Ref. No. : Ex/ME/T/126/2017

B.E. MECHANICAL ENGINEERING
FIRST YEAR SECOND SEMESTER EXAMINATION – 2017
DESCRIPTIVE GEOMETRY & SURFACE DEVLOPMENT

Time: 4 hours; Full Marks: 100
Answer any five questions

1. For the purpose of water-supply there is a pipe line in space with its axis line AB. What is the actual length of the pipe line? Find its angle with HP, VP and PP. How the pipe line is oriented with respect to the observer? Use the revolution method. Given that A(10,20,20) and B(70,50,-30). [20]

2. The axis XY of a steel rod used in a structure is 70 mm long. The rod is oriented upward-backward-right making 45^0 with the HP and 30^0 with the VP. Draw three projections of the axis. Also state the quadrants through which the rod passes if it is infinitely extended. Given that X(0,-30,10). [20]

3. A triangular plane consists of two lines AB and BC. Draw two views of the in-centre O of the plane. Drop a perpendicular OD of length 50 mm on the plane ABC at O. The perpendicular OD may be on any side of the plane ABC. Show two views of the perpendicular OD. Given that A(10,20,-10), B(40,50,-30) and C(70,-10,10). [20]

4. A right circular cylinder of diameter 40 mm rests 10 mm away from the planes of projections. AB is the axis of the cylinder when A(30,50,?) and B(30,10,?). CD is a line in space when C(10,40,-70) and D(60,10,-10). Check whether the line CD intersects the cylinder. If it intersects find the points of intersection. Also check whether the line CD and the axis AB intersect each other. [20]

[Turn over

5. A plane ABC and a right circular cone with apex X are in space. The cone rests 10 mm away from the planes of projection. Both the diameter and the height of the cone are 30 mm. If the plane slices the cone draw the true shape of the truncated top. Given that A(40,50,-40), B(10,20,-10), C(50,10,-20) and X(40,?,-10). [20]

6. A plane Q, which is normal to the profile plane of projection intersects the HP at 30 mm from the VP and intersects the VP at 20 mm from the HP. A plane R is parallel to the VP resting 20 mm from it. Draw the horizontal, frontal and profile traces of Q and R. From the above traces find the three projections of the line of intersection between the planes. Also find the dihedral angle. [20]

7. A regular hexagonal pyramid has its sides of the base 30 mm and height 60 mm. It rests on its base with one of the sides parallel to the VP. The pyramid is cut by a section plane that is perpendicular to the VP, inclined at 60^0 to the HP, and passing through a point on the axis 20 mm above the base. Draw the development of the lateral surface of the truncated pyramid. [20]

8. (a) Find the point of intersection between the line PQ and the plane XYZ. Also find the angle between them. Given that P(-50, 5, -40), Q(-10, 35, -20), X(-50, 10, -20), Y(-20, 40, -10) , Z(0, 20, -40).

(b) The projections of two lines AB and CD are given. Find the shortest distance between them. Given that A(20, 10, -25), B(60. 50, -10), C(30, 40, -40), D(70, 10, -20). [10 + 10]