

University of Information Technology & Sciences (UITS)

Faculty of Science and Engineering

Department of CSE

Mid Term Examination, Autumn - 2022

Course Title: Differential & Integral Calculus

Course Code: MAT 163

Marks: 20

Time: 1 (One) Hour

(Answer all questions)

1. a) Define domain and range of a function. Draw the graph and also find the domain and range of the following functions: [6]

(i) $f(x) = 1 + \sqrt{x-4}$ (ii) $f(x) = x^2 + 6x - 10$ (iii) $f(x) = |x+2| - 2$

- b) Define composition of functions. Find $(f \circ g \circ h)(x)$, if [4]

(i) $f(x) = x^2 + 1, g(x) = \frac{1}{x}, h(x) = x^3$

(ii) $f(x) = \frac{1}{1+x}, g(x) = \sqrt[3]{x}, h(x) = \frac{1}{x^3}$

2. Differentiate the following functions with respect to x and find $\frac{dy}{dx}$: [10]

(i) $y = [x \sin 2x + \tan^4(x^7)]^5$

(ii) $y = \left(\frac{1+x^2}{1-x^2}\right)^{17}$

(iii) $x^y = e^{x-y}$

(iv) $\cos(xy^2) = y$