



'সমানো মন্ত্র: সমিতি: সমানী'

UNIVERSITY OF NORTH BENGAL
BCA Honours 5th Semester Examination, 2022

DSE-P2-BACHELOR OF COMPUTER APPLICATION (54L) (PRACTICAL)

Time Allotted: 2 Hours

Full Marks: 20

*All questions are equal marks.
The figures in the margin indicate full marks.*

**The question paper contains DSE54L:E1L and DSE54L:E2L and DSE54L:E3L.
The candidates are required to answer any *one* from *three* courses.
Candidates should mention it clearly on the Answer Book.**

DSE54L:E1L (BCADSE4)

OPERATIONAL RESEARCH LAB

Answer any *one* question on lottery basis

1. Write a computer program using a suitable language to find out when given an array of size N, the task is to partition the given array into two subsets such that the average of all the elements in both subsets is equal. If no such partition exists print-1. Otherwise, print the partitions. If multiple solutions exist, print the solution where the length of the first subset is minimum. If there is still a tie then print the partitions where the first subset is lexicographically smallest.

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2. Write a computer program using a suitable language to find out when given an array of positive elements, you have to flip the sign of some of its elements such that the resultant sum of the elements of array should be minimum non-negative (as close to zero as possible). Return the minimum no. of elements whose sign needs to be flipped such that the resultant sum is minimum non-negative. Note that the sum of all the array elements will not exceed 10^4 .

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3. Implement and solve using simplex method with a computer program using a suitable language

$$\text{Maximize: } 60x_1 + 70x_2$$

$$\text{Subject to: } 2x_1 + x_2 \leq 300; 3x_1 + 4x_2 \leq 509; 4x_1 + 7x_2 \leq 812; x_1, x_2 \geq 0$$

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4. Implement and solve using dual simplex method with a computer program using a suitable language

$$\text{Minimize: } 5x_1 + 2x_2 + 4x_3$$

$$\text{Subject to: } 3x_1 + x_2 + 2x_3 \leq 4; 6x_1 + 3x_2 + 5x_3 \leq 10; x_1, x_2, x_3 \leq 0$$

5. Implement and solve using simplex method with a computer program using a suitable language
Maximize: $Z = 3x_1 + 2x_2$
Subject to: $-x_1 + 2x_2 \leq 4$; $3x_1 + 2x_2 \leq 14$; $x_1 - x_2 \leq 3$; $x_1, x_2 \geq 0$
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6. Implement and solve using dual simplex method with a computer program using a suitable language
Maximize: $Z = 3x_1 + 2x_2$
Subject to: $-x_1 + 2x_2 \leq 4$; $3x_1 + 2x_2 \leq 14$; $x_1 - x_2 \leq 3$; $x_1, x_2 \geq 0$
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7. Implement and solve using simplex method with a computer program using a suitable language
Minimize: $Z = x_1 - 3x_2 + 2x_3$
Subject to: $3x_1 - x_2 + 2x_3 \leq 7$; $-2x_1 + 4x_2 \leq 12$; $-4x_1 + 3x_2 + 8x_3 \leq 10$; $x_1, x_2, x_3 \geq 0$
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DSE54L:E2L (BCADSE5)

COMBINATORIAL OPTIMIZATION LAB

Answer any *one* question on lottery basis

1. Implement and solve using simplex method with a computer program using a suitable language
Maximize $Z = x_1 + 3x_2$
Subject to $x_1 \leq 5$; $x_1 + 2x_2 \leq 10$; $x_2 \leq 4$; $x_1, x_2 \geq 0$
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2. Implement and solve using dual simplex method with a computer program using a suitable language
Maximize $Z = 3x_1 + 2x_2$
Subject to $-x_1 + 2x_2 \leq 4$; $3x_1 + 2x_2 \leq 14$; $x_1 - x_2 \leq 3$; $x_1, x_2 \geq 0$
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3. Implement and solve using simplex method with a computer program using a suitable language
Maximize $Z = x_1 + 2x_2 + 3x_3 + 4x_4$
Subject to: $x_1 + 2x_2 + x_3 + x_4 = 3$
 $x_1 - x_2 + 2x_3 + x_4 = 4$
 $x_1 + x_2 - x_3 - x_4 = -1$
 $x_1, x_2, x_3, x_4 \geq 0$
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4. Implement and solve using dual simplex method with a computer program using a suitable language
Maximize $3x_1 + x_2$
Subject to: $x_1 + x_2 \geq 6$; $-x_1 + x_2 \leq 6$; $-x_1 + 2x_2 \geq -6$ and $x_1, x_2 \geq 0$
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5. Implement and solve using simplex method with a computer program using a suitable language
Minimize $Z = 200x_1 + 300x_2$
Subject to: $0.4x_1 + 0.6x_2 \geq 240$; $0.2x_1 + 0.2x_2 \leq 80$; $0.4x_1 + 0.3x_2 \geq 180$; $x_1, x_2 \geq 0$
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6. Implement and solve using simplex method with a computer program using a suitable language
Minimize $Z = 40x_1 + 36x_2$
Subject to: $5x_1 + 3x_2 \geq 45$; $x_1 \leq 8$ $x_2 \leq 10$; $x_1, x_2 \geq 0$
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7. Implement and solve using dual simplex method with a computer program using a suitable language
Minimize $Z = x_1 - 3x_2 + 2x_3$
Subject to: $3x_1 - x_2 + 2x_3 \leq 7$; $-2x_1 + 4x_2 \leq 12$; $-4x_1 + 3x_2 + 8x_3 \leq 10$; $x_1, x_2, x_3 \geq 0$

DSE54L:E3L (BCADSE6)
NUMERICAL METHODS LAB

Answer any *one* question on lottery basis

1. Write a program in MATLAB/MATHEMATICA/MAPLE to find the real roots of the equation $x^3 - x - 1 = 0$ using bisection method upto four significant figures.
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2. Write a program in MATLAB/MATHEMATICA/MAPLE to find the real roots of the equation $x^3 - 3x - 5 = 0$ using regula-falsi method upto four significant figures.
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3. Write a program in MATLAB/MATHEMATICA/MAPLE to find the real roots of the equation $3x^2 + 2x - 9 = 0$ using Newton-Raphson's method upto four significant figures.
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4. Write a program in MATLAB/MATHEMATICA/MAPLE to solve the system of linear equations using Gauss-Seidal Method

$$\begin{aligned}2x + 3y - 2z &= 2 \\5x - y - z &= 10 \\3x + y + 3z &= -8\end{aligned}$$

5. Write a program in MATLAB/MATHEMATICA/MAPLE to find the real roots of the equation $x^3 - 9x + 1 = 0$ using bisection method upto four significant figures.

6. Write a program in MATLAB/MATHEMATICA/MAPLE to find the real roots of the equation $x^3 - 2x - 5 = 0$ using regula-falsi method upto four significant figures.

7. Write a program in MATLAB/MATHEMATICA/MAPLE to find the real roots of the equation $x^4 - 4x - 9 = 0$ using Newton-Raphson's method upto four significant figures.

8. Write a program in MATLAB/MATHEMATICA/MAPLE to solve the system of linear equations using Gauss-Jordan Method

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

$$5x - y - z = 10$$

$$3x + y + 3z = -8$$

9. Write a program in MATLAB/MATHEMATICA/MAPLE to solve the system of linear equations using Gauss-Jacobi Method

$$10x - 5y - 2z = 3$$

$$4x - 10y + 3z = -3$$

$$x + 6y + 10z = -3$$

10. Write a program in MATLAB/MATHEMATICA/MAPLE to find the real roots of the equation $x^3 - 6x + 4 = 0$ using Newton-Raphson's method upto four significant figures.

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