**1.** $\vec{a}, \vec{b}, \vec{c}$ are three coplanar vectors. Find the vector sum, $\vec{a} = 4\hat{i} - \hat{j}, \vec{b} = -3\hat{i} + 2\hat{j}, \vec{c} = -3\hat{j}$

(a) $\sqrt{5}, 297^0$ (b) $\sqrt{5}, 63^0$ (c) $\sqrt{3}, 297^0$ (d) $\sqrt{3}, 63^0$

**2.** The resultant of two forces equal in magnitude is equal to either of two vectors in magnitude. Find the angle between the forces.

(a) $60^0$ (b) $45^0$ (c) $90^0$ (d) $120^0$

**3.** A man goes 100 m North then 100 m East and then 20 m North and then $100\sqrt{2}$ m South West. Find the displacement.

(a) 20 m West (b) 20 m East

(c) 20 m North (d) 20 m South

**4.** If $|\vec{A} + \vec{B}|$ = $|\vec{A} - \vec{B}|$ then angle between the vectors A and B is

(a) 0 (b) $\pi/3$ (c) $\pi/2$ (d) $\pi/4$

**5.** A boat sails 2 km east, then 4km northeast and then in an unknown direction. Final position of the boat is 5 km east from starting point. Unknown displacement is

(a) 2.8 km, 3°26' with north towards east

(b) 3km 2°26' with east

(c) 3.5 kin, 2°30' with south towards west

(d) 1.81cm, 2°36' with north towards east.

**6.** Two vectors $\vec{a}$ and $\vec{b}$ lie in one plane. Vector $\vec{c}$ lies in different plane, then $\vec{a} + \vec{b} + \vec{c}$

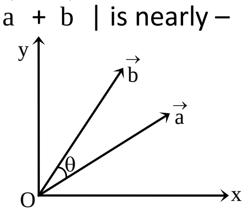
(a) May be zero (b) Must be zero

(c) Must not be zero (d) All of above are possible

**7.** If $\vec{a}$ and $\vec{b}$ are two unit vectors and $\vec{R} = \vec{a} + \vec{b}$ and also if $|\vec{R}|$ = R, then -

(a) R < 0 (b) R > 2 (c) $0 \le R \le 2$ (d) R must be 2

**8.** For the vectors $\vec{a}$ and $\vec{b}$ shown in figure, $\vec{a}$ = $\sqrt{3}$ $\hat{i}$ + $\hat{j}$ and $|\vec{b}|$ = 10 units while θ = 23º, then the value of R = $|\vec{a} + \vec{b}|$ is nearly –




(a)12 (b)13 (c)14 (d)15

**9.** The resultant of two vectors $\vec{P}$ and $\vec{Q}$ is $\vec{R}$. If the magnitude of $\vec{Q}$ is doubled, the new resultant becomes perpendicular to $\vec{P}$, then the magnitude of $\vec{R}$ is -

(a) $\frac{P^2 - Q}{2PQ}$ (b) $\frac{P + Q}{P - Q}$ (c) Q (d) $\frac{P}{Q}$

**10.** The maximum and the minimum magnitudes of the resultant of two given vectors are 17 unit and 7 unit respectively. If these two vectors are at right angles to each other, the magnitude of their resultant is -

(a) 14 (b)16 (c)18 (d)13

**11.** Vector $\vec{R}$ is the resultant of the vectors $\vec{A}$ and $\vec{B}$. Ratio of minimum value of $|\vec{R}|$ and maximum value of $|\vec{R}|$ is $\frac{1}{4}$. Then $\frac{|\vec{A}|}{|\vec{B}|}$ may be –

(a) $\frac{4}{1}$ (b) $\frac{2}{1}$ (c) $\frac{3}{5}$ (d) $\frac{1}{4}$

**12.** The unit vector parallel to the resultant of the vectors

$\vec{A} = 4\hat{i} + 3\hat{j} + 6\hat{k}$ and $\vec{B} = -\hat{i} + 3\hat{j} - 8\hat{k}$ is -

(a) $\frac{1}{7}(3\hat{i} + 6\hat{j} - 2\hat{k})$ (b) $\frac{1}{7}(3\hat{i} + 6\hat{j} + 2\hat{k})$

(c) $\frac{1}{49}(3\hat{i} + 6\hat{j} + 2\hat{k})$ (d) $\frac{1}{49}(3\hat{i} + 6\hat{j} - 2\hat{k})$

**13.** What is the numerical value of the vector $3\hat{i} + 4\hat{j} + 5\hat{k}$ ?

(a) $3\sqrt{2}$ (b) $5\sqrt{2}$ (c) $7\sqrt{2}$ (d) $9\sqrt{2}$

**14.** Given : $\vec{A} = \hat{i} + 2\hat{j} - 3\hat{k}$. When a vector $\vec{B}$ is added to $\vec{A}$, we get a unit vector along X-axis. Then, $\vec{B}$ is–

(a) $-2\hat{j} + 3\hat{k}$ (b) $-\hat{i} - 2\hat{j}$ (c) $-\hat{i} + 3\hat{k}$ (d) $2\hat{j} - 3\hat{k}$

**15.** Given : $\vec{R} = \vec{A} + \vec{B}$ and R = A = B. The angle between $\vec{A}$ and $\vec{B}$ is–

(a) $60^0$ (b) $90^0$ (c) $120^0$ (d) $180^0$

**16.** A force vector applied on a mass is represented as $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$ N and accelerates the mass at 1 m $s^{-2}$. The mass of the body is–

(a)10 kg (b) 20 kg (c) $2\sqrt{10}$kg (d) $10\sqrt{2}$kg

**17.** The vector $5\hat{i}+2\hat{j}-\ell\hat{k}$ is perpendicular to the vector $3\hat{i}+\hat{j}+2\hat{k}$ for $\ell$ =

(a) 1 (b) 4.7 (c) 6.3 (d) 8.5

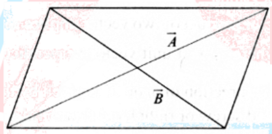
**18.** The vector which must be added to the sum of the two vectors $\hat{i}+2\hat{j}-\hat{k}$ and $\hat{i}-2\hat{j}+2\hat{k}$ to get a resultant of unit vector along z-axis is –

(a) $2\hat{i}+\hat{j}$ (b) $-2\hat{i}$ (c) $\hat{i}+\hat{j}+\hat{k}$ (d) $\hat{i}-\hat{j}-\hat{k}$

**19.** Given : $\vec{A}=\hat{i}+2\hat{j}-3\hat{k}$. When a vector $\vec{B}$ is added to $\vec{A}$, we get a unit vector along X-axis. Then, $\vec{B}$ is-

(a) $-2\hat{j}+3\hat{k}$ (b) $-\hat{i}-2\hat{j}$ (c) $-\hat{i}+3\hat{k}$ (d) $2\hat{j}-3\hat{k}$

**20.** A parallelogram has diagonals expressed as $\vec{A}=5\hat{i}-4\hat{j}+3\hat{k}$ and $\vec{B}=3\hat{i}+2\hat{j}-\hat{k}$. Area of parallelogram is




(a) $\sqrt{117}$ units (b) $\sqrt{171}$ units

(c) $\sqrt{711}$ units (d) $\sqrt{107}$ units

**21.** If $\vec{a}_1$ and $\vec{a}_2$ are two non collinear unit vectors and if $|\vec{a}_1+\vec{a}_2|=\sqrt{3}$, then the value of $(\vec{a}_1-\vec{a}_2)\cdot(2\vec{a}_1+\vec{a}_2)$ is –

(a) 2 (b) $\frac{3}{2}$ (c) $\frac{1}{2}$ (d) 1

**22.** The sum, difference and cross product of two vectors $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ are mutually perpendicular if :

(a) $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ are perpendicular to each other and $|\vec{\mathbf{A}}|=|\vec{\mathbf{B}}|$

(b) $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ are perpendicular to each other

(c) $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ are perpendicular but their magnitudes are arbitrary

(d) $|\vec{\mathbf{A}}|=|\vec{\mathbf{B}}|$ and their directions are arbitrary

**23.** If $\vec{A}=\hat{i}+2\hat{j}+2\hat{k}$ and $\vec{B}=3\hat{i}+6\hat{j}+2\hat{k}$, then the vector in the direction of $\vec{A}$ and having same magnitude as $|\vec{B}|$, is -

(a) $\frac{7}{3}(\hat{i}+2\hat{j}+2\hat{k})$ (b) $7(\hat{i}+2\hat{j}+2\hat{k})$

(c) $\frac{3}{7}(\hat{i}+2\hat{j}+2\hat{k})$ (d) $\frac{7}{9}(\hat{i}+2\hat{j}+2\hat{k})$

**24.** The angle between two vectors $(2\hat{i}+3\hat{j}+\hat{k})$ and $(-3\hat{i}+6\hat{k})$ is-

(a) $0^0$ (b) $45^0$ (c) $60^0$ (d) $90^0$

**25.** 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 $\alpha$ is-

(a) –1 (b) $\frac{1}{2}$ (c) $\frac{-1}{2}$ (d) 1

**26.** A vector $\vec{F}_1$ is along the positive x-axis. If its vector product with another vector $\vec{F}_2$ is zero then $\vec{F}_2$ may be -

(a) $4\hat{j}$ (b) $-(\hat{i}+\hat{j})$ (c) $(\hat{i}+\hat{k})$ (d) $-4\hat{i}$

**27.** Find out the unit vector perpendicular to both vectors $\hat{i}-\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+\hat{k}$.

(a) $\hat{i}+\hat{j}$ (b) $\frac{-\hat{i}+\hat{k}}{\sqrt{2}}$ (c) $\hat{j}+\hat{k}$ (d) $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$

**28.** A vector $\vec{P}_1$ is along the positive *x*-axis. If its vector product with another vector $\vec{P}_2$ is zero, then $\vec{P}_2$ could be–

(a) $4\hat{j}$ (b) $-4\hat{i}$ (c) $(\hat{j}+\hat{k})$ (d) $-(\hat{i}+\hat{j})$

**29.** The adjacent sides of a parallelogram are represented by co-initial vectors $2\hat{i}+3\hat{j}$ and $\hat{i}+4\hat{j}$. The area of the parallelogram is–

(a) 5 units along z-axis (b) 5 units in x-y plane

(c) 3 units in x-z plane (d) 3 units in y-z plane

**30.** A vector $\vec{A}$ of magnitude $5\sqrt{3}$ units, another vector $\vec{B}$ of magnitude 10 units are inclined to each other at an angle of 30º. The magnitude of the vector product of the two vectors is –

(a) 1 units (b) $5\sqrt{3}$ units

(c) 75 units (d) $25\sqrt{3}$ units