8657/MH

AS-2057

ANALYTICAL GEOMETRY-VI

(Semester-II)

Time Allowed : 3 Hours]   **[Maximum Marks : 36**

Note :- The candidates are required to attempt two questions each from Sections A and 5 carrying 5.5 marks each and the entire Section C consisting of 7 short answer type questions carrying 2 marks each.

SECTION-A

1. (a) A variable plane moves so that the sum of reciprocals of its intercepts on the three co-ordinates axes is constant. Show that it passes through a fixed point.   3

    (b) Show that the points (0, -1, -1), (4, 5, 1), (3, 9, 4), (-4, 4, 4) are coplanar.   2.5

2. (a) Find the angle between the planes

$$ax + by + cz - d = 0 \text{ and } ex + fy + gz - h = 0.$$ 2.5

   (b) A plane makes intercepts

$$OA = a, OB = b, OC = c$$

   on the axes. Find the area of triangle ABC. 3

3. (a) Find the angle between the lines

$$\frac{x}{1} = \frac{y}{0} = \frac{z}{-1} \text{ and } \frac{x}{3} = \frac{y}{4} = \frac{z}{5}.$$ 2.5

   (b) Find the locus of a point which moves so that its distance from the line $x = y = z$ is twice its distance from the plane $x + y + z = 1$. 3

4. (a) Find the shortest distance between the axis of z and the line

$$ax + by + ce + d = 0$$

$$a'x + b'y + c'z + d = 0.$$ 3

   (b) Write a short note on intersection of three planes. 2.5

(2)

SECTION-B

5. Explain four point form of sphere. Find the equation of the sphere through the points

    $(1, -4, 3), (1, -5, 2), (1, -3, 0)$

    and whose centre lies on the plane

    $x + y + z = 0$ 5.5

6. (a) Find the condition that the plane

    $lx + my + nz = p$

    may touch the sphere

    $x^2 + y^2 + z^2 = a^2$ 2.5

   (b) Find the equation of the sphere in the positive octant touching the co-ordinate planes and the plane

    $2x + 3y + 6z - 24 = 0.$ 3

7. Define General form of Right Circular Cone find she ecuation of the right circular cone which passes through the points (1, 2, 2) and has vertex at the

origin and axis, the line

$$\frac{x}{2} = \frac{y}{-4} = \frac{z}{3}.$$

5.5

8. (a) Find the equation to the quadric cone which passes through three co-ordinates axes and three mutually perpendicular lines

$$\frac{x}{1} = \frac{y}{-2} = \frac{x}{3}, \quad \frac{x}{1} = \frac{y}{-1} = \frac{z}{-1}, \quad \frac{x}{5} = \frac{y}{4} = \frac{z}{1}.$$

2.5

(b) Find the equation of the cone with vertex at the origin and which pass through the curves given by $x + y = b, z = a$.

3

SECTION-C

9. (a) The direction ratios of a line are 6, 2, 3. Find the direction cosines.

(b) Find the equation of the plane through the points (2, 2, 1), (1, -2, 3) and parallel to the x-Axis.

(c) State the condition of perpendicularity of a line and a plane.

(d) Write a short note on Reciprocal Cone.

(e) Define the Coaxial system of spheres with example.

(f) Find the image of the point (1, 2, -4) in the line

$$\frac{x-3}{2} = \frac{y-1}{-5} = \frac{z+2}{3} .$$

(g) Find the equation of the right circular cone generated by rotating the line

$$\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$$

about the line

$$\frac{x}{-1} = y = \frac{z}{2} .$$

2x7=14