VECTOR ALGEBRA

SCALAR (OR DOT) PRODUCT OF TWO VECTOR

EXERCISE

Q.1 What is the scalar product of vectors a and b when the angle between them is 90°

(A) 1 (B) 0 (C) Not defined (D) –1

Q.2 Find the scalar product of vectors $a = -i + j - k$ and $b = -2i + 2j - 2k$

(A) 1 (B) 0 (C) –6 (D) 6

Q.3 A unit vector along a bisector of the angle between the two vectors

(A) $\left(\frac{\hat{5i}+\hat{2j}+\hat{19k}}{\sqrt{390}}\right)$ (B) $\left(\frac{\hat{15i}-\hat{2j}-\hat{19k}}{15\sqrt{590}}\right)$

(C) $\left(\frac{\hat{5i}-\hat{22j}-\hat{9k}}{15\sqrt{590}}\right)$ (D) $\left(\frac{\hat{5i}-\hat{22j}+\hat{k}}{\sqrt{510}}\right)$

Q.4 A vector of magnitude 2 along a bisector of the angle between the two vectors $2\vec{i} - 2\vec{j} + \vec{k}$ and $\vec{i} + 2\vec{j} - 2\vec{k}$ is

(A) $\frac{2}{\sqrt{10}}(3\vec{i} - \vec{k})$ (B) $\frac{1}{\sqrt{26}}(\vec{i} - 4\vec{j} + 3\vec{k})a$

(C) $\frac{2}{\sqrt{26}}(\vec{i} - 4\vec{j} + 3\vec{k})a$ (D) None of these

Q.5 Let there be two vectors [6, 2, -1] and [5, -8, 2]. Find the dot product of the vectors.

Q.6 Let there be two vectors $|a|=4$ and $|b|=2$ and $\theta = 60°$. Find their dot product.

Q.7 Find the dot product of vectors P (a, b, c) and Q (p, q, r).

Q.8 Find the dot product of vectors P (1, 3, -5) and Q (7, -6, -2).

Q.9 Find the scalar product of the vectors $a = 2i + 3j - 6k$ and $b = i + 9k$.

Q.10 Calculate the scalar product of vectors a and b when the modulus of a is 9, modulus of b is 7 and the angle between the two vectors is 60°.

ANSWER KEY

1. (B) 0

2. (D) 6

3. (A) $\left(\frac{\hat{5i}+\hat{2j}+\hat{19k}}{\sqrt{390}}\right)$

4. (A) $\frac{2}{\sqrt{10}}(3\vec{i}-\vec{k})$ (C) $s\frac{2}{\sqrt{26}}(\vec{i}-4\vec{j}+3\vec{k})a$

5. a.b = 12

6. a.b = 4

7. The dot product of vector P and vector Q is ap + bq + cr

8. The dot product of vector P and vector Q is -1

9. The scalar product of vectors a = 2i + 3j - 6k and b = i + 9k is -49.

10. The scalar product of vectors a and b is 31.5