## O3 TRIBHUVAN UNIVERSITY INSTITUTE OF ENGINEERING

## Examination Control Division

2068 Baishakh

Exam.	Regular / Back					
Level	BE	Full Marks	80			
Programme	All (Except B.Arch.)	Pass Marks	32			
Year / Part	III / Laibnoo!	Time	3 hrs.			

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## Subject: - Numerical Methods

✓ Candidates are required to give their answers in their own words as far as practicable.

Attempt any Five questions. Question No. 6 is compulsory.

✓ The figures in the margin indicate Full Marks.

✓ Assume suitable data if necessary,

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1.	a).	Find	the	root	of	the	equation	ex	_	3x	=	0	correct	unto	three	decimal	places	uning
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b) Find the reciprocal of 3 using Newton Raphson method.

2. a) Apply Newton's forward difference formula to find y(3.5) from the following data.

x	1	2	. 3.	_4	5	6	7.	8
y	1	8	27	64	125	216	343	512

b) Obtain a relation of the form  $y = ae^{bx}$  for the following data by the method of least squares.

x:.	0.0	0.5	1.0	1.5-	2.0	2.5
y:	0.10	0.45	2.15	9.15	40.35	180.75

- 3. a) Use Romberg integration method to evaluate the integral  $\int_{1}^{2} \frac{dx}{x}$  correct upto 3 decimal places taking the initial sub interval size as h = (b a)/2.
  - b) The velocity V of a particle at a distance S from a point on its path is given in the table below:

S (ft)	0	10	20	30	40	50	60
V (ft/sec)	47	58	64	65	61	52	38

Estimate the time taken to travel a distance of 60ft by using Simpson's 1/3 rule. Compare the result with Simpson's 3/8 rule.

4. a) Find the largest eigen value correct to three significant digits and corresponding eigen vector of the following matrix using power method.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 4 & 5 \end{bmatrix}$$

b) Use Gauss Jordan method to find the inverse of the following matrix.

$$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$$

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- a) Solve  $y' = xy + y^2$ , y(0) = 1 for y(0.1) and y(0.2) using Runge-Kutta method of fourth order.
- b) Consider a metal plate of size 30cm × 30cm, the boundaries of which are held at 100°C. Calculate the temperature at interior points of the plate. Assume the grid size of 10cm ×10cm.

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		100°C	A 1 S	16 1-18 1-1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Write algorithm, flowchart and program code in any one of the high level languages (FORTRAN or C) to fit the parabola  $y = a + bx + cx^2$  where a, b and c are constants, Hence find the value of y when x is an user defined value.

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