

# Linears and Conics

## 1 Linear

1. If the two lines

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

$$L_2 : x = 2, \frac{y}{-1} = \frac{z}{z-\alpha} \quad (2)$$

are perpendicular, then the value of  $\alpha$

- (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.

$$\frac{x-1}{2} = \frac{y+1}{3} = z \quad (3)$$

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

**OR**

Find the equation of the plane through the line of intersection of the planes  $\vec{r} \cdot (\hat{i} + 3\hat{j}) + 6 = 0$  and  $\vec{r} \cdot (3\hat{i} - \hat{j} - 4\hat{k}) = 0$ , 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