R15/R14

ANURAG Engineering College
(An Autonomous Institution)
I B.Tech II Semester Supplementary Examinations, June/July – 2024
MATHEMATICS-III
(COMMON TO EEE, ECE & CSE)

Time: 3 Hours   **Max. Marks: 75**

Section – A (Short Answer type questions)   (25 Marks)
Answer All Questions

		Course Outcome	B.T Level	Marks
1.	What is the general form of the Newton-Raphson iteration formula for finding the roots of a function $f(x)$.	CO1	L1	2M
2.	Apply the bisection method to find an approximation of the root of the function $f(x) = x^3 - x - 2$ in the interval [1,2] after two iterations.	CO1	L2	3M
3.	Given the function $f(x) = x^3$, Compute the forward difference Δf at $x = 2$ with a step size of $h = 0.1$.	CO2	L2	2M
4.	Construct a backward difference table for the following data	CO2	L2	3M
5.	State the formula for Simson's 1/3 rule.	CO3	L1	2M
6.	Use the trapezoidal rule to approximate the integral of $f(x) = x^2$ from $x = 0$ to $x = 2$ using 4 equal subintervals.	CO3	L2	3M
7.	List the steps involved in the Euler's method and write the formula used for each iteration.	CO4	L1	2M
8.	Use Taylor's series method with h=0.1 to find approximate values of the solution of the initial value problem $y^1 = x^2 + y^2$, $y(0) = 1$ at $x = 0.1$.	CO4	L2	3M
9.	Find $\frac{\partial z}{\partial x}$ for $z = x^2 - 2xy + y^2$.	CO5	L2	2M
10.	Form the PDE by eliminating the constants a and b from $z = (x+a)(y+b)$.	CO5	L2	3M

Table for Q4:

x	0	10	20	30
y	0	0.174	0.347	0.518

Section B (Essay Questions)
Answer all questions, each question carries equal marks.   **(5 X 10M = 50M)**

			Course Outcome	B.T Level	Marks
11.	A)	Solve the following system of equations using the LU Decomposition method: x+y+z=1; 3x+y-3z=5; x-2y-5z=10.	CO1	L3	10M

OR

			Course Outcome	B.T Level	Marks
	B)	Solve the system of equations using the Jacobi method: $26x_1 + 2x_2 + 2x_3 = 12.6$; $3x_1 + 27x_2 + x_3 = -14.3$; $2x_1 + 3x_2 + 17x_3 = 6.0$;	CO1	L3	10M
12.	A)	Given a set of points for the function y=f(x), evaluate f(33) using Gauss backward interpolation formula:	CO2	L3	10M

x	25	30	35	40
f(x)	0.25	0.3	0.33	0.37

OR

			Course Outcome	B.T Level	Marks
	B)	Using Lagrange's interpolation formula find y(20) from the following table:	CO2	L3	10M

x	5	6	7	10
y	12	13	14	15

13. A) Consider the time series data given below: CO3 L3 10M

x	8	3	2	10	11	3	6	5	6	8
y	4	12	1	12	9	4	9	6	1	14

Use the least square method to determine the equation of straight line of best fit for the data.

OR

B) Determine the constants a and b by the method of least squares such that $y=ae^{bx}$. CO3 L3 10M

x	0	1	2	3	4
y	1	6	17	32	44

14. A) Use the Runge-Kutta 4th order method with step size h=0.1to find approximate values of the solution of the initial value problem $y^{1}+3y=7e^{4x}$, y(0)=2 at x=0.2 CO4 L3 10M

OR

B) Using Milne Thomson predictor corrector method find y when x=0.1 given $y^{1}=x-y^{2}$, y(0)=1. CO4 L3 10M

15. A) From the PDE by eliminating the arbitrary functions z=f(2x+3y)+g(4x+5y). CO5 L3 10M

OR

B) Solve $p^{3}+q^{3}=z^{3}$. CO5 L3 10M