CLASS XII
MATHS

CO-ORDINATE GEOMETRY IN SPACE
STRAIGHT LINE AND SPHERE-19

Level-I

Time-1.5 hrs FM-50

(Answer ALL questions)

1)
   a) Find the center and radius of the sphere $2x^2 + 2y^2 + 2z^2 - 6x + 2y - 4y = 3$.
   b) Find the equation of the sphere A(0 , 1 , 0) and B (4 , 5 , 8) are the end point of a diameter.
   c) Find the co-ordinate of the point of intersection of the line $3x - 3 = y + 2 = 3 - 3z$ and the plane $2x + y + z = 9$.
   d) If the plane z = 0 , touches the sphere $x^2 + y^2 + (z - 1)^2 = 9$.
   e) Write a point on the line $\frac{x-2}{3} = \frac{x+2}{3} = \frac{z-2}{3}$
2) Find the symmetric form of the equation of the line $x + z = 0 = y + z - 3$.
3) Find the equation of the sphere passing through the point (4 , 5 , -6) and having center at the point of intersection of the line $\frac{x-1}{2} = \frac{y+1}{-3} = \frac{z-2}{4}$ *and palne* $x + y + z + 8 = 0$
4) Find the length of perpendicular drawn from (2 , 0 , 1) on the line x = y = z .
5) *Prove that the lines and* $\frac{x+4}{1} = \frac{y+5}{3} = \frac{z-7}{-2}$ $2x + 3y + z - 2 = 0 = 5x + y + 2z + 3$ *are copalnnar.*
6) Find the intersection of the line passing through the points (3 , -2 , 1) and (4 , 1 , 3) with the plane $4x + y - 2z - 11 = 0$.
7) Find the equation of the sphere whose center is (1 , 2 , 3) and passes thorough the point (2 , 4 , -6).
8) *Find the angle between the plane* $2x + 3y + 6z - 1 = 0$ *and the line* $\frac{x-5}{2} = \frac{y-3}{1} = \frac{z+4}{2}$.

9) *Find the point of the intersecti on of the line* $\frac{x-2}{3}=\frac{y+1}{4}=\frac{z-2}{12}$ *and the plane* $x-y+z=5$.

10) *Prove that the lines* $\frac{x+3}{2}=\frac{y+5}{2}=\frac{z-7}{-3}$ *and* $\frac{x+1}{4}=\frac{y+1}{5}=\frac{z+1}{-1}$ *are coplannar*.

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(Answer ALL questions)

1) a) The line $\frac{x+2}{4}=\frac{y+3}{5}=\frac{z-1}{3}$ and $\frac{1-x}{4}=\frac{y-1}{5}=\frac{2-z}{3}$ are ____.
(perpendicular, Parallel, Co - incident)

b) The line $\frac{x+1}{2}=\frac{y-6}{1}=\frac{z-4}{0}$ is ____(Parallel to x - axis, Perpendicular to y - axis, perpendicular to z - axis)

c) If l, m, n be dcs of a line, then is perpendicular to the palne $x - 3y + 2z + 1 = 0$ if (i) $l = 1, m = -3, n = 2$ (ii) $\frac{l}{1}=\frac{m}{-3}=\frac{n}{2}$ (iii) $l - 3m + 2n = 0$

d) $x^2 + y^2 - az^2 - 2x + 6y - 4z + 1 = 0$ represent a sphere if a = ____.

e) The point (0 , 0 , k) lies out side the sphere $x^2 + y^2 + z^2 - 6z + 8 = 0$ if ___.
[k <4 , k = 4 , k >4]

2) Find the equation of the sphere passing through (5 , 4 , -6) its center being the point of intersection of the line $\frac{x+1}{-3}=\frac{y-1}{2}=\frac{z-2}{4}$ with the plane $x + y + z - 8 = 0$

3) Find the equation of the sphere inscribed within the tetrahedron whose faces are x = 0 , y = 0 , z = 0 and 2x + 2y + z = 1.

4) Find the symmetric form of the equation of the line of intersection of the planes 3x – 2y + z = 1 and 5x + 4y – 6z = 2.

5) Find the co-ordinates of the foot of the perpendicular drawn from the point (1 , 1 , -1) to the line $\frac{x+6}{3}=\frac{y-2}{1}=\frac{z-2}{-5}$.

6) Find the image of the point (2 , -1 , 3) in the plane 3x – 2y + z – 9 = 0.

7) Find the equation of the line passes through the points (2 , 1 , 3) and (4 , -2 , 5).

8) Show that the line s $\frac{x-1}{2}=\frac{y+2}{-3}=\frac{z-3}{1}$ lies on the plane $7x + 5y + z = 0$

9) Show that the lines $x - mz - a = y - nz - b$ and $x - m' z' - a' = 0 = y - n'z' - b'$ intersect if $(a - a')(n - n') = (b - b')(m - m')$.

10) Find the length and equation of the shortest distance between the lines $3x - 9y + 5 = 0 = x + y - z$ and $6x + 8y + 3z - 13 = 0 = x + 2y + z - 3$.

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(Answer ALL questions)

1)
   a) Write the symmetric form of equation of co-ordinate axes.
   b) The center of the sphere $2x^2 + 2y^2 + 2z^2 - 12x + 8y - 4z + 5 = 0$ is _____.
   c) Write the equation of the line passing thorough the point (- 3 , 1 , 2) and perpendicular to the plane $2y - z = 3$.
   d) If one end of a diameter of the sphere $x^2 + y^2 + z^2 - 2x + 4y - 6z - 7 = 0$ is (-1, 2, 4), find the co-ordinates of the other end.
   e) A straight line intersect the plane $x + 2y + 3z = 0$ normally at (1 , 1 , -1). Write the dcs of the straight line.

2) *Prove that the lines* $\frac{x+4}{3} = \frac{y+6}{5} = \frac{z-1}{-2}$ *and* $3x - 2y + z + 5 = 0 = 2x + 3y + 4z - 4$ *are coplanar.*

3) Find the equation of the line passes through the points (4 , -6 , 1) and (0 , 3 , -1).

4) Show that the line joining (0 , 2 , -4) and (-1 , 1 , -2) and the lines joining the point (-2 , 3 , 3) and (-3 , -2 , 1) are coplanar . Find their point of intersection.

5) Find the magnitude and equation of the line of shortest distance between the line, $\frac{x-3}{2} = \frac{y+15}{-7} = \frac{z-9}{5}$ *and* $\frac{x+1}{2} = \frac{y-1}{1} = \frac{z-9}{-3}$.

6) Find the perpendicular distance from the point (-1 , 3 , 9) from the line $\frac{x-13}{5} = \frac{y+8}{-8} = \frac{z-31}{1}$

7) Find the distance of the point (1 , -2 , 3) from the plane $x - y + z = 5$, measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$

8) Find the equation of the sphere passing through the point (4 , 5 , - 6) and the center being the point of intersection of the line $\frac{x-1}{2} = \frac{y+1}{-3} = \frac{z-2}{4}$ *with the plane* $x + y + z - 8 = 0$

9) Find the equation of the sphere through the point (2, 3 ,6) and the feet of perpendiculars drawn from this point on the co-ordinate planes.

10) A sphere of constant radius ‘k’ passes through origin and meets, the co-ordinates axes at P,Q,R. Prove that the centroid of the triangle PQR lies on the sphere $9(x^2 + y^2 + z^2) = 4k^2$.

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