Question Paper Code: R15A12HS02

R15

ANURAG Engineering College

(An Autonomous Institution)

I B.Tech II Semester Supplementary Examinations, January – 2025

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 method of false position 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 $f(x) = x^2 - 5$ in the interval [2,3] after two iterations.	CO1	L2	3M
3.	Given the function $f(x) = e^x$, compute the backward difference ∇f at $x = 1$ with a step size of h=0.2.	CO2	L1	2M
4.	Construct a forward difference table for the following data x: 0, 10, 20, 30 y: 0, 0.174, 0.347, 0.518	CO2	L1	3M
5.	State the formula for Trapezoidal rule.	CO3	L1	2M
6.	Use the Simpson's 3/8 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 Taylor's series method and write the formula used for each iteration.	CO4	L1	2M
8.	Use Euler's method with h=0.1 to find approximate values of the solution of the initial value problem $y^1+2xy=x^2$, y(0)=3 at x=0.1.	CO4	L1	3M
9.	Find $\frac{\partial z}{\partial y}$ for $z= 3x^2-2xy+4y^2$.	CO5	L1	2M
10.	Form the PDE by eliminating the constants a and b from $z=(x^2+a^2)(y^2+b^2)$.	CO5	L2	3M

Section B (Essay Questions)

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

11. A)	Solve the following system of equations using the LU Decomposition method: x+y+z=1; 4x+3y-z=6; 3x+5y+3z=4.	CO1	L3	10M
	OR			
B)	Solve the system of equations using the Gauss-Seidel iteration method: $12x_1+3x_2-5x_3=1$; $x_1+5x_2+3x_3=28$; $3x_1+7x_2+13x_3=76$	CO1	L3	10M
12. A)	Given a set of points for the function y=f(x), evaluate f(33) using Gauss forward interpolation formulae: x: 25, 30, 35, 40 f(x): 0.25, 0.3, 0.33, 0.37	CO2	L3	10M
	OR			
B)	Using Lagrange's interpolation formula find y(10) from the following table: x: 5, 6, 9, 11 y: 12, 13, 14, 16	CO2	L3	10M

13. A) Fit a straight line of best fit for the following data of heights and weights of students of a school using the least squares method — CO3 L3 10M

Height (in cm)	160	162	164	166	168
Weight (in kg)	52	55	57	60	61

OR

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

x	1	2	3	4	5
y	2	6	7	8	10

14. A) Use the Runge-Kutta 4^{th} order method with step size h=0.05to find approximate values of the solution of the initial value problem $y^1+3y=7e^{4x}$, y(0)=2 at x=0.1 — CO4 L3 10M

OR

B) Using Adams-Bashforth 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 $z=f(x^2+3y)+g(x^2-3y)$. — CO5 L2 10M

OR

B) Solve $z=p^2+q^2$. — CO5 L2 10M