MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 59

Total Marks : 39

Max. Time : 40 min.

Topics : Vector, Three Dimensional Geometry

Type of Questions		M.M., Min.
Single choice Objective (no negative marking) Q.1, 2, 3	(3 marks, 3 min.)	[9, 9]
Multiple choice objective (no negative marking) Q.4, 5	(5 marks, 4 min.)	[10, 8]
Subjective Questions (no negative marking) Q.6 to Q.8	(4 marks, 5 min.)	[12, 15]
Match the Following (no negative marking) Q.9	(8 marks, 8 min.)	[8, 8]

1. If the line $\frac{x-2}{5} = \frac{y+10}{2} = \frac{z+3}{2}$ meets the curve

$xy = a^2$, $z = 1$, then number of values of a is

(A) 0 (B) 1 (C) 2 (D) More than 2

2. If $|\vec{a}| = 2$, $|\vec{b}| = 3$ and $\vec{a}.\vec{b} = 0$ then $\vec{a}\times(\vec{a}\times(\vec{a}\times(\vec{a}\times\vec{b})))$ is equal to

(A) $48\ \vec{b}$ (B) $-48\ \vec{b}$ (C) $48\ \vec{a}$ (D) $16\ \vec{b}$

3. The equation of a line $4x - 4y - z + 11 = 0 = x + 2y - z - 1$ can be put as

(A) $\frac{x}{2} = \frac{y-2}{1} = \frac{z-3}{4}$ (B) $\frac{x-2}{2} = \frac{y-2}{1} = \frac{z}{4}$ (C) $\frac{x-2}{2} = \frac{y}{1} = \frac{z-3}{4}$ (D) None of these

4. A ray M is sent along the line $\frac{x-0}{2} = \frac{y-2}{2} = \frac{z-1}{0}$ and is reflected by the plane $x = 0$ at point A. The reflected ray is again reflected by the plane $x + 2y = 0$ at point B. The initial ray and final reflected ray meets at point J. Then

(A) the co-ordinates of point B is (4, –2, 1)

(B) the co-ordinates of point J is (–3, –1, 1)

(C) the centroid of ΔABJ is (0, 0, 0)

(D) the co-ordinates of point J is (2, –1, 1)

5. The line which intersects each of the two lines $L_1 : 2x + y - 1 = 0 = 3x - 2y + z$,

$L_2 : 3x - y - z + 1 = 0 = 4x + y + 5z - 3$ and is parallel to the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{-1}$

(A) has direction ratio (1, 2, –1)

(B) has equation $8x - 3y + 2z - 1 = 0 = 5x + 3y + 11z - 7$

(C) having angle with L_2 equal to $\cos^{-1}\left(\sqrt{\frac{3}{7}}\right)$

(D) is perpendicular to the plane$3x + 6y - 3z = 7$

6. Let image of the line $\frac{x-1}{3}=\frac{y-3}{5}=\frac{z-4}{2}$ in the plane $2x - y + z + 3 = 0$ be L. A plane $7x + By + Cz + D = 0$ is such that it contains the line L and perpendicular to the plane $2x - y + z + 3 = 0$ then find the value of B + C + D

7. P is a point and PM, PN are perpendicular from P to the ZX and XY planes. If OP makes angle θ, α, β, γ with the plane OMN and the XY, YZ, ZX plane respectively, then prove that

$\text{cosec}^2\theta = \text{cosec}^2\alpha + \text{cosec}^2\beta + \text{cosec}^2\gamma$.

8. Find the sum of n terms of the series $\frac{3}{1.2}.\frac{1}{2}+\frac{4}{2.3}.\frac{1}{2^2}+\frac{5}{3.4}.\frac{1}{2^3}+\frac{6}{4.5}.\frac{1}{2^4}+........$

9. **Mathch the column**

Column - I		**Column - I**
(A)	If $\vec{a},\vec{b},\vec{c}$ non-coplanar vectors, then $(\vec{a}+\vec{b}+\vec{c})\cdot((\vec{a}+\vec{b})\times(2\vec{a}+\vec{b}))$ is equal to	(p) $\frac{1}{4}a^2b^2$
(B)	If $\vec{b}$ and $\vec{c}$ are any two non-collinear perpendicular unit vectors and $\vec{a}$ is any vector , then $(\vec{a}\cdot\vec{b})\vec{b}+(\vec{a}\cdot\vec{c})\vec{c}+\frac{\vec{a}\cdot(\vec{b}\times\vec{c})}{\left|\vec{b}\times\vec{c}\right|^2}(\vec{b}\times\vec{c})$ is equal to	(q) $-[\vec{a}\ \vec{b}\ \vec{c}]$
(C)	If $\vec{a},\vec{b},\vec{c}$ are non-coplanar vectors then $[\vec{a}+\vec{b}+\vec{c}\quad \vec{a}-\vec{c}\quad \vec{a}-\vec{b}]$ is equal to	(r) $\vec{a}$
(D)	Let $\vec{a}=a_1\hat{i}+a_2\hat{j}+a_3\hat{k},\ \vec{b}=b_1\hat{i}+b_2\hat{j}+b_3\hat{k},\vec{c}=c_1\hat{i}+c_2\hat{j}+c_3\hat{k}$ non-zero vectors such that $\vec{c}$ is a unit vector perpendicular to both $\vec{a}$ and $\vec{b}$ (and angle between $\vec{a}$ and $\vec{b}$ is $(\pi/6)$, then $\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}^2$ is equal to	(s) $-3[\vec{a}\ \vec{b}\ \vec{c}]$

Answers Key

1. A **2.** D **3.** A **4.** AB

5. ABD **6.** 30 **8.** $1-\dfrac{1}{2^n(n+1)}$

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