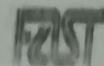




National University



Of Computer & Emerging Sciences

(BSCS) – Final Examination – December 2015

Paper: CALCULUS I

Time allowed: 3 hrs.

Total marks: 75

INSTRUCTIONS:

1. Do not use pencil for solution.
2. Programmable Calculator is not allowed.
3. Make assumptions where required.
4. All questions are compulsory.

Question # 1: (10+5)

- For what value of a is

$$f(x) = \begin{cases} x^2 - 1, & x < 3 \\ 2ax, & x \geq 3 \end{cases}$$

Continuous at every point x ?

- Q1 • Solve the inequality. Express the solution set as interval. And show the solution on real no line.

$$|s + 3| \geq \frac{1}{2}$$

Question # 2: (10+5)

- Water runs into a conical tank at the rate of $9 \text{ ft}^3/\text{min}$. The tank stands point down and has a height of 10 ft and base radius of 5 ft. How fast is the water level rising when the water is 6 feet deep?

Volume of right cone is $V = \frac{1}{3}\pi x^2 y$.

where x is radius of the surface of water at time t
and y is the depth of water at time t .

- Find the slope of the parametric curve at $t = 2$

$$x = t + \frac{1}{t}, \quad y = t - \frac{1}{t}$$

Question # 3: (10+5)

- Use the strategy for graphing and sketch the curve for

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

STRATEGY FOR GRAPHING

- 1) Identify domain of function and symmetries of the curve if any.
- 2) Identify asymptotes
- 3) Find x and y intercepts.
- 4) Find intervals where curve is increasing or decreasing. Find absolute and relative extreme points if any.
- 5) Find point of inflection and concavity of the curve.

- Evaluate limiting value of function

$$\lim_{x \rightarrow 0} \frac{2x}{x + 7\sqrt{x}}$$

Question # 4: (10+5)

- Sketch and find the area of region enclosed by $y = x^2 - 2x$ and $y = x$.
- Evaluate and check the definite integral for convergence

$$\int_0^2 \frac{s+1}{\sqrt{4-s^2}} ds$$

Question # 5: (10+5)

- Find the volume of solid by revolving the region about the given axes.

The region is bounded by

$y = \sqrt{x}, y = 2, x = 0$ about

a) The x-axis

b) The line $x = 4$

- Find the length of the given curve

$$y = \int_{-2}^x \sqrt{3t^4 - 1} dt, \quad -2 \leq x \leq -1$$

(Mon - Thursday)

24 hour

6 hour - sleep

2 hour - gym

1 hour - prayer

1 hour = Food

9 hour = Uni