

University of Information Technology & Sciences

Department of Computer Science and Engineering

Program: B.Sc. in CSE

Mid Term Examination, Autumn- 2023

Course Title: Differential and Integral Calculus

Course Code: MAT 163

Marks: 20

Time: 1(one) hour

Answer all the questions

1. (a) Find domain and range of the following functions and also [03]

sketch the graph of the following functions :

(i) $f(x) = \sqrt{-x-2} - 4$ (ii) $f(x) = \frac{x}{x+3}$

- (b) Define even function and odd function. Test whether the [04]
following functions are even or odd.

(i) $f(x) = x(\sqrt{1+2x^2})$

(ii) $f(x) = \frac{\tan x}{x + \sin x}$

- (c) If $f(x) = \sqrt{x^3 + 2\sqrt{x}}$, $g(x) = (1+x)^{-1}$ and $h(x) = x^{3/2}$, [03]
find $(g \circ h \circ f)(x)$.

2. (a) A function $f(x)$ is defined as follows. [02]

$$f(x) = \begin{cases} 2x + 3, & x \leq 4 \\ 7 + \frac{16}{x} & x > 4 \end{cases}$$

Discuss the continuity of $f(x)$ at $x = 4$.

- (b) Find $\frac{dy}{dx}$. [08]

(i) $x^3y + 4xy^2 = 3xy$ (ii) $y = (1 + x^5 \cot x)^{-8}$

(iii) $y = \frac{\sin x}{1 + \cos x}$ (iv) $y = (3x^2 - 1)(x^2 + 2)$