

13 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2074 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BGE, BEL, BEX, BCT, BAG	Pass Marks	32
Year / Part	II / II	Time	3 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.

[9:18]

1. Discuss the significance of Numerical Methods in the field of science and engineering in modern day context. [4]

2. Write pseudo-code for finding a real of a non-linear equation using the False Position Method. [6]

3. Find a real root of the following equation, correct to six decimals, using the Fixed Point iteration method. [6]

$$\sin x + 3x - 2 = 0$$

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

$$5x_1 + 2x_2 + 3x_3 = 31$$

$$3x_1 + 3x_2 + 2x_3 = 25$$

$$x_1 + 2x_2 + 4x_4 = 25$$

5. Write a pseudo-code to determine the largest Eigen value and the corresponding vector of a square matrix using Power Method. [8]

6. The following data are provided; use least-squares method to fit these data with the following model, $y = ax + b + \frac{c}{x}$ [8]

7. From the following data, compute: (a) y(3) using Newton's forward interpolation formula

(b) y(6.4) using stirling's formula [8]

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

8. Evaluate the following integral using Romberg's method. (correct to two decimal places) [8]

$$\int_0^2 \frac{e^x + \sin x}{1 + x^2} dx$$

9. Solve $y' = 4e^{0.8x} - 0.5y$; subject to initial condition y(0) = 2. for y(0.5) and y(1.0) using Runge-Kutta 2nd order method. [6]

10. Solve the following boundary value problem using the finite difference method by dividing the interval into four sub-intervals. [8]

$$y'' = e^x + 2y' - y; \quad y(0) = 1.5; \quad y(2) = 2.5$$

11. Find the values of $u(x, y)$ satisfying the Laplace equation $\nabla^2 u = 0$, at the pivotal points of the square region with boundary conditions as shown below. [10]


