

Model Question Paper 2

VECTOR ALGEBRA 2

11th Standard

Maths

Reg.No. :

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Answer all the Questions

Time : 02:00:00 Hrs

Total Marks : 50

6 x 1 = 6

Part A

- 1) If the initial point of vector $\vec{AB}$ is $(-1, 5, 8)$, then the terminal point is
 (a) $3\vec{i} + 2\vec{j} + 8\vec{k}$ (b) $-3\vec{i} + 2\vec{j} + 8\vec{k}$ (c) $-3\vec{i} - 2\vec{j} - 8\vec{k}$ (d) $3\vec{i} + 2\vec{j} - 8\vec{k}$
- 2) Which of the following vectors has the same direction as the vector $\vec{i} - 2\vec{j}$?
 (a) $-\vec{i} + 2\vec{j}$ (b) $2\vec{i} + 4\vec{j}$ (c) $-3\vec{i} + 6\vec{j}$ (d) $3\vec{i} - 6\vec{j}$
- 3) If $\vec{a} = \vec{i} + \vec{j} - 2\vec{k}$, $\vec{b} = -\vec{i} + 2\vec{j} + \vec{k}$, $\vec{c} = \vec{i} - 2\vec{j} + 2\vec{k}$, then a unit vector parallel to $\vec{a} + \vec{b} + \vec{c}$ is
 (a) $\frac{\vec{i} - 2\vec{j} + \vec{k}}{\sqrt{6}}$ (b) $\frac{-\vec{j} + \vec{k}}{\sqrt{3}}$ (c) $\frac{2\vec{i} + \vec{j} + \vec{k}}{\sqrt{6}}$ (d) $\frac{\vec{i} + \vec{j} + \vec{k}}{\sqrt{3}}$
- 4) If $\vec{a} = 2\vec{i} + \vec{j} - 8\vec{k}$, $\vec{b} = \vec{i} + 3\vec{j} - 4\vec{k}$, then the magnitude of $\vec{a} + \vec{b}$ =
 (a) 13 (b) $\frac{13}{3}$ (c) $\frac{3}{13}$ (d) $\frac{4}{13}$
- 5) If the position vectors of P and Q are $2\vec{i} + 3\vec{j} - 7\vec{k}$, $4\vec{i} - 3\vec{j} + 4\vec{k}$, then the direction cosines of $\vec{PQ}$ are
 (a) $\frac{2}{\sqrt{61}}$, $\frac{-6}{\sqrt{161}}$, $\frac{11}{\sqrt{161}}$ (b) $\frac{-2}{\sqrt{61}}$, $\frac{-6}{\sqrt{161}}$, $\frac{-11}{\sqrt{161}}$ (c) -2, -6, 11 (d) 1, 2, 3
- 6) The unit vector parallel to $\vec{a}$ are
 (a) $\hat{a} = \frac{\vec{a}}{|\vec{a}|}$ (b) $\pm |\vec{a}|$ (c) $\vec{a} = |\vec{a}| \hat{a}$ (d) $\pm (\hat{a})$

Part B

7 x 2 = 14

- 7) If ABCD is a quadrilateral and E and F are the mid-points of AC and BD respectively, prove that $\vec{AB} + \vec{AD} + \vec{CB} + \vec{CD} = 4\vec{EF}$
- 8) In a regular hexagon ABCDEF if $\vec{AB} = \vec{a}$ and $\vec{BC} = \vec{b}$, then express $\vec{AC}$, and $\vec{EF}$ in terms of $\vec{a}$ and $\vec{b}$.
- 9) If $\vec{a}$, $\vec{b}$, $\vec{c}$ be the vectors represented by the three sides of a triangle, taken in order, then prove that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$
- 10) If the vectors $2\vec{i} - 5\vec{j} + \vec{k}$ and $2\vec{i} + \vec{a}\vec{j} + 4\vec{k}$ are parallel find the values of $\vec{a}$ and $\vec{b}$.
- 11) Find a unit vector parallel to the sum of the vectors $\vec{a} = 22\vec{i} + 4\vec{j} - 5\vec{k}$ and $-\vec{b} = \vec{i} + 2\vec{j} - 3\vec{k}$
- 12) Show that the vectors $\vec{a} - 2\vec{b} + 3\vec{c}$, $\vec{a} - 3\vec{b} + 5\vec{c}$ and $-2\vec{a} + 3\vec{b} - 4\vec{c}$ are coplanar where $\vec{a}$, $\vec{b}$, $\vec{c}$ are non coplanar.
- 13) Prove that the medians of a triangle meet at a point.

Part C

5 x 3 = 15

- 14) Prove that the points $2\vec{i} + 3\vec{j} + 4\vec{k}$, $3\vec{i} + 4\vec{j} + 2\vec{k}$, $4\vec{i} + 2\vec{j} + 3\vec{k}$ form an equilateral triangle.
- 15) If the vertices of a triangle have position vectors $\vec{i} + 2\vec{j} + 3\vec{k}$, $2\vec{i} + 3\vec{j} + \vec{k}$, $3\vec{i} + \vec{j} + 2\vec{k}$, find the position vector of its centroid.
- 16) Find the unit vectors parallel to sum of $3\vec{i} - 5\vec{j} + 8\vec{k}$ and $-2\vec{j} - 2\vec{k}$
- 17) Find the unit vectors parallel to $3\vec{a} - 2\vec{b} + 4\vec{c}$ Where $\vec{a} = 3\vec{i} - \vec{j} - 4\vec{k}$, $\vec{b} = -2\vec{i} - 4\vec{j} - 3\vec{k}$, $\vec{c} = \vec{i} + 2\vec{j} - \vec{k}$
- 18) If the position vectors of P and Q are $\vec{i} + 3\vec{j} - 7\vec{k}$ and $5\vec{i} - 2\vec{j} + 4\vec{k}$ find $\vec{PQ}$ and determine its direction cosines.

Part D

3 x 5 = 15

- 19) The position vectors of the points A, B, C and D are $\vec{a}$, $\vec{b}$, $2\vec{a} + 3\vec{b}$, $\vec{a} - 2\vec{b}$ respectively. Find $\vec{DB}$ and $\vec{AC}$.
- 20) Find the position vector of the points which divide the join of the points A and B whose P.Vs $\vec{a} - 2\vec{b}$ and $\vec{a} - 2\vec{b}$ are internally and externally in the ratio 3 : 2.
- 21) If $\vec{a}$ and $\vec{b}$ are position vectors of points A and B respectively, then find the position vector of points of trisection of AB.
