VIT

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

ContinousAssessment Test II (CAT-2) – December 2022

Programme	:	B.Tech	Semester	:	Fall 2022-23
Course Code	:	BMAT101L/IMAT101L	Class Nbr(s)	:	CH2022231700262, CH2022231700260, CH2022231700270, CH2022231700272, CH2022231700268, CH2022231700481, CH2022231700612, CH2022231700751, CH2022231700482; CH2022231700484 , CH2022231700479. CH2022231700362
Course Title	:	Calculus			
Faculty(s)	:	**Dr. Karan Kumar Pradhan, Dr. Manoj Kumar Singh, Dr. Pankaj Shukla, Dr. Abhishek Kumar Singh, Dr Dhansekhar, Dr Berin Greeni A , Dr. Kirti Aarya, Dr Kalyan Manna, Dr Vijay Kumar Poshala, Dr. Sandeep Saha,Dr David Raj Michel,Dr Ankit Kumar**	Slot	:	B1+TB1
Time	:	One and half Hours	Max. Marks	:	50

Answer all the Questions

1.		(i) Find all critical points of the function $f(x,y)=x^4+y^4-2x^2-2y^2+4xy$ and check whether the function attains maximum or minimum at each of these points. (ii) Show that point $(0,0)$ is neither a point of local minimum nor a point of local maximum for the function given by $f(x,y)=3x^4-4x^2y+y^2$ for $(x,y)\in R^2$.	**10**
2.		(i) If x,y and z are positive real numbers, then find the minimum value of function $x^2+8y^2+27z^2$, where $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=1$. (ii) Find the Taylor series expansion of $f(x,y)=\sin xy+x^2y+e^x$ in the power of $(x-1)$ and $(y-\pi)$ up to second degree terms.	**10**

3.		(i) Find the value of integral by using the polar coordinates. $I = \iint_D \sqrt{x^2+y^2}\, dydx$ *where* $D = \{(x,y) \in R^2 : x \le x^2+y^2 \le 2x\}$ (ii) Find the value of integral by changing the order of integration $I = \int_0^4 \int_{(4-x)^{\frac{1}{2}}}^{2} e^{y^3}\, dydx$	**10**
4.		Using multiple integrals, find the volume of the solid region bounded above by hemisphere $z = 1+\sqrt{1-x^2-y^2}$ and bounded below by the cone $z = \sqrt{x^2+y^2}$.	**10**
5.		Solve the following integrals by using Beta and Gamma Function: (i) $I = \int_0^{\infty} \frac{e^{-\frac{k}{x^2}}}{x^6} dx$ *where* $k \neq 0$ (ii) $I = \int_0^1 x^4 \sqrt{1-x^2}\, dx$	**10**