



MATHS

BOOKS - NTA MOCK TESTS

VECTOR ALGEBRA TEST

Multiple Choice Questions

1. If the vectors
$$\overrightarrow{a}, \overrightarrow{b}$$
 and \overrightarrow{c} are the sides BC,CA and

AB respectively of a triangle ABC then

A.
$$\overrightarrow{a}$$
. \overrightarrow{b} + \overrightarrow{b} . \overrightarrow{c} + \overrightarrow{c} . \overrightarrow{a} = 0

B.
$$\overrightarrow{a} \times \overrightarrow{b} = \overrightarrow{b} \times \overrightarrow{c} = \overrightarrow{c} \times \overrightarrow{a}$$

C. $\overrightarrow{a} \cdot \overrightarrow{b} = \overrightarrow{b} \cdot \overrightarrow{c} = \overrightarrow{c} \cdot \overrightarrow{a}$
D. $\overrightarrow{a} \times \overrightarrow{b} + \overrightarrow{b} \times \overrightarrow{c} + \overrightarrow{c} \times \overrightarrow{a} = 0$

Answer: B



2. If
$$\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$$
 are unit vectors such that
 $\overrightarrow{a} + 2\overrightarrow{b} + 2\overrightarrow{c} = \overrightarrow{0}$ then $|\overrightarrow{a} \times \overrightarrow{c}|$ is equal to
A. $\frac{1}{4}$
B. $\frac{15}{16}$

C.
$$\frac{\sqrt{15}}{4}$$

D. $\frac{\sqrt{15}}{16}$

Answer: C



3. A line with positive direction cosines passes through the point P(2,-1,2) makes equal angles with the coordinate axes. The line meets the plane 2x + y + z = 9 at point Q. The length of the line segment PQ equals

B. $\sqrt{2}$ C. $\sqrt{3}$

D. 2

Answer: C

4. Let
$$\overrightarrow{a} = \hat{i} + 4\hat{j} + 2\hat{k}$$
, $\overrightarrow{b} = 3\hat{i} - 2\hat{j} + 7\hat{k}$ and $\overrightarrow{c} = 2\hat{i} - \hat{j} + 4\hat{k}$. Which of the following is representing a vector \overrightarrow{p} which is perpendicular to both \overrightarrow{a} and \overrightarrow{b} and also whose scalar product with vector \overrightarrow{c} would be $\overrightarrow{p} \cdot \overrightarrow{c} = 18$.

A.
$$\overrightarrow{p}=32\hat{i}-2\hat{j}-28\hat{k}$$

B. $\overrightarrow{p}=64\hat{i}-2\hat{j}-28\hat{k}$
C. $\overrightarrow{p}=64\hat{i}+2\hat{j}-28\hat{k}$
D. $\overrightarrow{p}=64\hat{i}-2\hat{j}+28\hat{k}$

Answer: B



5.
$$\overrightarrow{a}$$
. $\left(\overrightarrow{a} \times \overrightarrow{b}\right) =$

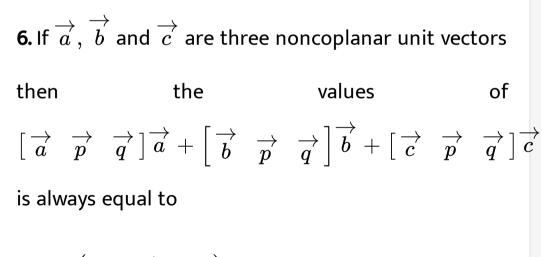
A.
$$\stackrel{
ightarrow}{b}$$
 . $\stackrel{
ightarrow}{b}$

C. 0

 $\mathsf{D}. a^2 + ab$

Answer: C





$$\begin{array}{l} \mathsf{A.} \left(\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} \right) \times \left(\overrightarrow{p} \times \overrightarrow{q} \right) \\ \\ \mathsf{B.} \overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} + \overrightarrow{p} + \overrightarrow{q} \end{array}$$

$$\mathsf{C}.\overrightarrow{p}+\overrightarrow{q}$$
 $\mathsf{D}.\overrightarrow{p} imes \overrightarrow{q}$

Answer: D



7. If the scalar projection of the vectors $x\hat{i} - \hat{j} + \hat{k}$ on the vectors $2\hat{i} - \hat{j} + 5\hat{k}$ is $\frac{1}{\sqrt{3}}$ then value of x is

equal to

A.
$$rac{-5}{2}$$

C.-6

D. 3

Answer: A



8. Let OACB be parallelogram with O at origin & OC a diagonal.Let D be the mid point of OA. Then the ratio in which OC intersect BD is

A. 2:1

B. 2:3

C.3:4

D. 4:5

Answer: A



9. Let
$$\overrightarrow{r}$$
 be a unit vector satisfying $\overrightarrow{r} \times \overrightarrow{a} = \overrightarrow{b}$
where $\left|\overrightarrow{a}\right| = \sqrt{3}$ and $\left|\overrightarrow{b}\right| = \sqrt{2}$ then
A. $\overrightarrow{r} = \frac{2}{3} \left(\overrightarrow{a} + \overrightarrow{a} \times \overrightarrow{b}\right)$
B. $\overrightarrow{r} = \frac{1}{3} \left(\pm \overrightarrow{a} + \overrightarrow{a} \times \overrightarrow{b} \right)$
C. $\overrightarrow{r} = \frac{1}{4} \left(\pm \overrightarrow{a} + \overrightarrow{a} \times \overrightarrow{b} \right)$
D. $\overrightarrow{r} = \frac{2}{3} \left(\pm \overrightarrow{a} + \overrightarrow{a} \times \overrightarrow{b} \right)$

Answer: B



10. Let
$$\overrightarrow{a} = \hat{i} + \hat{j} + \sqrt{2}\hat{k}$$
,
 $\overrightarrow{b} = b_1\hat{i} + b_2\hat{j} + \sqrt{2}\hat{k}$ and
 $\overrightarrow{c} = 6\hat{i} + \hat{j} + \sqrt{2}\hat{k}$ be three vectors such that the
projection vector of \overrightarrow{b} on \overrightarrow{a} is $\left|\overrightarrow{a}\right|$
If $\overrightarrow{a} + \overrightarrow{b}$ is perpendicular to \overrightarrow{c} then $\left|\overrightarrow{b}\right|$ is equal to

A. $\sqrt{22}$

B. $\sqrt{32}$

C. 6

Answer: C

View Text Solution

11. Unit vectors \hat{a} and \hat{b} are perpendicular to each other and the unit vector \hat{c} is inclined at angle θ to both \hat{a} and \hat{b} . If $\hat{c} = m(\hat{a} + \hat{b}) + n(\hat{a} \times \hat{b})$ and m,n are real, then

$$\begin{array}{l} \mathsf{A}.\, \displaystyle\frac{\pi}{4} \leq \theta \leq \displaystyle\frac{3\pi}{4} \\ \\ \mathsf{B}.\, \displaystyle\frac{\pi}{4} \leq \theta \leq \displaystyle\frac{3\pi}{2} \\ \\ \mathsf{C}.\, \displaystyle\frac{\pi}{4} \leq \theta \leq \displaystyle\frac{\pi}{2} \end{array}$$

D.
$$rac{\pi}{4} \leq heta \leq \pi$$

Answer: A

View Text Solution

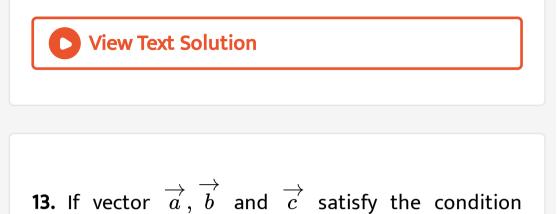
12. If the three vectors $\lambda \hat{i} + \hat{j} + 2 \hat{k},\, \hat{i} + \lambda \hat{j} - \hat{k}$

and $2\hat{i}-\hat{j}+\lambda\hat{k}$ are coplanar, then λ may be equal to

A. −2 B. −3 C. 2

D. $1-2\sqrt{3}$

Answer: A



 $\left(\overrightarrow{b}-\overrightarrow{a}
ight).\left(\overrightarrow{c}-\dfrac{\overrightarrow{a}+\overrightarrow{b}}{2}
ight)$ is

 $\mathsf{A.}\,2$

B. 1

C. -1

D. 0

Answer: D



14. The vector c directed along the internal bisector of the angle between the vectors $\overrightarrow{a}=7\hat{i}-4\hat{j}-4\hat{k}$ and $\stackrel{
ightarrow}{b}=\ -2\hat{i}-\hat{j}+2\hat{k}$ with $\left|\stackrel{
ightarrow}{c}
ight|=5\sqrt{6}$ is A. $rac{5}{2}ig(\hat{i}-7\hat{j}+2\hat{k}ig)$ B. $\frac{5}{2}\left(5\hat{i}+5\hat{j}+2\hat{k}\right)$ $\mathsf{C}.\,\frac{5}{2}\big(\hat{i}+7\hat{i}+2\hat{k}\big)$ D. $\frac{5}{2} \left(-5\hat{i} + 5\hat{j} + 2\hat{k} \right)$

Answer: A

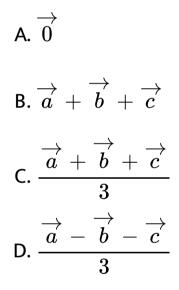
15. Let $\overrightarrow{x}, \overrightarrow{y}, \overrightarrow{z}$ be vectors such that $|\overrightarrow{x}| = |\overrightarrow{y}| = |\overrightarrow{z}| = \sqrt{2}$ and $\overrightarrow{x}, \overrightarrow{y}, \overrightarrow{z}$ make angles of 60° with each other and $(\overrightarrow{x} \times \overrightarrow{y}) = \overrightarrow{c}$ then $\overrightarrow{x} =$

$$\begin{array}{l} \mathsf{A.} \left\{ \left(\overrightarrow{a} + \overrightarrow{b} \right) \times \overrightarrow{c} - \left(\overrightarrow{a} + \overrightarrow{b} \right) \right\} \\ \mathsf{B.} \left\{ \left(\overrightarrow{a} + \overrightarrow{b} \right) - \left(\overrightarrow{a} + \overrightarrow{b} \right) \times \rightarrow \right\} \\ \mathsf{C.} \left\{ \left(\overrightarrow{a} + \overrightarrow{b} \right) \times \overrightarrow{c} - \left(\overrightarrow{a} + \overrightarrow{b} \right) \right\} \end{array}$$

D. None of these

Answer: C

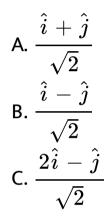
16. If A,B and C are the vertices of a triangle whose position vectors are \overrightarrow{a} , \overrightarrow{b} and \overrightarrow{c} respectively G is the centroid of the ΔABC ,then $\overrightarrow{GA} + \overrightarrow{GB} + \overrightarrow{GC}$ is



Answer: A



17. A unit vector in the xy-plane that makes an angle of 45° with the vector $\hat{i}+\hat{j}$ and an angle of 60° with the vector $3\hat{i}-4\hat{j}$ is



D. None of these

Answer: D



18. If $\overrightarrow{x} + \overrightarrow{y} + \overrightarrow{z} = \overrightarrow{0}$, $\left|\overrightarrow{x}\right| = \left|\overrightarrow{y}\right| = \left|\overrightarrow{z}\right| = 2$ and θ is the angle between \overrightarrow{y} and \overrightarrow{z} then the value of $\cos ec^2\theta + \cot^2\theta$ is equal to

A.
$$\frac{4}{3}$$

B. $\frac{5}{3}$
C. $\frac{1}{3}$

D. 1

Answer: B



19. If $\overrightarrow{a} = -\hat{i} + \hat{j} + 2\hat{k}$, $\overrightarrow{b} = 2\hat{i} - \hat{j} - \hat{k}$ and $\overrightarrow{c} = -2\hat{i} + 2\hat{j} + 3\hat{k}$ then the angle between $2\overrightarrow{a} - \overrightarrow{c}$ and $\overrightarrow{a} + \overrightarrow{b}$ is

A.
$$\frac{\pi}{4}$$

B. $\frac{\pi}{3}$
C. $\frac{\pi}{2}$
D. $\frac{3\pi}{2}$

Answer: B



20. The point of intersection of the lines

$$\overrightarrow{r} = 7\hat{i} + 10\hat{j} + 13\hat{k} + s\left(2\hat{i} + 3\hat{j} + 4\hat{k}
ight)$$

and $\overrightarrow{r} = 3\hat{i} + 5\hat{j} + 7\hat{k} + t\left(\hat{i} + 2\hat{j} + 3\hat{k}
ight)$ is
A. $\hat{i} + \hat{j} - \hat{k}$

- B. $2\hat{i}-\hat{j}+4\hat{k}$
- C. $\hat{i}-\hat{j}+\hat{k}$

D.
$$\hat{i}+\hat{j}+\hat{k}$$

Answer: D

21. If \overrightarrow{a} , \overrightarrow{b} and \overrightarrow{c} are unit vectors then $\left|\overrightarrow{a} - \overrightarrow{b}\right|^2 + \left|\overrightarrow{b} - \overrightarrow{c}\right|^2 + \left|\overrightarrow{c} - \overrightarrow{a}\right|^2$ does not exceed.

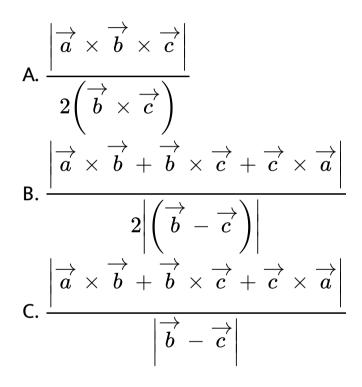
A. 6 B. 9

C. 5

D. 2

Answer: B

22. If A,B and C are three points with position vectors $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$ respectively then perpendicular distance of A from the line joining B and C is



D. Non

Answer: C





23. If three points whose position vectors are $A = a\hat{i} + b\hat{j} + c\hat{k}, B = \hat{i} + \hat{j}$ and $C = -\hat{i} - \hat{j}$ are collinear then

A.
$$\overrightarrow{a} - 2\overrightarrow{b} = 1$$

B. $\overrightarrow{a} - 2\overrightarrow{b} = 2$
C. $\overrightarrow{a} - 2\overrightarrow{b} = 3$
D. $\overrightarrow{a} - 2\overrightarrow{b} = 0$

Answer: A

24. Consider \widehat{a} and \widehat{b} be two unit vectors such that $\widehat{a} + \widehat{b}$ is also a unit vector. Then the angle between \widehat{a} and \widehat{b} is

A. Acute angle

B. Riht angle

C. Obtuse angle

D. Striaght angle

Answer: C

25. If
$$\overrightarrow{a} = \overrightarrow{b} + \overrightarrow{c}, \overrightarrow{b} \times \overrightarrow{d} = \overrightarrow{0}, \overrightarrow{c}, \overrightarrow{d} = 0$$
 then
the vector $\frac{\overrightarrow{d} \times \left(\overrightarrow{a} \times \overrightarrow{d}\right)}{\left|\overrightarrow{d}\right|^2}$ is always equal to

A.
$$\overrightarrow{a}$$

$$\mathsf{B}.\, \overset{\longrightarrow}{d}$$

$$\mathsf{C}.\stackrel{\rightarrow}{b}$$

D.
$$\overrightarrow{c}$$

Answer: D



26. $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$ are three noncoplanar vectors such

that

$$\begin{bmatrix} \overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} \overrightarrow{a} - \overrightarrow{b} + \overrightarrow{c} 2\overrightarrow{a} + \overrightarrow{b} - \overrightarrow{c} \end{bmatrix}$$
$$= k \begin{bmatrix} \overrightarrow{a} & \overrightarrow{b} & \overrightarrow{c} \end{bmatrix} \text{ then k is}$$

A. 3

- $\mathsf{B.}-3$
- $\mathsf{C.}\,2$
- D. 6

Answer: D



27. If the vectors $\overrightarrow{b}=\left(anlpha,\ -1,2\sqrt{\sinlpha/2}
ight)$ and

$$\overrightarrow{c}=\left(anlpha, anlpha-rac{3}{\sqrt{\sinlpha/2}}
ight)$$
 are orthogonal

and a vector $\stackrel{
ightarrow}{a}=(1,3,\sinlpha)$ makes an obtuse

angle wit z-axis, then the value of lpha is

A.
$$lpha = (4n+1)\pi - an^{-1}2, n \in Z$$

B. $lpha = (4n+2)\pi - an^{-1}2, n \in Z$
C. $lpha = (4n-1)\pi + an^{-1}2, n \in Z$
D. $lpha = (4n+2)\pi + an^{-1}2, n \in Z$

Answer: A

28. If
$$\left| \overrightarrow{a} \right| = 3$$
, $\left| \overrightarrow{b} \right| = 4 \left| \overrightarrow{c} \right| = 5$ and
 $\overrightarrow{a} \perp \left(\overrightarrow{b} + \overrightarrow{c} \right)$
 $\overrightarrow{b} \perp \left(\overrightarrow{c} + \overrightarrow{a} \right)$, $\overrightarrow{c} \perp \left(\overrightarrow{a} + \overrightarrow{b} \right)$, then
 $\left| \overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} \right|$ is equal to

B.25

C. $5\sqrt{2}$

D. 12

Answer: C



29. If \overrightarrow{a} , \overrightarrow{b} , \overrightarrow{c} are non coplanar non zero vectors such that $\overrightarrow{b} \times \overrightarrow{c} = \overrightarrow{a}$, $\overrightarrow{a} \times \overrightarrow{b} = \overrightarrow{c}$ and $\overrightarrow{c} \times \overrightarrow{a} = \overrightarrow{b}$,

then which of the following is not true

$$\begin{array}{l} \mathsf{A}. \left| \overrightarrow{a} \right| = 1 \\ \mathsf{B}. \left[\overrightarrow{a} \quad \overrightarrow{b} \quad \overrightarrow{c} \right] = 1 \\ \mathsf{C}. \left| \overrightarrow{a} \right| + \left| \overrightarrow{b} \right| + \left| \overrightarrow{c} \right| = 3 \\ \mathsf{D}. \left| \overrightarrow{a} \right| \neq \left| \overrightarrow{b} \right| \neq \left| \overrightarrow{c} \right| \end{array}$$

Answer: D

30. If x, y and z are non zero real numbers and $\overrightarrow{a} = x\hat{i} + 2\hat{j}, \overrightarrow{b} = y\hat{j} + \hat{k}$ and $\overrightarrow{c} = x\hat{i} + y\hat{j} + z\hat{k}$ are such that $\overrightarrow{a} \times \overrightarrow{b} = z\hat{i} - 3\hat{j} + \hat{k}$ then $\begin{bmatrix} \overrightarrow{a} & \overrightarrow{b} & \overrightarrow{c} \end{bmatrix}$ equals to

A. 3

B. 10

C. 9

D. 6

Answer: C

