

**THREE DIMENSIONAL GEOMETRY****PLANE****EXERCISE****(FOR COMPETITIVE EXAM)**

- Q.1** Which of the following is sufficient to form the equation of a plane?  
(A) Two Normal Lines (B) One Point and One Parallel Line  
(C) Two Points (D) One Normal and One Point
- Q.2** Convert the equation of plane  $\vec{r}(5\hat{i} - 2\hat{j} + 3\hat{k}) = 1$  to Cartesian form.  
(A)  $5x - 2y + 3z + 1 = 0$  (B)  $x - y + z = 1$   
(C)  $5i - 2j + 3k = 1$  (D)  $5x - 2y + 3z = 1$
- Q.3** Which of the following is the equation of a line that passes through the point (5, 6) and is parallel to the y-axis?  
(A)  $5y = 6x$  (B)  $6y = 5x$  (C)  $y = 6$  (D)  $x = 5$
- Q.4** Find the vector equation of plane passing through a point (2, -1, 3), and having the direction ratios of its normal as (5, 2, 4).
- Q.5** Find the vector equation of plane passing through the points A (2, 5, -3), B (3, 3, -5), C (4, -2, 3)
- Q.6** Using the slope intercept form, find the equation of a straight line with slope  $\left(\frac{1}{3}\right)$  and whose y-intercept is (0, -5).
- Q.7** Find the equation of the horizontal line that intersects the y-axis at (0, 3). Solve it using the slope-intercept formula.
- Q.8** Find the equation of a line that is parallel to the line  $y = 3x - 5$  and whose y-intercept is  $\left(-\frac{1}{5}\right)$ .
- Q.9** Determine the equation of the plane that contains the points  $P=(1,-2,0)$ ,  $Q=(3,1,4)$  and  $R=(0,-1,2)$ .
- Q.10** Determine if the plane given by  $-x+2z=10$  and the line given by  $\vec{r}=\langle 5, 2-t, 10+4t \rangle$  are orthogonal, parallel or neither.

## ANSWER KEY

1. (D) One Normal and One Point
2. (D)  $5x - 2y + 3z = 1$
3. (D)  $x = 5$
4. Therefore.  $(\vec{r} - (2\hat{i} - 1\hat{j} + 3\hat{k})) \cdot (5\hat{i} + 2\hat{j} + 4\hat{k}) = c$  is the required vector equation of plane.
5.  $(\vec{r} - (2\hat{i} + 5\hat{j} - 3\hat{k}))[(\hat{i} - 2\hat{j} - 2\hat{k}) \times (2\hat{i} - 7\hat{j} + 6\hat{k})] = 0$
6. The equation of the given line is,  $y = \left(\frac{1}{3}\right)x - 5$ .
7. The equation of the given line is,  $y = 3$ .
8. The equation of the required line is,  $y = 3x - \frac{1}{5}$ .