RK VISION ACADEMY

NEET | IIT – JEE | FOUNDATION

CBSE PRACTICE PAPER(2024)

(Mathematics)

Grade : XII marks   **Marks: 40**

Chapter:LIM & DER Set-2   **Time: 90 minutes**

SECTION A

(This section comprises of Multiple-choice questions (MCQ) of 1 mark each.)

1. $\begin{cases} \dfrac{\sin \pi x}{5x} & \text{if } x \neq 0 \\ k & \text{if } x = 0 \end{cases}$

   (A) $\dfrac{\pi}{5}$ (B) $\dfrac{5}{\pi}$ (C) 1   (D) 0

2. The function 'f' is defined by $f(x) = 2x - 1$, if $x > 2$, $f(x) = k$ if $x = 2$ and $x^2 - 1$, if $x < 2$ is continuous, then the value of k is equal to

   (a) 2   (b) 3   (c) 4   (d) –3

3. Which of the following is not true

   (a) A polynomial function is always continuous   (b) A continuous function is always differentiable   (c) A differentiable function is always continuous   (d) e^x is continuous for all x

4. $\dfrac{d}{dx}(x^2 e^x \sin x) =$

   (a) $xe^x(2\sin x + x\sin x + x\cos$ (b) $xe^x(2\sin x + x\sin x - \cos x$ (c) $xe^x(2\sin x + x\sin x + \cos x$ (d) None of these

5. $\dfrac{d}{dx}[\cos (1 - x^2)^2] =$

   (a) $-2x(1 - x^2)\sin (1 - x^2)^2$ (b) $-4x(1 - x^2)\sin (1 - x^2)^2$ (c) $4x(1 - x^2)\sin (1 - x^2)^2$ (d) $-2(1 - x^2)\sin (1 - x^2)^2$

6. $f(x) = x^2 - 3x$, then the points at which $f(x) = f'(x)$ are

   (a) 1, 3   (b) 1, – 3   (c) – 1, 3   (d) None of these

7. $\dfrac{d}{dx}\left(\dfrac{\cot^2 x - 1}{\cot^2 x + 1}\right) =$

   (a) $-\sin 2x$ (b) $2\sin 2x$ (c) $2\cos 2x$ (d) $-2\sin 2x$

8. $y = \log_{10} x + \log_x 10 + \log_x x + \log_{10} 10$, $\dfrac{dy}{dx} =$

   (a) $\dfrac{1}{x\log_e 10} - \dfrac{\log_e 10}{x(\log_e x)^2}$ (b) $\dfrac{1}{x\log_e 10} - \dfrac{1}{x\log_{10} e}$ (c) $\dfrac{1}{x\log_e 10} - \dfrac{\log_e 10}{x(\log_e x)^2}$ (d) None of these

9. $\dfrac{d}{dx}[\sin^n x\cos nx] =$

   (a) $n\sin^{n-1} x\cos (n+1)x$ (b) $n\sin^{n-1} x\cos nx$ (c) $n\sin^{n-1} x\cos (n-1)x$ (d) $n\sin^{n-1} x\sin (n+1)x$

10. $\dfrac{d}{dx}\cos^{-1}\sqrt{\cos x} =$

    (a) $\dfrac{1}{2}\sqrt{1 + \sec x}$ (b) $\sqrt{1 + \sec x}$ (c) $-\dfrac{1}{2}\sqrt{1 + \sec x}$ (d) $-\sqrt{1 + \sec x}$

SECTION B

(This section comprises of very short answer type-questions (VSA) of 2 marks each.)

11. If $x^y = e^{x-y}$, prove that $dy/dx = \dfrac{\log x}{(1 + \log x)^2}$

12. The derivative of $\cos^{-1}(2x^2 - 1)$ w.r.t. $\cos^{-1}x$ is

13. Verify Rolle's theorem for the function, $f(x) = \sin 2x$ in $(0, \dfrac{\pi}{2})$

SECTION C

(This section comprises of short answer type questions (SA) of 3 marks each)

14. Examine the continuity of the function $f(x) = x^3 + 2x^2 - 1$ at $x = 1$

15. Differentiate each of the following w.r.t. x $\sin^m x \cos^n x$

16. Differentiate $x/\sin x$ w.r.t $\sin x$.

SECTION D

(This section comprises of long answer-type questions (LA) of 5 marks each)

17. Find $\dfrac{dy}{dx} = \dfrac{y}{x}$ $x = 3\cos q - 2\cos^3 q$, $y = 3\sin q - 2\sin^3 q$.

18. If $x = \sin t$ and $y = \sin pt$, prove that $(1-x^2)\dfrac{d^2y}{dx^2} - x\dfrac{dy}{dx} + py = 0$

19. Find $\dfrac{dy}{dx}$ if $y = x^{\tan x} + \sqrt{\dfrac{x^2 + 1}{2}}$