

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

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

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

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

$$-17i - 22j - 37k \text{ m}$$

$$\Rightarrow \therefore -3A + 7B - 8C = -17i - 22j - 37k \text{ m}$$

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

$$2A = 2(2i - j) = 4i - 2j \quad +$$

$$4B = 4(3i + j - 11k) = 12i + 4j - 44k \quad -$$

$$C = 4i + 4j - 5k = 4i + 4j - 5k \quad -$$

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

$$\Rightarrow 2A + 4B - C = 12i - 2j - 39k \text{ m}$$

$$|2A + 4B - C| = \sqrt{(12)^2 + (-2)^2 + (-39)^2}$$

$$= 40.9 \text{ m}$$

$$L = \cos \alpha = \frac{12}{40.9}$$

$$M = \cos \beta = \frac{-2}{40.9}$$

$$N = \cos \gamma = \frac{-39}{40.9}$$

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

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

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

$$B \times C = 39i - 29j + 8k$$

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

$$= i[-8] - j[16] + k[-19] \text{ m}$$

$$\therefore A \times (B \times C) = -8i - 16j - 19k \text{ m}$$

$$(iv) \quad 3A = 3(2i - j) = 6i - 3j$$

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

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

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

$$i[33] - j[66] + k[15]$$

$$3A \times B = 33i + 66j + 15k$$

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

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

$$i[22] - j[44] + k[10]$$

$$A \times 2B = 22i + 44j + 10k$$

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

$$= 726 + 2904 + 150$$

$$= 3780$$

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

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

$$A = 2i - j$$

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

$$C = 4i + 4j - 5k$$

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

$$\therefore A \cdot 2B \cdot C = -8i - 7j + 27k$$

(2) (i) Two vectors are said to be perpendicular if

$A \cdot B = 0$ and 3 vectors \bar{A} , \bar{B} and \bar{C} are said to be C-planar if $A \cdot (B \times C) = 0$.