

Name: _____

Roll No.: _____

TRIBHUVAN UNIVERSITY
KHWOPA COLLEGE OF ENGINEERING
Dept. of Computer Engineering
2075 Jestha

Exam	CT - SET A		
Level	BE	Full Marks	50
Program	BEL, BEX, BCT, B. Agri.	Pass Marks	30
Year/Part	II / II	Time	2 Hrs.

Subject: - Numerical Method (SH553)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

- What are the applications of NM in engineering and science? Discuss it. And list type of errors. [4+2]
- Write an algorithm of Secant Method to calculate the roots of a non-linear equations $f(x) = 0$. Write the differences between Secant and the False Position Method. [4+2]
- Find a real root of a non-linear equation $x \log_{10} x = 1.2$ by N-R method correct up to 4 decimal places. [6]
- Write pseudo-code of Gauss-Jordan Method to solve the linear system $AX=B$. [8]
- Find the dominant Eigen value and Eigen vector of the matrix: [8]

$$A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$$

- Find y at $x=6.5$ from the following data using Natural Cubic Spline interpolation. [8]

x	3	5	7	9	11
y	8	10	9	12	5

- Fit the following set of data to a curve of the form $y=ax^b$. Also evaluate $y(8)$. [8]

x	5	7	10	11	13
y	100	294	900	1210	2028

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Exam	CT - SET B		
Level	BE	Full Marks	50
Program	BEL, BEX, BCT, B. Agri.	Pass Marks	30
Year/Part	II / II	Time	2 Hrs.

Subject: - Numerical Method (SH553)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

1. Discuss the significance of NM in the field of science and engineering in modern day context. And, list type of Errors. [4+2]

2. Write pseudo-code for finding a real root of a non-linear equation using the False Position method. Differentiate between Fixed-Point & N-R methods. [4+2]

3. Find a real root of a non-linear equation, correct to six decimal places using Fixed Point iteration method. $2x = \cos(x) + 3$ [6]

4. Solve the following system of equations using LU factorization method. [8]

$$5x_1 + 2x_2 + 3x_3 = 31, 3x_1 + 3x_2 + 2x_3 = 25, x_1 + 2x_2 + 4x_3 = 25$$

5. Find the dominant Eigen value and Eigen vector of the matrix: [8]

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 2 \\ 1 & 2 & -1 \end{bmatrix}$$

6. From the following data, compute: [4+4]

- a) $y(3)$ using Newton's forward interpolation formula
- b) $y(6.4)$ using Stirling's formula

x	2	4	6	8	10	12
y	5.1	4.2	3.1	3.5	6.2	7.3

7. Fit the following set of data to a curve of the form $y=ab^x$. Also evaluate $y(7)$. [8]

x	2	4	6	8	10	12
y	16.0	11.1	8.7	6.4	4.7	2.6

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Exam	CT - SET C		
Level	BE	Full Marks	50
Program	BEL, BEX, BCT, B. Agri.	Pass Marks	30
Year/Part	II / II	Time	2 Hrs.

Subject: - Numerical Method (SH553)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

- Discuss the importance of numerical methods in science and engineering. And list type of errors. [4+2]
- Find a real root of a non-linear equation $x \log_{10} x = 1.2$ by Secant method correct up to 4 decimal places. [6]
- Write a pseudo-code of Bisection Method to calculate the roots of a non-linear equations $f(x) = 0$. Compare this method with N-R method. [4+2]
- Compute the inverse of following matrix using the Gauss Jordan Method. [8]

$$\begin{bmatrix} 8 & 4 & 3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$$

- Find the dominant Eigen value and Eigen vector of the matrix: [8]

$$A = \begin{bmatrix} 1 & 4 & -1 \\ 4 & 2 & 5 \\ -1 & 5 & 10 \end{bmatrix}$$

- Find y at x=4.5 from the following data using Natural Cubic Spline interpolation. [8]

x	1	3	5	7	9
y	10	12	11	13	9

- Fit the following set of data to a curve of the form $y = ae^{bx}$. Also evaluate y(2.5). [8]

x	0	1	2	3
y	1.05	2.10	3.85	8.30

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Exam	CT - SET D		
Level	BE	Full Marks	50
Program	BEL, BEX, BCT, B. Agri.	Pass Marks	30
Year/Part	II / II	Time	2 Hrs.

Subject: - Numerical Method (SH553)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

- Discuss the difference between absolute error and relative error with appropriate examples. Also list the application areas of NM. [4+2]
- Write an algorithm for finding a real root of a non-linear equation using the Secant method. Compare this method with False Position Method. [4+2]
- Find a real root of a non-linear equation, correct to four decimal places using N-R method.
 $x \sin(x) + \cos(x) = 0$. [6]
- Apply Gauss Seidel Iterative Method to solve the linear equations correct to 2 decimal places. [8]

$$10x_1 + x_2 - x_3 = 11.19, x_1 - 10x_2 - x_3 = 28.08, -x_1 + x_2 - 10x_3 = 35.61$$

- Find the dominant Eigen value and Eigen vector of the matrix: [8]

$$A = \begin{bmatrix} 1 & 4 & 4 \\ 4 & 1 & 8 \\ 4 & 8 & 1 \end{bmatrix}$$

- Find y at x = 8 from the following data using Natural Cubic Spline interpolation. [8]

x	3	5	7	9
y	3	2	3	1

- Fit the following set of data to a curve of the form $y = ax^b$. Also evaluate y(12). [8]

x	5	7	10	11	13
y	100	294	900	1210	2028

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Exam	CT - SET E		
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Program	BEL, BEX, BCT, B. Agri.	Pass Marks	30
Year/Part	II / II	Time	2 Hrs.

Subject: - Numerical Method (SH553)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

- Define error. Explain different types of errors in numerical computation. Also list application areas of NM. [2+4+2]
- Find a real root of the following equation correct to four decimals using False Position method. $3x + \sin(x) = e^x$ [6]
- Discuss the limitations of Newton-Raphson method while finding a real root of a non-linear equation. [4]
- Solve the following system of equations using LU factorization method. [8]

$$5x_1 + 2x_2 + 3x_3 = 31, 3x_1 + 3x_2 + 2x_3 = 25, x_1 + 2x_2 + 4x_3 = 25$$

- Write an algorithm for solving a system of linear equations of 'N' unknowns using Gauss-Jordan Method. [8]
- Find y at x = 8 from the following data using Natural Cubic Spline interpolation. [8]

x	3	5	7	9
y	3	2	3	1

- Fit the following set of data to a curve of the form $y = ab^x$. Also evaluate y(7). [8]

x	2	4	6	8	10	12
y	16.0	11.1	8.7	6.4	4.7	2.6