Linears and Conics

1 Linear

1. If the two lines

$$L_1 : x = 5, \frac{y}{3-\alpha} = \frac{z}{-2} \tag{1}$$

$$L_1 : x = 2, \frac{y}{-1} = \frac{z}{z-\alpha} \tag{2}$$

are perpendicular,then the value of α

(a) $\frac{2}{3}$

(b) 3

(c) 4

(d) $\frac{7}{3}$

2. Find the shortest distance between the following lines and hence write whether the lines are intersecting or not.

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

$$\frac{x+1}{5} = \frac{y-2}{1}, z = 2 \tag{4}$$

OR

Find the equation of the plane through the line of intersection of the planes $\vec{r}.(\hat{i}+3\hat{j})+6=0$ and $\vec{r}.(3\hat{i}-\hat{j}-4\hat{k})=0$, which is at a unit distance from the origin.

3. If segment of the line intercepted between the co-ordinate-axes is bisected at the point $M(2,3)$, then the equation of this line is

$$2x + 3y = 13 \quad (5)$$
$$x + y = 5 \quad (6)$$
$$2x + y = 7 \quad (7)$$
$$3x + 2y = 12 \quad (8)$$

4. The equation of a line through (2,−4) and parallel to x-axis is _____.

5. Find the equation of the median through vertex A of the triangle ABC, having vertices A(2,5), B(−4,9) and C(−2, −1).

6. Solve the system of linear equations, using matrix method :

$$7x + 2y = 11 \quad (9)$$
$$4x - y = 2 \quad (10)$$

2 Conic

1. The point at which the normal to the curve $y = x + \frac{1}{x}$, $x > 0$ is perpendicular to the line $3x - 4y - 7 = 0 is$:
   a)$(2, \frac{5}{2})$ b)$(\pm 2, \frac{5}{2})$
   c) $(-\frac{1}{2}, \frac{5}{2})$ d) $(\frac{1}{2}, \frac{5}{2})$

2. The points on the curve $\frac{x^2}{9} + \frac{y^2}{16} = 1$ at which the tangents are parallel to y-axis are:

   (a) a)$(0, \pm 4)$ b)$(\pm 4, 0)$

   (b) c) $(\pm 3, 0)$ d) $(0, \pm 3)$

3. For which value of m is the line $y = mx + 1$ a tangent to the curve $y^2 = 4x$?
   a)$\frac{1}{2}$ b) 1
   c)2 d)3