**MATHEMATICS**

**DPP**

DAILY PRACTICE PROBLEMS

# DPP No. 25

**Total Marks : 27**

**Max. Time : 28 min.**

**Topics : Limits, Straight Line, Continuity & Derivability**

| **Type of Questions** | | **M.M., Min.** |
|---|---|---|
| **Comprehension (no negative marking) Q.1 to Q.2** | **(3 marks, 3 min.)** | **[6, 6]** |
| **Single choice Objective (no negative marking) Q.3,4** | **(3 marks, 3 min.)** | **[6, 6]** |
| **Multiple choice objective (no negative marking) Q.5** | **(5 marks, 4 min.)** | **[5, 4]** |
| **True or False (no negative marking) Q.6** | **(2 marks, 2 min.)** | **[2, 2]** |
| **Subjective Questions (no negative marking) Q.7,8** | **(4 marks, 5 min.)** | **[8, 10]** |

**COMPREHENSION (FOR Q.NO. 1 TO 2)**

If f(x) = maximum $\left(\cos x, \frac{1}{2}, \{\sin x\}\right)$, $0 \le x \le 2\pi$, where { . } represents fractional part function, then

**1.** Number of points of discontinuity of f(x) is

(A) 1 (B) 2 (C) 3 (D) 4

**2.** Number of points where f(x) is not differentiable is

(A) 4 (B) 5 (C) 6 (D) 7

**3.** Consider a function f(x) : R $\to$ R and if $\lim_{x \to a}$ [f(x)] does not exist, where [ ] denotes greatest integer function, then

(A) $\lim_{x \to a}$ f(x) will never exist (B) f(x) may be continuous at x = a

(C) Function will not have a tangent at x = a (D) None of these

**4.** The angle between straight lines joining the origin and intersection points of the straight line bx + ay = ab and circle $x^2 + y^2 = ax + by$ is

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{2}$

**5.** Two consecutive vertices of a rectangle of area 10 unit$^2$ are (1,3) and (–2, –1). Other two vertices are

(A) $\left(\frac{-3}{5}, \frac{21}{5}\right), \left(-\frac{18}{5}, \frac{1}{5}\right)$ (B) $\left(-\frac{3}{5}, \frac{21}{5}\right), \left(-\frac{2}{5}, -\frac{11}{5}\right)$

(C) $\left(-\frac{2}{5}, -\frac{11}{5}\right), \left(\frac{13}{5}, \frac{9}{5}\right)$ (D) $\left(\frac{13}{5}, \frac{9}{5}\right), \left(-\frac{18}{5}, \frac{1}{5}\right)$

**6.** True / False

(A) $\lim\limits_{x\to\infty} \dfrac{\ell n x}{[x]} = \lim\limits_{x\to\infty} \dfrac{\{x\}}{\ell n x}$

where [ . ] is G.I.F. & { . } denotes fractional part function

(B) If $\lim\limits_{x\to\infty} \left(\sqrt{x^4+ax^3+3x^2+bx+2}-\sqrt{x^4+2x^3-cx^2+3x-d}\right) = 4$,

then absolute value of a – c is 3.

(C) $\lim\limits_{x\to 0} \left[\dfrac{\sin(\text{sgn}(x))}{\text{sgn}(x)}\right] = 1$ where [ . ] is greatest integer function

(D) $\lim\limits_{x\to\infty} \sec^{-1}\left(\dfrac{x}{\sin x}\right) = \lim\limits_{x\to\infty} \sec^{-1}\left(\dfrac{\sin x}{x}\right)$

**7.** Consider the function $g(x) = \begin{cases} \dfrac{1-a^x+xa^x\ell na}{a^x x^2} & ; x<0 \\ \dfrac{2^x a^x - x\ell n2 - x\ell na - 1}{x^2} & ; x>0 \end{cases}$ where a > 0. Find the value of a and g(0) so

that the function g(x) is continuous at x = 0.

**8.** Consider the function $f(x) = \begin{cases} x^2\left|\cos\dfrac{\pi}{2x}\right| & \text{if} \quad x\neq 0 \\ 0 & \text{if} \quad x=0 \end{cases}$. Find LHD and RHD at $x = \dfrac{1}{3}$

# Answers Key

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

**5.** (A)(C)

**6.** (A) True (B) True (C) False (D) False

**7.** $a=\frac{1}{\sqrt{2}}$, $g(0)=\frac{1}{8}(\ell n2)^2$ **8.** LHD=$-\frac{\pi}{2}$ and RHD= $\frac{\pi}{2}$