

**Class: XII**  
**Subject: Math's**  
**Topic: 3-D Geometry**  
**No. of Questions: 20**

1. Find the shortest distance between lines

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

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

[All India 2009]

2. Find the value of  $\lambda$ , so that each other.  $\frac{1-x}{3} = \frac{7y-14}{2\lambda} = \frac{5z-10}{11}$  and  $\frac{7-7x}{3\lambda} = \frac{7-5}{1} = \frac{6-z}{5}$  are perpendicular to each other. [All India 2008C]

3. Find the perpendicular distance of the point (2, 3, 4) from the line  $\frac{4-x}{2} = \frac{y}{6} = \frac{1-z}{3}$ . Also, find coordinates of foot of perpendicular [Delhi 2009C]

4. Write the intercept cut-off by plane  $2x + y - z = 5$  on X-axis. [Hots; Delhi 2011]

5. Find the equation for the plane passing through the line of intersection of the Planes  $\vec{r}(\hat{i} + 3\hat{j}) - 6 = 0$  and  $\vec{r}(3\hat{i} - \hat{j} - 4\hat{k}) = 0$ , whose perpendicular distance from origin is unity. [All India 2013C]

6. Find the equation of plane passing through the point (1, 2, 1) and perpendicular to line joining points (1, 4, 2) and (2, 3, 5). Also, find the coordinates of foot of the perpendicular and the perpendicular distance of the point (4, 0, 3) from above found plane. [Hots; Delhi 2011C]

7. Find the distance of point (-2, 3, 4) from the line  $\frac{x+2}{3} = \frac{2y+3}{4} = \frac{3z+4}{5}$  measured Parallel to the plane  $4x + 12y - 3z + 1 = 0$ . [All India 2009C, 2008C, 2008]

8. Find the equation of plane passing through the point (-1, -1, 2) and perpendicular to each plane  $2x + 3y - 3z = 2$  And  $5x - 4y + z = 6$ . [Delhi 2008]

9. Find the direction cosines of the line  $\frac{4-x}{2} = \frac{y}{6} = \frac{1-z}{3}$ . [Delhi 2013C]

10. If a line has direction ratios 2,-1,-2, then what are its direction cosines? [Delhi 2012]  
 Right Answer Explanation:

11. Find the distance of point (2,3,4) from X-axis. [Delhi 2010C]

12. Show that the lines  $\vec{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \lambda(\hat{i} + 2\hat{j} + 2\hat{k});$   
 $\vec{r} = 5\hat{i} - 2\hat{j} + \mu(3\hat{i} + 2\hat{j} + 6\hat{k})$

13. Find the shortest distance between the lines whose vectors equations are [Hots; All india 2011]

$$\vec{r} = (1-t)\hat{i} + (t-2)\hat{j} + (3-2t)\hat{k}$$

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

14. Find the equation of the perpendicular from point (3,-1,11) to line  $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ . Also, find the coordinates of foot of perpendicular. [Hots; All india 2011]

15. Find the points on the line  $\frac{x+2}{3} = \frac{x+1}{2} = \frac{z-3}{2}$  at a distance of 5 units from the point P (1,3,3). [Hots; All india 2010]

16. Find the value of  $\lambda$ , so that following lines are perpendicular to each other  $\frac{x+5}{5\lambda+2} = \frac{2-y}{5} = \frac{1-z}{-1}$  and  $\frac{x}{1} = \frac{2y+1}{4\lambda} = \frac{1-z}{-3}$ . [Delhi 2010]

17. Find the shortest distance between lines  $l_1$  and  $l_2$  whose vector equations are given below. [Delhi 2008C]

$$l_1: \vec{r} = \hat{i} + \hat{j} + \lambda(2\hat{i} - \hat{j} + \hat{k})$$

$$l_2: \vec{r} = 2\hat{i} + \hat{j} - \hat{k} + \mu(3\hat{i} - 5\hat{j} + 2\hat{k})$$

18. Find the equation of line passing through points A(0,6,-9) and B (-3,-6,3). If D is the foot of perpendicular drawn from the point C(7,4,-1) on the line AB, then find the coordinates of point D and equation of line CD. [All india 2010C]
19. Find the image of the point (1,6,3) on the line  $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ . Also, write the equation of the line joining the given points and its image and find the length of segment joining given point and its image.
20. The points A(4,5,10), B (2,3,4) and C (1,2,-1) are three vertices of parallelogram ABCD. Find the vector equations of sides AB and BC and also find coordinates of point D. [Delhi 2010]

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