Shiksha Classes Bhandara
CHAPTER TEST

Subject : Physics **Topic : Vector** **M.M. : 100**

Marking Scheme:

(i) Each question is allotted 4 (four) marks for each correct response.

(ii) ¼ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

Q.1 A body is rotating with angular velocity $\vec{\omega} = (3\hat{i} - 4\hat{j} + \hat{k})$. The linear velocity of a point having position vector $\vec{r} = (5\hat{i} - 6\hat{j} + 6\hat{k})$ is – $[\vec{v} = \vec{\omega} \times \vec{r}]$

(A) $6\hat{i} + 2\hat{j} - 3\hat{k}$ (B) $18\hat{i} + 13\hat{j} - 2\hat{k}$

(C) $-18\hat{i} - 13\hat{j} + 2\hat{k}$ (D) $6\hat{i} - 2\hat{j} + 8\hat{k}$

Q.2 If force $\vec{F} = 5\hat{i} + 3\hat{j} + 4\hat{k}$ makes a displacement of $\vec{s} = 6\hat{i} - 5\hat{k}$ work done by the force is –

(A) 10 units (B) $122\sqrt{5}$ units

(C) $5\sqrt{122}$ (D) 20 units

Q.3 The sum of two vectors $\vec{A}$ and $\vec{B}$ is at right angles to their difference. Then –

(A) A = B

(B) A = 2B

(C) B = 2A

(D) $\vec{A}$ and $\vec{B}$ have the same direction

Q.4 Two vectors are perpendicular, if –

(A) $\vec{A}.\vec{B} = 1$ (B) $\vec{A} \times \vec{B} = 1$

(C) $\vec{A}.\vec{B} = 0$ (D) $\vec{A} \times \vec{B} = AB$

Q.5 What is the vector joining the points (3, 1, 14) and (–2, –1, –6) ?

(A) $2\hat{i} + \hat{j} + 2\hat{k}$ (B) $5\hat{i} + 2\hat{j} + 20\hat{k}$

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

Q.6 $\vec{A}$ is directed vertically downwards and $\vec{B}$ is directed along the north. What is the direction of $\vec{B} \times \vec{A}$

(A) east

(C) north (D) north west

(B) west

Q.7 A body of 3 kg moves in the XY plane under the action of a force given by $6t\,\hat{i} + 4t\,\hat{j}$. Assuming that the body is at rest at time t = 0, the velocity of the body at t = 3s is –

(A) $6\hat{i} + 6\hat{j}$ (B) $18\hat{i} + 6\hat{j}$

(C) $9\hat{i} + 6\hat{j}$ (D) $12\hat{i} + 18\hat{j}$

Q.8 If $\vec{a}, \vec{b}$ and $\vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = 0$, then find the angle between $\vec{a}$ and $\vec{b}$.

(A) $\pi/3$ (B) $\pi/4$

(C) $2\pi/3$ (D) $2\pi/5$

Q.9 A force $\vec{F}$ of magnitude 12N has non-rectangular components $\vec{P}$ and $\vec{Q}$. The sum of the magnitude of $\vec{P}$ and $\vec{Q}$ is 18N. The direction of $\vec{Q}$ is at right angles to $\vec{F}$. Find the magnitude of $\vec{Q}$.

(A) 4N (B) 5N

(C) 2N (D) 7N

Q.10 If a vector $2\hat{i} + 3\hat{j} + 8\hat{k}$ is perpendicular to the vector $4\hat{j} - 4\hat{i} + \alpha\hat{k}$, then the value of α is –

(A) 1/2 (B) –1/2

(C) 1 (D) – 1

Q.11 If the angle between the vectors $\vec{A}$ and $\vec{B}$ is θ, the value of the product $(\vec{B} \times \vec{A}).\vec{A}$ is equal to –

(A) $BA^2 \sin\theta$ (B) $BA^2 \cos\theta$

(C) $BA^2 \sin\theta \cos\theta$ (D) zero

Q.12 A particle having simultaneous velocities 3m/s, 5 m/s and 7m/s is at rest. Find the angle between the first two velocities.

(A) 45° (B) 30°

(C) 90° (D) 60°

Q.13 A set of vectors taken in a given order gives a closed polygon. Then the resultant of these vectors is a –

(A) scalar quantity (B) pseudo vector

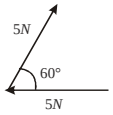
(C) unit vector (D) null vector

Q.14 If $0.3\hat{i} + 0.4\hat{j} + c\hat{k}$ is a unit vector, value of c = ?

(A) $\sqrt{0.75}$ (B) $\sqrt{0.25}$

(C) $\sqrt{2}$ (D) 1

Q.15 The forces, each numerically equal to 5N, are acting as shown in the figure. Find the angle between forces ?



(A) 60° (B) 120°

(C) 30° (D) None of these

Q.16 Find the angle between two vectors of magnitude 12 and 18 units when their resultant is 24 units.

(A) $\cos\theta = 1/4$ (B) $\cos\theta = 1/2$

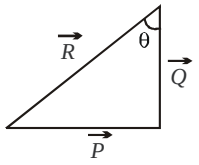
(C) $\cos\theta = 1/\sqrt{2}$ (D) $\cos\theta = \sqrt{3}/2$

Q.17 Two forces have magnitudes in the ratio 3 : 5 and the angle between their directions is 60°. If their resultant is 35N, find the sum of their magnitudes.

(A) 50 N (B) 60 N

(C) 30 N (D) 40N

Q.18 If vectors P, Q and R have magnitude 5, 12 and 13 units and $\vec{P} + \vec{Q} = \vec{R}$, find the angle between Q and R.



(A) $\theta = \cos^{-1}\left(\frac{12}{13}\right)$ (B) $\theta = \cos^{-1}\left(\frac{5}{13}\right)$

(C) $\theta = \cos^{-1}\left(\frac{1}{13}\right)$ (D) None of these

Q.19 The resultant of two vectors of magnitudes 2A and $\sqrt{2}A$ acting at an angle θ is $\sqrt{10}A$. Find the value of θ.

(A) 90° (B) 60°
(C) 45° (D) 30°

Q.20 A force $\vec{F} = 6\hat{i} + x\hat{j}$ acting on a particle displaces it from the point A (3, 4) to the point B (1, 1). If the work done is 3 units, then find value of x.

(A) 6 (B) –1
(C) 3 (D) –5

For Q.21-Q.25 :

The answer to each question is a NUMERICAL VALUE.

Q.21 Two forces of $\vec{F}_1 = 250N$ due east and $\vec{F}_2 = 250N$ due north have their common initial point is $\vec{F}_2 - \vec{F}_1 = 250\sqrt{X}$ N. Find the value of X.

Q.22 One of the rectangular components of a velocity of $60kmh^{-1}$ is $30kmh^{-1}$. Other rectangular component is $X\sqrt{3}\ kmh^{-1}$. Find the value of X.

Q.23 A woman walks 250m in the direction 30° east of north, then 175m directly east. Find the magnitude of the displacement.

Q.24 If the resultant of two forces of magnitudes P and Q acting at a point at an angle of 60° is $\sqrt{13}Q$, then find P/Q.

Q.25 A vector $\vec{a}$ of magnitude 10 units and another vector $\vec{b}$ of magnitude 6.0 units differ in directions by 60°. Find the magnitude of the vector product $\vec{a} \times \vec{b}$.