MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 27

Total Marks : 30

Max. Time : 33 min.

Topics : Method of Differentiation, Continuity & Derivability, Limits, Solution of Triangle

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 marks, 4 min.)**	**[5, 4]**
Subjective Questions (no negative marking) Q.5,6,7,8	**(4 marks, 5 min.)**	**[16, 20]**

1. The number of points where $f(x) = [\sin x + \cos x]$, where [.] denotes the greatest integer function, $x \in (0, 2\pi)$ is not continuous is :

(A) 3 (B) 4 (C) 5 (D) 6

2. $\lim\limits_{x\to 0} \dfrac{\sin[\cos x]}{1+[\cos x]}$ ([.] denotes the greatest integer function) is equal to

(A) equal to 1 (B) equal to 0 (C) does not exist (D) none of these

3. If $x = \cos\theta$, $y = \sin^3\theta$, then $\left(\dfrac{dy}{dx}\right)^2 + y\dfrac{d^2y}{dx^2} + 3\Big|_{\theta=\pi/3}$ is equal to

(A) 0 (B) 1 (C) $\dfrac{16}{57}$ (D) $\dfrac{57}{16}$

4. If $4a^2 + c^2 = b^2 - 4ac$, then the variable line $ax + by + c = 0$ always passes through two fixed points. The coordinates of the fixed points can be

(A) (–2, –1) (B) (2, –1) (C) (–2, 1) (D) (2, 1)

5. Let $f(x) = x^3 - 9x^2 + 15x + 6$ and $g(x) = \begin{cases} \min f(t); & 0 \le t \le x, 0 \le x \le 6 \\ x - 18\ ; & x > 6 \end{cases}$

Draw the graph of g(x) and discuss the continuity and differentiability of g(x).

6. If $f(x) = \begin{cases} -x\ , & x \le 1 \\ 3 + x\ , & x > 1 \end{cases}$ and $g(x) = \begin{cases} 3x\ , & x \le 1 \\ 2 + x\ , & x > 1 \end{cases}$, then define f(g(x)) and also examine its continuity.

7. If $\cos^{-1}(y/a) = \log(x/n)^n$ satisfies the equation $x^2\dfrac{d^4y}{dx^4} + 5x\dfrac{d^3y}{dx^3} + 8\dfrac{d^2y}{dx^2} = 0$, then find the value of n.

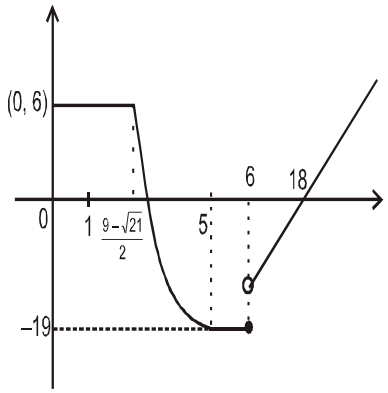
8. The distance between the two parallel lines is 1 unit . A point 'A' is chosen to lie between the lines at a distance 'd' from one of them . Triangle ABC is equilateral with B on one line and C on the other parallel line. Find the length of the side of the equilateral triangle

Answers Key

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

5. f(x) is discontinuous at x = 6 and non-differentiable

at $x = \frac{9-\sqrt{21}}{2}, 6$



6. $\begin{cases} -3x, & x \le \frac{1}{3} \\ 3+3x, & \frac{1}{3} < x \le 1 \\ 5+x, & x > 1 \end{cases}$, discontinuous at $x = \frac{1}{3}$

7. n = ±2 **8.** $2\sqrt{\frac{d^2-d+1}{3}}$