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MAT 102

19/ENG 04/005

Electrical Electronic Engineering

1 $A = 4i + j - 2k$

$$B = 3i - 2j + k$$

$$C = i - 2k$$

② $(A - 2B) \times C$

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

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

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

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

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

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

$$= 10i - 8j - 5k$$

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③ $A \times (2C + 3B)$

$$(2C + 3B)$$

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

$$= 2i - 4k$$

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

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

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

$$i[0+24] - j[6+36] + k[-12-0]$$

$$= -24i - 42j - 12k$$

Ax(Bx3B)

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

$$i[-12-84] - j[-48-48] + k[-168+24]$$

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

$$= z$$

② $A = pi - 6j - 3k$

$B = 4i + 3j - k$

$C = i - 3j + 2k$

Find the value of p for which A, B & C are coplanar

Soln

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

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

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

$$3p + 99 = 0$$

$$3p = -99$$

$$p = -33$$