

$$= i \begin{vmatrix} -1 & 0 \\ -29 & 8 \end{vmatrix} - j \begin{vmatrix} 2 & 0 \\ 39 & 8 \end{vmatrix} + k \begin{vmatrix} 2 & -1 \\ 39 & -29 \end{vmatrix}$$

$$= i(-8) - j(16) + k(-19)$$

$$A \times (B \times C) = -8i - 16j - 19k$$

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

$$= 6i - 3j$$

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

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

$$= i(33) - j(-66) + k(15)$$

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

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

$$= 6i + 2j - 22k$$

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

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

$$= i(22) - j(-44) + k(10)$$

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

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

$$= 3780$$

$$v) A - 2B - C = 2i - j - 2(3i + j - 11k) - (4i + 4j - 5k)$$

$$= 2i - j - 6i - 2j + 22k - 4i - 4j + 5k$$

$$= -8i - 7j + 27k$$

2) Two vectors are said to be perpendicular if its scalar product is equal to zero.

Vectors parallel to the same plane, or lie on the same plane are called coplanar vectors.

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MATRIC NO: 19/ENG02/067

MAT 102 ASSIGNMENT

$$A = 2i - j \quad B = 3i + j - 11k \quad C = 4i + 4j - 5k$$

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

$$\begin{aligned} &= -3(2i - j) + 7(3i + j - 11k) - 8(4i + 4j - 5k) \\ &= -6i + 3j + 21i + 7j - 77k - 32i - 32j + 40k \\ &= -17i - 22j - 37k \end{aligned}$$

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

$$K = 2(2i - j) + 4(3i + j - 11k) - (4i + 4j - 5k)$$

$$K = 4i - 2j + 12i + 4j - 44k - 4i - 4j + 5k$$

$$K = 12i - 2j - 39k$$

$$|K| = \sqrt{(12)^2 + (-2)^2 + (-39)^2}$$

$$|K| = \sqrt{144 + 4 + 1521}$$

$$|K| = 40.85$$

$$l = \cos \alpha = \frac{\vec{K} \cdot i}{|K|} = \frac{12}{40.85} = 0.29 \quad m = \cos \beta = \frac{-2}{40.85} = -0.05$$

$$n = \cos \gamma = \frac{-39}{40.85} = -0.955$$

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

$$(B \times C) = \begin{vmatrix} i & j & k \\ 3 & 1 & -11 \\ 4 & 4 & -5 \end{vmatrix}$$

$$= i \begin{vmatrix} 1 & -11 \\ 4 & -5 \end{vmatrix} - j \begin{vmatrix} 3 & -11 \\ 4 & -5 \end{vmatrix} + k \begin{vmatrix} 3 & 1 \\ 4 & 4 \end{vmatrix}$$

$$= i(39) - j(29) + k(8)$$

$$= 39i - 29j + 8k$$

$$A \times (B \times C) = \begin{vmatrix} i & j & k \\ 2 & -1 & 0 \\ 39 & -29 & 8 \end{vmatrix}$$