Seat No.

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OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Applied Numerical Methods

Sub. Code: 63360/79119/79407

Day and Date: Saturday ,06-12-2025 **Total Marks: 70**

Time: 10:30 AM To 01:00 PM

Instructions: **1. All questions are compulsory**
2. Assume suitable data wherever necessary and mention it boldly
3. Figures to the right indicate full marks

Special Inst.: **Use of Non-programmable calculators series fx-82 ES, fx-82 ES Plus, fx-82 MS are only allowed.**

Q1) . **[12]**

a. Find root of equation $x^2 - 4x - 10 = 0$ lying between -2 and -1 using bisection method. Perform FOUR iterations. **[6]**

b. Use the Newton- Raphson method to find a root of the equation $x^3 - 2x - 5 = 0$.The root lies between 2 and 3.Perform TWO iterations. **[6]**

OR

b. Use Muller method with guesses -1, 0 and 1 determine a root of the equation $cosx - xe^x = 0$. Perform ONE iteration.

Q2) . **[12]**

a. Solve the following system of equations by Gauss elimination method. **[6]**

$$x + y + z = 9$$

$$2x - 3y + 4z = 13$$

$$3x + 4y + 5z = 40$$

b.

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Use LU decomposition method to solve the following equations [6]

$$2x + y + 4z = 12$$

$$4x + 11y - z = 33$$

$$8x - 3y + 2z = 20$$

OR

b. Solve the following system of equations using Gauss Jacobi iteration [Perform FOUR iterations]

$$3x + 4y + 15z = 54.8$$

$$x + 12y + 3z = 39.66$$

$$10x + y - 2z = 7.74$$

Q3) . **[12]**

a. Fit a straight line for following data by least square method **[6]**

x	0.5	1.0	1.5	2.0	2.5	3.0
y	15	17	19	14	10	7

b. Fit a polynomial of 2^{nd} degree for the following data by least square method **[6]**

x	1	1.2	1.4	1.6	1.8	2.0
y	0.98	1.40	1.86	2.55	2.28	3.20

OR

b. Use Lagrange's interpolation formula to find the value of y at x=2 from the following data.

x	0	1	3	4
y	-12	0	6	12

Q4) . **[12]**

a. Find the first derivative at x=0.01 **[6]**

X	0.01	0.02	0.03	0.04	0.05	0.06
y	0.1023	0.1047	0.1071	0.1096	0.1122	0.1148

OR

a. The following data gives velocity for particle for 20 second at an interval of 5 seconds. Find the initial acceleration using following data

Time t(sec.)	0	5	10	15	20
Velocity v(m/s)	0	3	14	69	228

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b. The velocity v (km/min) of a moped which starts from rest is given at a fixed interval of time t(min) as follow Use Simpson's 1/3rd Rule to estimate distance covered in 20 minutes. **[6]**

t	0	2	4	6	8	10	12	14	16	18	20
v	0	10	18	25	29	32	20	11	5	2	0

Q5) . **[12]**

a. Apply Euler's method of fourth order to find approximate value of y when x=0.3 given that **[6]**

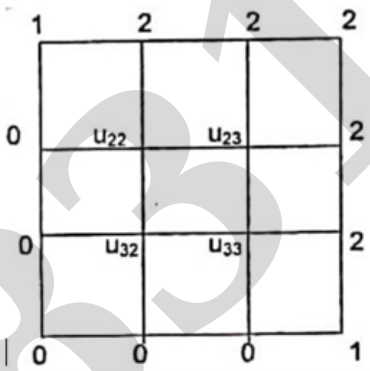
$\frac{dy}{dx} = x + y$ and y=1 when x=0 take h=0.1 correct up to two decimal place

b. Using Taylor method calculate y(0.2) correct up to 4th decimal place given $\frac{dy}{dx} = 1 - 2xy$ and y(0)=1 **[6]**

OR

b. Find dominant Eigen value of $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ by power method.

Q6) Solve $\nabla^2 u=0$ for square mesh with boundary value as shown in figure. Iterate till mesh values are up to fifth approximation. **[10]**



End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (101) Bachelor of Engineering (63360) Applied Numerical Method Part 2 SEM 4
2] (1154) B.Tech. CBCS (79119) Applied Numerical Methods Part 2 SEM 4
3] (101) Bachelor of Engineering (79407) Applied Numerical Methods Part 2 SEM 4

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