11 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2071 Magh

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, BGE, 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 <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *Assume suitable data if necessary.*

[T:16]

1. Find a root of the equation $\cos x = xe^x$ using the regula-falsi method correct upto four decimal places. [8]
2. Derive Newton-Raphson iterative formula for solving non-linear equation. [4]
3. Define error. Discuss different types of errors in numerical computation. [4]
4. Solve the following set of linear equations using LU factorization method. [8]

$$x - 3y + 10z = 3$$
$$-x + 4y + 2z = 20$$
$$5x + 2y + z = -12$$

5. Use Gauss Seidel method to solve the following equations: [8]

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

6. The following data are taken from the steam table. [8]

Temp. °C	140	150	160	170	180
Pressure kgf/cm^2	3.685	4.854	6.302	8.076	10.225

Find the pressure at the temperature T = 142°C and T = 175°C using Newton's interpolation.

7. Derive expression for least square method of fitting a linear curve. [8]

OR

Develop pseudocode to interpolate the given set of data using Langrange interpolation.

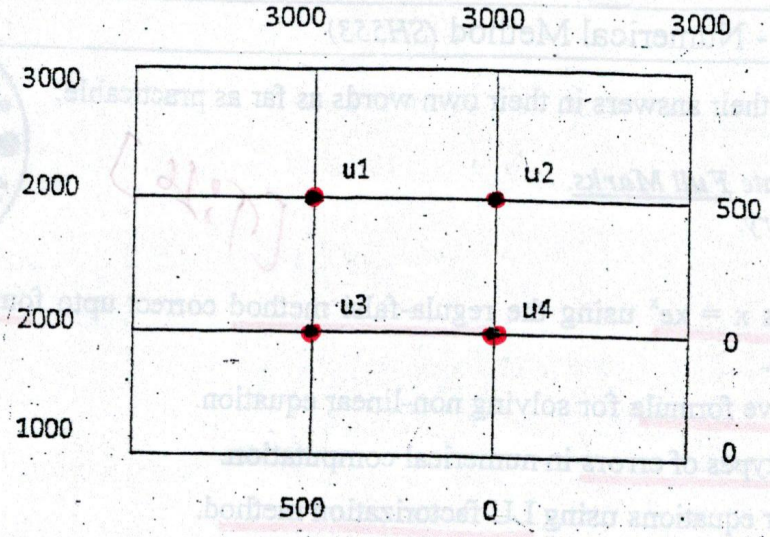
8. If 'x' is in cm and 't' is in time then find velocity and acceleration when t = 0.1 second. [4]

t	0	0.1	0.2	0.3	0.4	0.5	0.6
x	30.13	31.62	32.87	33.64	33.95	33.81	33.24

9. Compute integration of the following function using Romberg integration $\int_{-1}^{1} \frac{dx}{1+x^2}$. [6]
10. Using Euler's method find y(0.2) from following equation $y' = x + y$, $y(0) = 0$, take h = 0.1. [4]

11. Using the Runge-Kutta method of second order, obtain a solution of the equation $y'' = y + xy'$ with the initial condition $y(0) = 1$, $y'(0) = 0$ to find $y(0.2)$ and $y'(0.2)$. (Take $h = 0.1$) [8]

12. Calculate the value of $u(x, y)$ satisfying the Laplace equation $\nabla^2 u = 0$ at the interior points of the square region with boundary conditions shown in figure below. [10]



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