CHAPTER-10 VECTOR ALGEBRA

1 EXERCISE - 10.2

- 1. Compute the magnitude of the following vectors: $\vec{a} = \hat{i} + \hat{j} + \hat{k}; \ \vec{b} = 2\hat{i} 7\hat{j} 3\hat{k}; \ \vec{c} = \frac{1}{\sqrt{3}} \ \hat{i} + \frac{1}{\sqrt{3}} \hat{j} \frac{1}{3}\hat{k}$
- 2. Write two different vectors having same magnitude.
- 3. Write two different vectors having same direction.
- 4. 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.
- 5. Find the scalar and vector components of the vector with initial point (2, 1) and terminal point (-5, 7).
- 6. Find the sum of the vectors $\vec{a} = \hat{i} 2\hat{j} + \hat{k}$, $\vec{b} = -2\hat{i} + 4\hat{j} + 5\hat{k}$ and $\vec{c} = \hat{i} 6\hat{j} 7\hat{k}$.
- 7. Find the unit vector in the direction of the vector $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$.
- 8. Find the unit vector in the direction of vector \overrightarrow{PQ} , where P and Q are the points (1, 2, 3) and (4, 5, 6), respectively.
- 9. For given vectors, $\vec{a}=2\hat{i}-\hat{j}+2\hat{k}$ and $\vec{b}=-\hat{i}+\hat{j}-\hat{k}$, find the unit vector in the direction of the vector $\vec{a}+\vec{b}$.
- 10. Find a vector in the direction of vector $5\hat{i} \hat{j} + 2\hat{k}$ which has magnitude 8 units.
- 11. Show that the vectors $2\hat{i} 3\hat{j} + 4\hat{k}$ and $-4\hat{i} + 6\hat{j} 8\hat{k}$ are collinear.
- 12. Find the direction cosines of the vector $\hat{i} + 2\hat{j} + 3\hat{k}$.
- 13. Find the direction cosines of the vector joining the points A (1, 2, -3) and B(-1, -2, 1), directed from A to B.
- 14. Show that the vector $\hat{i} + \hat{j} + \hat{k}$ is equally inclined to the axes OX, OY and OZ.

- 15. Find the position vector of a point R which divides the line joining two points P and Q whose position vectors are $\hat{i} + 2\hat{j} \hat{k}$ and $-\hat{i} + \hat{j} + \hat{k}$ respectively, in the ratio 2: 1
 - (i) internally
 - (ii) externally
- 16. Find the position vector of the mid point of the vector joining the points P(2, 3, 4) and Q(4, 1, -2).
- 17. Show that the points A, B and C with position vectors, $\vec{a} = 3\hat{i} 4\hat{j} 4\hat{k}$, $\vec{b} = 2\hat{i} \hat{j} + \hat{k}$ and $\vec{c} = \hat{i} 3\hat{j} 5\hat{k}$, respectively form the vertices of a right angled triangle.
- 18. In triangle ABC (Fig 10.18), which of the following is not true:
 - (a) $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} = \overrightarrow{0}$
 - (b) $\overrightarrow{AB} + \overrightarrow{BC} \overrightarrow{CA} = \overrightarrow{0}$
 - (c) $\overrightarrow{AB} + \overrightarrow{BC} \overrightarrow{CA} = \overrightarrow{0}$
 - (d) $\overrightarrow{AB} \overrightarrow{BC} + \overrightarrow{CA} = \overrightarrow{0}$

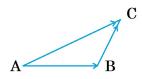


Fig 10.18

- 19. If \vec{a} and \vec{b} are two collinear vectors, then which of the following are incorrect:
 - (a) $\vec{b} = \lambda \vec{a}$, for some scalar λ
 - (b) $\vec{a} = \pm \vec{b}$
 - (c) the respective components of \vec{a} and \vec{b} are not proportiona
 - (d) both the vectors \vec{a} and \vec{b} have same direction, but different magnitudes.