JEE MAIN : CHAPTER WISE TEST-11

SUBJECT :- MATHEMATICS DATE...

CLASS :- 12th NAME...

CHAPTER :- VECTOR & 3D SECTION..

(SECTION A)

1. The points (3, 2, 0), (5, 3, 2) and (–9, 6, –3), are the vertices of a triangle ABC. AD is the internal bisector of $\angle BAC$ which meets BC at D, then the co-ordinates of D, are

(A) $\left(\frac{17}{16},\frac{57}{16},\frac{19}{8}\right)$ (B) $\left(\frac{19}{8},\frac{57}{16},\frac{17}{16}\right)$

(C) $\left(0,0,\frac{17}{16}\right)$ (D) $\left(\frac{17}{16},0,0\right)$

2. The distance of the point (3, – 4 , 5) from the plane 2x + 5y – 6z = 16 measured parallel to the line $\frac{x}{2} = \frac{y}{1} = \frac{z}{-2}$ must be equal to -

(A) $\frac{30}{7}$ (B) $\frac{60}{7}$ (C) $\frac{60}{11}$ (D) $\frac{30}{11}$

3. If x + y + z = 0, | x | = | y | = | z | = 2 and θ is angle between y and z. then the value of $\text{cosec}^2\theta + \cot^2\theta$ is equal to

(A) 4/3 (B) 5/3 (C) 1/3 (D) 1

4. If the sum of the squares of the distance of a point from the three co-ordinate axes be 36, then its distance from the origin is

(A) 6 (B) $3\sqrt{2}$

(C) $2\sqrt{3}$ (D) None of these

5. If acute angle between the line $\vec{r} = \hat{i} + 2\hat{j} + \lambda(4\hat{i} - 3\hat{k})$ and xy plane is α and acute angle between the planes x + 2y = 0 and 2x + y = 0 is β then $(\cos^2\alpha + \sin^2\beta)$ equals

(A) 1 (B) $\frac{1}{4}$ (C) $\frac{2}{3}$ (D) $\frac{3}{4}$

6. Which one of the following lines is parallel to the plane 2x + 3y + 4z + 1 = 0 ?

(A) x = – 6t ; y = 1 + 9t ; z = – 3t

(B) x = – 1 + t ; y = 4 + t ; z = 1 + 3t

(C) x = 1 + 2t ; y = 3t ; z = 2 – t

(D) x = 1 + 2t ; y = 4 – 4t ; z = 2t

7. The projection of line joining (3,4,5) and (4,6,3) on the line joining (– 1, 2, 4) and (1, 0, 5) :

(A) 4/3 (B) 2/3

(C) 8/3 (D) 1/3

8. Let L_1 : $\vec{r} = \hat{i} - \hat{j} + 2\hat{k} + s(2\hat{i} + \hat{j} + 4\hat{k})$ and L_2 : $\vec{r} = -2\hat{i} - \hat{k} + t(4\hat{i} - 3\hat{j} + \hat{k})$ be two lines in R^3, then

(A) L_1 and L_2 are intersecting lines at a unique point.

(B) L_1 and L_2 are parallel lines with no intersecting point.

(C) L_1 and L_2 are coincident lines.

(D) L_1 and L_2 are skew lines.

9. The plane 2x – 3y + 6z – 11 = 0 makes an angle $\sin^{-1}$(a) with the x-axis. Then the value of 'a' is :

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{\sqrt{2}}{3}$ (C) $\frac{3}{7}$ (D) $\frac{2}{7}$

10. The distance between the line $\vec{r} = (2\hat{i} - 2\hat{j} + 3\hat{k}) + \lambda(\hat{i} - \hat{j} + 4\hat{k})$ & the plane $\vec{r}.(\hat{i} + 5\hat{j} + \hat{k}) = 5$ is :

(A) $\frac{10}{3\sqrt{3}}$ (B) $\frac{10}{3}$

(C) $\frac{10}{9}$ (D) None of these

11. If the shortest distance between the line $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda_1(2\hat{i} + 3\hat{j} + 4\hat{k})$ and $\vec{r} = (2\hat{i} + 4\hat{j} + 5\hat{k}) + \lambda_2(3\hat{i} + 4\hat{j} + \hat{k})$ is x, then $\cos^{-1}(\cos\sqrt{6}\,x)$ is equal to -

(A) 1/2 (B) 0 (C) 1 (D) 2

12. The image of the point having the position vector $\hat{i} + 3\hat{j} + 4\hat{k}$ in the plane $\vec{r}.(2\hat{i} - \hat{j} + \hat{k}) + 3 = 0$ is

(A) $3\hat{i} + 2\hat{j} + \hat{k}$ (B) $3\hat{i} + 5\hat{j} + 2\hat{k}$

(C) $-3\hat{i} + 5\hat{j} + 2\hat{k}$ (D) $3\hat{i} + 2\hat{j} - 5\hat{k}$

13. Let $\vec{a}$, $\vec{b}$, $\vec{c}$ are 3 vectors mutually perpendicular such that $|\vec{a}| = |\vec{b}| = |\vec{c}|$. If a vector $\vec{m}$ satisfies the equation:

$\vec{a} \times [(\vec{m} - \vec{b}) \times \vec{a}] + \vec{b} \times [(\vec{m} - \vec{c}) \times \vec{b}] + \vec{c} \times [(\vec{m} - \vec{a}) \times \vec{c}] = 0$, then vector $\vec{m}$ equals-

(A) $\vec{a} + \vec{b} + \vec{c}$ (B) $\vec{a} + \vec{b} - \vec{c}$

(C) $\vec{a} - \vec{b} + \vec{c}$ (D) None of these

14. If $\vec{a} + \vec{b} + \vec{c} = \alpha\vec{d}$, $\vec{b} + \vec{c} + \vec{d} = \beta\vec{a}$ and $[\vec{a}\ \vec{b}\ \vec{c}] \neq 0$ then $\vec{a} + \vec{b} + \vec{c} + \vec{d}$ equals -

(A) $\alpha\vec{a}$ (B) $\beta\vec{b}$

(C) 0 (D) $(\alpha+\beta)\vec{c}$

15. If the vector $\vec{x}$ satisfying $\vec{x} \times \vec{a} + (\vec{x}.\vec{b})\vec{c} = \vec{d}$ given by $\vec{x} = \lambda\vec{a} + \vec{a} \times \frac{\vec{a}\times(\vec{d}\times\vec{c})}{(\vec{a}.\vec{c})a^2}$, then λ =

(A) $\frac{\vec{a}.\vec{c}}{a^2}$ (B) $\frac{\vec{a}.\vec{b}}{b^2}$

(C) $\frac{\vec{c}.\vec{d}}{c^2}$ (D) $\frac{\vec{a}.\vec{x}}{a^2}$

16. $\vec{a} = \hat{i} + 2\hat{k}$, $\vec{b} = \hat{i} + \hat{j} + \hat{k}$, $\vec{c} = 7\hat{i} - 3\hat{j} + 4\hat{k}$, then the vector $\vec{d}$ satisfies the relation $\vec{d} \times \vec{b} = \vec{c} \times \vec{b}$, $\vec{a}.\vec{d} = 0$ is given by –

(A) $2\hat{i} + 4\hat{j} + \hat{k}$ (B) $2\hat{i} - 8\hat{j} - \hat{k}$

(C) $2\hat{i} + 5\hat{j} + 2\hat{k}$ (D) None of these

17. If the vectors $\vec{b} = \left(\tan\alpha, -1, 2\sqrt{\tan\frac{\alpha}{2}}\right)$, $\vec{c} = \left(\tan\alpha, \tan\alpha, \frac{-3}{\sqrt{\sin\frac{\alpha}{2}}}\right)$ are orthogonal and vector $\vec{a}$ = (1, 3, sin 2α) makes an obtuse angle with z- axis then α equals:

(A) $(2n+1)\pi + \tan^{-1} 2$

(B) $(2n+1)\pi - \tan^{-1} 2$

(C) $n\pi - \tan^{-1} 2$

(D) None of these

18. If $\vec{a}, \vec{b}, \vec{c}$ are such that $[\vec{a}, \vec{b}, \vec{c}]$ = 1, $\vec{c} = \lambda(\vec{a}\times\vec{b})$, $\vec{a} \wedge \vec{b} < \frac{2\pi}{3}$, and $|\vec{a}| = \sqrt{2}$, $|\vec{b}| = \sqrt{3}$, $|\vec{c}| = \frac{1}{\sqrt{3}}$, then the angle between $\vec{a}$ and $\vec{b}$ is

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

19. A unit vector $\vec{a}$ in the plane $\vec{b} = 2\hat{i} + \hat{j}$ and $\vec{c} = \hat{i} - \hat{j} + \hat{k}$ is such that $\vec{a} \wedge \vec{b} = \vec{a} \wedge \vec{d}$ where $\vec{d} = \hat{j} + 2\hat{k}$ is

(A) $\frac{\hat{i}+\hat{j}+\hat{k}}{\sqrt{3}}$ (B) $\frac{\hat{i}-\hat{j}+\hat{k}}{\sqrt{3}}$

(C) $\frac{2\hat{i}+\hat{j}}{\sqrt{3}}$ (D) $\frac{2\hat{i}+\hat{j}}{\sqrt{5}}$

20. sFor α > 0, let the volume of parallelopiped whose adjacent edges are $\vec{a} = 2\hat{i} + 3\hat{j} + 4\hat{k}$, $\vec{b} = \hat{i} + \alpha\hat{j} + 2\hat{k}$, $\vec{c} = \hat{i} + 2\hat{j} + \alpha\hat{k}$ s is 15, then the value of α is equal to

(A) $\frac{5}{2}$ (B) $\frac{7}{2}$

(C) $\frac{9}{2}$ (D) $\frac{13}{2}$s

(SECTION B)

21. The length of perpendicular drawn from (1, 2, 3) to the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$ is

22. ABC is a triangle A = (2, 3, 5), B = (–1, 3, 2) and C = (λ, 5, μ). If the median through A is equally inclined to the axes, then $\lambda+\mu$ = 17

23. The distance between two points P and Q is d and the length of their projections of PQ on the coordinate planes are d_1, d_2, d_3. Then $d_1^2 + d_2^2 + d_3^2 = Kd^2$ where K is –

24. P, Q, R, S are four coplanar points on the sides AB, BC, CD, DA of a skew quadrilateral. The product $\frac{AP}{PB}.\frac{BQ}{QC}.\frac{CR}{RD}.\frac{DS}{SA}$ equals –

25. The plane containing the two lines $\frac{x-3}{1} = \frac{y-2}{4} = \frac{z-1}{5}$ and $\frac{x-2}{1} = \frac{y+3}{-4} = \frac{z+1}{5}$ is 11x + my + nz = 28 then |m + n| is eqyal to

26. If distance between two non-intersecting planes P_1 and P_2 is 3 units, where P_1 is $2x - 3y + 6z + 5 = 0$ and P_2 is $4x + by + cz + d = 0$ and point A (–3, 0, –1) is lying between the planes P_1 and P_2 then the value of (b + c + d), is equal to

27. If $x\vec{i}+\vec{j}+\vec{k}$, $\vec{i}+y\vec{j}+\vec{k}$ and $\vec{i}+\vec{j}+z\vec{k}$ are coplanar where $x \neq 1$, $y \neq 1$, $z \neq 1$ then value of $\frac{1}{1-x} + \frac{1}{1-y} + \frac{1}{1-z}$ is -

28. If$(2\hat{i} + P\hat{j} + 2\hat{k})$ is perpendicular to $(4\hat{i}-2\hat{j}-\hat{k})$ then value of P is

29. If the line $2x + y = 0 = x - y + z$ is parallel to the plane $kx + y + z + 2 = 0$ then the value of k is equal to

30. If O (origin) is a point inside the triangle PQR such that $\overrightarrow{OP} + k_1\overrightarrow{OQ} + k_2\overrightarrow{OR} = 0$ s, where k_1, k_2 are constants such that $\frac{\text{Area}(\Delta PQR)}{\text{Area}(\Delta OQR)} = 4$, then the value of $k_1 + k_2$ is