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17/ENG03/063
MATHS 202 (C.O)

Maths 102 Assignment

$$1) A = 2i - j \quad B = 3i + j - 11k \text{ and } C = 4i + 4j - 5k$$
$$i = 3A + 7B - 8C$$

$$-3A = -3(2i - j) = -6i + 3j$$

$$7B = 7(3i + j - 11k) = 21i + 7j - 77k$$

$$-8C = -8(4i + 4j - 5k) = -32i - 32j + 40k$$

$$\therefore 3A + 7B - 8C = -17i - 22j - 37k$$

$$ii) |a| = 2A + 4B - C$$

$$2A = 2(2i - j) = 4i - 2j$$

$$4B = 4(3i + j - 11k) = 12i + 4j - 44k$$

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

$$\therefore 2A + 4B - C = 12i - 2j - 39k$$

$$|a| = \sqrt{(12)^2 + (-2)^2 + (-39)^2} = \sqrt{1667} = 40.85$$

\therefore The direction cosines of a are:

$$\cos \alpha = \frac{12}{40.85} \Rightarrow 0.2938$$

$$\cos \beta = \frac{-2}{40.85} \Rightarrow -0.0490$$

$$\cos \gamma = \frac{-39}{40.85} \Rightarrow -0.9547$$

2) Two vectors A & B are said to be perpendicular if their scalar product is equal to zero

3) Vectors A , B & C are said to be coplanar



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$$(iii) A \times B \times C \Rightarrow AXB = \begin{bmatrix} i & j & k \\ 2 & -1 & 0 \\ 3 & 1 & -11 \end{bmatrix}$$

$$= i(11-0)j(-22-0) + k(2+3)$$

$$= 11i + 22j + 5k$$

$$= AXB \times C = \begin{bmatrix} i & j & k \\ 11 & 22 & 5 \\ 4 & 4 & -5 \end{bmatrix}$$

$$= i(-110-20) - j(-55-20) + k(44-88)$$

$$= -130i + 75j - 44k$$

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

$$3A = 3 \begin{bmatrix} i & j \\ 2 & -1 \end{bmatrix} = \begin{bmatrix} 6i & -3j \end{bmatrix}$$

$$2B = 2 \begin{bmatrix} 3i + j & -11k \\ 6j + 2j & -22k \end{bmatrix}$$

$$3A \times B = \begin{bmatrix} i & j & k \\ 6 & -3 & 0 \\ 3 & 1 & -11 \end{bmatrix}$$

$$= i(33-0) - j(-66-0) + k(6+9)$$

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

