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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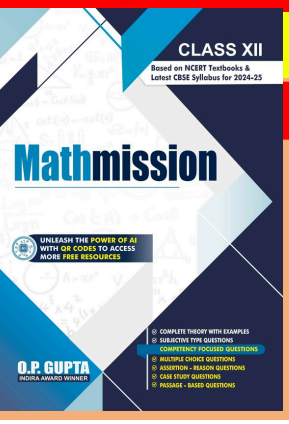

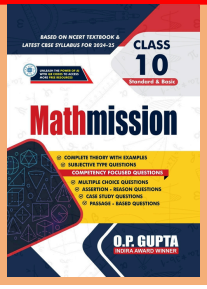

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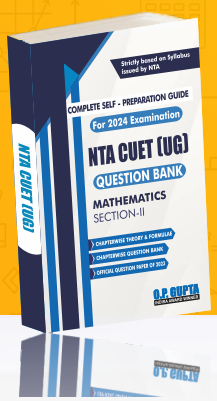

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