



Continuous Assessment Test (CAT) – I - AUGUST 2025

Programme	:	Int. M.Tech.	Semester	:	Fall 25-26
Course Code & Course Title	:	IAMAT101 Multivariable Calculus and Differential Equations	Class Number	:	CH2025260103061
Faculty	:	Dr. Lakshmanan S	Slot	:	F2+TF2
Duration	:	1 hour 30 minutes	Max. Mark	:	50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information
- Only non-programmable calculator without storage is permitted
- Answer all questions

Answer all questions

Q. No	Sub Sec.	Description	Marks	CO	BT Level
1.	a)	If $f = \log(x^3 + y^3 + z^3 - 3xyz)$ then prove that $\frac{\partial f}{\partial x} + \frac{\partial f}{\partial y} + \frac{\partial f}{\partial z} = \frac{3}{x+y+z}.$	5	1	K3
	b)	If $f = x^2y^3, x = \log t, y = e^t$, then find $\frac{df}{dt}$.	5	1	K2
2.		Find the Jacobian $\frac{\partial(x,y,z)}{\partial(\rho,\varphi,\theta)}$ of the transformation $x = \rho \sin \varphi \cos \theta, y = \rho \sin \varphi \sin \theta, z = \rho \cos \varphi$.	10	1	K3
3.	a)	Find Taylor's series expansion of the function $f(x, y) = e^x \sin y$ in the powers of $(x + 1)$ and $(y - \frac{\pi}{4})$ up to the second-degree terms.	4	1	K3
	b)	Examine $f(x, y) = x^3y^2(12 - x - y)$ for extreme values.	6	1	K2
4.	a)	Evaluate $\int_2^4 \int_1^2 \frac{xdy}{xy}$.	5	2	K3
	b)	Evaluate $\iint_R xy(x + y)dydx$ over the area between $y = x^2$ and $y = x$.	5	2	K2
5.		Evaluate $\int_0^1 \int_y^{2-y} xy \, dx dy$ by changing the order of integration.	10	2	K3

*****All the best *****