



# VIT

Vellore Institute of Technology

Vellore – 632014, Tamil Nadu, India  
 DEPARTMENT OF MATHEMATICS  
 SCHOOL OF ADVANCED SCIENCES  
 FALL SEMESTER 2022-2023

## CONTINUOUS ASSESSMENT TEST – II

Programme Name & Branch : B. Tech

Course Code : BMAT101L

Course Name : Calculus

Slot : EI+TEI

Date of the Examination : 15/12/2022

Duration : 90 minutes

Max. Marks : 50

Q.No	Question	Marks
1	Determine the 2 <sup>nd</sup> degree Taylor polynomial approximation for $f(x, y) = \ln(3x + 4y)$ near the point $x_0 = 1, y_0 = 1$ .	10
2	A Delivery company requires a six sided rectangular box that must hold volume of $0.5 \text{ m}^3$ . Find the minimised surface area of the box which satisfies the company requirement?	10
3	Evaluate $\iint_D 5x^3 \cos(y^3) \, dA$ , $D$ is region bounded by $y = 2$ , $y = \frac{1}{4}x^2$ and the y-axis.	10
4	Ram's ice cream cone can be visualised as the solid which is bounded above by $x^2 + y^2 + z^2 = 4$ and is bounded below by $z^2 = x^2 + y^2$ . Set up a triple integral to represent volume of ice cream cone in (a) cylindrical coordinates, and (b) spherical coordinates. Evaluate any one of the integrals in (a) and (b).	10
5	Evaluate the integral $\int_0^{\infty} \sqrt{t} \cdot e^{-3\sqrt{t}} \, dt$ using gamma function.	10