



বাংলাদেশ আর্মি ইন্টারন্যাশনাল ইউনিভার্সিটি অব সায়েন্স এন্ড টেকনোলজি, কুমিল্লা
 BANGLADESH ARMY INTERNATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY (BAIUST), CUMILLA

Department of Electrical & Electronic Engineering
 Level-1, Term-I

Mid-Term Examination, Spring 2023

Course Code: MATH 111

Course Title: Differential and Integral Calculus

Time : 1 hour
 Full Marks: 60

Notes:

- Each question carries 30 marks.
- Figure on the right of each question indicates marks for the respective question.
- Answer any 02 (Two) of the following questions.

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- 1.(a) Do the given limit exist? If so, compute the value $\lim_{x \rightarrow \pi} \frac{\sin x}{\pi - x}$. 10
- (b) A function $\phi(x)$ is defined as follows: 12
- $$\begin{aligned} \phi(x) &= x^2 && \text{when } x < 1 \\ &= 2.5 && \text{when } x = 1 \\ &= x^2 + 2 && \text{when } x > 1 \end{aligned}$$
- Explaining the continuity of the given function $\phi(x)$ at $x=1$.
- (c) Express the differential coefficient of the function $(x^2 \log x)$ with respect to x . 8
- 2.(a) If $f(x) = \frac{x^3 - 8x^2 + 13x - 6}{x^2 - 11x + 10}$, describe the values of x for which $f'(x) = 0$. 12
- (b) Change the given function $(\cos x)^{\sin x}$ to differentiation coefficient with respect to x . 8
- (c) Compute $\frac{dy}{dx}$, when $x = a(\cos t + t \sin t)$, $y = a(\sin t - t \cos t)$. 10
- 3.(a) Explain the following integrals by the method of substitution: 20
- (i) $\int \sqrt{\frac{\sin x}{\cos^5 x}} dx$; (ii) $\int \frac{e^x dx}{e^{2x} + 2e^x + 5}$.
- (b) Write the solution of the $\int x^2 \tan^{-1} x dx$ by the method of parts. 10