DPP
DAILY PRACTICE PROBLEMS

CLASS : XIIth **SUBJECT : MATHS**
DATE : **DPP NO. : 2**

Topic :- CONTINUITY AND DIFFERENTIABILITY

1. The set of points where the function $f(x) = \sqrt{1 - e^{-x^2}}$ is differentiable is
   a) $(-\infty, \infty)$ b) $(-\infty, 0) \cup (0, \infty)$ c) $(-1, \infty)$ d) None of these

2. If $f(x) = x\sin\left(\frac{1}{x}\right), x \neq 0$, then the value of function at $x = 0$, so that the function is continuous at $x = 0$ is
   a) 1 b) -1 c) 0 d) Indeterminate

3. The value of $f(0)$ so that the function $f(x) = \frac{2 - (256 - 7x)^{1/8}}{(5x + 32)^{1/5} - 2}(x \neq 0)$ is continuous everywhere, is given by
   a) -1 b) 1 c) 26 d) None of these

4. The derivative of $f(x) = |x|^3$ at $x = 0$ is
   a) -1 b) 0 c) Does not exist d) None of these

5. If $f(x) = \begin{cases} \frac{(4^x - 1)^3}{\sin\left(\frac{x}{a}\right)\log\left(1 + \frac{x^2}{3}\right)}, x \neq 0 \\ 9(\log 4)^3, x = 0 \end{cases}$ is continuous function at $x = 0$, then the value of a is equal to
   a) 3 b) 1 c) 2 d) 0

6. $f(x) = |[x] + x|$ in $-1 < x \leq 2$ is
   a) Continuous at $x = 0$
   b) Discontinuous at $x = 1$
   c) Not differentiable at $x = 2, 0$
   d) All the above

7. Let $f(x) = [x^3 - x]$, where $[x]$ the greatest integer function is. Then the number of points in the interval $(1, 2)$, where function is discontinuous is
   a) 4 b) 5 c) 6 d) 7

8. If $y = \cos^{-1}\cos(|x| - f(x))$, where
$f(x) = \begin{cases} 1, if\ x > 0 \\ -1, if\ x < 0 \\ 0, if\ x = 0 \end{cases}$. Then, $(dy/dx)\ x = \frac{5\pi}{4}$ is equal to

a) -1 b) 1
c) 0 d) Cannot be determined

9. Let $f(x + y) = f(x) + f(y)$ and $f(x) = x^2\ g(x)$ for all $x, y \in R$, where $g(x)$ is continuous function. Then, $f'(x)$ is equal to

a) $g'(x)$ b) $g(0)$ c) $g(0) + g'(x)$ d) 0

10. Let a function $f(x)$ be defined by $f(x) = \begin{cases} x, & x \in Q \\ 0, & x \in R - Q \end{cases}$ Then, $f(x)$ is

a) Everywhere continuous
b) Nowhere continuous
c) Continuous only at some points
d) Discontinuous only at some points

11. The function $f(x) = \begin{cases} 1 - 2x + 3x^2 - 4x^3 + \ldots \text{to } \infty, & x \neq -1 \\ 1, & x = -1 \end{cases}$ is

a) Continuous and derivable at $x = -1$
b) Neither continuous nor derivable at $x = -1$
c) Continuous but not derivable at $x = -1$
d) None of these

12. $f(x) = \begin{cases} 2a - x \text{ in } -a < x < a \\ 3x - 2a \text{ in } a \leq x \end{cases}$. Then, which of the following is true?

a) $f(x)$ is discontinuous at $x = a$ b) $f(x)$ is not differentiable at $x = a$
c) $f(x)$ is differentiable at $x \geq a$ d) $f(x)$ is continuous at all $x < a$

13. Let $f(x + y) = f(x)f(y)$ and $f(x) = 1 + (\sin 2\ x)g(x)$ where $g(x)$ is continuous. Then, $f'(x)$ equals

a) $f(x)g(0)$ b) $2f(x)g(0)$ c) $2g(0)$ d) None of these

14. If $f(x) = [x\sin \pi\ x]$, then which of the following is incorrect?

a) $f(x)$ is continuous at $x = 0$
b) $f(x)$ is continuous in $(-1, 0)$
c) $f(x)$ is differentiable at $x = 1$
d) $f(x)$ is differentiable in $(-1, 1)$

15. If $f(x) = \begin{cases} 1, x < 0 \\ 1 + \sin x, 0 \leq x \leq \frac{\pi}{2} \end{cases}$ then derivative of $f(x)$ at $x = 0$

a) Is equal to 1 b) Is equal to 0 c) Is equal to -1 d) Does not exist

16. If the derivative of the function $f(x)$ is everywhere continuous and is given by $f(x) = \begin{cases} bx^2 + ax + 4; & x \geq -1 \\ ax^2 + b; & x < -1 \end{cases}$, then

a) $a = 2, b = -3$ b) $a = 3, b = 2$ c) $a = -2, b = -3$ d) $a = -3, b = -2$

17. If $f(x) = \begin{cases} \frac{x \log \cos x}{\log(1 + x^2)}, & x \neq 0 \\ 0, & x = 0 \end{cases}$, then

a) $f(x)$ is not continuous at $x = 0$
b) $f(x)$ is not continuous and differentiable at $x = 0$
c) $f(x)$ is not continuous at $x = 0$ but not differentiable at $x = 0$
d) None of these

18. If the function $f(x) = \begin{cases} Ax - B, & x \leq 1 \\ 3x, & 1 < x < 2 \\ B\,x^2 - A, & x \geq 2 \end{cases}$ be continuous at $x = 1$ and discontinuous at $x = 2$, then

a) $A = 3 + B, B \neq 3$ b) $A = 3 + B, B = 3$ c) $A = 3 + B$ d) None of these

19. If $f(x) = \begin{cases} |x - 4|, \text{ for } x \geq 1 \\ (x^3/2) - x^2 + 3x + (1/2), \text{ for } x < 1 \end{cases}$, then

a) $f(x)$ is continuous at $x = 1$ and $x = 4$
b) $f(x)$ is differentiable at $x = 4$
c) $f(x)$ is continuous and differentiable at $x = 1$
d) $f(x)$ is not continuous at $x = 1$

20. The function $f(x) = a[x + 1] + b[x - 1]$, where $[x]$ is the greatest integer function, is continuous at $x = 1$, is

a) $a + b = 0$ b) $a = b$ c) $2a - b = 0$ d) None of these