MM 25 **Vectors** **Time 45 Min**

Section A 1 Marks Each

Paper prepared by
Dev Anoop
Mathematics Teacher
Bathinda
Email: devanoop@devanoop.com

1. Find the values of x and y, so that the vectors $2\hat{i}+3\hat{j}$ and $x\hat{i}+y\hat{j}$ are equal.

Section A 4 Marks Each

2. For any two vectors $\vec{a}$ and $\vec{b}$, prove that $(\vec{a}\times\vec{b})^2 = \vec{a}^2\vec{b}^2-(\vec{a}.\vec{b})^2$.

3. If $\hat{a}$ and $\hat{b}$ are unit vectors and θ is the angle between them, then show that:

$\sin\frac{\theta}{2}=\frac{1}{2}\left|\hat{a}-\hat{b}\right|$.

4. If $\vec{a}+\vec{b}+\vec{c}=0$ and $\left|\vec{a}\right|=3,\left|\vec{b}\right|=5$ and $\left|\vec{c}\right|=7$, show that the angle between $\vec{a}$ and $\vec{b}$ is 60°.

5. Let $\vec{a},\vec{b}$ and $\vec{c}$ be three vectors such that $\left|\vec{a}\right|=3,\left|\vec{b}\right|=4,\left|\vec{c}\right|=5$ and each one of them being perpendicular to the sum of the other two, find $\left|\vec{a}+\vec{b}+\vec{c}\right|$.

6. Show that $\vec{b}\times\vec{c}+\vec{c}\times\vec{a}+\vec{a}\times\vec{b}$ is perpendicular to the plane containing the points A, B, C whose position vectors are $\vec{a},\vec{b}$ and $\vec{c}$ respectively.

7. Show that the points whose position vectors are given $2\hat{i}-\hat{j}+\hat{k},\hat{i}-3\hat{j}-5\hat{k}$ and $3\hat{i}-4\hat{j}-4\hat{k}$ form a right-angled triangle.