## 11 TRIBHUVAN UNIVERSITY INSTITUTE OF ENGINEERING

## **Examination Control Division**

2071 Magh

Exam.	Mew Back (2066 & Later Batch)					
Level	BE and a lo	Full Marks	80			
Programme	BEL, BEX, BCT, BGE, B.Agri.	Pass Marks	32			
Year / Part	II / II	Time	3 hrs.			

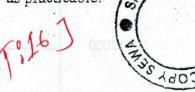
## Subject: - Numerical Method (SH553)

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 Full Marks.

√ Assume suitable data if necessary.



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1. Find a root of the equation  $\cos x = xe^x$  using the regula-falsi method correct upto four decimal places.

2. Derive Newton-Raphson iterative formula for solving non-linear equation.

- 3. Define error. Discuss different types of errors in numerical computation. [4]
- 4. Solve the following set of linear equations using LU factorization method.

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

$$5x + 2y + z = -12$$

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

20x + y - 2z = 17

$$3x + 20y - z = -18$$

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

6.) The following data are taken from the steam table.

		BANKS AND			
Temp. °C	140	150	160	170	180
Pressure kgf/cm <sup>2</sup>	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.

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.

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	

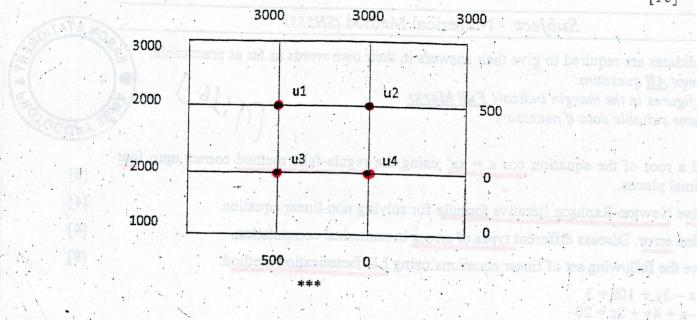
- 9. Compute integration of the following function using Romberg integration  $\int_{-1}^{1} \frac{dx}{1+x^2}$ .
- Using Euler's method find y(0.2) from following equation y' = x + y, y(0) = 0, take h = 0.1.

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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