VIT®

Vellore Institute of Technology

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

Fall Semester 2023-2024

School of Advanced Sciences

Continuous Assessment Test -II (October 2023)

Course: BMAT 101L – Calculus **Slot: B2+TB2**

Max. Time: 90 minutes **Max. Marks:** 50

Answer all the questions (5x10M=50M)

Q.No.	Question	Max Marks
1.	Find the value of the constant k for which $u = kx^2 + 4y^2 + z^2; v = 3x + 2y + z; w = 2yz + 3zx + 6xy$ are functionally related, and obtain the corresponding relation.	10
2.	Find the Taylor's series expansion of $f(x, y) = x^2 y + \sin y + e^x$ in powers of $(x-1)$ and $(y-\pi)$ up to second degree terms.	10
3.	A space probe in the shape of the ellipsoid $4x^2 + y^2 + 4z^2 = 16$ enters Earth's atmosphere and its surface begins to heat. After 1 hour, the temperature at the point (x, y, z) on the probe's surface is $T(x, y, z) = 8x^2 + 4yz - 16z + 600$. Find the hottest point on the probe's surface.	10
4.	Sketch the region in the xy plane and evaluate the double integral $I = \int_1^2 \int_1^{x^2} \left(x^2 + y^2\right) dx\, dy$ by using change of order of integration.	10
5.	Evaluate the double integral $I = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \frac{1}{\left(1 + x^2 + y^2\right)^{\frac{3}{2}}} dx\, dy$ by changing in to polar coordinates.	10

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