[B19 BS 1201]
SAGI RAMA KRISHNAM
I B. Tech II Semester (R19) Regular Examinations
MATHEMATICS – II
(Common to CE, EEE & ME)
MODEL QUESTION PAPER

TIME : 3 Hrs.   **Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT**
All questions carry equal marks
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	UNIT-I	**CO**	**KL**	**M**
1.a)	Using Newton's forward difference interpolation formula find Y (3), from the following table 	CO3	K2	8
b)	Find the interpolating polynomial f(x) for the data of the following table 	CO3	K1	7
	(OR)			
2. a)	Using Gauss backward formula, find f(42), from the following table 	CO4	K2	8
b)	Using Lagrange's interpolation formula find Y (10) from the following table 	CO4	K3	7
	UNIT-II			
3.a)	Find the cube root of 41 using Newton-Raphson method.	CO5	K2	8
b)	Evaluate $\int_0^2 \frac{dx}{x^3+x+1}$ by using Simpsons $1/3^{rd}$ rule with $h = 0.25$	CO5	K2	7
	(OR)			
4. a)	Find a real root of the equation x $\log_{10}$ x=1.2 by Regula-false method correct to three decimal places	CO5	K2	8
b)	Evaluate $y(0.8)$ using Runge Kutta method given $$y' = (x + y)^{\frac{1}{2}}, y(0.4) = 0.41$$	CO5	K3	7
	UNIT-III			
5.a)	If $U = \tan^{-1}\frac{x^3+y^3}{x-y}$ and x U_X + y U_y = sin 2U, prove that $x^2 U_{xx}$ + 2xy U_{xy} + $y^2 U_{yy}$ = 2cos $3U$ sin U.	CO1	K2	8

Table for 1.a):

X	0	5	10	15	20	25
Y	7	11	14	18	24	32

Table for 1.b):

x	0	1	4	5
f(x)	4	3	24	39

Table for 2.a):

X	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

Table for 2.b):

x	5	6	9	11
Y	12	13	14	16

b)	If $u = x^2 - 2y^2$, $v = 2x^2 - y^2$ where $x = r\cos\theta$, $y = r\sin\theta$ then show that $\frac{\partial(u,v)}{\partial(r,\theta)} = 6\,r^3 \sin 2\theta$.	CO1	K2	7
	(OR)			
6. a)	Expand $x^2y + 3y - 2$ in powers of $(x - 1)$ and $(y + 2)$ using Taylor's theorem.	CO1	K2	8
b)	By using the method of differentiation under the integral sign prove that $\int_0^\infty \frac{\tan^{-1}(ax)}{x(1+x^2)}\,dx = \frac{\pi}{2}\log(1 + a)$, $a \geq 0$.	CO1	K3	7
	UNIT-IV			
7. a)	Solve $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$.	CO2	K2	8
b)	solve $(D^2 - DD' - 2D'^2) z = (y - 1)e^x$.	CO2	K2	7
	(OR)			
8. a)	Solve $x(y - z)p + y(z - x)q = z(x - y)$.	CO2	K2	8
b)	solve $(D + D' - 1)(D + 2D' - 3)z = 3x + 6y + 4$.	CO2	K2	7
	UNIT-V			
9.a)	Obtain the solution of $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0$ by the method of separation of variables.	CO6	K2	8
b)	A tightly stretched elastic string of length L, fixed at its end points is initially in a position given by $u(x,0) = u_0 \sin^3 \frac{\pi x}{L}$. If it is released from rest, find the displacement at any subsequent time.	CO6	K3	7
	(OR)			
10.a)	Obtain the solution of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 0$ by the method of separation of variables.	CO6	K2	8
b)	A bar of conducting material of length π units is initially kept at a temperature sin x. Find the temperature at any subsequent time if the ends of the bar are held at zero temperature.	CO6	K3	7