Department of Basic Sciences and Islamiat
NWFP University of Engineering and Technology, Peshawar,
Civil Engineering (Main & Bannu Campus & GIST)

Mid-Term Examination 2nd Semester Spring – 2007

Paper: Calculus (BSI-102)  Time: 2Hrs
Maximum Marks: 25

Note: Attempt all questions

Q1. a. Make a Conjecture about the value of the limit \( \lim_{x \to 0} \frac{\sin x}{x} \).

   b. For what value of \( x \) is there discontinuity of \( y = \frac{x^2 - 9}{x^2 - 5x + 6} \).

Q2. a. Find the derivative of \( y = (\tan \frac{x}{2}) \) by definition.

   b. Find \( \frac{dy}{dx^2} \) at \( x = 1 \), where \( y = \frac{6}{x^4} \).

Q3. a. Find maxima and minima and point of inflection (if any) of \( f(x) = x^4 - 2x^2 \).

   b. Find first four terms of Maclaurin’s series for \( f(x) = \cos x \) in ascending power of \( x \).

Q4. a. Find first three terms of Taylor series for \( f(x) = \sin \pi x \) about \( x = \frac{1}{2} \).

   b. Evaluate \( \int \log x \, dx \).

Q5. a. Find the area under the curve \( y = \frac{1}{(3x + 1)^2} \) over the interval \([0,1]\).

   b. Evaluate \( \int_{0}^{\pi} \sqrt{25 - 9x^2} \, dx \).

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