

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

MATHEMATICS-II (Mathematical Methods)
(Common to CSE and IT)

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										
1	a)	Using bisection method, find a root of $x^2 - x - 1 = 0$ in the interval (1,2).	K1	C01										
	b)	Prove that $\Delta[x(x+1)(x+2)(x+3)] = 4(x+1)(x+2)(x+3)$ if $h=1$	K2	C02										
	c)	Trapezoidal Rule States that -----	K1	C03										
	d)	Find the Fourier series of $f(x) = x$ in $(-\pi, \pi)$	K1	C04										
	e)	Find the Fourier cosine transform of $f(x) = e^{-ax}$	K1	C05										
	f)	Find the general solution of $p+q=1$	K1	C06										
PART-B														
[4x12=48M]														
2	a)	Apply Newton Raphson method to find the real root of the equation $x^3 - x - 1 = 0$	K3	C01										
	b)	Apply Iteration method to find a real root of $x^4 - x - 13 = 0$	K3	C01										
3	a)	Using Lagrange's interpolation formula find the value of $y(10)$ from the table <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td>x</td><td>0</td><td>5</td><td>8</td><td>15</td></tr> <tr> <td>y</td><td>7</td><td>11</td><td>14</td><td>18</td></tr> </table>	x	0	5	8	15	y	7	11	14	18	K3	C02
x	0	5	8	15										
y	7	11	14	18										
	b)	Using Gauss Backward difference formula find $y(10)$ from the following table <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td>x</td><td>0</td><td>5</td><td>8</td><td>15</td></tr> <tr> <td>y</td><td>12</td><td>13</td><td>14</td><td>16</td></tr> </table>	x	0	5	8	15	y	12	13	14	16	K3	C02
x	0	5	8	15										
y	12	13	14	16										
4	a)	Evaluate $\int_0^1 \frac{1}{1+x} dx$ by using Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rule.	K3	C03										
	b)	Evaluate $y(0.1)$ and $y(0.2)$ using fourth order Runge-Kutta method, given that $\frac{dy}{dx} = x^2 - y$ & $y(0) = 1$.	K4	C03										
5	a)	Expand the function $f(x) = x^3$ as a Fourier series in the interval $-\pi < x < \pi$	K3	C04										

	b)	Find the half range cosine series for $f(x) = x - x^2$ in $0 < x < 1$	K3	C04	[6M]
6		Using Fourier Integral formula, show that $e^{-ax} = \frac{2a}{\pi} \int_0^{\infty} \frac{\cos ax}{a^2 + \alpha^2} d\alpha$	K3	C05	[12M]
7	a)	Solve the partial differential equation $p\sqrt{x} + qy = \sqrt{z}$	K3	C06	[6M]
	b)	Solve the partial differential equation $x(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$	K3	C06	[6M]