SET - I

RK VISION ACADEMY

NEET | IIT – JEE | FOUNDATIONS

MATRIC PRACTICE PAPER (2024)

(Mathematics)

Grade: XII **Marks: 40 marks**
Chapter: Applications Of Vector Algebra **Time: 90 minutes**

SECTION A (10x1=10)

Choose the correct option.

1. The distance between the planes x+2y+3z+7=0 and 2x+4y+6x+7=0 is
   (a) $\frac{7}{2\sqrt{2}}$ (b) $\frac{\sqrt{7}}{2\sqrt{2}}$ (c) $\frac{7}{2}$ (d) $\frac{\sqrt{7}}{2}$

2. $\vec{r} = s\hat{\imath} + t\hat{\jmath}$ is the equation of (s, t are parameters)
   (a) zox plane (b) a straight line joining the points $\hat{\imath}$ *and* $\hat{\jmath}$
   (c)xoy plane (d) yoz plane

3. If $\vec{a}.\vec{b} = \vec{b}.\vec{c} = \vec{c}.\vec{a}$ = 0, then the value of $[\vec{a}, \vec{b}, \vec{c}]$ is
   (a) $|\vec{a}|.|\vec{b}|.|\overrightarrow{c}|$ (b) $\frac{1}{3}|\vec{a}|.|\vec{b}|.|\overrightarrow{c}|$ (c) 1 (d) -1

4. The angle between the lines $\frac{x-2}{3} = \frac{y+1}{-2}, z = 2$ and $\frac{x-1}{1} = \frac{2y+3}{3} = \frac{z+5}{2}$ is
   (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$

5. If the planes $\vec{r}.(2\hat{\imath} - \lambda\hat{\jmath} + \hat{k}) = 3$ *and* $\vec{r}.(4\hat{\imath} + \hat{\jmath} - \mu\hat{k})$ = 5 are parallel, then the values of λ *and* μ are
   (a) $\frac{1}{2}$,-2 (b) $\frac{-1}{2}$,2 (c) $\frac{-1}{2}$,-2 (d) $\frac{1}{2}$,2

6. If $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$; $\vec{b} = \hat{\imath} + \hat{\jmath}$; $\vec{c} = \hat{\imath}$ and $(\vec{a}\text{x}\vec{b})\text{x}\vec{c} = \lambda\vec{a} + \mu\vec{b}$, then the value of $\lambda + \mu$ is
   (a) 0 (b) 1 (c) 6 (d) 3

7. If $\vec{a}$ *and* $\vec{b}$ are unit vectors such that $[\vec{a}, \vec{b}, \vec{a}\text{x}\vec{b}] = \frac{1}{4}$, then the angle between $\vec{a}$ and $\vec{b}$ is
   (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

Mail: rkvisionkorattur@gmail.com *Ph: 8248951556*

8. If $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} - \hat{k}$; $\vec{b} = \hat{\imath} + 2\hat{\jmath} - 5\hat{k}$; $\vec{c} = 3\hat{\imath} + 5\hat{\jmath} - \hat{k}$, then a vector perpendicular to $\vec{a}$ and lies in the plane containing $\vec{b}$ and $\vec{c}$ is
   (a) $-17\hat{\imath} + 21\hat{\jmath} - 97\hat{k}$ (b) $17\hat{\imath} + 21\hat{\jmath} - 123\hat{k}$
   (c) $-17\hat{\imath} - 21\hat{\jmath} + 97\hat{k}$ (d) $-17\hat{\imath} - 21\hat{\jmath} - 97\hat{k}$

9. If a vector $\vec{\alpha}$ lies in the plane of $\vec{\beta}$ *and* $\vec{\gamma}$, then
   (a) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}]=1$ (b) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}]=-1$ (c) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}]=0$ (d) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}]=2$

10. The volume of the parallelopiped with its edges represented by the vectors $\hat{\imath} + \hat{\jmath}, \hat{\imath} + 2\hat{\jmath}, \hat{\imath} + \hat{\jmath} + \pi\hat{k}$ is
   (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) π

SECTION B (3x2=6)

Answer the following.

11. Find the magnitude and direction cosines of the tangent about the point (2,0,-1) of a force $2\hat{\imath} + \hat{\jmath} - \hat{k}$ whose line of action passes through the origin.

12. Find the vector equation of a plane which is at a distance of 7 units from the origin having 3, -4 and 5 as direction ratios of normal to it.

13. Show that the distance from the origin to the plane 3x+6y+2z+7=0 is 1.

SECTION C (3x3=9)

Answer the following.

14. Find the vector and cartesian equations of a straight line passing through the points (-5,7,-4) and (13,-5,2). Find the point where the straight line crosses the xy-plane.

15. Find the length of the perpendicular from the point (1,-2,3) to the plane x-y+z=5.

16. Find the angle made by the straight line $\frac{x+3}{2} = \frac{y-1}{2} = -z$ with coordinate axis.

SECTION D (3x5=15)

Answer the following.

17. Using vector method, prove that $\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$.

Mail: rkvisionkorattur@gmail.com *Ph: 8248951556*

18. Find the parametric form of a vector equation and cartesian equation of the plane containing the line $\vec{r}.\left(\hat{\imath}-\hat{\jmath}+\widehat{3k}\right)+\ t\left(2\hat{\imath}-\hat{\jmath}+4\hat{k}\right)\ and$ perpendicular to the plane $\vec{r}.\left(\hat{\imath}+2\hat{\jmath}+\widehat{4k}\right)$ = 8.

19. If $\vec{a}=\hat{\imath}-\hat{\jmath}\ ;\ \vec{b}=\ \hat{\imath}-\hat{\jmath}-4\hat{k}\ ;\ \vec{c}=3\hat{\jmath}-\hat{k}\ ;\ \vec{d}=\ 2\hat{\imath}+5\hat{\jmath}+\hat{k}$, verify that $(\vec{a}\mathrm{x}\vec{b})\mathrm{x}(\vec{c}\mathrm{x}\vec{d})=[\vec{a},\vec{b},\vec{d}]\vec{c}$ - $[\vec{a},\vec{b},\vec{c}]\ \vec{d}$.

Mail: rkvisionkorattur@gmail.com *Ph: 8248951556*