MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 52

Total Marks : 33

Max. Time : 36 min.

Topics : Solution of Triangle, Vector, Sequence & Series, Continuity & Derivability

Type of Questions		**M.M., Min.**
Comprehension (no negative marking) Q.1 to Q.4	**(3 marks, 3 min.)**	**[12, 12]**
Single choice Objective (no negative marking) Q.5,6,7	**(3 marks, 3 min.)**	**[9, 9]**
Subjective Questions (no negative marking) Q.8,9,10	**(4 marks, 5 min.)**	**[12, 15]**

COMPREHENSION (FOR Q. 1 TO 4)

A regular heptagon (seven sides) is inscribed in a circle of radius 1. A_1A_2.....A_7 be its vertices, G_1 is centriod of $\Delta A_1A_2A_5$ and G_2 be centroid of $\Delta A_3A_6A_7$. P is centriod of $\Delta\ OG_1G_2$, where O (origin) is centre of circumscribing circle.

1. Angle $\angle POA_1$ is equal to

(A) $\frac{\pi}{7}$ (B) $\frac{2\pi}{7}$ (C) $\frac{5\pi}{7}$ (D) $\frac{6\pi}{7}$

2. OP is equal to

(A) $\frac{10}{9}$ (B) $\frac{8}{9}$ (C) $\frac{1}{9}$ (D) 1

3. G_3 is such that centriod of triangle $G_1G_2G_3$ is O, then

(A) $3OG_3 = OA_2$ (B) $3OG_2 = A_2G_3$ (C) $2OG_3 = OA_2$ (D) $OG_3 = G_3A_2$

4. PA_1 is equal to

(A) $\frac{1}{9}\sqrt{\left(82-18\cos\frac{\pi}{7}\right)}$ (B) $\frac{1}{9}\sqrt{\left(82+18\cos\frac{2\pi}{7}\right)}$

(C) $\frac{1}{9}\sqrt{\left(82-18\sin\frac{2\pi}{7}\right)}$ (D) None of these

5. If sine of the acute angle between two vectors $-3\hat{i}+4\hat{j}+\hat{k}$ and $-2\hat{i}-\hat{j}-\hat{k}$ be $1+\frac{1}{2}x-\frac{1}{8}x^2$ ..... to ∞ then x is equal to

(A) $\frac{155}{156}$ (B) $\frac{1}{156}$ (C) $\frac{-1}{156}$ (D) None of these

6. Let $\vec{a}, \vec{b}, \vec{c}$ be three unit vectors such that $|\vec{a}+\vec{b}+\vec{c}| = 1$ and $\vec{a} \perp \vec{b}$. If $\vec{c}$ makes angles α, β with $\vec{a}, \vec{b}$ respectively then $\cos\alpha + \cos\beta$ is equal to

(A) 3/2 (B) 1 (C) – 1 (D) none of these

7. If $\vec{a}$ = (1, –1, 2), $\vec{b}$ = (–2, 3, 5), $\vec{c}$ = (2, –2, 4) and $\hat{i}$ is the unit vector in positive x-direction, then $(\vec{a}-2\vec{b}+3\vec{c})\cdot\hat{i}$ is equal to

(A) 11 (B) 15 (C) 18 (D) 10

8. Find the sum of infinite terms of the series : $\frac{3}{2.4}+\frac{5}{2.4.6}+\frac{7}{2.4.6.8}+\frac{9}{2.4.6.8.10}+.....$

9. Let f : [a, b] $\to$ R a continuous positive function, differentiable on [a, b]. Prove that there exists c $\in$ (a, b) such that $\frac{f(b)}{f(a)} = e^{(b-a)\frac{f'(c)}{f(c)}}$

10. If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}+\vec{b}| = |\vec{a}|$ then prove that $2\vec{a}+\vec{b}$ is a perpendicular to $\vec{b}$.

Answers Key

1.	(A)	**2.**	(C)	**3.**	(A)	**4.**	(A)
5.	(C)	**6.**	(C)	**7.**	(A)	**8.**	1/2