MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 56

Total Marks : 33

Max. Time : 37 min.

Topic : Vector

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3	**(3 marks, 3 min.)**	**[9, 9]**
Subjective Questions (no negative marking) Q.4,5,6,7	**(4 marks, 5 min.)**	**[16, 20]**
Match the Following (no negative marking) Q.8	**(8 marks, 8 min.)**	**[8, 8]**

1. Let $\vec{a} = 2\hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$ and a unit vector $\vec{c}$ be coplanar. If $\vec{c}$ is perpendicular to $\vec{a}$ then $\vec{c}$ =

(A) $\pm \frac{1}{\sqrt{2}}(-\hat{j} + \hat{k})$ (B) $\frac{1}{\sqrt{3}}(-\hat{i} - \hat{j} - \hat{k})$ (C) $\frac{1}{\sqrt{5}}(\hat{i} - 2\hat{j})$ (D) $\frac{1}{\sqrt{3}}(\hat{i} - \hat{j} - \hat{k})$

2. $\vec{a} \times (\vec{b} \times \vec{c})$, $\vec{b} \times (\vec{c} \times \vec{a})$ and $\vec{c} \times (\vec{a} \times \vec{b})$ are :

(A) linearly dependent (B) equal vectors (C) parallel vectors (D) none of these

3. If $\vec{a}$ is perpendicular to $\vec{b}$ and $\vec{r}$ is a non-zero vector such that $p\,\vec{r} + (\vec{r}\,.\,\vec{a})\vec{b} = \vec{c}$, then $\vec{r}$ =

(A) $\frac{\vec{c}}{p} - \frac{(\vec{a}\,.\,\vec{c})\,\vec{b}}{p^2}$ (B) $\frac{\vec{a}}{p} - \frac{(\vec{c}\,.\,\vec{b})\,\vec{a}}{p^2}$ (C) $\frac{\vec{a}}{p} - \frac{(\vec{a}\,.\,\vec{b})\,\vec{c}}{p^2}$ (D) $\frac{\vec{c}}{p^2} - \frac{(\vec{a}\,.\vec{c})\,\vec{b}}{p}$

4. Find the direction cosines ℓ, m, n of a line which are connected by the relations $\ell + m + n = 0$, $2mn + 2m\ell - n\ell = 0$.

5. Find the equation of a straight line which passes through a point with position vector $\vec{a}$, meets the line $\vec{r} = b + \lambda\vec{c}$ and is parallel to the plane $\vec{r}\cdot\vec{n} = 1$.

6. If the three planes $\vec{r}.\vec{n}_1 = p_1$, $\vec{r}.\vec{n}_2 = p_2$ and $\vec{r}.\vec{n}_3 = p_3$ have a common line of intersection, then show that $p_1(\vec{n}_2 \times \vec{n}_3) + p_2(\vec{n}_3 \times \vec{n}_1) + p_3(\vec{n}_1 \times \vec{n}_2) = \vec{0}$.

7. Find the equation of the plane through (3, 4, 1) which is parallel to the plane $\vec{r}\cdot(2\vec{i} - 3\vec{j} + 5\vec{k}) + 7 = 0$.

8. **Match the column**

Column – I	**Column – II**
(A) If $|\vec{a}| = |\vec{b}| = |\vec{c}| = 2$ and $\vec{a}.\vec{b} = \vec{b}.\vec{c} = \vec{c}.\vec{a} = 2$, then $|[\vec{a}\ \vec{b}\ \vec{c}]|$ is equal to	(p) 32
(B) If $|\vec{a}| = |\vec{b}| = |\vec{c}| = 2$ and $\vec{a}.\vec{b} = \vec{b}.\vec{c} = \vec{c}.\vec{a} = 2$, then $\sqrt{[\vec{a}\times\vec{b}\ \ \vec{b}\times\vec{c}\ \ \vec{c}\times\vec{a}]}$ is equal to	(q) $4\sqrt{2}$
(C) If $|\vec{a}| = |\vec{b}| = |\vec{c}| = 2$ and $\vec{a}.\vec{b} = \vec{b}.\vec{c} = \vec{c}.\vec{a} = 2$ and $\vec{p}, \vec{q}$ and $\vec{r}$ is reciprocal system of $\vec{a}, \vec{b}$ and $\vec{c}$, then 32 $[\vec{p}\ \vec{q}\ \vec{r}]$ is equal to	(r) $5\sqrt{3}$
(D) The area of a quadrilateral whose diagonals are $3\hat{i} + \hat{j} - 2\hat{k}$ and $\hat{i} - 3\hat{j} + 4\hat{k}$ is	(s) 1

Answers Key

1. (A) **2.** (A) **3.** (A)

4. $\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{-2}{\sqrt{6}}$ or $\frac{-2}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}$

5. $\vec{a} + m\left(\vec{b} + \frac{(\vec{a}-\vec{b}).\vec{n}}{\vec{c}.\vec{n}}\vec{c} - \vec{a}\right)$

7. $\vec{r}\cdot\left(2\vec{i} - 3\vec{j} + 5\vec{k}\right) + 1 = 0$

8. (A) $\to$ (q), (B) $\to$ (q), (C) $\to$ (q), (D) $\to$ (r)