National University of Computer and Emerging Sciences 064

Lahore Campus

Calculus & Analytical Geometry (MT1003)

Sessional-II Exam

Total Time (Hrs.): 1
Total Marks: 45
Total Questions: 5

Date: 5th November, 2024

Course Instructor(s)

Dr. Mazhar Hussain (Moderator)
Dr. Sonia Hanif
Dr. Komal Hassan
Dr. Ayesha Razzaq
Dr. Atta Ullah
Mr. Abdul Hafeez
Mr. Muhammad Adeel
Ms. Eesha Meer

[redacted]

Roll No. [redacted] Section [redacted] Student Signature

Do not write below this line

- Attempt all the questions in the given order
- Write question number on your answer with bold faced marker.

CLO #4: Apply the concept of differentiation in real life problem

1. The base of a right triangle is decreasing at the rate of 5 in/sec and the height of the right triangle is increasing at the rate of 7 in/sec. At what rate is the triangle's
   a) hypotenuse changing
   b) perimeter changing
   c) area changing

   when base is 8 inches and height is 6 inches.

[7]

CLO #5: Curve sketching using extrema theory

2. The first derivative of a function $y = f(x)$ is given
   a) At what points, if any, does the graph of f have a local maximum, local minimum, or inflection point?
   b) Sketch the general shape of the graph.

$$y' = x(x^2 - 12)$$

[10]

CLO #4: Apply the concept of differentiation in real life problem

3. A manufacturer needs to make a cylindrical can that will hold 1.5 liters of liquid. Determine the dimensions of the can that will minimize the amount of material used in its construction.

[10]

CLO #6: Riemann sum, evaluation of definite & indefinite integral and their applications to compute lengths of curves / area of regions / volume of solids.

4. Let $f(x) = 2x - x^3$ is defined over the interval $[0, 1]$.
   a) Find a formula for the Riemann sum by dividing the interval into n equal subintervals.
   b) Take a limit of the sum to calculate the area under the curve on the interval.

9/4

[10]

CLO #6: Riemann sum, evaluation of definite & indefinite integral and their applications to compute lengths of curves / area of regions / volume of solids.

5. Determine the area bounded by the regions $g(y) = 3 - y^2$ and $x = -1$.

2013

[8]

Good Luck