

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, JULY - 2024

MATHEMATICS-I
(Common to All Branches)

Time: 3 hours

Max. Marks: 60

Question Paper Consists of **Part-A** and **Part-B**
Answer **ALL** questions from **Part-A**,
Answer any **FOUR** Questions from **Part-B**

PART-A				
[6x2=12M]				
Q.No.	Question	BTL	CO	Marks
1	a) Define normal form of a matrix.	K1	CO1	[2M]
	b) Write any two properties of eigen values.	K2	CO2	[2M]
	c) Define canonical form.	K1	CO3	[2M]
	d) Define an exact differential equation.	K1	CO4	[2M]
	e) Solve $(D^2 - 4D + 4)y = 0$.	K3	CO5	[2M]
	f) State Euler's theorem.	K2	CO6	[2M]
PART-B				
[4x12=48M]				
2	a) Find the rank of a matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 4 \\ 4 & 4 & 3 \end{bmatrix}$.	K3	CO1	[6M]
	b) Solve $3x + y + 2z = 3$; $2x - 3y - z = -3$; $x + 2y + z = 4$ by using Gauss elimination method.	K3	CO1	[6M]
3	a) Verify Cayley- Hamilton theorem for $A = \begin{bmatrix} 7 & -1 & 3 \\ 6 & 1 & 4 \\ 2 & 4 & 8 \end{bmatrix}$ and hence find A^{-1} .	K3	CO2	[6M]
	b) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$.	K3	CO2	[6M]
4	Reduce the quadratic form $8x^2 + 7y^2 + 3z^2 - 12xy + 4xz - 8yz$ to canonical form. Hence find the nature, rank, index and signature.	K3	CO3	[12M]
5	a) Solve $\cos^2 x \frac{dy}{dx} + y = \tan x$.	K3	CO4	[6M]
	b) If the temperature of the air is 30°C and the body cools from 100°C to 70°C in 15 minutes, then find when the temperature will be 40°C .	K3	CO4	[6M]
6	a) Solve $(D^2 + 2D + 3)y = e^x \cos x$.	K3	CO5	[6M]

	b)	Solve $(D^2 + 4)y = \tan 2x$ by using method of variation of parameters.	K3	CO5	[6M]
7	a)	If $\sin u = \frac{x^2 y^2}{x+y}$, then show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3 \tan u$.	K3	CO6	[6M]
	b)	If $u = x^2 - 2y$, $v = x + y + z$, $w = x - 2y + 3z$, then find $J\left(\frac{u,v,w}{x,y,z}\right)$.	K3	CO6	[6M]