

2) Find the area of triangle with vertices  $A(1, 1, 2)$ ,  $B(2, 3, 5)$ ,  $C(1, 5, 5)$

$$A \equiv (1, 1, 2) \quad \overrightarrow{OA} = i + j + 2k$$

$$B \equiv (2, 3, 5) \quad \overrightarrow{OB} = 2i + 3j + 5k$$

$$C \equiv (1, 5, 5) \quad \overrightarrow{OC} = i + 5j + 5k$$

$$\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA}$$

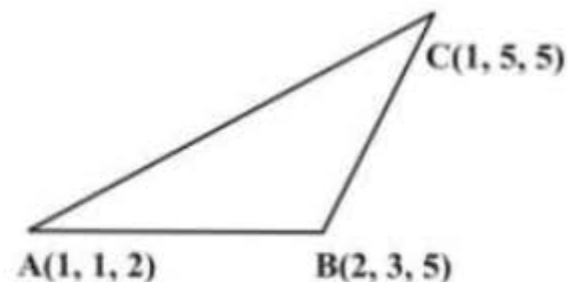
$$= 2i + 3j + 5k - i - j - 2k$$

$$\overrightarrow{AB} = i + 2j + 3k$$

$$\overrightarrow{AC} = \overrightarrow{OC} - \overrightarrow{OA}$$

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

$$\overrightarrow{AC} = 4j + 3k$$



$$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{vmatrix} i & j & k \\ 1 & 2 & 3 \\ 0 & 4 & 3 \end{vmatrix}$$

$$= i(6 - 12) - j(3 - 0) + k(4 - 0) = -6i - 3j + 4k$$

$$|\overrightarrow{AB} \times \overrightarrow{AC}| = \sqrt{(-6)^2 + (-3)^2 + 4^2} = \sqrt{36 + 9 + 16} = \sqrt{51}$$

$$\text{Area of triangle ABC} = \frac{1}{2} |\overrightarrow{AB} \times \overrightarrow{AC}| = \frac{1}{2} \sqrt{51} \text{ sq units}$$