# SRI RAGHAVENDRA TUITION CENTER

**vector**

**11th Standard**

**Maths**

Date : 29-06-24

Reg.No. : | | | | | | |

Exam Time : 01:00 Hrs

Total Marks : 50

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**I.ANSWER ALL QUESTION** 11 x 1 = 11

1) The value of $\overrightarrow{AB}+\overrightarrow{BC}+\overrightarrow{DA}+\overrightarrow{CD}$ is

(a) $\overrightarrow{AD}$ (b) $\overrightarrow{CA}$ (c) $\vec{0}$ (d) $-\overrightarrow{AD}$

2) The unit vector parallel to the resultant of the vectors $\hat{i}+\hat{j}-\hat{k}$ and $\hat{i}-2\hat{j}+\hat{k}$ is

(a) $\frac{\hat{i}-\hat{j}+\hat{k}}{\sqrt{5}}$ (b) $\frac{2\hat{i}+\hat{j}}{\sqrt{5}}$ (c) $\frac{2\hat{i}-\hat{j}+\hat{k}}{\sqrt{5}}$ (d) $\frac{2\hat{i}-\hat{j}}{\sqrt{5}}$

3) A vector makes equal angle with the positive direction of the coordinate axes. Then each angle is equal to

(a) $cos^{-1}(\frac{1}{3})$ (b) $cos^{-1}(\frac{2}{3})$ (c) $cos^{-1}(\frac{1}{\sqrt{3}})$ (d) $cos^{-1}(\frac{2}{\sqrt{3}})$

4) If ABCD is a parallelogram, then $\overrightarrow{AB}+\overrightarrow{AD}+\overrightarrow{CB}+\overrightarrow{CD}$ is equal to

(a) $2(\overrightarrow{AB}+\overrightarrow{AD})$ (b) $4\overrightarrow{AC}$ (c) $4\overrightarrow{BD}$ (d) $\vec{0}$

5) If $\vec{a},\vec{b}$ are the position vectors A and B, then which one of the following points whose position vector lies on AB, is

(a) $\vec{a}+\vec{b}$ (b) $\frac{2\vec{a}-\vec{b}}{2}$ (c) $\frac{2\vec{a}+\vec{b}}{3}$ (d) $\frac{\vec{a}-\vec{b}}{3}$

6) If $\lambda\hat{i}+2\lambda\hat{j}+2\lambda\hat{k}$ is a unit vector, then the value of $\lambda$ is

(a) $\frac{1}{3}$ (b) $\frac{1}{4}$ (c) $\frac{1}{9}$ (d) $\frac{1}{2}$

7) If $\vec{a}$ and $\vec{b}$ having same magnitude and angle between them is 60° and their scalar product is $\frac{1}{2}$ then $|\vec{a}|$ is

(a) 2 (b) 3 (c) 7 (d) 1

8) Vectors $\vec{a}$ and $\vec{b}$ are inclined at an angle $\theta=120^{o}$. If $|\vec{a}|=1,|\vec{b}|=2$, then $[(\vec{a}+3\vec{b})\times(3\vec{a}-\vec{b})]^2$ is equal to

(a) 225 (b) 275 (c) 325 (d) 300

9) If the projection of $5\hat{i}-\hat{j}-3\hat{k}$ on the vector $\hat{i}+3\hat{j}+\lambda\hat{k}$ is same as the projection of $\hat{i}+3\hat{j}+\lambda\hat{k}$ on $5\hat{i}-\hat{j}-3\hat{k}$, then $\lambda$ is equal to

(a) $\pm4$ (b) $\pm3$ (c) $\pm5$ (d) $\pm1$

10) If the points whose position vectors $10\hat{i}+3\hat{j},12\hat{i}-5\hat{j}$ and $a\hat{i}+11\hat{j}$ are collinear then a is equal to

(a) 6 (b) 3 (c) 5 (d) 8

11) If $\vec{a}=\hat{i}+2\hat{j}+2\hat{k},|\vec{b}|=5$ and the angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{6}$, then the area of the triangle formed by these two vectors as two sides, is

(a) $\frac{7}{4}$ (b) $\frac{15}{4}$ (c) $\frac{3}{4}$ (d) $\frac{17}{4}$

**II.ANSWER ANY 5 QUESTION** 5 x 2 = 10

12) Find a unit vector along the direction of the vector $5\hat{i}$ - $3\hat{j}$ + $4\hat{k}$ .

13) Find a direction ratio and direction cosines of the following vectors $3\hat{i}-4\hat{k}$

14) Verify whether the following ratios are direction cosines of some vector or not $\frac{1}{\sqrt{2}}, \frac{1}{2}, \frac{1}{2}$

15) Find $\vec{a}.\vec{b}$ when $\vec{a}= \hat{i} - \hat{j} + 5\hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{k}$

16) Find $(\vec{a} + 3\vec{b}).(2\hat{a} - \hat{b})$ if $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} - \hat{k}$

17) Find the value $\lambda$ for which the vectors $\vec{a}$ and $\vec{b}$ are perpendicular, where $\vec{a} = 2\hat{i} + \lambda\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + 3\hat{k}$

18) If $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}, \vec{b} = -3\hat{i} + 4\hat{j} - 5\hat{k}$ then find the value of $\vec{a}.\vec{b}$.

**II.ANSWER ANY 3 QUESTION** 3 x 3 = 9

19) Let A and B be two points with position vectors $2\vec{a}+ 4\vec{b}$ and $2\vec{a} - 8\vec{b}$. Find the position vectors of the points which divide the line segment joining A and B in the ratio 1:3 internally and externally.

20) Find the angle between the vectors $5\hat{i} + 3\hat{j} + 4\hat{k}$ and $6\hat{i} - 8\hat{j} - \hat{k}$.

21) Find the angle between the vectors $2\hat{i} + 3\hat{j} - 6\hat{k}$ and $6\hat{i} - 3\hat{j} + 2\hat{k}$

22) If $\vec{a}, \vec{b}$ are unit vectors and $\theta$ is the angle between them, show that $sin\frac{\theta}{2} = \frac{1}{2}|\vec{a} - \vec{b}|$

23) Find the unit vectors perpendicular to each of the vectors $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$, where $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = \hat{i} + 2\hat{j} + 3\hat{k}$.

24) Find the area of the parallelogram whose two adjacent sides are determined by the vectors $\hat{i} + 2\hat{j} + 3\hat{k}$ and $3\hat{i} - 2\hat{j} + \hat{k}$

**IV.ANSWER ANY 4 QUESTION** 4 x 5 = 20

25) a) If ABCD is a quadrilateral and E and F are the midpoints of AC and BD respectively, then prove that $\overrightarrow{AB}$ + $\overrightarrow{AD}$ + $\overrightarrow{CB}$ +$\overrightarrow{CD}$ = 4 $\overrightarrow{EF}$.

**(OR)**

b) Show that the following vectors are coplanar $5\hat{i}$ +$6\hat{j}$ +$7\hat{k}$ ,7 $\hat{i}$ -$8\hat{j}$ +9 $\hat{k}$,$3\hat{i}$+$20\hat{j}$ +$5\hat{k}$ .

26) a) Show that the points whose position vectors are $2\hat{i}$ + $3\hat{j}$ − $5\hat{k}$, $3\hat{i}$ + $\hat{j}$ − $2\hat{k}$ and, $6\hat{i}$ − $5\hat{j}$ + $7\hat{k}$ are collinear

**(OR)**

b) If $\vec{a}, \vec{b}, \vec{c}$are position vectors of the vertices A, B, C of a triangle ABC, show that the area of the triangle ABC is $\frac{1}{2}|\vec{a} \times \vec{b} + \vec{b} + \vec{c} + \vec{c} \times \vec{a}|$. Also deduce the condition for collinearity of the points A, B, and C.

27) a) Show that the points A (1, 1, 1), B(1, 2, 3) and C(2, - 1, 1) are vertices of an isosceles triangle.

**(OR)**

b) The medians of a triangle are concurrent.

28) a) Prove that the points whose position vectors $2\hat{i} + 4\hat{j} + 3\hat{k}, 4\hat{i} + \hat{j} + 9\hat{k}$ and $10\hat{i} - \hat{j} + 6\hat{k}$ form a right angled triangle.

**(OR)**

b) For any vector $\vec{a}$ prove that $|\vec{a} \times \hat{i}|^2 + |\vec{a} \times \hat{j}|^2 + |\vec{a} \times \hat{k}|^2 = 2|\vec{a}|^2$ .

**ALL THE BEST**

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