MULTIPLE CHOICE QUESTIONS (MCQs)

Mark the correct alternative in each of the following:

Q 1. If $\vec{a}$ is any vector, then $(\vec{a} \text{ xi})^2 + (\vec{a} \text{ xj})^2 + (\vec{a} \text{ xk})^2 =$

(a) $\vec{a}^2$ (b) $2\vec{a}^2$ (c) $3\vec{a}^2$ (d) $4\vec{a}^2$

Q 2. If $\vec{a}.\vec{b} = \vec{a}.\vec{c}$ and $\vec{a} \times \vec{b} = \vec{a} \times \vec{c}$, then

(a) either $\vec{a} = \vec{0}$ or $\vec{b} = \vec{c}$ (b) $\vec{a} \parallel (\vec{b} - \vec{c})$

(c) $\vec{a} \perp (\vec{b} - \vec{c})$ (d) none of these

or

If $\vec{a}.\vec{b} = \vec{a}.\vec{c}$ and $\vec{a} \times \vec{b} = \vec{a} \neq 0$, then

(a) $\vec{b} = \vec{c}$ (b) $\vec{b} = \vec{0}$ (c) $\vec{b} + \vec{c} = \vec{0}$ (d) none of these

Q 3. The vector $\vec{b}$ = 3i + 4k is to be written as the sum of a vector $\vec{\alpha}$ parallel to $\vec{a}$ = i + j and a vector $\vec{\beta}$ perpendicular to $\vec{a}$ .Then $\vec{\alpha} =$

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

Q 4. The unit vector perpendicular to the plane passing through points P (i -j + 2k), Q (2i - k) and R(2j + k) is

(a) 2i + j + k (b) $\sqrt{6}(2i + j + k)$ (c) $\frac{1}{\sqrt{6}}(2i + j + k)$ (d) $\frac{1}{6}(2i + j + k)$

Q 5. If $\vec{a}, \vec{b}$ represent the diagonals of a rhombus, then

(a) $\vec{a} \times \vec{b} = \vec{0}$ (b) $\vec{a}.\vec{b} = 0$ (c) $\vec{a}.\vec{b} = 1$ (d) $\vec{a} \times \vec{b} = \vec{a}$

Q 6. Vectors $\vec{a}$ and $\vec{b}$ are inclined at angle θ = 120°.

If $|\vec{a}| = 1, |\vec{b}| = 2$, then $[(\vec{a} + 3\vec{b}) \times (3\vec{a} - \vec{b})]^2$ is equal to

(a) 300 (b) 325 (c) 275 (d) 225

Q 7. If $\vec{a}$ i + j – k, $\vec{b}$ = – i + 2j + 2k and $\vec{c}$ = i + 2j – k, then a unit vector normal to the vectors $\vec{a} + \vec{b}$ and $\vec{b} - \vec{c}$ is

(a) i (b) j (c) k (d) none of these

Q 8. A unit vector perpendicular to both i + j and j + k is

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

Q 9. If $\vec{a}$ = 2i – 3j – k and $\vec{b}$ = i + 4j – 2k, then $\vec{a} \times \vec{b}$ is

(a) 10i + 2j + 11k (b) 10i+3j + 11k (c) 10i - 3j + 11k (d) 10i - 3j - 10k

Q 10. If i, j, k are unit vectors, then

(a) i . j = 1 (b) i. i = 1 (c) i × j = 1 (d) i × (j × k) = 1

Q 11. If θ is the angle between the vectors 2i - 2j + 4k and 3i + j + 2k, then sin **0** =

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

Q 12. If $|\vec{a}\times\vec{b}| = 4$. $|\vec{a}.\vec{b}| = 2$, then $|\vec{a}|^2 |\vec{b}|^2 =$

(a) 6 (b) 2 (c) 20 (d) 8

Q 13. $(\vec{a}\times\vec{b})^2$ = ?

(a) $|\vec{a}|^2 + |\vec{b}|^2 - (\vec{a}.\vec{b})^2$ (b) $|\vec{a}|^2 \ |\vec{b}|^2 - (\vec{a}.\vec{b})^2$

(c) $|\vec{a}|^2 + |\vec{b}|^2 - 2(\vec{a}.\vec{b})$ (d) $|\vec{a}|^2 + |\vec{b}|^2 - \vec{a}.\vec{b}$

Q 14. The value of i.(j × k) + j. (i × k) + k. (i × j), is

(a) 0 (b) -1 (c) 1 (d) 3

Q 15. If θ is the angle between any two vectors a and b, then $|\vec{a}.\vec{b}| = |\vec{a}\times\vec{b}|$ when θ is equal to

(a) 0 (b) π/4 (c) π/2 (d) π

ANSWERS

1. (b) 2. (a) 3. (a) 4. (c) 5. (b) 6. (a) 7. (a) 8. (c) 9. (b) 10. (b)
11. (b) 12. (c) 13. (b) 14. (c) 15. (b)