Bankura University

B.Sc(Honours) FIFTH SEMESTER EXAMINATIONS, 2021-22

Subject: Computer Science   **Course ID: 51516**

Course Title: Numerical Methods

Full Marks: 25   **Time: 1 Hr 15 Min**

The figures in the margin indicate full marks

Answer all the questions

UNIT I

1. **Answer any five of the following questions:**   **(1×5 = 5)**

    a. Distinguish between symbolic computations and numerical analysis.

    b. Round off the real number 7.9999501 correct up to four decimal places

    c. Find the percentage of error in approximation of 7/6 by 1.16

    d. Define forward and backward difference operator

    e. Prove that $\Delta (C) = 0$

    f. Show that $\Delta = \nabla E$

    g. What do you mean by inverse interpolation?

    h. State one advantage of numerical integration over the symbolic integration

UNIT II

2. **Answer any two of the following questions:**   **(2×5 = 10)**

    a. Write down the bisection algorithm for computing a simple real root of the equation f(x) = 0 and discuss the convergence of the method

    b. Compute $\int_0^1 \frac{dx}{1+x^2}$ up to 4 decimal places by Simpson's 1/3rd rule

    c. Find by suitable interpolation formula, the value of f(2.5) from the following table:

X	2	3	4	5
f(x)	14.5	16.3	17.5	18.0

    d. Write a short note on numerical differentiation including its geometrical interpretation.

UNIT III

3. **Answer any one of the following question:**   **(1×10 = 10)**

    a. Using the false position method find a root of the equation $x^3 - x - 1 = 0$ which lies in the interval (1, 2) correct up to four decimal places

    Write down the sufficient condition for the convergence in Newton-Raphson method

b. Describe Gauss-Seidel Method for numerical solution of a system of n linear equations with n unknowns. State the condition for the system to converge

Use Gauss elimination method to solve the following system: (no solution)

x + y + z = 2

x + 2y + 3z = 5

2x + 3y + 4z = 11

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B.Sc(Honours) FIFTH SEMESTER EXAMINATIONS, 2021-22

Subject: Computer Science   **Course ID: 51516**

Course Title: Operations Research

Full Marks: 25   **Time: 1 Hr 15 Min**

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Answer all the questions

UNIT I

1. **Answer any five of the following questions:**   **(1×5 = 5)**
   a. What is decision science?
   b. Name the introducer of the term Operations Research
   c. Write the full form of LPP
   d. Distinguish between linear and non linear programming?
   e. State one limitation of Operations Research
   f. What do you mean by linearly dependent vectors?
   g. Give an example of convex set
   h. What is Primal/Dual Relationship?

UNIT II

2. **Answer any two of the following questions:**   **(2×5 = 10)**
   a. Describe the transformation of Operations Research from Military domain to Commercial domain in brief
   b. Show that the vectors $\hat{a} = \{1, 1, 1\}$; $\hat{b} = \{1, 2, 0\}$; $\hat{c} = \{0, -1, 2\}$ are linearly independent
   c. Write the step-by-step process to solve a LPP by the Graphical Method

d. A company makes two kinds of leather belts, belt A and belt B. Belt A is a high quality belt and belt B is of lower quality. The respective profits are Rs 4 and Rs 3 per belt. The production of each of type A requires twice as much time as a belt of type B, and if all belts were of type B, the company could make 1,000 belts per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle and only 400 of these are available per day. There are only 700 buckles a day available for belt B.

---- What should be the daily production of each type of belt? Formulate this problem as an LP model

UNIT III

3. Answer any one of the following questions **(1×10 = 10)**

a. Solve the following LPP using big-M method

Maximize $z = x_1 + 5x_2$

Subject to:

$3x_1 + 4x_2 \leq 6$

$x_1 + 3x_2 \geq 2$

$x_1, x_2 \geq 0$

Interpret duality in economic terms

b. Describe the concept of sensitivity analysis with a suitable example involving at least three variables