BRANCH: M.C.A 1ST Semester
TIME: 2 Hours
Faculty Name-Divya Akancha

CREDIT: 4
FULL MARKS: 30
SESSION: 2023 - 2024

Subject: CA31103 Resource Management Techniques

INSTRUCTIONS:

1) Attempt any **THREE** questions.
2) Marks of the questions are indicated in the right hand margin.
3) Missing data, if any, may be assumed suitably.
4) Before attempting the question paper, be sure that you have got the correct question paper.

Q1. (a) Find the minimum of $f(x) = x^2 - 2x$ by Fibonacci method. Take interval $0 \le x \le 1.5$ and n=4. [8]

(b) What are the steps of Fibonacci Search method? [2]

Q2. (a) Find the minimum of $f(x) = 4x^3 + x^2 - 7x + 14$ using Golden section Search method. Take interval $0 \le x \le 1$ and stopping tolerance is 0.15. [8]

(b) What is the difference between Fibonacci Search Method and Golden Section Search Method in an Optimization technique? [2]

Q3. Solve the problem by using the method of Lagrange Multiplier.
Minimize $Z = 4x^2 - 2xy + 6y^2$
Subject to, $x + y = 72$ [10]

Q4. (a) One kind of cake requires 200g of flour and 25g of fat, and another kind of cake requires 100g of flour and 50g of fat. Find the maximum number of cakes that can be made from 5kg of flour and 1 kg of fat assuming that there is no shortage of the other ingredients used in making the cakes. [5]

(b) Solve the LPP by graphical Method. [5]
Maximize $Z = 20x + 10y$
Subject to, $x + 2y \le 40$
$3x + y \ge 30$
$4x + 3y \ge 60$
$x \ge 0$
$y \ge 0$

@@@ All the Best @@@

MID-SEM 2023

National Institute of Technology, Jamshedpur
Department of Computer Science and Engineering
Mid Semester Examination, Autumn 2022-23
Branch: MCA , First Semester (2022 Batch)

Date of Exam : 21-Oct-2022   Shift: B (3.00 pm -5.00 pm)

Subject: **Resource Management Techniques** (CA3103)

Full Marks: 30

Time: 2 Hours

Course Instructor: Prof. D. K. Yadav   Mode of Examination: Offline (Closed Book)

INSTRUCTIONS:
1) Attempt all the questions.
2) Write parts of a question at one place in the answer sheet.
3) Marks of the question and their parts are indicated in the right hand margin.
4) Missing data, if any, may be assumed suitably.

----

1. A tape recorder company manufactures models A, B and C, which have profit contributions per unit of Rs 15, Rs 40 and Rs 60, respectively. The weekly minimum production requirements are 25 units for model A, 130 units for model B and 55 units for model C. Each type of recorder requires a certain amount of time for the manufacturing of the component parts for assembling and for packing. Specifically, a dozen units of model A require 4 hours for manufacturing, 3 hours for assembling and 1 hour for packaging. The corresponding figures for a dozen units of model B are 2.5, 4 and 2 and for a dozen units of model C are 6, 9 and 4. During the forthcoming week, the company has available 130 hours of manufacturing, 170 hours of assembling and 52 hours of packaging time. Formulate this problem as an LP model so as to maximize the total profit to the company. **(10)**

2. Use the simplex method to solve the following LP problem. **(10)**

   Maximize $Z = 3x_1 + 5x_2 + 4x_3$

   subject to the constraints

   (i) $2x_1 + 3x_2 \leq 8,$ (ii) $2x_2 + 5x_3 \leq 10,$ (iii) $3x_1 + 2x_2 + 4x_3 \leq 15$

   and $x_1, x_2, x_3 \geq 0$

3. Use penalty (Big-M) method to solve the following LP problem. **(10)**

   Minimize $Z = 5x_1 + 3x_2$

   subject to the constraints

   (i) $2x_1 + 4x_2 \leq 12,$ (ii) $2x_1 + 2x_2 = 10,$ (iii) $5x_1 + 2x_2 \geq 10$

   and $x_1, x_2 \geq 0.$

MID-SEM 2022

National Institute of Technology, Jamshedpur
Department of Computer Applications
Mid Semester Examination, Autumn 2021-22

Branch: MCA , First Semester (2021 Batch)

Date of Exam : 27-Nov-2021 (9.00 am -11.00 am)

Subject: **Resource Management Techniques** (CA3103)

Time: 2 Hours (Including uploading of Answer sheet)   **Full Marks:** 30

Course Instructor: Prof. D. K. Yadav   **Mode of Examination:** Online (Open Book)

INSTRUCTIONS:
1) Attempt all the questions.
2) Write parts of a question at one place in the answer sheet.
3) Marks of the question and their parts are indicated in the right hand margin.
4) Missing data, if any, may be assumed suitably.
5) Draw graph on plain paper assuming approximate value on x and y coordinates.

---

1. A company sells two different products A and B, making a profit of Rs 4 and Rs 3 per unit, respectively. They are both produced with the help of a common production process and are sold in two different markets. The production process has a total capacity of 30,000 man-hours. It takes three hours to produce a unit of A and one hour to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 8,000 units and that of B is 12,000 units. Subject to these limitations, products can be sold in any combination. Formulate this problem as an LP model to maximize profit.   (10)

2. Vitamins A and B are found in foods F1 and F2. One unit of food F1 contains three units of Vitamin A and four units of Vitamin B. One unit of food F2 contains six units of Vitamin A and three units of Vitamin B, One unit of food F1 and F2 cost Rs 4 and 5, respectively. The minimum daily requirement (for a person) of Vitamins A and B is 80 and 100 units, respectively. Assuming that anything in excess of the daily minimum requirement of A and B is not harmful. Formulate this problem as an LP model to find out the optimum mixture of food F1 and F2 at the minimum cost which meets the daily minimum requirement of Vitamins A and B.   (10)

3. Fill in the Blanks   (5x1 = 5)

   (i) A linear programming technique improves the quality of _____.

   (ii) In a linear programming, all relationships among decision variables are _____.

   (iii) Linear programming is used to allocate _____ to activities so as to optimize the value of objective function.

(iv) Most of the constraints in the linear programming problem are expressed as _____.

(v) Linear programming is a technique which attempts to determine how best to allocate _____ in order achieve some _____.

4. Use the graphical method to solve the following LP problem: (5)

$$\text{Maximize } Z = 6x_1 - 4x_2$$

subject to the constraints

(i) $2x_1 + 4x_2 \leq 4$ (ii) $4x_1 + 8x_2 \geq 16$

and $x_1, x_2 \geq 0$

Which type of solution is obtained for this LP problem? Explain