



International Islamic University Chittagong (IIUC)
Department of Computer Science and Engineering (CSE)
Mid Term Examination

Program: B. Sc. in CSE
Course Code: MATH-1107
Time: 1:30 hours

Semester: Spring-2025
Course Title: Mathematics-I
Total Marks: 30

- (i) Answer all the questions. The figures in the right-hand margin indicate full marks.
(ii) Please answer the several parts of a question sequentially.
(iii) Course Learning Outcomes (CLOs) and Bloom's Levels are mentioned in additional Columns.

Course Learning Outcomes (CLOs) of the Questions

CLO1:	Compute the functions, limit and continuity of a function, derivatives, integrals and extrema of single-variable and/or multivariable functions.
CLO2:	Understand the techniques of differentiation and integration.

Bloom's Taxonomy Domain Levels of the Questions

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

		Marks	CLOs	DLs
1.	a) Find the Maclaurin Series for the function $f(x) = \cos x$	2	CLO1	U
	b) Find the domain & range of the function, $f(x) = \sqrt{\frac{1-x}{x}}$	2	CLO1	U
	c) Test the differentiability of the following function at $x = 2$ $f(x) = 3x + 2; \quad x > 2$ $\quad \quad \quad = 12 - x^2; \quad x \leq 2$ Or Test the differentiability of the following function at $x = 2$, where $f(x) = \begin{cases} x & \text{when } 0 < x < 1 \\ 2 - x & \text{when } 1 \leq x \leq 2 \\ x - \frac{1}{2}x^2 & \text{when } x > 2 \end{cases}$	6	CLO1	App
		6	CLO1	App
2.	a) Find the differential co-efficient of e^x by the first principle method.	3	CLO2	U
	b) If $y = \sqrt{\sin x} + \sqrt{\sin x} + \sqrt{\sin x} + \dots \infty$; then Show that $y_1 = \frac{\cos x}{2y - 1}$	3	CLO2	U

- c) Evaluate the limit using L'Hospitals rules for $\lim_{x \rightarrow 0} \left(\frac{1}{x}\right)^{\tan x}$ 4 CLO2 App
 Or
 Differentiate $\tan^{-1} \frac{2x}{1-x^2}$ with respect to $\sin^{-1} \frac{2x}{1+x^2}$. 4 CLO2 App
3. a) If $y = \tan^{-1} x$ then show that, $(1+x^2)y_{n+1} + 2nxy_n + n^2y_{n-1} - ny_{n-1} = 0$ 6 CLO3 App
 b) Verify Rolle's theorem for $f(x) = 2x^3 + x^2 - 4x - 2$ over $[-\sqrt{2}, \sqrt{2}]$ 4 CLO2 U
 Or
 Test whether the mean value theorem is true for $f(x) = 3 + 2x - x^2$ on $(0, 1)$. 4 CLO2 U