VIT
Vellore Institute of Technology

WINERSEMESTER: 2019-20

Continuous Assessment Test –1

Programme Name & Branch: B. Tech.

Course Name & Code: CALCULUS FOR ENGINEERS ( MAT-1011) Slot: D1+TD1

Class Number(s): 3791 Exam Duration: 90 minutes Maximum Marks: 50

Answer All the Questions

| Q. No. | Questions | Marks |
|---|---|---|
| 1. | Determine the intervals in which the function $f(x) = (x^3 / 3) - (x^2 / 2) - 2x + (1 / 3)$ is increasing and decreasing. Find the local extreme values. Also find the intervals in which the function is concave up and down. What is the point of inflection. | [ 10 ] |
| 2. | (a) Using Mean Value Theorem, find the values of "c" for $f(x) = \begin{cases} x^3 & -2 \le x \le 0 \\ x^2 & 0 < x \le 2 \end{cases}$<br>(b) Using the Fundamental Theorem of Calculus, find dy/dx, if $y = \int_1^{x^2} \cos t \, dt$ | [ 5 + 5 ] |
| 3. | Find the volume of the solid of revolution generated when the area bounded by the curves $y = x^2$, $x = 3$ and the x-axis is revolved about the (i) x-axis and (ii) line $x = 3$. | [ 10 ] |
| 4. | (a) Find the Laplace transform of $f(t) = t^2 \sin^2 t$<br>(b) Find the Laplace transform of $f(t) = (1 - \cos at) / t$ | [ 5+ 5 ] |
| 5 | Find the inverse Laplace transform of the function<br>$F(s) = (4s^2 - 5s + 6) / (s + 1)(s^2 + 4)$ | [ 10 ] |