REG.NO.: 24BEC0230

NIRANJANA SUNIL

VIT

Vellore Institute of Technology

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: B1+TB1

Programme Name & Branch : **B.Tech**
Course Code and Course Name : **BMAT101L & Calculus**
Class Number(s) : **(Common to all B1+TB1 slot)**
Date of Examination : **14/10/2024**
Exam Duration : **90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- Students are permitted to bring any number of text books, printouts of e-books(complete/chapters) and hand written note books (class notes)

Q. No	Question	M	CO	BL
1.	Expand the function $f(x,y)=\left(1+4x^2+y^2\right)^{\frac{1}{2}}$ in Taylor series up to the 2nd degree about $(1,2)$.	10	2	2
2.	A space probe is in the shape of ellipsoid $4x^2+y^2+4z^2=16$ enters Earth's atmosphere and its surface begins to heat. After one hour, the temperature at the point on the probe's surface is $T(x,y,z)=8x^2+4yz-16z+600$. Find the hottest point of the probe's surface.	10	2	3
3.	Sketch the region of integration $\int_0^8\int_{\sqrt[3]{y}}^2 \sqrt{x^4+1}\,dxdy$ and hence evaluate it using change of order of integration.	10	3	3
4.	Doss's ice cream cone can be visualized as a solid which is bounded above by a sphere $x^2+y^2+z^2=4$ and is bounded below by a cylinder $z=\sqrt{x^2+y^2}$. Evaluate $\iiint_V \sqrt{x^2+y^2+z^2}\,dxdydz$ over the volume of the ice cream using spherical coordinates.	10	3	3
5.	a) Evaluate $\int_0^\infty x^3 3^{-x}\,dx$ using gamma function. b) Evaluate $\int_0^1 \frac{x}{\sqrt{1-x^5}}\,dx$ using beta and gamma functions.	5 5	4	2

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