QP Code: R251A001 | Reg. No | | | | | | | | | | | AY 25

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (First Semester - Regular) Examinations, December 2025

25FYBS11001 – Applied Mathematics – I

(Common to All except Biotechnology)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

	Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a.	Check whether the Matrix $\begin{pmatrix} i & 1+i \\ -1+i & -2i \end{pmatrix}$ is Skew-Hermitian or not.	CO1	K1
b.	Write a formula for Radius of Curvature of a curve in Polar form.	CO2	K1
c.	Find the Total derivative of $z = e^x \sin y$	CO3	K1
d.	Define first order Linear Differential Equation with an example	CO4	K1
e.	Find the Laplace transformation of a^t	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

	Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a.	Verify Cayley Hamilton theorem for A=$\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$	5	CO1	K3
b.	Diagonolize the Matrix A=$\begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$	5	CO1	K3
	(OR)			
c.	Reduce the Quadratic Form $-5x_1^2 + 4x_1x_2 - 2x_2^2$ into canonical form, using Orthogonal Transformation.	10	CO1	K3
3.a.	Find the Radius of Curvature of the curve $x^3 + y^3 = 3axy$ at $\left(\frac{3a}{2}, \frac{3a}{2}\right)$.	5	CO2	K3
b.	Verify the Rolle's theorem for $f(x) = (x+2)^3(x-3)^4$ in $[2, 3]$.	5	CO2	K3
	(OR)			
c.	Find the coordinates of the Centre of curvature at $(1, 1)$ on the curve $x^3 + y^3 = 2$.	5	CO2	K3
d.	Verify the Lagrange's Mean Value theorem for $f(x) = x^3 - x^2 - 5x + 3$ in $[0, 4]$.	5	CO2	K3
4.a.	Find the Maximum and Minimum values of $f(x, y) = x^3 + y^3 - 3axy, a > 0$.	5	CO3	K3
b.	If U = $\sin^{-1}\frac{x^2+y^2}{x+y}$ then Prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \tan u$	5	CO3	K3
	(OR)			

c.	Expand $f(x,y) = e^x \ cosy$ by Taylor's series in powers of x and y.	5	CO3	K3
d.	If Z is a Homogeneous function, then prove that $x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \partial y} + y^2 \frac{\partial^2 z}{\partial y^2} = n(n-1)z$	5	CO3	K3
5.a.	Solve $\frac{dy}{dx} + \frac{y}{x} = y^2 \ x \ \sin x$.	5	CO4	K3
b.	Solve $y'' - 4y' + 4y = \frac{e^{2x}}{x}$ by using Method of variation of parameters.	5	CO4	K3
	(OR)			
c.	Solve $y'' - 6y' + 9y = 0$,$y(0) = 2$ and $y'(0) = 3$	5	CO4	K3
d.	Solve $\frac{dy}{dx} + y \ \tan x = \sin 2x$.	5	CO4	K3
6.a.	Solve $y'' + 2y' - 3y = \sin t, \ at \ y(0) = 0, \ y'(0) = 0$, Using Laplace transform.	5	CO6	K3
b.	Find the Laplace transformation of the function $\frac{sin2t}{t}$	5	CO5	K3
	(OR)			
c.	Find the Laplace transformation of the function $te^{-t}(\cos t + \sin t)$	5	CO5	K3
d.	Using Convolution Theorem, find Inverse Laplace Transformation of $\frac{1}{s^2 \ (s-1)}$	5	CO5	K3

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