VIT

Vellore Institute of Technology

FALL SEMESTER 2022-2023

SLOT: G1+TG1

CONTINUOUS ASSESSMENT TEST – I

Programme Name & Branch : B.Tech. (SCE, SCHEME, SCOPE, SMEC)

Course Code / Course Name : BMAT101L - CALCULUS

Class Number(s) : VL202223010 5494, 5441, 7338, 5429, 5434, 544

Duration : **90 minutes** **Max. Marks : 50**

Answer **ALL** the questions

Q. No	Question	Marks
1.	Find the area of the region enclosed by the line $x=2y$ and the curve $x=y^3-y^2$	10
2.	Prove that $\frac{\pi}{3}-\frac{1}{5\sqrt{3}}>\cos^{-1}\frac{3}{5}>\frac{\pi}{3}-\frac{1}{8}$ using Lagrange's mean value theorem	10
3.	a) Find the volume of the solid generated by the revolution of the area bounded by $y=x^2$ and $y=x$ about y-axis. (5 Marks) b) Discuss the concavity and find the extremities of a function $y=f(x)$, if $y'=(x^2-2x)(x-5)^2$ (5 Marks)	10
4.	a) Verify $\frac{\partial^2 u}{\partial x\partial y}=\frac{\partial^2 u}{\partial y\partial x}$ for the function $u=\tan^{-1}\frac{x}{y}$ (5 Marks) b) If $u=x\log xy$ where $x^3+y^3+3xy=1$ find $\frac{dy}{dx}$ (5 Marks)	10
5.	If $y_1=\frac{x_2x_3}{x_1}$, $y_2=\frac{x_3x_1}{x_2}$, $y_3=\frac{x_1x_2}{x_3}$, Show that the Jacobian of y_1,y_2,y_3 with respect to x_1,x_2,x_3 is 4.	10