

**INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY**  
**Department of Mechanical Engineering**  
ME119 – Engineering Drawing and Graphics

(2021-22) Semester II

**Sheet 3: Projections of Planes**

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**Instructions:**

- For more details of the exercises in this sheet, refer Chapters 11, 12 of the text book (N. D. Bhatt, Engineering Drawing, 53rd Ed.).
  - Scale, dimension the drawings suitably. Label the important nodes/points on the drawings.
  - Mention the scale if it is not 1:1.
  - Use 1<sup>st</sup> angle projection unless mentioned otherwise
  - Practice the problems before coming for the lab session
  - Use plain A4 sheets only. Make the borders and title block as per the template.
  - Indicate hidden lines and center lines clearly
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1. A Trapezium plane of parallel sides 70 and 40 mm is resting on the HP on its longer edge. The plane makes  $25^\circ$  to the HP and a shorter side is parallel to the VP. Draw the projections of the plane if the distance between the parallel sides is 50mm.
2. A Circular plate of 70mm in diameter has a triangular hole of sides 25mm at its center. If a point A on the circumference of the plane is on the ground with the diameter AB making an angle  $50^\circ$  with the HP and  $30^\circ$  with the VP, draw the final projection of the plate and find the inclination of the plate with the VP. (one side of the triangular hole remains parallel to the ground.)
3. A circle of diameter 80mm is seen as an ellipse with a major axis of 80mm and a minor axis of 50mm in TV. Its FV is another ellipse with a major axis of 80mm and a minor axis of 25mm. A point on the circumference of the circle is on the HP and the point diametrically opposite to this point is in the VP. What will be the shortest distance between the center of the circle from HP?
4. A thin rectangular plate ABCD of sides 200 mm x 100 mm has one of its shorter sides AB in the H.P. and inclined at  $30^\circ$  to the V.P. Project its front view if the top view is a square of 100 mm long sides. Also, Find the “Edge view” and the shortest distance between the plane and X-Y line

5. End A of line AB is 10 mm above the HP and 20 mm in front of the VP, while the other end B is 60 mm above the HP and 50 mm in front of the VP. The distance between the projectors through A and B is 50 mm. A point P is located 30 mm above the HP and 10 mm in front of the VP. The projector of point P is equidistant from the projections of points A and B. Determine the shortest distance between the line AB and the point P.
6. Two planes ABC and ACD intersect along AC. The true length (50 mm) and true inclination angle with H.P. ( $45^\circ$ ) of AC are seen in the F.V. The edges AB and CD are parallel to the H.P. with their lengths in the F.V. are 30 mm and 40 mm, respectively. Also, A is 10 mm above H.P. and 20 mm in front of V.P., and the projections of points B and D in the H.P. are 40 mm and 50 mm away from XY, respectively. Draw the projections of the planes in F.V. and T.V. and find the angle between the planes.
7. Find the angles of inclination of the plane ABC as given in question 6 with reference planes using edge view.
8. The projections of the vertices of the plane ABC on the HP and VP, represented as (HP, VP) in mm are A(20, 10), B(70, 50) and C(10,10). The projectors through B and C are 40 mm and 70 mm to the right of the projector through A. Find the shortest distance between the plane and a point P(30,0), the projector through which is 20 mm to the right of projector through A.