## TRIBHUVAN UNIVERSITY INSTITUTE OF ENGINEERING

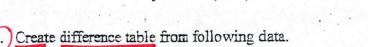
## Examination Control Division

## 2071 Bhadra

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

## Subject: - Numerical Methods (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.

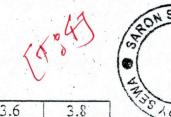


3.2

0.5051

3.0

0.4771



0.5798

[4]

[8]

[4]

[8]

[8]

[8]

[8]

[6]

[10]

2. Use bisection method to find a real positive root of  $\sin x = \frac{1}{x}$  correct upto three decimal places.

3.4

0.5315

0.5563

- 3 Write a pseudo-code to find a real root of a non-linear equation using Secant Method.
- 4. Solve the following linear equations using Gauss Elimination or Gauss Jordan method using partial pivoting.

$$2x+3y+2z /= 2$$
  
 $10x+3y+4z = 16$   
 $3x+6y+z = 6$ 

5. Find the largest eigen-value and the corresponding eigen-vector of the following matrix.

 $\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$ 

6. Find the best fit curve in the form of  $y = a + bx + cx^2$  using least square approximation from the following discrete data.

X	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

7. Use Lagrange's Interpolation formula to find the value of y when x = 3.0, from the following table.

X	3.2	2.7	1.0	4.8	5.6
y	22.0	17.8	14.2	38.3	51.7

- 8. Evaluate  $\int_0^2 f(x)dx$ , for the function  $f(x) = e^x + \sin 2x$  using composite Simpson's 3/8 formula taking step size h = 0.4.
- 9. Evaluate  $\int_0^2 \frac{dx}{x^2 + 2x + 1}$  using Gaussian 3 point formula. [5]

(10) Solve 
$$\frac{dy}{dx} = \frac{y^2 - x^2}{v^2 + x^2}$$
 using RK - 4 method, for y(0.4). (Given, y(0) = 1, h = 0.2)

- Using the finite difference method, find y(0.25), y(0.5) and y(0.75) satisfying the differential equation xy'' + y = 0, subject to the boundary conditions y(0) = 1, y(1) = 2.
- 12. Solve the Poisson equation  $u_{xx} + u_{yy} = -81xy$ , 0 < x < 1, 0 < y < 1 given that u(0, y) = 0, u(x, 0) = 0, v(1, y) = 100, u(x, 1) = 100 and u(0, y) = 0, u(x, y) = 100, u(x, y) = 100,