International Islamic University Chittagong (IIUC)

Department of Electronic and Telecommunication Engineering

Midterm Examination

Program: **B.sc (Engg.)** Semester: **Spring 2024**
Course Code: **MATH–1101** Course Title: **Differential and integral Calculus**
Total Marks: **30** Time: **1 Hours 30 Minutes**

(i) Answer all the questions. The figures in the right-hand margin indicate full marks.
(ii) Course Learning Outcomes (CLOs) and Bloom's Levels are mentioned in additional Columns.

Course Learning Outcomes (CLOs) of the Questions

CLO1 For complex Engineering problems, it is essential to get Knowledge of the limit, continuity, and differentiability, power series, Rolle's Theorem, Mean value theorem, Taylor, and Mclaurin's series. Also, the need concept of the partial derivative and Integration.

CLO2 By using the above mentioned foundational mathematical information: One can implement it to solve the mathematical problems, which is expressing engineering principles.

Bloom's Levels of the Questions

Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Q1	a)	Find The Differential Coefficients y', y", y"' of function $y = \frac{1+x+x^2+x^3+x^4+x^5+x^6}{x}$ at $x = -2$. ii) Evaluate $\frac{dy}{dx}$ where $a)$ $\cos y = e^{\cot^{-1} x}$ b) $y = \sin^{-1} x^2 + xe^{x^2}$	CLO 1	U	2+3
	b)	i) Find $\frac{dy}{dx}$ where $y = f(x) = (cosx)^{sinx}+(sinx)^{cosx}$ Find the differential coefficient $\frac{dy}{dx}$ of the function: $x = t - \sqrt{1-t^2}$, $y = e^{\sin^{-1} t}$	CLO 1	U	2×2.5
Q2	a)	Define continuity. Determine whether the function is continuous or discontinuous of $f(x) = \frac{x^2-9}{3x^2+2x-8}$ at the point $x = -2$ *and* $x = \frac{4}{3}$.	CLO 1	R& U	1+4
	b)	i) Evaluate the limit: $\lim_{x\to 0} \frac{cosecx-cotx}{x}$	CLO 1	U	05
Q3	a)	Describe range and inverse of function. Find the domain, inverse function and range of $f(x) = \frac{3x+2}{x-1}$.	CLO 1	R& U	1+4
	b)	i) Find $\frac{dy}{dx}$ when $y = a(\sin t - t\cos t)$, $x = a(\cos t + t\sin t)$ ii) Find $\frac{dy}{dx}$ when $y = (\sin x)^{\ln x}$	CLO 1	U	1+4
		OR			
Q3	a)	State Rolle's Theorem. Verify the Roll's Theorem for the function: $f(x) = -3x^2 + 6x + 12$ on a closed interval [0,2]	CLO 1	R&U	1+4
	b)	State Mean Value Theorem. Verify that the function, $f(x) = \frac{x}{x-4}$ satisfies the conditions of the mean value theorem on the interval [−2,2] and then determine the value/s, c, that can satisfy the conclusion of the theorem.	CLO 1	R& U	1+4