

NAM^o: Obembe Oluwadamilola . B

M/N^o: 19/ENG041036

DEPT^o: Electrical and Electronics Engineering

1) $-3A + 7B - 8C$

$-3A$

Solution

$$-3A = -3(2i - j) = -6i + 3j$$

$$7B = 7(3i + j - 11k) = 21i + 7j - 77k$$

$$-8C = -8(4i + 4j - 5k) = -32i - 32j + 40k$$

$$-3A + 7B - 8C = -17i - 22j - 37k$$

w) $K = 2A + 4B - C$

direction cosine of K

$$|K| = \sqrt{2^2 + 4^2 - 1^2}$$

$$\cos \alpha = \frac{2}{\sqrt{19}}$$

$$|K| = \sqrt{4 + 16 - 1}$$

$$\cos \beta = \frac{4}{\sqrt{19}}$$

$$|K| = \sqrt{19}$$

$$\cos \gamma = \frac{-1}{\sqrt{19}}$$

iii) $A \times (B \times C)$

$$A = 2i - j, \quad B = 3i + j - 4k, \quad C = 4i + 4j - 5k$$

$$B \times C = \begin{vmatrix} i & j & k \\ 3 & 1 & -4 \\ 4 & 4 & -5 \end{vmatrix}$$

$$i \begin{vmatrix} 1 & -4 \\ 4 & -5 \end{vmatrix} - j \begin{vmatrix} 3 & -4 \\ 4 & -5 \end{vmatrix} + k \begin{vmatrix} 3 & 1 \\ 4 & 4 \end{vmatrix}$$

$$i(-5 + 16) - j(-15 + 16) + k(12 - 4)$$

$$B \times C = 11i - 1j + 8k$$

$$A \times (B \times C) = \begin{vmatrix} i & j & k \\ 2 & -1 & 0 \\ 11 & -1 & 8 \end{vmatrix}$$

$$i \begin{vmatrix} -1 & 0 \\ -1 & 8 \end{vmatrix} - j \begin{vmatrix} 2 & 0 \\ 11 & 8 \end{vmatrix} + k \begin{vmatrix} 2 & -1 \\ 11 & -1 \end{vmatrix}$$

$$i(8 - 0) - j(16 - 0) + k(2 - 11)$$

$$8i - 16j - 9k$$

$$iv) (3A \times B) \cdot (A \times 2B)$$

$$3A = 3(2i - j) = 6i - 3j$$

$$2B = 2(3i + j - 11k) = 6i + 2j - 22k$$

$$3A \times B = \begin{vmatrix} i & j & k \\ 6 & -3 & 0 \\ 3 & 1 & -11 \end{vmatrix}$$

$$i \begin{vmatrix} -3 & 0 \\ 1 & -11 \end{vmatrix} - j \begin{vmatrix} 6 & 0 \\ 3 & -11 \end{vmatrix} + k \begin{vmatrix} 6 & -3 \\ 3 & 1 \end{vmatrix}$$

$$i(33 - 0) - j(-66 - 0) + k(6 + 9)$$

$$33i + 66j + 15k$$

$$(A \times 2B) = \begin{vmatrix} i & j & k \\ 2 & -1 & 0 \\ 6 & 2 & -22 \end{vmatrix}$$

$$i \begin{vmatrix} -1 & 0 \\ 2 & -22 \end{vmatrix} - j \begin{vmatrix} 2 & 0 \\ 6 & -22 \end{vmatrix} + k \begin{vmatrix} 2 & -1 \\ 6 & 2 \end{vmatrix}$$

$$i(22 - 0) - j(-44 - 0) + k(4 + 6)$$

$$22i + 44j + 10k$$

$$(3A \times B) \cdot (A \times 2B) = (33i + 66j + 15k) \cdot (22i + 44j + 10k)$$

$$726 + 110 + 25$$

$$= 861$$

$$Q) A - 2B - C$$

$$= 2i - 2j + (-2)(3i + j - 11k) = -6i - 2j + 22k$$

$$2i - j + (-6i - 2j + 22k) = (-4i - 3j + 22k)$$

$$\neq 18i + 8j = -8i - 7j + 22k$$

Perpendicular vectors: two vectors A and B are said

to be perpendicular if $A \cdot B = 0$

Co-planar vectors: three vectors A, B and C are said

to be co-planar if $A \cdot (B \times C) = 0$