VIT
Vellore Institute of Technology

DEPARTMENT OF MATHEMATICS
SCHOOL OF ADVANCED SCIENCES
FALL SEMESTER 2023-2024

CONTINUOUS ASSESSMENT TEST – II

Programme Name & Branch	: B.Tech
Course Code	: BMAT101L
Course Name	: Calculus
Slot	: E2+TE2
Date of the Examination	: 19-10-2023
Duration	: 90 minutes
Max. Marks	: 50

General instruction(s): Students are permitted to bring any number of text books and hand written note books (class notes)

Q. No	Question	Marks
1.	Find whether the following functions are functionally dependent. If so, find the relation between them. $u = \frac{x}{y-z}$, $v = \frac{y}{z-x}$ and $w = \frac{z}{x-y}$	10
2.	Find the second order Taylor expansion of $f(x,y) = \sqrt{1+x+y^2}$ about $(1,0)$.	10
3.	A Car manufacturer estimates a production function to be $f(x,y) = 100x^{3/4}y^{1/4}$, where x represents the units of labour (at Rs. 150 per unit) and y represents the units of capital (at Rs. 250 per unit). The total cost of labour and capital is equal to Rs. 50,000 (i.e.,$150x + 250y = 50000$). Find the maximum production level for this manufacturer.	10
4.	Evaluate $\int_0^1 \int_{x^2}^1 x^3 \sin(y^3) dy\, dx$ by changing the order of integration.	10
5.	Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} y^2\sqrt{x^2+y^2}\, dydx$ by changing into polar coordinates.	10