SWOT INSTITUTE
3-DIMENSIONAL GEOMETRY
XII-TEST

Time : 1 hr.

1. Find the direction cosines of a line which makes equal angles with the coordinate axes.

2. Find the shortest distance between the lines

   $\vec{r} = (\hat{i} + 2\hat{j} + \hat{k}) + \lambda(\hat{i} - \hat{j} + \hat{k})$ and

   $\vec{r} = 2\hat{i} - \hat{j} - \hat{k} + \mu(2\hat{i} + \hat{j} + 2\hat{k})$

3. Find the angle between the lines whose vector equations are

   $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(\hat{i} - 3\hat{j} + 2\hat{k})$ and

   $\vec{r} = 4\hat{i} + 5\hat{j} + 6\hat{k} + \mu(2\hat{i} + 3\hat{j} + \hat{k})$

4. Find the shortest distance between the linens whose vector equations are

   $\vec{r} = (i - t)\hat{i} + (t - 2)\hat{j} + (3 - 2t)\hat{k}$ and

   $\vec{r} = (s + 1)\hat{i} + (2s - 1)\hat{j} - (2s + 1)\hat{k}$

5. Find the values of p so that the lines $\frac{1 - x}{3} = \frac{7y - 14}{2p} = \frac{z - 3}{2}$ and $\frac{7 - 7x}{3p} = \frac{y - 5}{1} = \frac{6 - z}{5}$ are at right angles.

6. Find the equation of the linen in vector and in Cartesian form that passes through the point with position vector $2\hat{i} - \hat{j} + 4\hat{k}$ and is in the direction $\hat{i} + 2\hat{j} - \hat{k}$.

7. Find the equation of the plane through the intersection of the planes $3x - y + 2z - 4 = 0$ and $x + y + z - 2 = 0$ and the point (2, 2, 1).

8. Find the equation of the plane through the line of intersection of the planes $x + y + z = 1$ and $2x + 3y + 4z = 5$ which is perpendicular to the plane $x - y + z = 0$.

9. In the following cases, find the coordinates of the foot of the perpendicular drawn from the origin.
   $2x + 3y + 4z - 12 = 0$.

10. Find the equation of the plane that contains the point (1, –1, 2) and is perpendicular to each of the planes $2x + 3y - 2z = 5$ and $x + 2y - 3z = 8$.

11. Find the coordinate of the point where the line through the points A(3, 4, 1) and B(5, 1, 6) crosses the XY-plane.

12. Find the vector equation of the line passing through (1, 2, 3) and parallel to the planes $\vec{r}.(\hat{i} - \hat{j} + 2\hat{k}) = 5$ and $\vec{r}.(3\hat{i} + \hat{j} + \hat{k}) = 6$.