

University of Information Technology & Sciences (UITS)
Faculty of Science and Engineering
Department of Computer Science & Engineering
Program: B.Sc. in CSE
Mid Term Examination, Spring 2025
Course Title: Differential & Integral Calculus
Course Code: MATH 0541111

Marks: 20

Time: 1(one) hour

(Answer all questions)

Q.No.

Marks

1. a) Find the differentiation the following equations:

[06]

i) $x^3 \sec\left(\frac{1}{x}\right) = y$

ii) $y = [1 + \sin^3(4x^2 - 2)]^{11}$

iii) $y = \sqrt{\frac{1+x^2}{1-x^2}}$

- b) If $f(x) = \sqrt{x^3 + 2\sqrt{x}}$, $g(x) = \frac{1}{1+x}$ and $h(x) = x^{3/2}$, find $(g \circ h \circ f)(x)$. [04]

Also test the function odd or even : $f(x) = \frac{\tan x}{x + \sin x}$.

2. a) Show that the following function $f(x)$ is continuous at $x = 2$,

[03]

$$f(x) = \begin{cases} x, & 0 < x < 1 \\ 2 - x, & 1 \leq x \leq 2 \\ 2x - x^2, & x > 2 \end{cases}$$

- b) Estimate the following limits:

[07]

i) $\lim_{x \rightarrow 0} (e^x + x)^{1/x}$

ii) $\lim_{x \rightarrow 0} \frac{x - \cos 3x}{x^3}$

iii) $\lim_{x \rightarrow \infty} (\sqrt{x^2 + x} - x)$