RK VISION ACADEMY

NEET | IIT – JEE | FOUNDATION

CBSE PRACTICE PAPER(2024)

(Mathematics)

Grade : XII **Marks: 40 marks**

Chapter: THREE DIMENSIONAL GEOMETRY SET 1 Set-1 **Time: 90 minutes**

SECTION A

(This section comprises of Multiple-choice questions (MCQ) of 1 mark each.)

1. If $\vec{a}.\vec{b} = 12|\vec{a}||\vec{b}|$, then the angle between $\vec{a}$ and $\vec{b}$ is

(a) 0° (b) 30° (c) 60° (d) 90°

2. P is a point on the line joining the points A(0, 5, -2) and 5(3, -1, 2). If the x-coordinate of P is 6, then its Z-coordinate

(a) 10 (b) 6 (c) -6 (d) -10

3. 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) –23 (b) 23 (c) -2 (d) 2

4. If $|\vec{a}\times\vec{b}| = 1$, $|\vec{a}| = 2$ and $|\vec{b}| = 1$, then angle between $\vec{a}$ and $\vec{b}$ is equal to

(a) π3 (b) π6 (c) π4 (d) π2

5. The equation of a line passing through the point (-3, 2, -4) and equally inclined to the axes are

(a) x – 3 = y + 2 = z – (b) x + 3 = y – 2 = z + 4 (c) x+3/1=y−2/2=z+4/3 (d) None of these

6. The value of λ, so that the vectors $\vec{a}=3\hat{i}+2\hat{j}+9\hat{k}$ and $\vec{b}=\hat{i}+\lambda\hat{j}+3\hat{k}$ are perpendicular to each other is

(a) 15 (b) -15 (c) 12 (d) -12

7. If $|\vec{a}| = 20$, $|\vec{b}| = 4$ and $\vec{a}.\vec{b} = 24$, then $|\vec{a}\times\vec{b}|$ is equal to

(a) 30 (b) 32 (c) 0 (d) 24

8. If $(\hat{i}+3\hat{j}+9\hat{k})\times(3\hat{i}-\lambda\hat{j}+\mu\hat{k}) = 0$, then λ + μ is equal to

(a) 10 (b) 18 (c) 0 (d) 1

9. $(\hat{k}\times\hat{j}).\hat{i}+\hat{j}.\hat{k}$ is equal to

(a) -1 (b) 1 (c) 0 (d) -2

10 Assertion (A) The acute angle between the line $\vec{r}=\hat{i}+\hat{j}+2\hat{k}+\lambda(\hat{i}-\hat{j})$ and X-axis is $\frac{\pi}{4}$.

Reason (R) The acute angle θ between the line $\vec{r}=\vec{a_1}+\lambda\vec{b_1}$ and $\vec{r}=\vec{a_2}+\mu\vec{b_2}$ is given by $\cos\theta=\frac{\vec{a_1}\cdot\vec{a_2}}{|\vec{b_1}||\vec{b_2}|}$.

(a) Both A and R are true and R is the correct explanation of A (b) Both A and R are true but R is not the correct explanation of A (c) A is true but R is false (d) A is false but R is true

SECTION B

(This section comprises of very short answer type-questions (VSA) of 2 marks each.)

11 If the points A(-1, 3, 2), B(-4, 2, -2) and C(5, 5, λ) are collinear, find the value of λ.

12 If the direction ratios of a line are 1, 1, 2, find the direction cosines of the line.

13 Find the vector equation of the line which is parallel to the vector ˆ ˆ ˆ3 2 6i j k− +and which passes through the point (1,–2,3).

SECTION C

(This section comprises of short answer type questions (SA) of 3 marks each)

14 Find the shortest distance between the lines given by $\vec{r} = (2 + \lambda)\hat{i} - (3 + \lambda)\hat{j} + (5 + \lambda)\hat{k}$ and $\vec{r} = (2\mu - 1)\hat{i} + (4\mu - 1)\hat{j} + (5 - 3\mu)\hat{k}$.

15 Find the shortest distance between lines $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$ and $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$.

16 Find a vector of magnitude 5 units, perpendicular to each of the vectors $(\vec{a} + \vec{b})$ and $(\vec{a} - \vec{b})$, where $\vec{a} = (\hat{i} + \hat{j} + \hat{k})$ and $\vec{b} = (\hat{i} + 2\hat{j} + 3\hat{k})$.

SECTION D

(This section comprises of long answer-type questions (LA) of 5 marks each)

17 Find the coordinates of the image of the point (1, 6, 3) with respect to the line $\vec{r} = (\hat{j} + \hat{k}2) + \lambda(\hat{i} + 2\hat{j} + 3\hat{k})$, where λ. is a scalar. Also, find the distance of the image from the F-axis.

18 An aeroplane is flying along the line $\vec{r} = \lambda(\hat{i} - \hat{j} + \hat{k})$, where λ is a scalar and another aeroplane is flying along the line $\vec{r} = \hat{i} - \hat{j} + \mu(-2\hat{j} + \hat{k})$, where μ is a scalar. At what points on the lines should they reach, so that the distance between them is the shortest? Find the shortest possible distance between them.

19 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