

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

THURSDAY, 17 JUNE - AFTERNOON 2.00 - 5.00

(200 MARKS)

**INSTRUCTIONS**

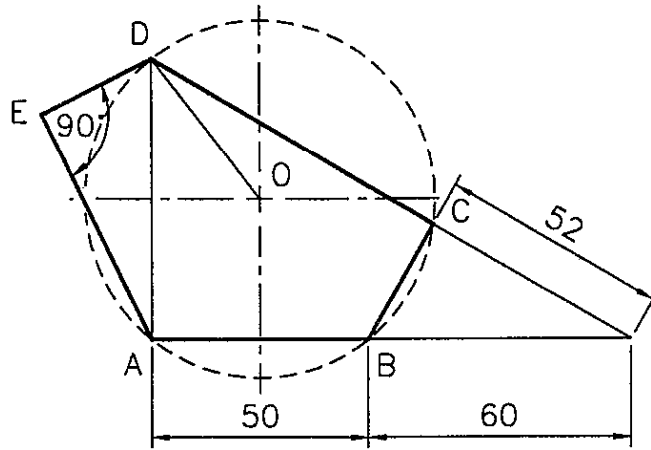
- (a) Answer **four** questions.
- (b) All questions carry equal marks.
- (c) Construction lines must be shown on all solutions.
- (d) Write the number of the question distinctly on the answer paper.
- (e) All dimensions on the question paper are given in millimetres.
- (f) First or third angle projection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

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

A	=	190	---	90	---	5
B	=	205	---	55	---	75
C	=	155	---	10	---	15
D	=	240	---	25	---	85
E	=	140	---	40	---	35

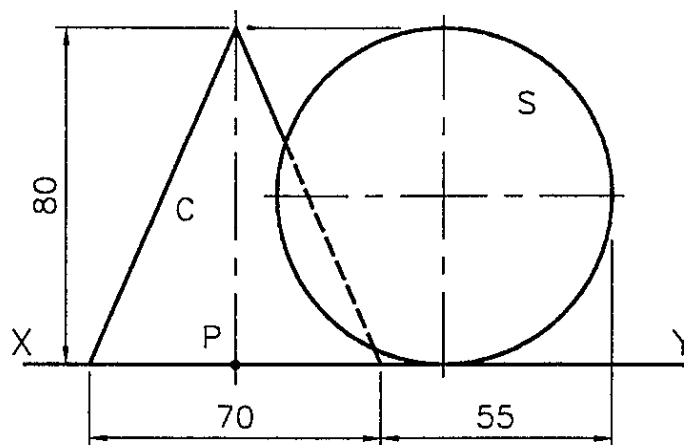
- (a) Determine the line of intersection between the planes.
- (b) Determine the dihedral angle between the planes.
- (c) Show the projections of a horizontal line drawn from D, which is 40 mm long and is inclined at  $60^\circ$  to the line AD.
- (d) On a separate diagram, draw the projections of the skew lines AC and DE and show the projections of the shortest distance between them.

2. Fig. 1 shows an irregular pentagon ABCDE. In the given figure, the line AE is twice as long as the line DE.
- (a) Draw the given figure, showing clearly how the points D, C and E are obtained.
- (b) Using the line DO and continuing from O draw a straight line, which shall divide the area of ABCDE into two equal parts.



**FIG. 1**

3. Fig. 2 shows the elevation of a right cone C and a sphere S in contact with each other. Also shown is the position of a point P on the front of the cone.
- (a) Draw the elevation and plan of the solids in contact.
- (b) Show the projections of another right cone standing on the horizontal plane so that it is in contact with the base of the cone C at the point P and touches the sphere S at a point 20 mm above the horizontal plane.
- (c) Draw the traces of a tangent plane to the cone C and the sphere S.

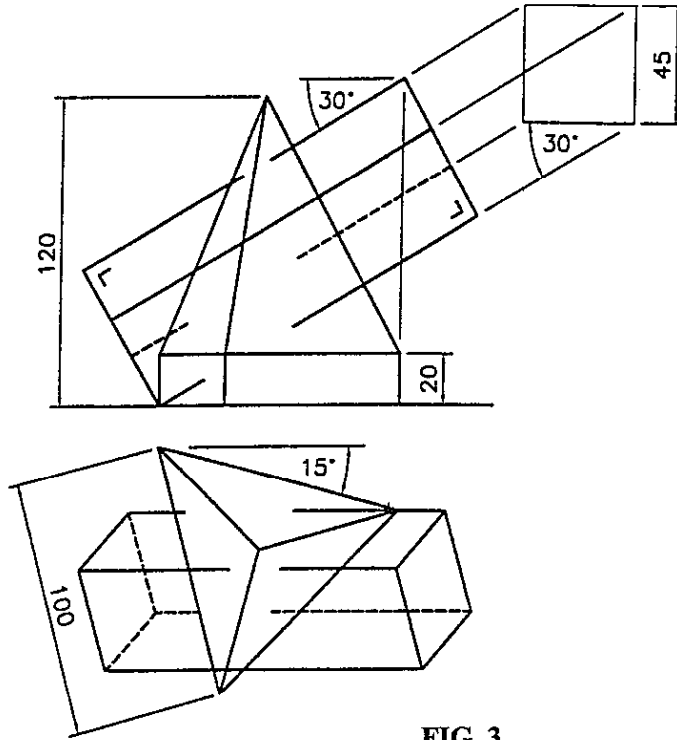


**FIG. 2**

4. Fig. 3 shows the projections of a solid composed of a right equilateral triangular based pyramid standing on an equilateral triangular prism.

Also shown are the projections of a square based prism of 45 mm side which penetrates the solid as shown.

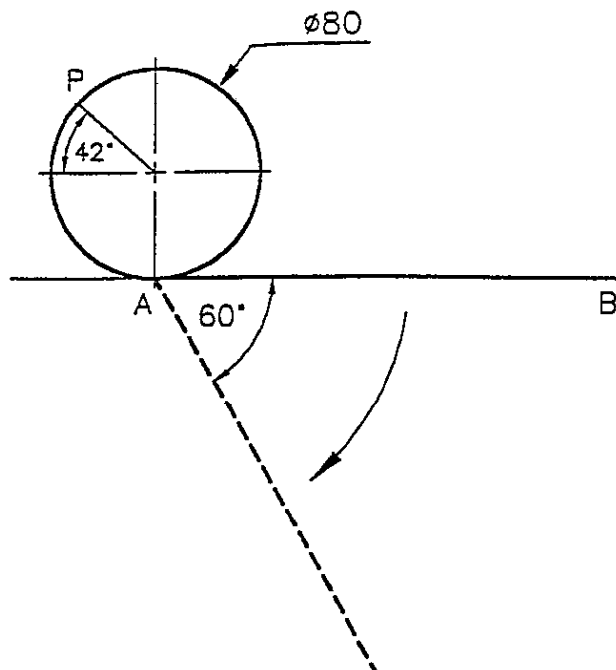
Draw the projections of both solids showing all lines of interpenetration.



**FIG. 3**

5. In Fig. 4 the circle rolls clockwise along the line AB for half of a revolution. During the rolling of the circle the line AB rotates clockwise about the point A through an angle of 60°.

Draw the locus of the point P on the circle for the combined movement.



**FIG. 4**

6. (a) Draw a straight line DPF, where DP is 50 mm long and PF is 35 mm long. F is the focus of a parabola, P is a point on the curve and D is a point on the directrix.
- (i) Draw a portion of the curve.
- (ii) Draw a tangent to the curve which makes an angle of  $50^\circ$  with the axis, showing clearly how the point of contact is obtained.
- (b) The perimeter of a triangle TPF is 225 mm. TP is 95 mm long and the angle  $\angle TFP = 90^\circ$ . F is one of the focal points of an ellipse whose major axis is 145 mm long. TP is a tangent to the curve and P is the point of contact. Draw the ellipse.
7. A regular hexagonal right pyramid has a side of base 45 mm and an altitude of 90 mm and rests with one of its triangular faces on the horizontal plane as shown in Fig. 5. The pyramid is cut by an oblique plane as shown. The cut surface is inclined at  $60^\circ$  to the horizontal plane.

Draw the projections of the pyramid when it has been cut by the oblique plane.

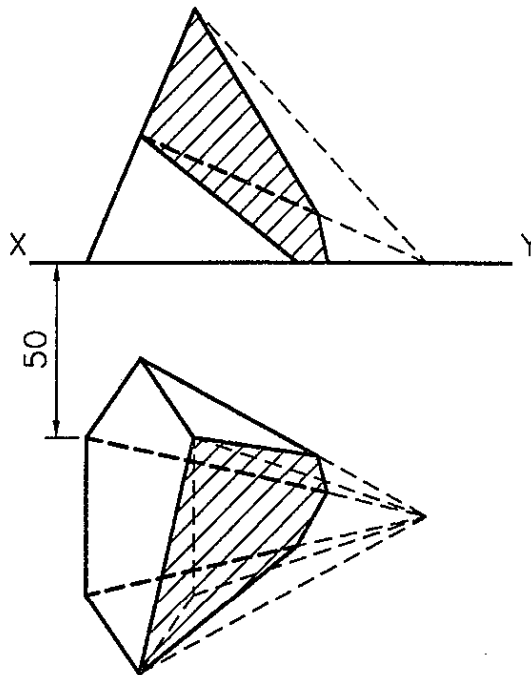


FIG. 5