

CLASS : XIIth DATE : SUBJECT : MATHS 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  $f(x) = x \sin(\frac{1}{x})$ ,  $x \neq 0$ , 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  $-1 < x \le 2$  is a) Continuous at x = 0b) Discontinuous at x = 1c) Not differentiable at x = 2, 0d) 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  $f(x) = \begin{cases} 1, & \text{if } x > 0 \\ -1, & \text{if } x < 0. \\ 0, & \text{if } x = 0 \end{cases}$ a) -1
b) 1
c) 0
b) 1
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 
$$f(x) = \begin{cases} 1 - 2x + 3x^2 - 4x^3 + \dots \cos x \neq -1 \\ 1, & x = -1 \end{cases}$$
 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.  $f(x) = \begin{cases} 2a - x \text{ in } -a < x < a \\ 3x - 2a \text{ in } a \le x \end{cases}$ . Then, which of the following is true?

a) f(x) is discontinuous at x = ab) f(x) is not differentiable at x = ac) f(x) is differentiable at  $x \ge a$ 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 
$$f(x) = \begin{cases} 1, x < 0 \\ 1 + \sin x, 0 \le x \le \frac{\pi}{2} \end{cases}$$
 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  $f(x) = \begin{cases} bx^2 + ax + 4; \ x \ge -1\\ ax^2 + b; \ x < -1 \end{cases}$ , then a) a = 2, b = -3 b) a = 3, b = 2 c) a = -2, b = -3 d) a = -3, b = -217. 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 = 0b) f(x) is not continuous and differentiable at x = 0c) f(x) is not continuous at x = 0 but not differentiable at x = 0d) None of these 18. If the function  $f(x) = \begin{cases} Ax - B, x \le 1\\ 3x, 1 < x < 2\\ B x^2 - A, x \ge 2 \end{cases}$  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 + Bd) None of these 19. If  $f(x) = \begin{cases} |x-4|, \text{ for } x \ge 1\\ (x^3/2) - x^2 + 3x + (1/2), \text{ for } x < 1 \end{cases}$  then a) f(x) is continuous at x = 1 and x = 4b) f(x) is differentiable at x = 4c) 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