VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test 1 – October 2022

ramme	: B.Tech		Semester	:	FALLSEM 2022-23
			Code	:	BMAT101L
rse	Calculus		Slot	:	A1+TA1
			Class Number	:	CH2022231700297
ilty	Dr. R. Radha				CH2022231700423
	Dr. N. Nathiya				CH2022231700424
	Dr. Sowndarrajan P T				CH2022231700298
	Dr. Manoj Kumar Singh				CH2022231700617
	Dr. Harshavarthini Shanmugam				CH2022231700608
	Dr. Manimaran J		Max. Marks	:	50
ne	: 1½ hours				

Answer ALL the Questions (5 x 10 = 50 marks)

Question Description   Marks

.No. Sec

1. a. Suppose that $f(x)$ is continuous and differentiable on the interval $[-2,2]$ such that $f(-2) = 3$ and $f'(x) \le 4$. What is the largest possible value for $f(2)$?   5

   b. Find the intervals in which the given function
   $f(x) = \frac{1}{2x^2+5}$ is increasing, decreasing, concave up and concave down.   5

2. Find the dimensions of a right circular cylinder of maximum volume that can be inspired in a sphere of radius 10 cm. What is the maximum volume?   10

3. Find the volume of the solid generated by revolving the region in the first quadrant bounded above by the curve $y = x^2$, below by x-axis and on the right side by $x = 1$ about the line $x = -1$.   10

4. Show that the function $f(x,y) = \begin{cases} \frac{xy}{\sqrt{x^2+y^2}}, & (x,y) \ne (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$ is continuous.   10

5. If $x = u - y - z,\ y = uv - z,\ z = uvw$ and
   $u = \frac{x_2 x_3}{x_1},\ v = \frac{x_3 x_1}{x_2},\ w = \frac{x_1 x_2}{x_3}$, find $\frac{\partial(x,y,z)}{\partial(x_1,x_2,x_3)}$.   10