



UNIVERSITY OF NORTH BENGAL

BCA Honours 5th Semester Examination, 2020

DSE2- BACHELOR OF COMPUTER APPLICATION(54)

Full Marks: 40

ASSIGNMENT

The figures in the margin indicate full marks.

Candidates should answer in their own words and adhere to the word limit as practicable.

**The question paper contains DSE2A and DSE2B and DSE2C.
The candidates are required to answer any one from three courses.
Candidates should mention it clearly on the Answer Book.**

DSE2A

OPERATIONAL RESEARCH

Answer any two questions from the following

20×2 = 40

1. (a) Use Simplex method to solve the following linear programming problem: 15

$$\text{Maximum } z = 3x_1 + 7x_2$$

Subject to the constraints

$$2x_1 + 5x_2 \leq 20$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

- (b) Write any two applications of Operation Research. 5

2. (a) Use graphical method to solve the following Linear programming problem: 15

$$\text{Maximum } z = 8x_1 + 5x_2$$

Subject to the constraints

$$5x_1 + 3x_2 \geq 30$$

$$2x_1 + 5x_2 \geq 20$$

$$x_1 + x_2 \leq 8$$

$$x_1, x_2 \geq 0$$

- (b) Explain redundant constraints in graphical method of LPP. 5

3. (a) Use Simplex method to solve the following linear programming problem: 15

$$\text{Maximum } z = x + y$$

Subject to the constraints

$$2x + y \leq 4$$

$$x + 2y \leq 3$$

$$x, y \geq 0$$

- (b) Write optimality condition for a minimization type LPP problem. 5
4. A company is manufacturing two products A and B, the net profit for these products is Rs. 60 and Rs. 50 respectively. These products require working in two departments C and D. The available hours per month in these departments are 150 each. Product A requires 2 hours in department C and 3 hours in department D. Product B requires 3 hours in department C and 2 hours in department D. The production of products A and B cannot exceed 40 units each because of marketability constraints. Formulate the LP model to obtain maximum profit and solve it by Simplex method. 20
5. Apply Two Phase Simplex method to solve 20
- Maximum $z = 5x_1 - 4x_2 + 3x_3$
- Subject to the constraints
- $2x_1 + x_2 - 6x_3 = 20$
- $6x_1 + 5x_2 + 10x_3 \leq 76$
- $8x_1 - 3x_2 + 6x_3 \geq 50$
- $x_1, x_2, x_3 \geq 0$

DSE2B

COMBINATORIAL OPTIMIZATION (TH)

Answer any two questions from five. Each questions consist of 20 marks 20×2 = 40

1. (a) Write down the differences of Local and Global Optima. 10
- (b) What is global optimal solution? 5
- (c) How do you calculate global minima? 5
2. Maximize $f(x) = x_1 + 2x_2 + x_3$ 20
- Subject to:
- $x_1 + 2x_2 + x_3 \leq 2$
- $3x_1 + x_2 + x_3 \leq 4$
- $x_1 + x_2 + 2x_3 \leq 4$
- $x_1 + x_2 + x_3 \leq 2$
- $x_1 \geq 0$
- $x_2 \geq 0$
- $x_3 \geq 0$
- Solve using Simplex method.

3. Maximize $f(x) = x_1 + 2x_2$ 20
 Subject to: $x_1 + 2x_2 \leq 3$
 $x_1 + x_2 \leq 2$
 $x_1 \leq 1$
 $x_1 \geq 0$
 $x_2 \geq 0$
 Solve using Simplex method.
4. Discuss the algorithm of Dual Simplex Problem with an example. 20
5. (a) What is the relationship between convex functions and convex sets? 6
 (b) Are all convex functions differentiable? Explain. 8
 (c) Are convex functions continuous? 6

DSE2C

NUMERICAL METHODS

Answer any two questions from the following 20×2 = 40

1. (a) Describe different types of errors in numerical approximations. 10
 (b) Describe Gauss elimination method of solving linear simultaneous equations. 10
2. (a) Explain Regula-Falsi method of solving non-linear equation giving illustration. 10
 (b) Write an algorithm to solve system of linear simultaneous equations using Gauss-Siedel iterative method. 10
3. (a) Estimate a real root of the following non-linear equation using bisection method: 10

$$x^2 \sin(x) + e^{-x} = 3$$

 (b) Define interpolation. Find the Lagrange interpolation polynomial to fit the following data and find $f(0.6)$: 2+8

x	0.4	0.5	0.7	0.8
$f(x)$	-0.916	-0.693	-0.357	-0.223

4. (a) What are the sources of errors? Find the roots of the equation: $x^2 + 5.6x - 10 = 0$ by trial and error up to 4 significant digits. 3+7

(b) Solve the following set of equations using Gauss elimination method:

10

$$x_1 + 10x_2 + x_3 = 24$$

$$10x_1 + x_2 + x_3 = 15$$

$$x_1 + x_2 + 10x_3 = 33$$

5. Write short notes on the following:

5×4 = 20

(a) Significant digits

(b) Floating point representation

(c) Rounding

(d) Ill conditioned system.

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