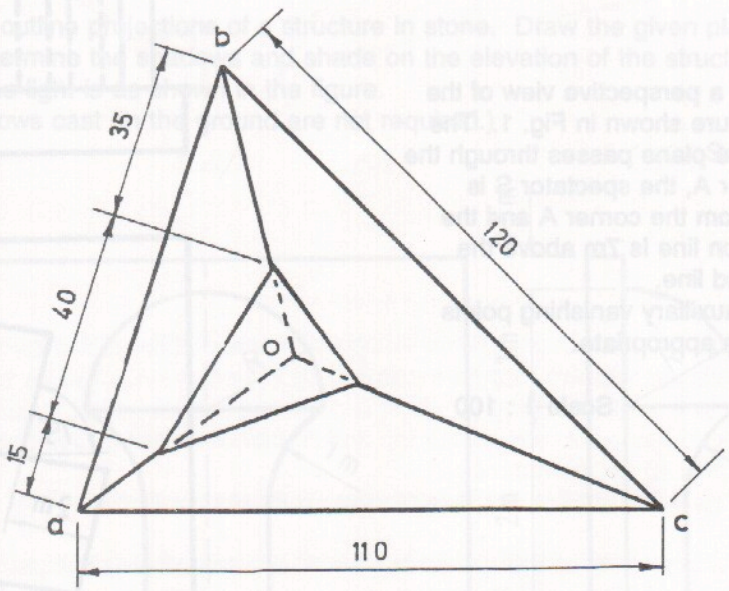

FIG. 5