24 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2070 Magh

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, B.Agri.	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.*

[F=14]

1. Discuss the importance of Numerical Methods in the field of Science and Engineering. [4]
2. Write pseudo-code for finding a real root of a non-linear equation using False Position Method. [6]
3. Find a real root of the following equation, correct to three decimals, using the Fixed Point iteration method. [6]

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

4. Solve the following systems of linear equations using the Gauss-Seidal iteration method. [8]

$$x_1 + 3x_2 - x_3 + 7x_4 = 19$$
$$2x_1 + 8x_2 + x_3 - x_4 = 17$$
$$3x_1 + x_2 + 9x_3 - x_4 = 15$$
$$9x_1 - x_2 - x_3 + 2x_4 = 13$$

5. Find the largest Eigen value and corresponding vector of the following matrix using power method. [8]

$$\begin{bmatrix} 2 & 5 & 1 \\ 5 & -2 & 3 \\ 1 & 3 & 10 \end{bmatrix}$$

6. Compute the value of y(3) and y(7) from the following data using Newton's interpolation formula. [8]

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

7. Fit the following data to the curve $y = \log_e (ax+b)$. [8]

x	0	1	2	3	4	5	6
y	0.9	1.0	1.5	1.9	2.1	2.4	2.5

8. Evaluate the following, using simpson's 1/3 rule. (take h = 0.2) $\int_0^2 \frac{4e^x}{1+x^3} dx$ [5]

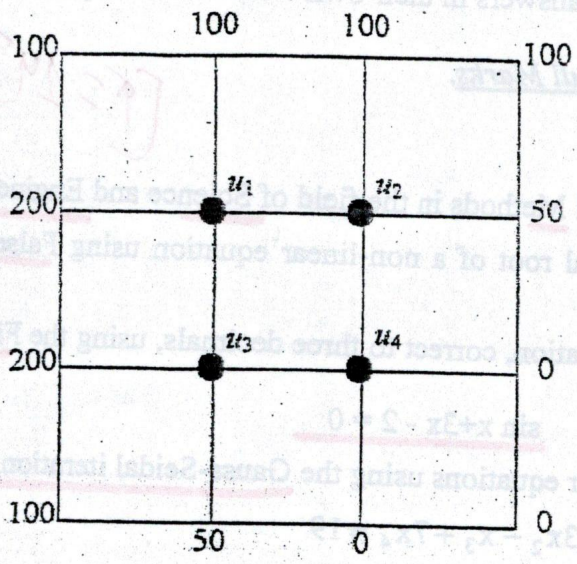
9. Evaluate $\int_2^3 \frac{\cos 2x}{1+\sin x} dx$ using Gauss quadrature three-point formula. [5]

10. Solve the following boundary value problem using finite difference method. [8]

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

11. Explain the technique of solving an initial value problem using Euler's method. [4]

12. Find the value 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]



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