

Tribhuvan University
Institute of Science and Technology
2067
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Bachelor Level/ Second Year/ Third Semester/Science — Full Marks: 60
Computer Science and Information Technology (CSc 204) — Pass Marks: 24
(Numerical Method) — Time: 3 Hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt all questions:

8. Discuss methods of Half Interval and Newton's for solving the nonlinear equation f(x) = 0. Illustrate the methods by figures and compare them stating their advantages and disadvantages. **(8)**
9. Derive the equation for Lagrange's interpolating polynomial and find the value of f(x) at x = 1 for the following: **(4+4)**

X	-1	-2	2	4
F(x)	-1	-9	11	69

10. Write Newton-cotes integration formulas in basic form for x = 1, 2, 3 and give their composite rules. Evaluate $\int_{.2}^{1.5} e^{-x^2} dx$ using the Gaussian integration three point formula. **(4+4)**
11. Solve the following algebraic system of linear equations by Gauss-Jordan algorithm. **(8)**

$$\begin{bmatrix} 0 & 2 & 0 & 1 \\ 2 & 2 & 3 & 2 \\ 4 & -3 & 0 & 1 \\ 6 & 1 & -6 & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 0 \\ -2 \\ -7 \\ 6 \end{bmatrix}$$

12. Write an algorithm and program to solve system of linear equations using Gauss-Siedel iterative method. **(4+8)**

13. Explain the Picard's proves of successive approximation. Obtain a solution upto the fifth approximation of the equation

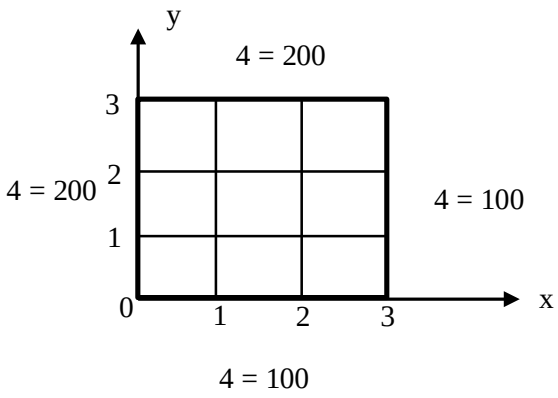
$$\frac{dy}{dx} = y + x \; such \; that \; y = 1 \; when \; x = 0$$

using Picard's process of successive approximations. **(2+6)**

14. Define a difference equation to represent a Laplace's equation. Solve the following Laplace equation.

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \qquad within\ 0 \le x \le 3, 0 \le y \le 3.$$

For the rectangular plate given as:



(3+5)

OR

Derive a difference equation to represent a Poison's equation. Solve the Poison's equation

$$\nabla^2 f = 2x^2 y^2$$

over the domain $0 \le x \le 3, 0 \le y \le 3$ with $f = 0$ on the boundary and $h = 1$. **(3+5)**

