MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 53

Total Marks : 31

Max. Time : 32 min.

Topic : Vector

Type of Questions		**M.M. Min.**
Single choice Objective ('–1' negative marking) Q.1,2,3,4,5,6,7,8,9	**(3 marks, 3 min.)**	**[27, 27]**
Subjective Questions (no negative marking) Q.10	**(4 marks, 5 min.)**	**[4, 5]**

1. If $\vec{a} + 2\vec{b} + 3\vec{c} = 0$ and $|\vec{a}| = 6$, $|\vec{b}| = 3$ and $|\vec{c}| = 2$, then angle between $\vec{a}$ and $\vec{b}$ is

(A) $\pi + \cos^{-1}\left(\frac{3}{4}\right)$ (B) $\sin^{-1}\left(\frac{4}{5}\right)$ (C) $\pi - \cos^{-1}\left(\frac{3}{4}\right)$ (D) None of these

2. The value of λ for which the vector $\vec{r} = (\lambda^2 - 9)\hat{i} + 2\hat{j} - (\lambda^2 - 16)\hat{k}$ makes acute angle with the positive direction of coordinate axis.

(A) $(-\infty, -3) \cup (3, \infty)$ (B) $(4, 4)$ (C) $(-4, -3) \cup (3, 4)$ (D) None of these

3. The set of all values of λ for which the vectors $\vec{a} = (\lambda \log_2 x)\hat{i} - 6\hat{j} + 3\hat{k}$ and $\vec{b} = (\log_2 x)\hat{i} + 2\hat{j} + (2\lambda \log_2 x)\hat{k}$ make an obtuse angle for any $x \in (0, \infty)$

(A) $\left(0, \frac{4}{3}\right)$ (B) $\left(-\frac{4}{3}, 0\right)$ (C) $\left(\frac{4}{3}, \infty\right)$ (D) $\left(-\frac{4}{3}, 0\right]$

4. $(\vec{r}.\hat{i})(\hat{i} \times \vec{r}) + (\vec{r}.\hat{j})(\hat{j} \times \vec{r}) + (\vec{r}.\hat{k})(\hat{k} \times \vec{r}) =$

(A) 0 (B) $\vec{r}$ (C) $2\vec{r}$ (D) $3\vec{r}$

5. If $|\vec{a}| = 3$, $|\vec{b}| = 4$, then a value of λ for which $\vec{a} + \lambda\vec{b}$ is perpendicular to $\vec{a} - \lambda\vec{b}$, is :-

(A) $\frac{9}{16}$ (B) $\frac{3}{4}$ (C) $\frac{3}{2}$ (D) $\frac{4}{3}$

6. If ABCDEF is regular hexagon, then $\overrightarrow{AD} + \overrightarrow{EB} + \overrightarrow{FC}$ is equal to

(A) 0 (B) $2\overrightarrow{AB}$ (C) $3\overrightarrow{AB}$ (D) $4\overrightarrow{AB}$

7. If $\vec{a} = \hat{i} + \hat{j}, \vec{b} = 2\hat{j} - \hat{k}$ and $\vec{r} \times \vec{a} = \vec{b} \times \vec{a}, \vec{r} \times \vec{b} = \vec{a} \times \vec{b}$, then $\frac{\vec{r}}{|\vec{r}|}$ is equal to

(A) $\frac{1}{\sqrt{11}}(\hat{i} + 3\hat{j} - \hat{k})$ (B) $\frac{1}{\sqrt{11}}(\hat{i} - 3\hat{j} + \hat{k})$ (C) $\frac{1}{\sqrt{3}}(\hat{i} - \hat{j} + \hat{k})$ (D) none of these

8. If $\vec{a}, \vec{b}$ are nonzero and noncollinear vectors, then $[\vec{a}\ \vec{b}\ \vec{i}]\vec{i} + [\vec{a}\ \vec{b}\ \vec{j}]\vec{j} + [\vec{a}\ \vec{b}\ \vec{k}]\vec{k}$ =

(A) $\vec{a} + \vec{b}$ (B) $\vec{a} \times \vec{b}$ (C) $\vec{a} - \vec{b}$ (D) $\vec{b} \times \vec{a}$

9. A vector $\vec{c}$ of magnitude $20\sqrt{6}$ parallel to the bisector of the angle between $\vec{a} = 7\hat{i} - 4\hat{j} - 4\hat{k}$ and $\vec{b} = -2\hat{i} - \hat{j} + 2\hat{k}$ is

(A) $\pm \frac{20}{3}(2\hat{i} + 7\hat{j} + \hat{k})$ (B) $\pm \frac{3}{20}(\hat{i} + 7\hat{j} + 2\hat{k})$

(C) $\pm \frac{20}{3}(\hat{i} - 2\hat{j} + 7\hat{k})$ (D) $\pm \frac{20}{3}(\hat{i} - 7\hat{j} + 2\hat{k})$

10. In a triangle OAB, $\angle$ AOB = 90° where O is origin. If P and Q are point of trisection of AB then prove that $OP^2 + OQ^2 = \frac{5}{9}AB^2$

Answers Key

1. (D) **2.** (C) **3.** (D) **4.** (A)

5. (B) **6.** (D) **7.** (A) **8.** (B) **9.** (D)