MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 58

Total Marks : 34

Max. Time : 32 min.

Topics : Function, Vector, Three Dimensional Geometry

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1 to 4	**(3 marks, 3 min.)**	**[12, 12]**
Multiple choice objective (no negative marking) Q.5, 6	**(5 marks, 4 min.)**	**[10, 8]**
Subjective Questions (no negative marking) Q.7	**(4 marks, 5 min.)**	**[4, 5]**
Match the Following (no negative marking) Q.8	**(8 marks, 8 min.)**	**[8, 8]**

1. The greatest value of the function $f(x) = 2.3^{3x} - 3^{2x}.\ 4 + 2.3^{x}$ in the interval $[-1, 1]$ is

(A) 0 (B) 8/27 (C) 1 (D) 24

2. Let $\vec{a}, \vec{b}, \vec{c}$ be three non – coplanar vectors such that volume of the parallelopiped formed by these vectors is 1/4. Now, if any vector $\vec{d}$ is represented as, $\vec{d} = \lambda\left(\vec{a}\times\vec{b}\right) + \mu\left(\vec{b}\times\vec{c}\right) + \nu\left(\vec{c}\times\vec{a}\right)$. Then $\lambda + \mu + \nu$ equals:

(A) $\vec{d}\cdot\left(\vec{a}+\vec{b}+\vec{c}\right)$ (B) $\frac{2\vec{d}}{3}\cdot\left(\vec{a}+\vec{b}+\vec{c}\right)$ (C) $8\vec{d}\cdot\left(\vec{a}+\vec{b}+\vec{c}\right)$ (D) $4\vec{d}\cdot\left(\vec{a}+\vec{b}+\vec{c}\right)$

3. If $\vec{a}, \vec{b}, \vec{c}, \vec{d}$ are non - zero, non collinear vectors and if $\left((\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d})\right).\left(\vec{a}\times\vec{d}\right) = 0$, then which of the following is always true

(A) $\vec{a}, \vec{b}, \vec{c}, \vec{d}$ are necessarily coplanar

(B) either $\vec{a}$ or $\vec{d}$ must lie in the plane of $\vec{b}$ and $\vec{c}$

(C) either $\vec{b}$ or $\vec{c}$ must lie in plane of $\vec{a}$ and $\vec{d}$

(D) either $\vec{a}$ or $\vec{b}$ must lie in plane of $\vec{c}$ and $\vec{d}$

4. Let $\vec{r} = (\vec{a}\times\vec{b})\sin x + (\vec{b}\times\vec{c})\cos y + 2(\vec{c}\times\vec{a})$ where $\vec{a}\ \vec{b}\ \vec{c}$ are three noncoplanar vectors. If $\vec{r}$ is perpendicular to $\vec{a} + \vec{b} + \vec{c}$, then minimum value of $x^2 + y^2$ is

(A) π^2 (B) $\frac{\pi^2}{4}$ (C) $\frac{5\pi^2}{4}$ (D) none of these

5. If $\vec{a}, \vec{b}, \vec{c}$ are non-zero non-coplanar vectors, then $\vec{r}_1 = 2\vec{a} - 3\vec{b} + \vec{c}, \vec{r}_2 = 3\vec{a} - 5\vec{b} + 2\vec{c}, \vec{r}_3 = 4\vec{a} - 5\vec{b} + \vec{c}$ are

(A) linearly independent

(B) linearly dependent

(C) $\vec{r}_3 = \alpha\vec{r}_1 - \beta\,\vec{r}_2\ ;\ \alpha, \beta \in R$

(D) None of these

6. Projection of line $\frac{x+1}{2} = \frac{y+1}{-1} = \frac{z+3}{4}$ on the plane x + 2y + z = 6; has equation

(A) x + 2y + z – 6 = 0 = 9x – 2y – 5z – 8

(B) x + 2y + z + 6 = 0, 9x – 2y + 5z = 4

(C) $\frac{x-1}{4} = \frac{y-3}{-7} = \frac{z+1}{10}$

(D) $\frac{x+3}{4} = \frac{y-2}{7} = \frac{z-7}{-10}$

7. Find the equation of the plane passing through the point (1, 1, –1) and perpendicular to the planes x + 2y + 3z – 7 = 0 and 2x – 3y + 4z = 0.

8. **Match the column**

Column - I		**Column - I**	
(A)	If $\vec{a}, \vec{b}, \vec{c}$ are non coplanar unit vectors such that $\vec{a}\times(\vec{b}\times\vec{c}) = \frac{\vec{b}+\vec{c}}{\sqrt{2}}$, then the angle between $\vec{a}$ and $\vec{b}$ is	(p)	$\frac{\pi}{3}$
(B)	Four vectors $\vec{a}, \vec{b}, \vec{c}, \vec{d}$ such that $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d}) = \vec{O}$. Let P_1 and P_2 be planes determined by the pairs of vectors $\vec{a}, \vec{b}$ and $\vec{c}, \vec{d}$ respectively, then the angle between P_1 and P_2 is	(q)	$\frac{3\pi}{4}$
(C)	If $\vec{a}$ and $\vec{b}$ are two unit vectors such that $\vec{a}+2\vec{b}$ and $5\vec{a}-4\vec{b}$ are perpendicular to each other then the angle between $\vec{a}$ and $\vec{b}$ is	(r)	$\frac{\pi}{6}$
(D)	If $\lvert\vec{a}\rvert = 3, \lvert\vec{b}\rvert = 5, \lvert\vec{c}\rvert = 7$ and $\vec{a}+\vec{b}+\vec{c} = \vec{O}$. The angle between $\vec{a}$ and $\vec{b}$ is	(s)	0

Answers Key

1. D **2.** D **3.** C **4.** C

5. BC **6.** AC **7.** $17x + 2y - 7z = 26$.

8. (A) $\rightarrow$ q ; (B) $\rightarrow$ s ; (C) $\rightarrow$ p ; (D) $\rightarrow$ p