

THREE DIMENSIONAL GEOMETRY

Assignment 4 Practice by O.P. GUPTA • M. +91-9650350480

Q01. The equation of the line in vector form passing through the point $(-1, 3, 5)$ and parallel to line $\frac{x-3}{2} = \frac{y-4}{3}, z=2$, is

(a) $\vec{r} = (-\hat{i} + 3\hat{j} + 5\hat{k}) + \lambda(2\hat{i} + 3\hat{j} + \hat{k})$ (b) $\vec{r} = (-\hat{i} + 3\hat{j} + 5\hat{k}) + \lambda(2\hat{i} + 3\hat{j})$
 (c) $\vec{r} = (2\hat{i} + 3\hat{j} - 2\hat{k}) + \lambda(-\hat{i} + 3\hat{j} + 5\hat{k})$ (d) $\vec{r} = (2\hat{i} + 3\hat{j}) + \lambda(-\hat{i} + 3\hat{j} + 5\hat{k})$

Q02. The lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{4-z}{k}$ and $\frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{-2}$ are mutually perpendicular if the value of k is

(a) $-\frac{2}{3}$ (b) $\frac{2}{3}$ (c) -2 (d) 2

Q03. The two lines $x = ay + b$, $z = cy + d$; and $x = a'y + b'$, $z = c'y + d'$ are perpendicular to each other, if

(a) $\frac{a}{a'} + \frac{c}{c'} = 1$ (b) $\frac{a}{a'} + \frac{c}{c'} = -1$ (c) $aa' + cc' = 1$ (d) $aa' + cc' = -1$

Q04. The vector equation of a line which passes through the points $(3, 4, -7)$ and $(1, -1, 6)$ is

(a) $\vec{r} = 3\hat{i} + 4\hat{j} - 7\hat{k} + \lambda(-2\hat{i} + 5\hat{j} + 13\hat{k})$ (b) $\vec{r} = 3\hat{i} + 4\hat{j} - 7\hat{k} + \lambda(-2\hat{i} - 5\hat{j} + 13\hat{k})$
 (c) $\vec{r} = 3\hat{i} - 4\hat{j} - 7\hat{k} + \lambda(-2\hat{i} - 5\hat{j} + 13\hat{k})$ (d) $\vec{r} = 3\hat{i} + 4\hat{j} + 7\hat{k} + \lambda(-2\hat{i} - 5\hat{j} + 13\hat{k})$

Q05. The coordinates of the foot of perpendicular drawn from the point $(-2, 8, 7)$ on the XZ-plane is

(a) $(-2, -8, 7)$ (b) $(2, 8, -7)$ (c) $(-2, 0, 7)$ (d) $(0, 8, 0)$

Q06. The image of the point $(2, -1, 4)$ in the YZ-plane is

(a) $(0, -1, 4)$ (b) $(-2, -1, 4)$ (c) $(2, 1, -4)$ (d) $(2, 0, 4)$

Q07. The coordinates of the foot of the perpendicular drawn from the point $(2, -3, 4)$ on the y-axis is

(a) $(2, 3, 4)$ (b) $(-2, -3, -4)$ (c) $(0, -3, 0)$ (d) $(2, 0, 4)$

Q08. The length of the perpendicular drawn from the point $(4, -7, 3)$ on the y-axis is

(a) 3 units (b) 4 units (c) 5 units (d) 7 units

Q09. A point P lies on the line segment joining the points $(-1, 3, 2)$ and $(5, 0, 6)$. If the x-coordinate of P is 2, then its z-coordinate is

(a) -1 (b) 4 (c) $\frac{3}{2}$ (d) 8

Q10. If the two lines $L_1 : x = 5, \frac{y}{3-\alpha} = \frac{z}{-2}$ and $L_2 : x = 2, \frac{y}{-1} = \frac{z}{2-\alpha}$ are perpendicular, then the value of α is

(a) $\frac{2}{3}$ (b) 3 (c) 4 (d) $\frac{7}{3}$

Q11. The Cartesian equation of a line is $\frac{x-5}{3} = \frac{2y+4}{7} = \frac{6-z}{2}$. Its vector equation will be

(a) $\vec{r} = 5\hat{i} - 2\hat{j} + 6\hat{k} + \lambda(3\hat{i} + 7\hat{j} - 2\hat{k})$ (b) $\vec{r} = 5\hat{i} - 2\hat{j} + 6\hat{k} + \lambda\left(3\hat{i} + \frac{7}{2}\hat{j} - 2\hat{k}\right)$
 (c) $\vec{r} = 5\hat{i} - 2\hat{j} + 6\hat{k} + \lambda(3\hat{i} + 7\hat{j} + 2\hat{k})$ (d) $\vec{r} = 5\hat{i} - 2\hat{j} - 6\hat{k} + \lambda(3\hat{i} + 7\hat{j} - 2\hat{k})$

Q12. Find the acute angle between the lines $\frac{x-4}{3} = \frac{y+3}{4} = \frac{z+1}{5}$ and $\frac{x-1}{4} = \frac{y+1}{-3} = \frac{z+10}{5}$.

Q13. Find the value of k , so that the lines $x = -y = kz$ and $x - 2 = 2y + 1 = -z + 1$ are perpendicular to each other.

Q14. Find the shortest distance between the lines $\vec{r} = 2\hat{i} - \hat{j} + \hat{k} + \lambda(3\hat{i} - 2\hat{j} + 5\hat{k})$ and, $\vec{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \mu(4\hat{i} - \hat{j} + 3\hat{k})$.

Q15. Find the vector and Cartesian equations of the line which is perpendicular to the lines with equations $\frac{x+2}{1} = \frac{y-3}{2} = \frac{z+1}{4}$ and, $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and passes through the point (1, 1, 1). Also find the angle made between the given lines.

Q16. Find the shortest distance between the lines $\frac{x-1}{2} = \frac{y+1}{3} = z$; $\frac{x+1}{5} = \frac{y-2}{1} = z = 2$ and hence write whether the lines are intersecting or not.

Q17. Find the shortest distance between the lines $\vec{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \lambda(\hat{i} + 2\hat{j} + 2\hat{k})$ and $\vec{r} = 5\hat{i} - 2\hat{j} + \mu(3\hat{i} + 2\hat{j} + 6\hat{k})$. If the lines intersect, find their point of intersection.

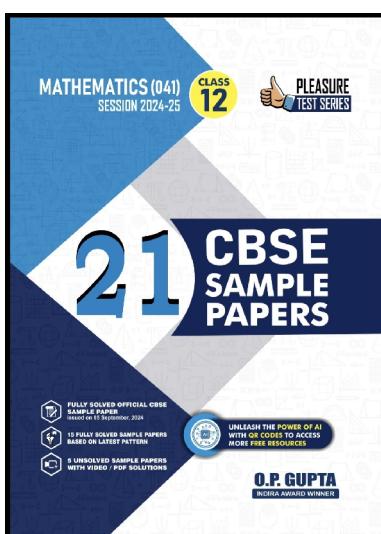
Q18. Show that the lines $\frac{x-2}{1} = \frac{y-2}{3} = \frac{z-3}{1}$ and $\frac{x-2}{1} = \frac{y-3}{4} = \frac{z-4}{2}$ intersect. Also, find the coordinates of the point of intersection.

Q19. Find the image of the point (1, 6, 3) in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$.

Q20. Find the shortest distance between the lines $\frac{x-6}{1} = \frac{2-y}{2} = \frac{z-2}{2}$ and $\frac{x+4}{3} = \frac{y}{-2} = \frac{z+1}{-2}$. Also find the equation of line of shortest distance and the coordinates of the points where it meets the given lines.

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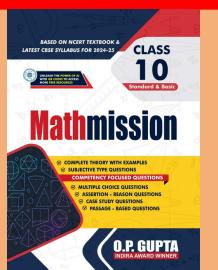
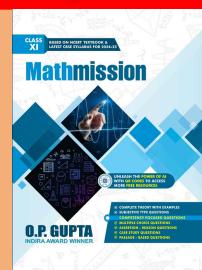
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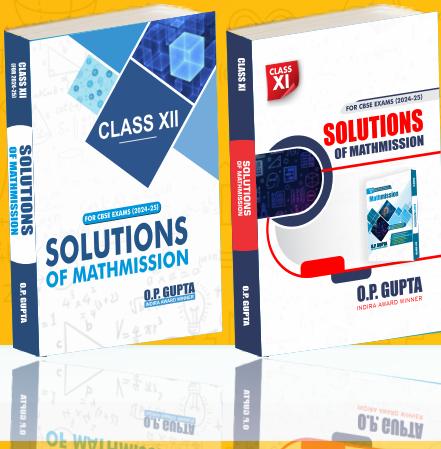


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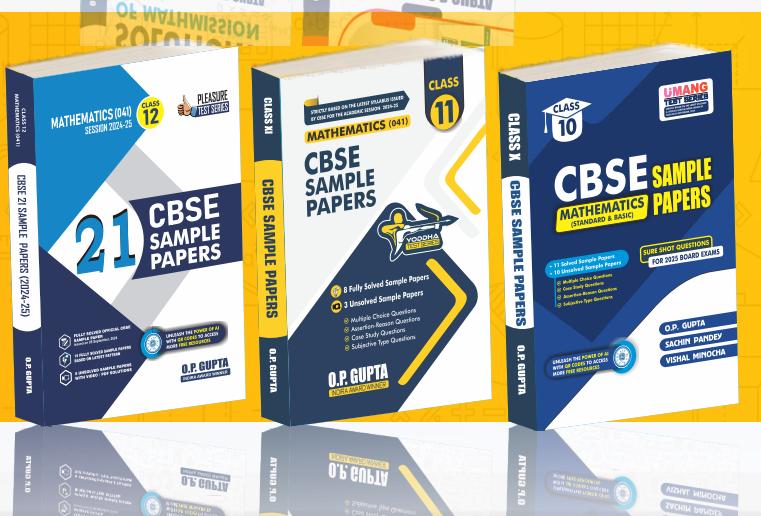
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