TECHNICAL DRAWING - HIGHER LEVEL - PAPER I

(Plane and Solid Geometry)

MONDAY, 23 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 DEF.

A	=	260	---	5	---	80
B	=	215	---	90	---	25
C	=	150	---	25	---	55
D	=	200	---	10	---	15
E	=	250	---	55	---	95
F	=	140	---	70	---	35

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

(b) Determine the dihedral angle between the planes.

(c) Determine the horizontal trace and the vertical trace of a plane which passes through the points B, C and E.

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

2. Fig. 1 shows a circle and an irregular pentagon ABCDE. The area of the triangle CDE is half that of the quadrilateral ABCE.

(a) Draw the given figure showing all constructions clearly.

(b) On a separate diagram, inscribe an equilateral triangle in the pentagon ABCDE having one vertex at C and the other two vertices on the sides AB and DE, respectively.

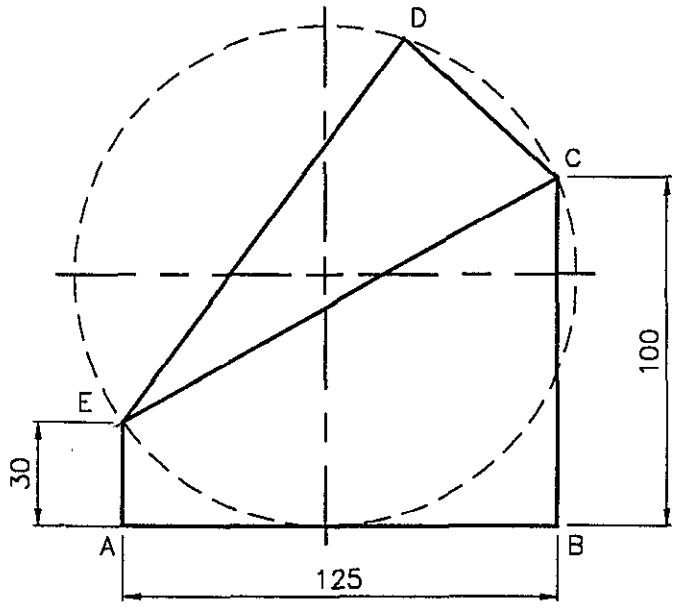

FIG. 1

3. Fig. 2 shows the elevation of a right cone A and a sphere B which are in contact with each other.

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

(b) Draw the projections of another sphere in the position C so that it rests on the horizontal plane, is in contact with the cone and touches the sphere B at a point 40mm above the horizontal plane.

(c) Draw the traces of a tangent plane to the cone and sphere B.

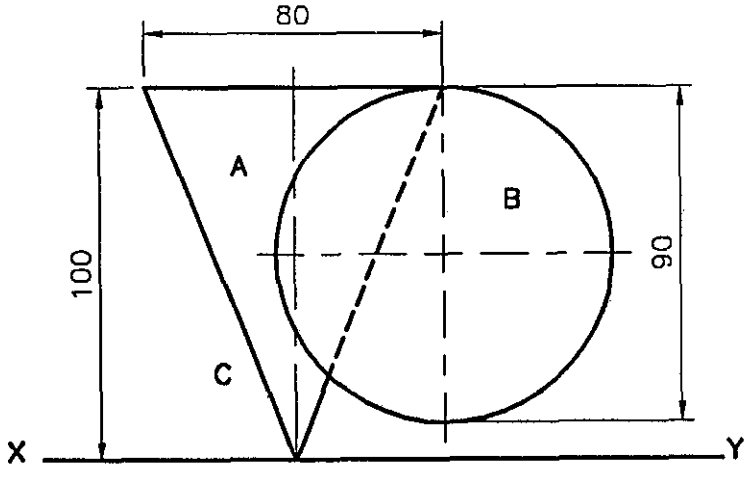

FIG. 2

4. Fig. 3 shows the projections of an equilateral triangular prism of 95mm side lying on the horizontal plane.

Also shown are the projections of a solid whose cross-section is a quadrant of a circle of 40mm radius which penetrates the prism.

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

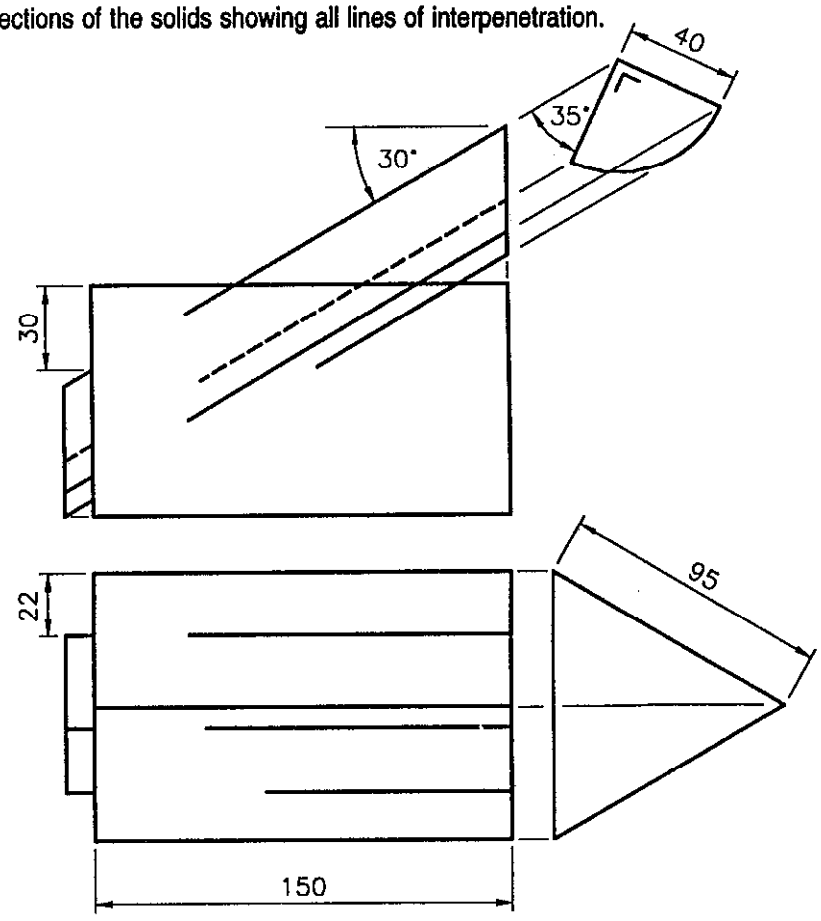

FIG. 3

5. Fig. 4 shows the projections of a cylinder which lies on the horizontal plane. The diameter of the cylinder is 100 mm and its length is 140 mm. Also shown is a straight line PQ on the surface of the cylinder.

The cylinder rolls clockwise along the horizontal plane for one complete revolution. During the rolling of the cylinder the point P moves along the straight line to Q.

Draw the locus of the point P in plan and elevation for the combined movement.

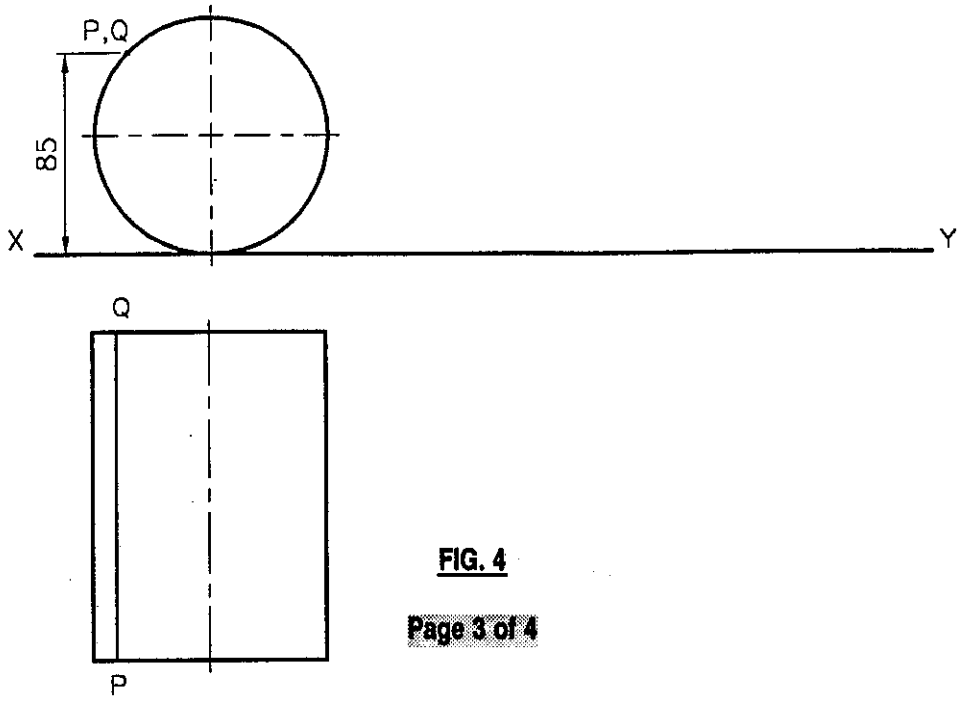

FIG. 4

OVER →

6. **(a)** Draw a straight line DVF, where DV is 45mm long and VF is 28mm long. F is a focus of an ellipse, V is the vertex and D is a point on the directrix.

Draw a portion of the curve.

(b) Draw a triangle AFP where AF = 35 mm, FP = 70 mm and AP = 85 mm. F is one of the focal points of a double hyperbola, A is a point on the transverse axis, AP is a tangent to the curve and P is the point of contact.

Draw a portion of the double curve.

7. Fig. 5 shows the plan and elevation of a regular tetrahedron of 90mm side. The tetrahedron has been cut by an oblique plane as shown.

The true length of the edge DF is 57mm and the cut surface DEF is inclined at 40° to the horizontal plane.

(a) Draw the given plan and elevation.

(b) On a separate diagram, draw a plan and elevation of the complete tetrahedron when the corner C rests on the horizontal plane and the corners A and B are 20mm and 60mm, respectively, above the horizontal plane.

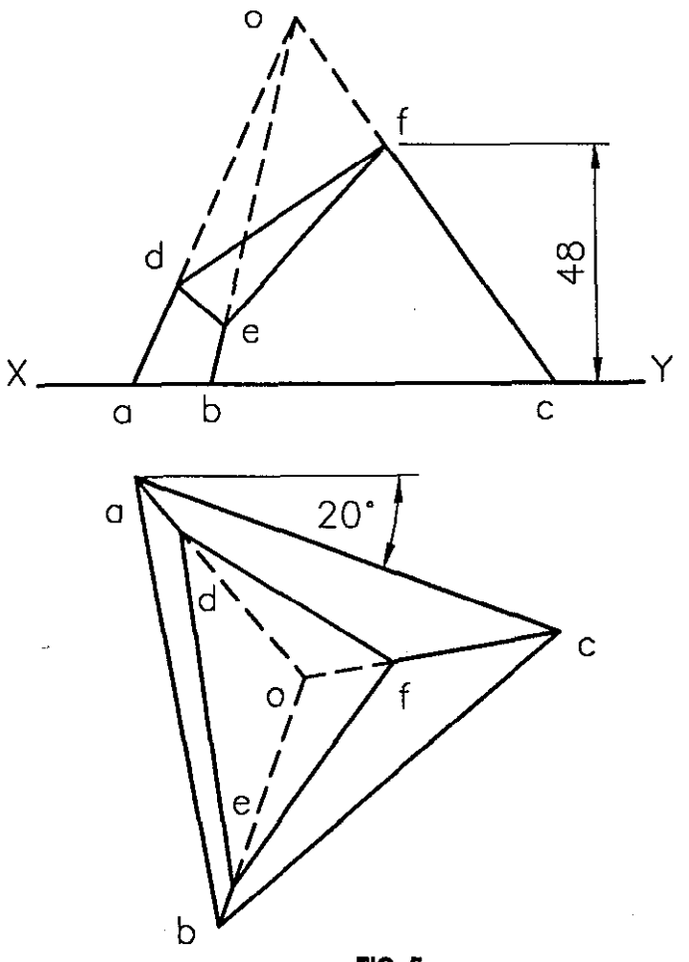

FIG. 5