INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY
Department of Mechanical Engineering

ME119 – Engineering Drawing and Graphics   **2014-2015 Semester 1**

<u>Projection of Points and Lines</u>

1. A line AB, 50mm long, has its end A in both H.P. and V.P. It is inclined at $\theta=30°$ to H.P. and at $\varphi=45°$ to V.P. Draw its projections.

2. Point A is 50mm below the H.P. and 12mm behind the V.P. Point B is 10mm above the H.P. and 25mm in front of the V.P. The distance between the projectors of A and B is 40mm. Determine the traces of the line AB.

3. A line PQ, 100mm long, is inclined at 30° to H.P. and at 45° to V.P. Its mid-point is in V.P. and 20mm above the H.P. P is in 3rd quadrant and Q is in 1st quadrant. Draw its projections.

4. A line AB, 65 mm long, has its end A 20 mm above the H.P. and 25 mm in front of the V.P. The end B is 40 mm above the H.P. and 65 mm in front of the V.P. Draw the projections of AB and show its inclinations with the H.P. and the V.P. Determine the traces of the line.

5. A room measures 6 m long, 5 m wide and 4 m high. It has a light-bracket above the center of the longer wall and 1 m below the ceiling. The light bulb is 0.3m away from the wall. The switch for the light bulb is on an adjacent wall, 1.5m above the floor and 1 m from the other longer wall. Determine graphically the shortest distance between the bulb and switch.

6. A line AB, 90 mm long, measures 72 mm in the front view and 65 mm in the top view. The line lies completely in the first quadrant. Draw the two views of the line. Determine the true inclinations.

7. A straight line AB has its end point A 10 mm above the HP and 20 mm in front of the V.P. The front view of the line is 50 mm long and is inclined at 45^0 to the XY line. Draw the projections of the straight line AB if its top view is inclined 30^0 to the XY line. Find the true length, angle of inclinations of AB with the H.P. and the V.P. and the traces.

8. Draw the projections of a line AB, 90 mm long, its mid-point M being 50 mm above the H.P. And 40 mm in front of the V.P. The end A is 20 mm above the H.P. And 10 mm in front of V.P. Determine the traces and the inclinations of the line with the H.P. and the V.P.

9. The projectors drawn from the H.T. and the V.T. of a straight are 80 mm apart while those from its ends are 50 mm apart. The H.T. is 35 mm in from of V.P., the V.T. is 55 mm above the H.P. and the end A is 10 mm above the H.P. Draw the projections of AB and determine its true length and inclinations with the reference planes.

10. Two oranges on a tree are respectively 1.8 m and 3.0 m above the ground, and 1.2 m and 2.1 m from a 0.3 m thick wall, but on opposite sides of it. The distance between the oranges, measured along the ground and parallel to the wall is 2.7 m. Determine graphically the actual distance between the oranges.

11. Two water tanks, T1 and T2, placed in adjoining rooms are to be connected using a pipe through the common wall between the rooms. The common wall is 0.2 m thick. The point of

connection of tank T1 is 1m above the floor and 1m from the common wall. The point of connection of tank T2 is 3m above the floor and 2.5m from the common wall. The distance between the connection points measured parallel to the common wall is 3.5m. Determine the length of the required pipe.

12. A straight line AB has its end point A 15 mm in front of the V.P. while end B is 50 mm in front of the V.P. The length of the top view of the line is 50 mm and the H.T. is 10 mm in front of the V.P. Draw the projections of the line if it is inclined at 30° to the H.P. Also find its V.T.

13. A straight line AB has its end point A 15 mm in above the H.P. while end B is 50 mm above the H.P. The length of the front view of the line is 50 mm and the V.T. is 10 mm above of the H.P. Draw the projections of the line if its true angle of inclination with the V.P. is 30° . Find the true length of the line, the true angle of inclination with the H.P. and the apparent angles of inclination with the H.P. and the V.P.

14. A picture frame 2m wide and 1m high is to be fixed on a wall railing by two straight wires attached to the top corners. The frame is to make an angle of 40° with the wall and the wires are to be fixed to a hook on the wall on the center line of the frame and 1.5m above the railing. Find the length of the wires and the angle between them.

15. Three vertical poles AB, CD, EF are respectively 5, 8 and 12 meters long. Their ends B, D, and F are on the ground and lie at the corners of an equilateral triangle of 10m long sides. Determine graphically the distance between the top ends of the poles, viz. AC, CE and EA.

16. Three lines oa, ob and oc are respectively 25mm, 45mm and 65mm long, each making 120° angles with the other two and the shortest line being vertical. The figure is the top view of the three rods OA, OB and OC whose end A, B, and C are on the ground, while O is 100mm above it. Draw the front view and determine the length of each rod and its inclination with the ground.

17. A chimney, 18 m high, 0.9 m diameter is supported by two sets of three wires each, as shown in the figure. One set is attached 3 m from the top and anchored 6 m above the ground level. It measures 7.5 m in the top view. The other set is fixed to the chimney at its mid-height and anchored to the ground. It measures 4.5 m in the top view. Determine graphically the length and slope with the ground, of one of the wires from each set

Front view

Top view

4.5

7.5