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COMPUTER ENGINEERING

19/eng02/071 MAT 102 Serial NO:

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

$$D = 3A + 7B - 8C$$

$$\begin{aligned} & -3(2i - j) + 7(3i + j - 11k) - 8(4i + 4j - 5k) \\ & -6i - 3j + 21i + 7j - 77k - 32i - 32j + 40k \\ & = -17i - 22j - 37k \end{aligned}$$

$$(6) K = 2A + 4B - C$$

$$2(2i - j) + 4(3i + j - 11k) - (4i + 4j - 5k)$$

$$4i - 2j + 12i + 4j - 44k - 4i + 4j - 5k$$

$$12i + 6j - 39k$$

$$K = 12i + 6j - 39k$$

$$\begin{aligned} |K| &= \sqrt{(12)^2 + (6)^2 + (-39)^2} \\ &= \sqrt{144 + 36 + 1521} \\ &= \sqrt{1701} \end{aligned}$$

$$|K| = 41.2$$

$$L = \cos \alpha = \frac{12}{41.2} = 0.29$$

$$M = \cos \beta = \frac{6}{41.2} = 0.15$$

$$41.2$$

$$N = \cos \gamma = \frac{-39}{41.2} = -0.95$$



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

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

$$= i(1 \times -5) - (4 \times -11) - j(3 \times -5) - (-11 \times 4)$$

$$= k(3 \times 4) - (4 \times 4)$$

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

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

$$= i[(-1 \times 8) - (-29 \times 0)] - j[(2 \times 8) - (39 \times 0)] + k[(2 \times -1) - (39 \times -1)]$$

$$= i(-8) - j(16) + k(-19)$$

$$= -8i - 16j - 19k$$

$$d) (3A \times B) (A \times 2B)$$

$$3A = 6i - 3j$$

$$3A \times B$$

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



$$1[(3 \times 1) - (0 \times 1) - i[(6 \times 1) - (0 \times 3)] + k(6 \times 1)] - (3 \times 3)$$

$$1[33 - 0] - i[-66 - 0] + k(66) - 9$$

$$i(33) + j[766] + k(15)$$

$$33i + 66j + 15k$$

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

$A \times B$	$1$	$-1$
	$2$	$-10$
	$6$	$2 - 22$
	$c_i$	$(j) \quad (k)$

$$1[(2 \times 6) - (-1 \times -22)] - j(-22 \times 2) - (0 \times 6) + k[(2 \times 2) - (0 \times 2)]$$

$$i[(22) - j(-44) + k(4)]$$

$$22i + 44j + 10k$$

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

$$C(33i + 66j + 15k) \cdot (22i + 44j + 10k)$$

$$726 + 2984 + 150$$

$$= 3780$$

$$c) A - 2B - C$$

$$(2i - j) - 2(3i + j - 11k) - (4i + 4j - 5k)$$

$$2i - j - 6i - 2j + 22k - 4i - 4j + 5k$$

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



② Perpendicular vectors are two vectors  
dot product is equal to zero e.g.  $\underline{A} \cdot \underline{B} = 0$

Coplanar vectors is that which when three  
given vectors  $\underline{A}$ ,  $\underline{B}$  and  $\underline{C}$  have the scalar  
triple product to be equal to zero e.g.  $\underline{A} \cdot (\underline{B} \times \underline{C}) = 0$ .