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MATRIC NO: 19/ENG02/036

$$01) \bar{A} = 4\bar{i} + \bar{j} - 2\bar{k}$$

$$\bar{B} = 3\bar{i} - 2\bar{j} + \bar{k}$$

$$\bar{C} = \bar{i} - 2\bar{k}$$

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

$$A - 2B = 4\bar{i} + \bar{j} - 2\bar{k} - 2(3\bar{i} - 2\bar{j} + \bar{k})$$

$$= 4\bar{i} + \bar{j} - 2\bar{k} - 6\bar{i} + 4\bar{j} - 2\bar{k}$$

$$= -2\bar{i} + 5\bar{j} - 4\bar{k}$$

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

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

$$= \bar{i}(-10 + 0) - \bar{j}(4 + 4) + \bar{k}(0 - 5)$$

$$= -10\bar{i} - 8\bar{j} - 5\bar{k}$$

b)  $2C = 2\bar{i} - 4\bar{k}$

$$3B = 9\bar{i} - 6\bar{j} + 3\bar{k}$$

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

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

$$= \bar{i}(0 - 24) - \bar{j}(6 + 36) + \bar{k}(-12 + 0)$$

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

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

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

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

02)  $A = 9i - 6j - 3k$

$B = 4i + 3j - k$

$C = i - 3j + 2k$

$A \cdot (B \times C) = \begin{vmatrix} 9 & -6 & -3 \\ 4 & 3 & -1 \\ 1 & -3 & 2 \end{vmatrix} = 0$

$$0 = 9 \begin{vmatrix} 3 & -1 \\ -3 & 2 \end{vmatrix} + 6 \begin{vmatrix} 4 & -1 \\ 1 & -3 \end{vmatrix} - 3 \begin{vmatrix} 4 & 3 \\ 1 & -3 \end{vmatrix}$$

$$0 = 9(6 - 3) + 6(8 + 1) - 3(-12 - 3)$$

$$0 = 9(3) + 6(9) - 3(-15)$$

$$0 = 9(3) + 9(9)$$

$$P = -33$$

$$\begin{aligned}
 A - 2B &= 4i + j - 2k - 2(3i - 2j + k) \\
 &= 4i + j - 2k - 6i + 4j - 2k \\
 &= -2i + 5j - 4k
 \end{aligned}$$

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

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

$$\begin{aligned}
 &= i(-10 + 0) - j(4 + 4) + k(0 - 5) \\
 &= -10i - 8j - 5k
 \end{aligned}$$

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

$$3B = 9i - 6j + 3k$$

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

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

$$\begin{aligned}
 &= i(0 - 24) - j(6 + 36) + k(-12 + 0) \\
 &= -24i - 42j - 12k
 \end{aligned}$$