



Tribhuvan University
Faculty of Humanities & Social Sciences
OFFICE OF THE DEAN
2024

Bachelor in Computer Applications
Course Title: Numerical Methods
Code No: CACS 252
Semester: IV

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Candidates are required to answer the questions in their own words as far as possible.

Group B

Attempt any SIX questions.

[6×5 = 30]

2. Explain absolute and relative error. Find the relative error of number 5.6 if both of its digits are correct. [2+3]
3. On what type of equations Newton's method can be applicable – Justify. [5]
4. Solve the following equations by using Gauss-Jordan method. [5]

$$2x + 3y + 4z = 5$$

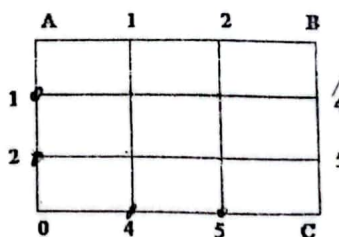
$$3x + 4y + 5z = 6$$

$$4x + 5y + 6z = 7$$

Use the Romberg method to get an improved estimate of the integral from $x = 1.8$ to $x = 3.4$ from the data in the table with $h = 0.4$. [5]

X:	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8
Y:	4.953	6.050	7.389	9.025	11.023	13.464	16.445	20.056	24.533	29.964	36.598	44.701

6. Write a program to compute integral $\int_0^{\pi/2} \sqrt{\sin x} dx$ using Simpson's 1/3 rule [5]
7. Using Runge-Kutta method of 4th order solve the following equation taking each step $h = 0.1$ for $\frac{dy}{dx} = \left[\frac{4x}{y} - xy \right]$ given $y(0) = 3$. calculate y at $x = 0.1$ and 0.2 . [5]
8. Solve the Laplace equation $U_{xx} + U_{yy} = 0$ for the following square mesh with the boundary values as shown in the figure below.



Group C

Attempt any TWO questions.

[2×10 = 20]

9. Solve the given set of linear equations using Dolittle LU decomposition method:

$$3x_1 + 2x_2 + x_3 = 10$$

$$2x_1 + 3x_2 + 2x_3 = 14$$

$$x_1 + 2x_2 + 3x_3 = 14$$
10. Define initial value problems and final value problems. Using Heun's method, find value of y when $x = 0.3$ given that $\frac{dy}{dx} = x+y$ and $y=1$ when $x=0$. [2+8]
11. How can we use Interpolation techniques (methods) to approximate the value of the integral for the functions whose antiderivative can't be found? Explain. Write a program to solve $\sin x - 2x + 1 = 0$ using Bisection method. [4+6]