

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

FRIDAY 19 JUNE - AFTERNOON, 2.00 to 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 ABCD and ABE.

A = 285 - 50 - 85
B = 260 - 95 - 15
C = 210 - 25 - 35
D = 255 - 10 - 95
E = 205 - 80 - 85

- (a) Determine the dihedral angle between the planes.
- (b) Determine the position of a point P on the plane ABCD which shall be at a distance of 35mm from the horizontal plane and 75 mm from the vertical plane. Join EP and determine the inclination of EP to the plane ABCD.
- (c) On a separate diagram, draw the projections of the skew lines AE and BC and show the projections of the shortest horizontal distance between them.

2. In Fig. 1 the triangle ACD is similar to the triangle ABC. The perimeter of the quadrilateral ABCD is 415mm.

- (a) Draw the given figure.
- (b) Draw a figure similar to ABCD and having an area equal to a square of 70mm side.
- (c) On a separate diagram, inscribe an equilateral triangle in the quadrilateral ABCD having one vertex at C and the other two vertices on the sides AB and AD, respectively.

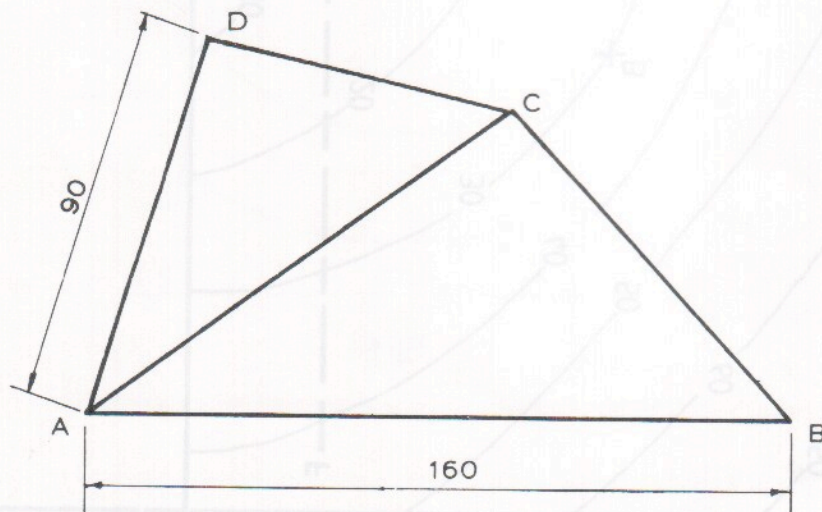


Fig. 1

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 apex of the cone, touches the sphere A and has an inclination of 50° to the horizontal plane.

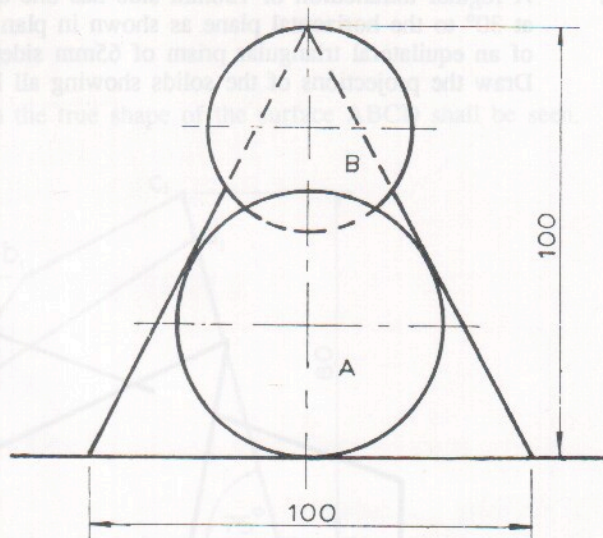


Fig. 2

4. Fig. 3 shows two circles, A and B, in contact. Also shown is a point P on the circumference of the circle A.

- (a) Determine the radius of circle A and draw the given figure.
- (b) The circle A rolls clockwise along the circumference of the circle B for one-quarter of a revolution and, at the same time, the circle B rolls clockwise along the line CD for one-quarter of a revolution. Draw the locus of the point P for the combined movement.

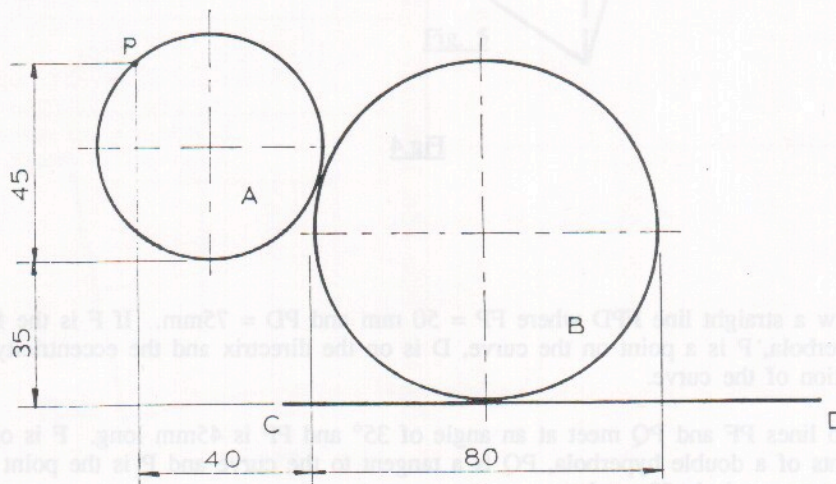


Fig. 3

5. A regular tetrahedron of 120mm side has one edge resting on the horizontal plane and one face inclined at 30° to the horizontal plane as shown in plan and elevation in Fig. 4. Also shown are the projections of an equilateral triangular prism of 65mm side which penetrates the tetrahedron. Draw the projections of the solids showing all lines of interpenetration.

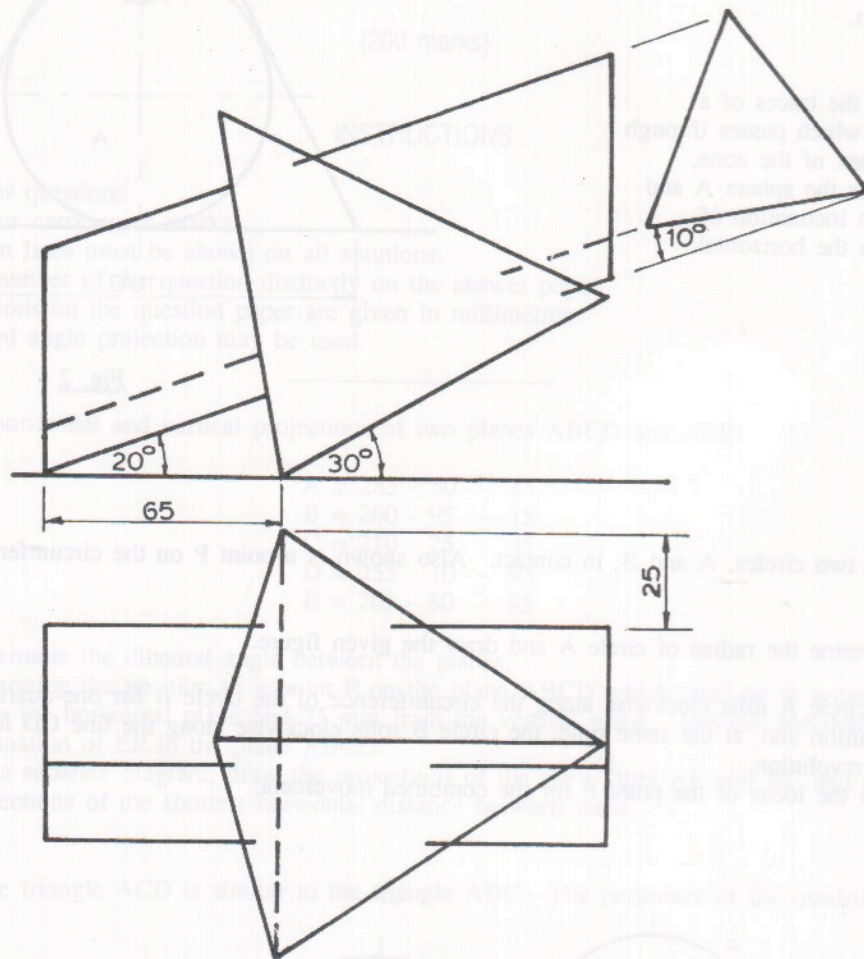


Fig.4

6. (a) Draw a straight line FPD where $FP = 50$ mm and $PD = 75$ mm. If F is the focus of a hyperbola, P is a point on the curve, D is on the directrix and the eccentricity is 1.2, draw a portion of the curve.
- (b) Two lines PF and PQ meet at an angle of 35° and PF is 45mm long. F is one of the focal points of a double hyperbola, PQ is a tangent to the curve and P is the point of contact. The transverse axis is 50mm long. Draw a portion of the double curve.

7. Fig. 5 shows the plan and elevation of a solid.

- (a) Draw the given projections of the solid.
- (b) Draw a new plan of the solid in which the true shape of the surface ABCD shall be seen.

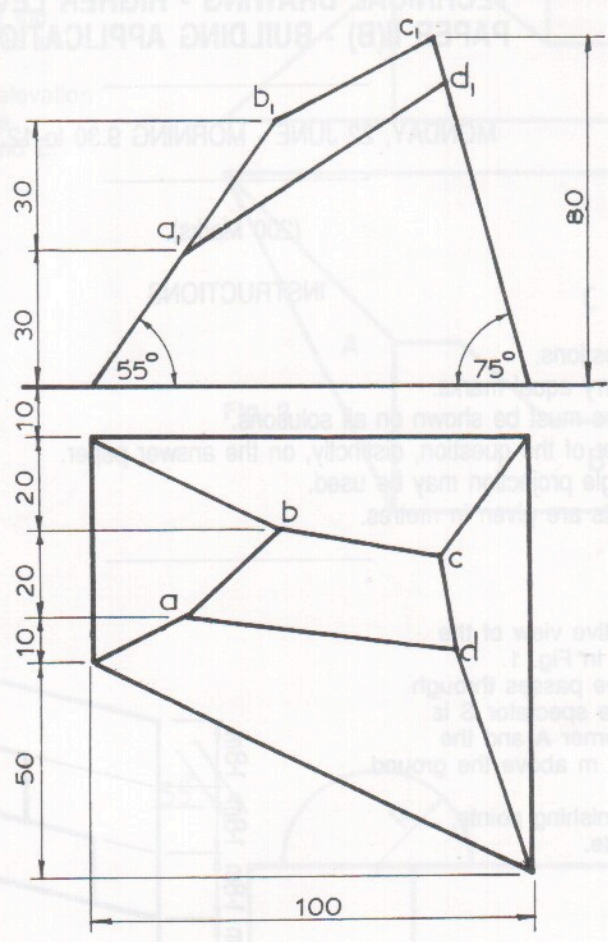


Fig. 5