1.

If a vector $2\hat{i} + 3\hat{j} + 8\hat{k}$ is perpendicular to the vector $4\hat{i} + 4\hat{j} + \alpha\hat{k}$. Then the value of α is:

1. -1
2. 1/2
3. -5/2
4. 1

2.

There are two force vectors, one of 5N and the other of 12N. At what angle the two vectors be added to get the resultant vector of 17N, 7N, and 13N respectively

1. 0°, 180° and 90°
2. 0°, 90° and 180°
3. 0°, 90° and 90°
4. 180°, 0° and 90°

3.

If the angle between two forces increases, the magnitude of their resultant:

1. Decreases
2. Increases
3. Remains unchanged
4. First decreases and then increases

4.

If $\vec{P} = \vec{Q}$ then which of the following is **NOT** correct?

1. $\hat{P} = \hat{Q}$
2. $\left|\vec{P}\right| = \left|\vec{Q}\right|$
3. $P\hat{Q} = Q\hat{P}$
4. $\vec{P} + \vec{Q} = \hat{P} + \hat{Q}$

5.

Two forces of the same magnitude are acting on a body in the East and North direction respectively. If the body remains in equilibrium, then the third force should be applied in the direction of

(1) North-East

(2) North-West

(3) South-West

(4) South-East

6.

The vector sum of two vectors $\vec{A}$ and $\vec{B}$ is maximum, then the angle θ between two vectors is:

(1) 0°

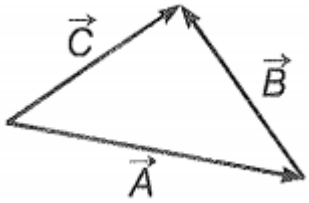
(2) 30°

(3) 45°

(4) 60°

7.

Which is true for the given figure?



(1) $\vec{B} = \vec{A} + \vec{C}$

(2) $\vec{A} = \vec{B} + \vec{C}$

(3) $\vec{C} = \vec{A} + \vec{B}$

(4) All of these

8.

A force of 5N acts on a particle along a direction making an angle of 60° with vertical. Its vertical component will be:

1. 10 N
2. 3 N
3. 4 N
4. 2.5 N

9.

If $\vec{A} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ the direction cosines of the vector $\vec{A}$ are:

(**direction cosines** (or directional **cosines**) of a vector are the **cosines** of the angles between the vector and the three +ve coordinate axes.)

1. $\frac{2}{\sqrt{45}}$, $\frac{4}{\sqrt{45}}$ and $\frac{-5}{\sqrt{45}}$
2. $\frac{1}{\sqrt{45}}$, $\frac{2}{\sqrt{45}}$ and $\frac{3}{\sqrt{45}}$
3. $\frac{4}{\sqrt{45}}$, 0 and $\frac{4}{\sqrt{45}}$
4. $\frac{3}{\sqrt{45}}$, $\frac{2}{\sqrt{45}}$ and $\frac{5}{\sqrt{45}}$

10.

If the magnitude of the sum of two vectors is equal to the magnitude of the difference of the two vectors, the angle between these vectors is:

1. 0^0
2. 90^0
3. 45^0
4. 180^0

11.

If $\hat{p}$ is the unit vector in the direction $\vec{B}$, then:

1. $\hat{p} = \frac{|\vec{B}|}{\vec{B}}$
2. $\hat{p} = |\vec{B}| \times \vec{B}$
3. $\hat{p} = \frac{\vec{B}}{|\vec{B}|}$
4. $\hat{p} = \frac{\vec{B}}{\vec{B}}$

12.

$\vec{A}$ and $\vec{B}$ are two vectors given by $\vec{A} = 2\hat{i} + 3\hat{j}$ and $\vec{B} = \hat{i} + \hat{j}$. The component of $\vec{A}$ parallel to $\vec{B}$ is:

1. $\frac{1}{2}(2\hat{i} - \hat{j})$
2. $\frac{5}{2}(\hat{i} - \hat{j})$
3. $\frac{5}{2}(\hat{i} + \hat{j})$
4. $\frac{(3\hat{i} - 2\hat{j})}{2}$

13.

The angle made by the vector $\vec{A} = \sqrt{3}\hat{i} + 3\hat{j} + 2\hat{k}$ with y-axis is:

1. $\sin^{-1}(\frac{3}{\sqrt{14}})$
2. $\sin^{-1}(\frac{\sqrt{7}}{4})$
3. $\cos^{-1}(\frac{4}{3})$
4. $\cos^{-1}(\frac{3}{5})$

14.

If $|\vec{A} \times \vec{B}| = \sqrt{3}\vec{A}.\vec{B}$, then the value of $|\vec{A} + \vec{B}|$ is:-

1. $(A^2 + B^2 + \frac{AB}{\sqrt{3}})^{1/2}$
2. $A + B$
3. $(A^2 + B^2 + \sqrt{3}AB)^{1/2}$
4. $(A^2 + B^2 + AB)^{1/2}$

15.

If $|\vec{A}| \neq |\vec{B}|$ and $|\vec{A} \times \vec{B}| = |\vec{A} \cdot \vec{B}|$, then

1. $\vec{A} \perp \vec{B}$
2. $\vec{A} \parallel \vec{B}$
3. $\vec{A}$ is antiparallel to $\vec{B}$
4. $\vec{A}$ is inclined to $\vec{B}$ at an angle of 45°

16.

If $\vec{a} = 2\hat{i} + \hat{j}$ and $\vec{b} = 3\hat{i} + 2\hat{j}$, then $|\vec{a} \times \vec{b}|$=?

1. 1
2. $\sqrt{65}$
3. 8
4. 4

17.

What is the torque of a force $\vec{F} = (2\hat{i} - 3\hat{j} + 4\hat{k})$ Newton acting at a point $\vec{r} = (3\hat{i} + 2\hat{j} + 3\hat{k})$ metre about the origin? (Given: $\vec{\tau} = \vec{r} \times \vec{F}$)

1. $6\hat{i} - 6\hat{j} + 12\hat{k}$
2. $17\hat{i} - 6\hat{j} - 13\hat{k}$
3. $-6\hat{i} + 6\hat{j} - 12\hat{k}$
4. $-17\hat{i} + 6\hat{j} - 13\hat{k}$

18.

Two vectors are as given $\vec{A} = (2\hat{i} - 5\hat{j} + 2\hat{k})$ and $\vec{B} = (4\hat{i} - 10\hat{j} + c\hat{k})$. What should be the value of c so that vector $\vec{A}$ and $\vec{B}$ be parallel to each other?

1. 1
2. 2
3. 3
4. 4

19.

The position of a particle in a rectangular co-ordinate system is (3, 2, 5). Then its position vector will be:

1. $5\hat{i} + 6\hat{j} + 2\hat{k}$
2. $3\hat{i} + 2\hat{j} + 5\hat{k}$
3. $5\hat{i} + 3\hat{j} + 2\hat{k}$
4. None of these

20.

If vectors $\hat{i} - 3\hat{j} + 5\hat{k}$ and $\hat{i} - 3\hat{j} - \alpha\hat{k}$ are equal vectors, then the value of α is:

1. -5
2. 2
3. -3
4. 4

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