

Oluntau Obaniji Oladayo

Mechanical Engineering 100/v

19/EN106/040

MTI 102

Serial No: 205

1  $A = 4i + j - 2k$ ,  $B = 3i - 2j + k$ ,  $C = i - 2k$ .

a.  $(A - 2B) \times C$ .

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

$$A - 2B = (4i + j - 2k) - (6i - 4j + 2k)$$
$$= -2i + 5j - 4k$$

$$(A - 2B) \times C = \begin{vmatrix} i & j & k \\ -2 & 5 & -4 \\ 1 & 0 & -2 \end{vmatrix}$$

$$= i \begin{vmatrix} 5 & -4 \\ 0 & -2 \end{vmatrix} - j \begin{vmatrix} -2 & -4 \\ 1 & -2 \end{vmatrix} + k \begin{vmatrix} -2 & 5 \\ 1 & 0 \end{vmatrix}$$

$$= i(-10 - 0) - j(4 + 4) + k(0 - 5)$$
$$= -10i - 8j - 5k$$

b)  $A \times (2C \times 3B)$

$$2C = 2(i - 2k) = 2i - 4k$$

$$3B = 3(3i - 2j + k) = 9i - 6j + 3k$$

$$A \times (2C \times 3B) = \begin{vmatrix} i & j & k \\ 2 & 0 & -4 \\ 9 & -6 & 3 \end{vmatrix}$$

$$i \begin{vmatrix} 0 & -4 \\ -6 & 3 \end{vmatrix} - j \begin{vmatrix} 2 & -4 \\ 9 & 3 \end{vmatrix} + k \begin{vmatrix} 2 & 0 \\ 9 & -6 \end{vmatrix}$$

$$i(-24) - j(42) + k(-12)$$

$$2C \times 3B = -24i - 42j - 12k$$



$$A \times (2C \times 3B) = \begin{vmatrix} i & j & k \\ 4 & 1 & -2 \\ -24 & -42 & -12 \end{vmatrix}$$

$$i \begin{vmatrix} 1 & -2 \\ -42 & -12 \end{vmatrix} - j \begin{vmatrix} 4 & -2 \\ -24 & -12 \end{vmatrix} + k \begin{vmatrix} 4 & 1 \\ -24 & -42 \end{vmatrix}$$

$$i(-12 - (84)) - j(-48 - (48)) + k(-168 - (-24))$$

$$= -96i + 96j - 144k$$

2.  $A = p_i - 6j - 3k$ ,  $B = 4i + 3j - k$ ,  $C = i - 3j + 2k$ .

$$A \cdot (B \times C) = 0$$

$$\begin{vmatrix} p & -6 & -3 \\ 4 & 3 & -1 \\ 1 & -3 & 2 \end{vmatrix}$$

$$p \begin{vmatrix} 3 & -1 \\ -3 & 2 \end{vmatrix} + 6 \begin{vmatrix} 4 & -1 \\ 1 & 2 \end{vmatrix} - 3 \begin{vmatrix} 4 & 3 \\ 1 & -3 \end{vmatrix} = 0$$

$$p(3) + 6(9) - 3(-12 - 3) = 0$$

$$3p + 54 + 45 = 0$$

$$3p = -45 - 54$$

$$3p = -99$$

$$p = \frac{-99}{3}$$

$$p = -33$$