VIT

Vellore Institute of Technology

SCHOOL OF ADVANCED SCIENCES

Fall Semester 2024-2025

Continuous Assessment Test – I

Programme Name & Branch: B.Tech

Slot: B2+TB2

Course Name & code: Calculus -BMAT101L

Exam Duration: 90 Min. **Maximum Marks: 50**

Answer ALL the questions

Q.No.	Question	Max Marks	CO	BL
1.	(i)Verify Rolles theorem for $f(x)=(x+2)^3(x-3)^4$ in $[-2,3]$. (ii) Verify Lagrange's mean value theorem for $f(x)=x^3-x^2-5x+3$ in [0 4].	5 5	CO1	BL2
2.	For the function $f(x)=x^4-4x^3+10$, (i) Identify where the extrema of f occurs. (ii) Find the intervals on which f is increasing and the interval on which f is decreasing. (iii) Find the intervals on which f is concave up and the interval on which f is concave down. (iv) Sketch the general shape of the graph for f.	10	CO1	BL2
3.	(i) Find the area of the region enclosed by the curves $y^2=4x$ and $x^2=4y$. (ii) Find the volume of the solid generated by revolving the region between the y-axis and curve $x=\frac{2}{y}$, $1\le y\le 4$, about the $y-$axis.	5 5	CO1	BL2
4.	(i) Verify the continuity of the function at the origin, where $f(x,y)=\begin{cases}\frac{2xy}{x^2+y^2}, & (x,y)\neq(0,0)\\ 0, & (x,y)=(0,0)\end{cases}$	5	CO2	BL1

	(ii) Find first and second partial derivatives of $f(x,y)=x^3-3axy+y^3$.	5		
5.	Determine whether the following functions are functionally dependent or not. Find a functional relation between them in case they are functionally dependent. $u=xy+yz+zx, v=x^2+y^2+z^2$, and $w=x+y+z$	10	CO2	BL3