Q1. 21 January Shift 1

Let (α, β, γ) be the co-ordinates of the foot of the perpendicular drawn from the point $(5,4,2)$ on the line $\vec{r}=(-\hat{i}+3\hat{j}+\hat{k})+\lambda(2\hat{i}+3\hat{j}-\hat{k})$.

Then the length of the projection of the vector $\alpha\hat{i}+\beta\hat{j}+\gamma\hat{k}$ on the vector $6\hat{i}+2\hat{j}+3\hat{k}$ is :

(1) $\frac{15}{7}$ (2) 4 (3) $\frac{18}{7}$ (4) 3

Q2. 21 January Shift 2

Let the line L pass through the point $(-3,5,2)$ and make equal angles with the positive coordinate axes. If the distance of L from the point $(-2, \mathrm{r}, 1)$ is $\sqrt{\frac{14}{3}}$, then the sum of all possible values of r is :

(1) 10 (2) 6 (3) 12 (4) 16

Q3. 21 January Shift 2

Let the line L_1 be parallel to the vector $-3\hat{i}+2\hat{j}+4\hat{k}$ and pass through the point (2,6,7), and the line L_2 be parallel to the vector $2\hat{i}+\hat{j}+3\hat{k}$ and pass through the point $(4,3,5)$. If the line L_3 is parallel to the vector $-3\hat{i}+5\hat{j}+16\hat{k}$ and intersects the lines L_1 and L_2 at the points C and D, respectively, then $|\overrightarrow{CD}|^2$ is equal to :

(1) 89 (2) 312 (3) 171 (4) 290

Q4. 22 January Shift 1

If the image of the point $\mathrm{P}(1,2,a)$ in the line $\frac{x-6}{3}=\frac{y-7}{2}=\frac{7-z}{2}$ is $\mathrm{Q}(5, b, \mathrm{c})$, then $a^2+b^2+c^2$ is equal to

(1) 298 (2) 293 (3) 264 (4) 283

Q5. 22 January Shift 1

Let $\mathrm{P}(\alpha, \beta, \gamma)$ be the point on the line $\frac{x-1}{2}=\frac{y+1}{-3}=z$ at a distance $4\sqrt{14}$ from the point $(1,-1,0)$ and nearer to the origin. Then the shortest distance, between the lines $\frac{x-\alpha}{1}=\frac{y-\beta}{2}=\frac{z-\gamma}{3}$ and $\frac{x+5}{2}=\frac{y-10}{1}=\frac{z-3}{1}$, is equal to

(1) $4\sqrt{\frac{7}{5}}$ (2) $2\sqrt{\frac{7}{4}}$ (3) $7\sqrt{\frac{5}{4}}$ (4) $4\sqrt{\frac{5}{7}}$

Q6. 22 January Shift 2

Let L be the line $\frac{x+1}{2}=\frac{y+1}{3}=\frac{z+3}{6}$ and let S be the set of all points $(\mathrm{a}, \mathrm{b}, \mathrm{c})$ on L, whose distance from the line $\frac{x+1}{2}=\frac{y+1}{3}=\frac{z-9}{0}$ along the line L is 7. Then $\sum_{(a,b,c)\in S}(a+b+c)$ is equal to :

(1) 6 (2) 34 (3) 40 (4) 28

Q7. 23 January Shift 1

Let the direction cosines of two lines satisfy the equations : $4l+m-n=0$ and $2mn+10nl+3lm=0$. Then the cosine of the acute angle between these lines is :

(1) $\frac{20}{3\sqrt{38}}$ (2) $\frac{10}{3\sqrt{38}}$ (3) $\frac{10}{7\sqrt{38}}$ (4) $\frac{10}{\sqrt{38}}$

Q8. 23 January Shift 1

The vertices B and C of a triangle ABC lie on the line $\frac{x}{1}=\frac{1-y}{-2}=\frac{z-2}{3}$. The coordinates of A and B are $(1,6,3)$ and $(4,9,\alpha)$ respectively and C is at a distance of 10 units from B. The area (in sq. units) of $\triangle$ABC is :

(1) $20\sqrt{13}$
(2) $5\sqrt{13}$
(3) $15\sqrt{13}$
(4) $10\sqrt{13}$

Q9. 23 January Shift 2

If the image of the point $\mathrm{P}(a,2,a)$ in the line $\frac{x}{2}=\frac{y+a}{1}=\frac{z}{1}$ is Q and the image of Q in the line $\frac{x-2b}{2}=\frac{y-a}{1}=\frac{z+2b}{-5}$ is P, then $a+b$ is equal to ____.

Q10. 24 January Shift 1

Let the lines $\mathrm{L}_1:\vec{r}=\hat{\mathrm{i}}+2\hat{\mathrm{j}}+3\hat{\mathrm{k}}+\lambda(2\hat{\mathrm{i}}+3\hat{\mathrm{j}}+4\hat{\mathrm{k}}),\lambda\in\mathbb{R}$ and $\mathrm{L}_2:\vec{r}=(4\hat{\mathrm{i}}+\hat{\mathrm{j}})+\mu(5\hat{\mathrm{i}}+2\hat{\mathrm{j}}+\hat{\mathrm{k}}),\mu\in\mathbb{R}$, intersect at the point R. Let P and Q be the points lying on lines L_1 and L_2, respectively, such that $|\overrightarrow{\mathrm{PR}}|=\sqrt{29}$ and $|\overrightarrow{\mathrm{PQ}}|=\sqrt{\frac{47}{3}}$. If the point P lies in the first octant, then $27(\mathrm{QR})^2$ is equal to

(1) 348
(2) 340
(3) 320
(4) 360

Q11. 24 January Shift 1

Let a line L passing through the point $\mathrm{P}(1,1,1)$ be perpendicular to the lines $\frac{x-4}{4}=\frac{y-1}{1}=\frac{z-1}{1}$ and $\frac{x-17}{1}=\frac{y-71}{1}=\frac{z}{0}$. Let the line L intersect the $yz-$ plane at the point Q. Another line parallel to L and passing through the point $\mathrm{S}(1,0,-1)$ intersects the yz-plane at the point R. Then the square of the area of the parallelogram PQRS is equal to ____.

Q12. 24 January Shift 2

The sum of all values of α, for which the shortest distance between the lines $\frac{x+1}{\alpha}=\frac{y-2}{-1}=\frac{z-4}{-\alpha}$ and $\frac{x}{\alpha}=\frac{y-1}{2}=\frac{z-1}{2\alpha}$ is $\sqrt{2}$, is

(1) 6
(2) 8
(3) -8
(4) -6

Q13. 28 January Shift 1

If the distances of the point $(1,2,a)$ from the line $\frac{x-1}{1}=\frac{y}{2}=\frac{z-1}{1}$ along the lines $\mathrm{L}_1:\frac{x-1}{3}=\frac{y-2}{4}=\frac{z-a}{b}$ and $\mathrm{L}_2:\frac{x-1}{1}=\frac{y-2}{4}=\frac{z-a}{c}$ are equal, then $a+b+c$ is equal to

(1) 5
(2) 7
(3) 4
(4) 6

Q14. 28 January Shift 2

Let $\mathrm{Q}(\mathrm{a}, \mathrm{b}, \mathrm{c})$ be the image of the point $\mathrm{P}(3,2,1)$ in the line $\frac{x-1}{1}=\frac{y}{2}=\frac{z-1}{1}$. Then the distance of Q from the line $\frac{x-9}{3}=\frac{y-9}{2}=\frac{z-5}{-2}$ is

(1) 8 (2) 5 (3) 7 (4) 6

Q15. 28 January Shift 2

If the distance of the point $\mathrm{P}(43, \alpha, \beta), \beta<0$, from the line $\vec{\mathrm{r}}=4\hat{i}-\hat{k}+\mu(2\hat{i}+3\hat{k}), \mu \in \mathbf{R}$ along a line with direction ratios $3,-1,0$ is $13\sqrt{10}$, then $\alpha^2+\beta^2$ is equal to ____

ANSWER KEYS

1. (3)	**2.** (1)	**3.** (4)	**4.** (1)	**5.** (1)	**6.** (2)	**7.** (1)	**8.** (2)
9. 3	**10.** (4)	**11.** 6	**12.** (4)	**13.** (2)	**14.** (3)	**15.** 170	