

LOTTO SOLOMON

088

MATHEMATICAL ENGINEERING

MAT 102 17/06/2024

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

$$K = 4i - 2j + 12i + 4j - 44k - 4i - 4j - 45k \\ - 44i + 4i + 12i - 4i - 2j + 4j - 44k + 5k - 4j \\ = 12i - 2j + 12i - 2j - 39k$$

$$\text{iii } AXC = C$$

$$(XC) = \begin{pmatrix} i & j & k \\ 3i + 1 & -11 \\ 4 + 4 & -5 \end{pmatrix}$$

$$= i[(ix-5) - (ix-11)] - j[(3x-5) - (4x-11)] + k[(3xu) - (1xu)] \\ = i(-5+4u) - j(-15+4u) + k(10-4) \\ = 39i - 29j + 8k$$

$$\text{iv } (3AXB) \cdot (AX2B)$$

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

$$= 6i - 3j$$

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

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

$$3AXB = \begin{pmatrix} i & j & k \\ 6 & -3 & 0 \\ 0 & 2 & -22 \end{pmatrix}$$

$$= i[(3x-11) - (11x)] - j[(6x-11) - (21x)] + k[(6x) - (-3x^2)] \\ = i(33-11) - j(-66-11) + k(6+9) \\ = 33i + 66j + 15k$$

Latha Polammon 088
 MACHINANCAL ENGINEERING
 MAT 102 19/ENR06/084

$$A \times 2B = \begin{vmatrix} i & j & k \\ 9 & -1 & 0 \\ 6 & 2 & -22 \end{vmatrix}$$

$$\begin{aligned}
 &= i [(1)(-22) - (2)(0)] - j [(9)(-22) - (6)(0)] + k [(9)(2) - (4)(6)] \\
 &= i(22 - 0) - j(-198 - 0) + k(18 - 24) \\
 &= 22i + 198j - 6k
 \end{aligned}$$

$$\begin{aligned}
 (2A \times B) \cdot (A \times 2B) &= 83i + 166j + 15k \cdot 22i + 198j + 10k \\
 &= 126 + 2904 + 150 \\
 &= 3780
 \end{aligned}$$

$$\begin{aligned}
 v) \quad A - 2B - C &= 2i - j - 6i - 2j + 22k - 4i - 4j + 5k \\
 &= 2i - 6i - 4i - j - 2j - 4j + 22k + 5k \\
 &= -8i - 7j + 27k
 \end{aligned}$$

2. Perpendicular vectors

Two vectors are said to be perpendicular if their dot product is equal to zero i.e. $A \cdot B = 0$

Coplanar vectors

Three vectors are said to be coplanar if

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

LOHRSOPOMIDA 088

19/FAUGUS/084 MECHANICAL ENGINEERING

MAT 102

If $A = 2i - j$, $B = 3i + j - 11k$ and $C = 4i + 4j - 5k$

$$(1) \quad -3A + 7B - 8C$$

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

$$= -6i + 3j$$

$$+7B = 7(3i + j - 11k)$$

$$= 21i + 7j - 77k$$

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

$$= -32i - 32j + 40k$$

$$\text{---} \quad -3A + 7B - 8C = -6i + 3j + 21i + 7j - 77k +$$

$$-3A + 7B - 8C = -6i + 3j + 21i + 7j - 77k - 32i - 32j + 40k$$

$$= -6i - 32i + 21i + 3j + 7j - 32j - 77k + 40k$$

$$= -17i - 22j - 37k$$

$$11) \quad k = 2A + 4B - C$$

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

$$= 4i - 2j$$

$$4B = 4(3i + j - 11k)$$

$$= 12i + 4j - 44k$$

$$-C = -1(4i + 4j - 5k)$$

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