



Tribhuvan University
Faculty of Humanities & Social Sciences
OFFICE OF THE DEAN
2023

Bachelor in Computer Applications
Course Title: Numerical Methods
Code No: CACS252
Semester: IV

Full Marks: 60
Pass Marks: 24
Time: 3 hours
Batch: 2020

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. Define error. Explain the Taxonomy Errors. [1+4]
3. Estimate the value of $\sin \theta$ at $\theta = 45^\circ$ using Newton's backward difference formula from the following set of data. [5]

θ	10	20	30	40	50	60
$\sin \theta$	0.1736	0.3420	0.5000	0.6428	0.7660	0.8660

4. Write an algorithm and program to calculate integration using Trapezoidal rule. [2+3]
5. What is the form of resultant matrix using Gauss-Jordan method? Solve the following system of equations using Gauss-Jordan Method. [1+4]

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

$$2x + 4y - 6z = 8$$

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

6. Define ordinary differential equation. Use the fourth order Runge-Kutta method to estimate $y(0.4)$ of the equation $\frac{dy}{dx} = x^2 + y^2$ with $y(0) = 0$ assuming that $h = 0.2$. [1+4]

7. Solve for the steady-state temperatures in a rectangular plate of 8cm x 10cm, if one 10cm side is held at 50°C , and the other 10cm side is held at 30°C and other two sides are held at 10°C . Assume grids of size 2cm x 2cm. [5]

8. Write a short note on (Any Two): [2.5 + 2.5]
a) Linear Interpretation b) Boundary value problems d) Partial Differential Equations

Group C

Attempt any TWO questions.

[2×10 = 20]

9. Write an algorithm and program to compute the root of nonlinear equation using Newton-Raphson method. [4+6]
10. a) Fit a straight line to the following set of data using Least Square Regression. [5]

x	1	2	3	4	5
y	3	5	6	7	9

- b) Apply the factorization method (any) to solve the equations: [5]

$$3x + 2y + 7z = 4$$

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

$$3x + 4y + z = 7$$

11. a) Write and implement an algorithm to solve the system of linear equations using Gauss-Seidel method with suitable numerical example. [2.5 + 2.5]
b) Write a program to solve the ordinary differential equations using Heun's method. [5]