Model Question paper

Differential Calculus 2

11th Standard

Maths

Reg.No. : | | | | | | |

I. Answer all the questions.

II. Use blue pen only.

Time : 02:00:00 Hrs

Total Marks : 60

Part - A

10 x 1 = 10

1) $\lim_{x \to 0} x \cot x$ is .....

(a) 0 (b) -1 (c) ∞ (d) 1

2) $\lim_{x \to \infty} \left(1 - \frac{1}{x}\right)^x$ is.....

(a) e (b) -e (c) $\frac{1}{e}$ (d) 0

3) The function $f(x) = \begin{cases} sin\frac{(x-2)}{x-2}, & x \neq 2 \\ 0, & x = 2 \end{cases}$ is discontinuous at .....

(a) x=0 (b) x=-1 (c) x=-2 (d) x=2

4) The function y= tan x is continuous at.....

(a) x=0 (b) $x = \frac{\pi}{2}$ (c) $x = \frac{3\pi}{2}$ (d) $x = \frac{-\pi}{2}$

5) The function $f(x) = \begin{cases} 2, x \leq 1 \\ x, x > 1 \end{cases}$ is not differentiable at .....

(a) x=0 (b) x=-1 (c) x=1 (d) x=-2

6) $\lim_{x \to \infty} \frac{x-2}{x+2}$ is

(a) 2 (b) -2 (c) 1 (d) -1

7) $\frac{d}{dx}\left(\frac{1}{log_x^4}\right)$ is

(a) $\log_x 4$ (b) $\frac{1}{x}\log_4 e$ (c) $\frac{1}{x^4}$

8) $\frac{dy}{dx}$ if $x^3+y^3=3axy$ is

(a) $\frac{ay-x^2}{y^2+ax}$ (b) $\frac{ay-x^2}{y^2-ax}$ (c) $ay-x^2$ (d) y^2-ax

9) If $y=3x^3+x^2+1$, then $\frac{d^3y}{dx^2}$ is

(a) 18x+2 (b) 18 (c) 2 (d) $9x^2+2x$

10) If $y=\sqrt{sinx}$, then $\frac{dy}{dx}$ is

(a) $\frac{cosx}{2\sqrt{sinx}}$ (b) $\frac{sinx}{2\sqrt{cosx}}$ (c) $\frac{cosx}{\sqrt{sinx}}$ (d) $\frac{cosx}{sin\sqrt{x}}$

Part - B

5 x 2 = 10

11) Differentiate: $\cot^{-1}\left[\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right]$ $Hint: \sin^2 x/2 + \cos^2 x/2 = 1; \sin x = 2\sin x/2 \cos x/2$

12) If $y = e^{\tan^{-1} x}$ prove that $\left(1+x^2\right) y_2 + (2x-1) y_1 = 0$

13) If $y = \log\left(x^2 - a^2\right)$prove that $y_3 = 2\left[\frac{1}{(x+a)^3} + \frac{1}{(x-a)^3}\right]$

14) Find $\frac{dy}{dx}$ where $y = \sqrt{1+sin^2 x}$

15) If $y = tan{-}1\ \frac{cos\ x}{1+sin\ x}$ find $\frac{dy}{dx}$

Part - C

5 x 3 = 15

16) f(x)=\(\begin{cases} 2x,0\le x\le 1 \\ 3,x=1 \\ 4x,1at x=1.

17) Let f be defined by f(x)=$\begin{cases} \frac{x^2}{2}.0 \leq x \leq 1 \\ 2x^2 - 3x + \frac{3}{2}, 1 < x \leq 2 \end{cases}$ show that f is continuous at x=1.

18) Differentiate $\sin^2 x$

19) Investigate the continuity at the indicated point:

$\{\frac{\frac{sin(x-c)}{x-c}, x \neq c}{0, \quad if \quad x=c}$ at x=c

20) A function f(x) is defined in an interval [0, 2] as follows :

f(x) = x when $0 \leq x \leq 1$

= 2x − 1 when $1 < x \leq 2$

Show that f(x) is continuous at 1 but not differentiable at that point.The graph of this function is as shown in fig. 8.6This function is continuous at x = 1.

Part - D

5 x 5 = 25

21) Differentiate the following functions w.r. to x.

$\frac{(x^2+2)(x+\sqrt{2})}{(\sqrt{x+4})(x-7)}$

22) Find dy / dx for the following implicit functions.

$x^m y^n = (x+y)^{m+n}$

23) Differentiate $\frac{cos \quad x+log \quad x}{x^2+e^x}$

24) Evaluate $\lim_{x \to 1} \frac{x^3-1}{x-1}$

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25) Compute $\lim_{x \to \pi/6} \frac{2sin^2x+sinx-1}{2sin^2x-3sinx+1}$

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