

**PRAGATI ENGINEERING COLLEGE:SURAMPALEM
(AUTONOMOUS)**

I B.Tech I Semester Supplementary Examinations, July -2024

**MATHEMATICS-II (Numerical Methods and Complex Variables)
(ECE)**

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)	Find the root of the equation $x^3 = 2x + 5$ by iteration method						K1	CO1	[2M]
	b)	Evaluate $\Delta \cos x$						K2	CO2	[2M]
	c)	State Simpon's 1/3 rd rule.						K1	CO3	[2M]
	d)	Define Legender's function of first kind						K1	CO4	[2M]
	e)	Show that Z^2 is Analytic for all Z.						K2	CO5	[2M]
	f)	Obtain the Taylor's series of $f(z) = \frac{1}{z}$ about $z=1$						K2	CO6	[2M]
PART-B										
[4x12=48M]										
2	a)	Find a real root of the equation $2x - \log x = 6$ using Regula-Falsi method						K3	CO1	[6M]
	b)	Using Newton-Raphson method ,find a root of the equation correct up to 3 decimal places $x^3 - 8x - 4 = 0$ near 3						K3	CO1	[6M]
3	a)	Apply Newton's Forward interpolation formula.compute the value of $\sqrt{5.5}$ given that $\sqrt{5} = 2.236$, $\sqrt{6} = 2.449$, $\sqrt{7} = 2.646$ and $\sqrt{8} = 2.828$ correct up to 3 places of decimal.						K3	CO2	[6M]
	b)	Using Lagrange's formula, calculate $f(3)$ from the table						K3	CO2	[6M]
		x	0	1	2	4	5			
		$f(x)$	1	14	15	5	6	19		
4	a)	Solve $y' = y - x^2$. $y(0) = 1$ by picard's method up to fourth approximation						K3	CO4	[6M]
	b)	Evaluate $y(0.4)$ using fourth order Runge-Kutta method , given that $10 \frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$. Take $h = 0.1$						K4	CO4	[6M]
5	a)	Prove that $p_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} [(x^2 - 1)^n]$						K3	CO4	[6M]
	b)	Find the first 3 terms of Legendre series of $f(x) = e^x$						K3	CO4	[6M]
6	a)	Find the analytic function $f(z) = u + iv$ if $u + v = \frac{2 \sin 2x}{e^{2y} + e^{-2y} - 2 \cos 2x}$						K3	CO5	[6M]
	b)	Verify Cauchy's theorem for the function $f(z) = 3z^2 + iz - 4$ if						K3	CO5	[6M]

		C is the square with vertices at $1 \pm i$ and $-1 \pm i$			
7	a)	Expand $f(z) = \frac{1}{(z-1)(z-2)}$ in the region (i) $ z < 1$ (ii) $1 < z < 2$ (iii) $ z > 2$	K3	CO6	[6M]
	b)	Evaluate $\int_0^{2\pi} \frac{\sin 3\theta}{5-3\cos\theta} d\theta$ using Residue Theorem	K3	CO6	[6M]