INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

Department of Mechanical Engineering

ME-119 Engineering Drawing & Graphics 2014-15 Semester I

Sheet 5: Projections of Planar Features

Note:

- *Practice all problems roughly before coming to the Drawing Session. For more details of the exercises in this sheet, refer Chapter 12 of the text book (N. D. Bhatt, Engineering Drawing, 50th Ed.).*
- ***Totally Five problems (Four from P1 to P16 and One from P17 to P20).***

1. Consider a square plate of 100 mm side and inscribe a circle in it (diameter equal to side of square). Draw the projections of this figure, when its plane is vertical and inclined at 45° to the V.P. and one of the sides of the square is inclined at 30° to the H.P.

2. A circular plate of diameter 70 mm has a hexagonal hole of side 28mm, centrally located. The plate is resting on the ground on a point A on its circumference. The diameter AB (passing through two opposite corners of the hexagonal hole) makes angles of 50° with the HP and 30° with VP. Draw the projections.

3. A triangle ABC rests on a corner C on the HP. Point A is 15 mm above HP and 25 mm in front of VP. Point B is 40 mm from both the planes. The distance between the projectors of A and B is 50 mm. The sides AC and BC are 45 mm and 60 mm long (ie., true lengths) respectively. Draw the projections and determine the true shape of the triangle.

4. ABC is a thin triangular plate with an edge AB in the HP, and the point A is 10 mm in front of the VP. The distance between the projectors through A and B is 45 mm. The sides AB, BC and AC measure 70, 80 and 60 mm respectively. The point C is 45 mm above HP. Draw projections of the plate and measure the angles of the plate with the HP and VP.

5. A regular hexagon of 40 mm side has a corner in the H.P. Its surface is inclined at 45° to the H.P. and the top view of the diagonal through the corner which is in the H.P. makes an angle of 60°with the V.P. Draw its projections.

6. A regular pentagon has sides of 35 mm with one of its edges in the Vertical Plane. Its surface is inclined at 60° to VP. The side in the V.P is inclined at 45° to the H.P. Draw projections.

7. Draw the projection of a rhombus having diagonals 125 mm and 50 mm long, the smaller diagonal of which is parallel to both the principal planes, while the other is inclined at 30° to the H.P.

8. Draw the projections of a circle of 75 mm with the end A of the diameter AB in the H.P., the end B in V.P., and the surface inclined at 30° to the H.P. and 60° to the V.P.

9. A circle of diameter 80 mm is seen as an ellipse with a major axis of 80 mm and a minor axis of 50 mm in the top view. Its front view is another ellipse with a major axis of 80 mm and a minor axis of 25 mm. A point on the circumference of the circle is on the HP and the point diametrically opposite to this on the VP. What will be the shortest distance of the center of the circle from the HP.

10. A thin hexagonal plate of 35 mm side has a central equilateral triangular hole of side equal to that of the plate. The plate is kept in such a way that one of its edges is parallel to the ground and inclined at 30° to the VP. The plate makes 45° with ground. Draw the projections of the plate with hole if one of the sides of the hole is parallel to the ground.

11. A semi-circular plate of radius 38 mm is suspended freely from a point on its straight edge, 18 mm from a corner. The semi-circle is inclined to the V.P at 60 degrees. Draw the projections of the semi-circle.

12. The top view of a plate, the surface of which is perpendicular to the V.P. and inclined at 60° to the H.P. is a circle of 60 mm diameter. Draw its three views.

13. Draw a rhombus of diagonals 100 mm and 60 mm long, with the longer diagonal horizontal. Its top view is a square 60 mm diagonal, with a corner on the ground. Draw its front view and determine the angle which its surface makes with the ground.

14. A thin pentagonal plate ABCDE of 45 mm sides (i.e., regular pentagon) has one side (AB) in the horizontal plane. The side is inclined at 30 degrees to the V.P. The corner D is 50 mm above the H.P. Draw the projections of the plate and determine its inclination to the H.P.

15. A circular plate of 70 mm diameter has a triangular hole of sides 25 mm at its center. A point A on the circumference of the plate is on the ground such that the diameter AB makes an angle of 50 degrees with HP and 30 degrees with VP. One side of the triangular hole remains parallel to the ground. Draw the projections of the plate and find the inclination of the plate with the VP.

16. A divider has 60 mm long legs. The angle between them is 30°. It is resting on the HP on the ends of its legs with the line joining those ends inclined at 45^{o} degrees with the VP. The head of the divider is 35 mm above the HP. Draw three views of the divider and determine the angle made by its plane with the HP.

17. PQRS and ABCD are two square thin plates with their diagonals measuring 30 mm and 60 mm. They are touching the H.P. with their corners P and A respectively, and touching each other with their corresponding opposite corners R and C. If the plates are perpendicular to each other and perpendicular to V.P. also, draw their projections and determine the length of their sides.

18. A composite plate of negligible thickness is made up of a rectangle (sides 60 mm and 40 mm) and a semi-circle on one of its longer side. Draw its projections when the longer sides are parallel to the H.P., and inclined at 45° to the VP. The surface of the plate makes an angle of 30° with HP.

19. Two semi-circular laminas of equal size (radius 30 mm) are connected along their base such that the included angle between them is 90 degrees. The surface of one of the laminas makes 30 degrees to the ground and the common edge is 45 degrees to the VP. The combined object is resting on the common edge on the ground. Draw the projections.

20. Consider two triangles PQS and QRS joined together at QS. The front view is a trapezium p'q'r's' (p'q' is 85 mm and is on XY, r's' is 40 mm, p'q' is parallel to r's' and is 50 mm from it). The top view is made of two right angled triangles pqs (with angle pqs being 90 degrees) and qrs (with angle qrs being 90 degrees) such that the side qs is inclined at 30 degrees to XY. Find the angle between the triangles.