	ADAMAS UNIVERSITY		
ADAMAS UNIVERSITY PURSUE EXCELLENCE	**END-SEMESTER EXAMINATION: MAY 2021** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech. (CE/ME/EE)	**Semester:**	IV
Paper Title :	Engineering Mathematics-IV (Numerical Techniques)	**Paper Code:**	SMA42116
Maximum Marks :	40	**Time duration:**	3 hrs.
Total No of questions:	8	**Total No of Pages:**	2

Instructions:
1. At top of Answer Sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, and Date of Exam.
2. Assumptions made if any, should be stated clearly at the beginning of your answer.
3. All parts of a Question should be answered consecutively.

Answer all the Groups
Group A
Answer all the questions of the following $5 \times 1 = 5$

1. a) How many significant figures are there in the number 0.00100500.

b) Is the matrix $\begin{pmatrix} 9 & -5 & 2 \\ -5 & 10 & 3 \\ 1 & 4 & 6 \end{pmatrix}$ strictly diagonally dominant? Justify.

c) What is the order of convergence of Newton-Rapson method?

d) Define degree of precision of a quadrature formula.

e) What is the relation between Euler's method and R-K method?

GROUP –B
Answer *any three* of the following $3 \times 5 = 15$

2. Using Regula-falsi method, find the real root of the equation $x^3 - 5x - 7 = 0$ correct to 3 decimal places. Assume that the root lies between 2 and 3. **[5]**

3. Solve the following system of equations by Gauss-elimination method. **[5]**

$$2x + 3y - z = 5$$
$$4x + 4y - 3z = 3$$
$$2x - 3y + 2z = 2$$

4. Use Simpson's 1/3rd rule to evaluate $\int_{0}^{6} \frac{dx}{(1+x)^2}$ taking six sub-intervals. **[5]**

5. Use R-K method of order two to find y(0.2) and y(0.4) given that **[5]**

$$y\frac{dy}{dx} = y^2 - x, \, y(0) = 2, \text{taking h=0.2.}$$

GROUP –C
Answer *any two* of the following $2 \times 10 = 20$

6. (a) Use the LU decomposition method to solve the following system of equations:

$$x + 3y + z = 3$$
$$x + 4y + 2z = 3$$ [7]
$$x + 2y - 3z = 6$$

   (b) Evaluate $\int_{-1}^{0} xe^x dx$ by using Trapezoidal rule taking n=6.   [3]

7. (a) Find the equation of the curve which passes through the points (4, -43), (7, 83), (9,327) and (12,1053) by Newton's forward interpolation formula.   [3]

   (b) Using the Gauss-Seidal method find the solution of the following system of linear equation up to fourth iteration: [7]

$$10x + y - 2z = 7.74$$
$$x + 12y + z = 39.66$$
$$3x + 4y + 15z = 54.8$$

8. (a) Find the percentage error if 625.483 is approximated to 3 significant figures. [2]

   (b) Find the value of $(\nabla + \Delta)^2 (x^2 + x)$.   [3]

   (c) Use Euler method to find the value of y when x=0.5, if   [5]

$$\frac{dy}{dx} = x^2 - y, \, y(0) = 1, \text{taking h=0.1.}$$

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