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.

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

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

3. Find the equation of the plane through the line of intersection of the planes

$$\mathbf{r}.(i+3j)+6=0 \tag{5}$$

$$\mathbf{r}.(3i-j-4k)=0 \tag{6}$$

which is at a unit distance from the origin.

4. 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

$$2x + 3y = 13 \tag{7}$$
$$x + y = 5 \tag{8}$$
$$2x + y = 7 \tag{9}$$
$$3x + 2y = 12 \tag{10}$$

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

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

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

$$7x + 2y = 11 \tag{11}$$
$$4x - y = 2 \tag{12}$$

2 Conic

1. The point at which the normal to the curve

$$y = x + \frac{1}{x}, x > 0 \tag{13}$$

is perpendicular to the line

$$3x - 4y - 7 = 0 \tag{14}$$

(a) $\left(2, \frac{5}{2}\right)$
(b) $\left(\pm 2, \frac{5}{2}\right)$
(c) $\left(-\frac{1}{2}, \frac{5}{2}\right)$
(d) $\left(\frac{1}{2}, \frac{5}{2}\right)$

2. The points on the curve

$$\frac{x^2}{9} + \frac{y^2}{16} = 1 \tag{15}$$

at which the tangents are parallel to y-axis are:

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

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

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

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

3. For which value of m is the line

$$y = mx + 1 \tag{16}$$

a tangent to the curve

$$y^2 = 4x \tag{17}$$

(a) $\frac{1}{2}$

(b) 1

(c) 2

(d) 3