PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF COMMERCE
MID TERM EXAMINATION - APR 2023

Semester : Semester II - 2022 - 2022
Course Code : BSE2006
Course Name : Sem II - BSE2006 - Operations Research
Program : BSE

Date : 13-APR-2023
Time : 9.30AM - 11.00AM
Max Marks : 50
Weightage : 25%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS   (5 X 2 = 10M)

1. Define operation research.

                                                                          (CO1) [Knowledge]

2. List out two advantages of operation research.

                                                                          (CO1) [Knowledge]

3. Define Feasible solution

                                                                          (CO2) [Knowledge]

4. Describe in brief the basic feasible solution.

                                                                          (CO2) [Knowledge]

5. State Linear programming.

                                                                          (CO1) [Knowledge]

PART B

6. How should the manufacturer allocate his production capacity to the two types of models so that he may make the maximum profit in a week for the below problem:
    A manufacturer produces two types of models $M1$ and $M2$. Each model of the type $M1$ requires 5 hrs of grinding and 3 hrs of polishing; whereas each model of the type $M2$ requires 2 hrs of grinding and 5 hrs of polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works for 40 hrs a week and each Polisher works for 50 hrs a week. Profit on $M1$ model is Rs. 3 and on model $M2$ is Rs. 4. Whatever is produced in a week is sold in the market.

    (CO1) [Comprehension]

7. Solve the below LPP using Graphical Method.
    $$Max \ (Z) = 100x_1 + 40x_2.$$
    $$sub \ to \ 5x_1 + 2x_2 \le 1000,$$
    $$3x_1 + 2x_2 \le 900,$$
    $$x_1 + 2x_2 \le 500,$$
    $$x_1, x_2 \ge 0.$$

    (CO1) [Comprehension]

8. Write the basic initial Simplex table by introducing Slack variables.
    $$Max \ (P) = 4x + 6y + z.$$
    $$Subject \ to,$$
    $$3x - y + 7z \ \le 5,$$
    $$x \ \le 2,$$
    $$x, y, z \ge 0.$$

    (CO2) [Comprehension]

9. A company produces two types of hats. Each Hat of the first type requires twice as much labour time as the second type. If all the hats are of the second type only, the company can produce a total of 500 hats a day. The market limits daily sales of the first and second type to Rs. 150 and 250 resp. Assuming that the profits per hat are Rs. Rs. 8 for type A and Rs. 5 for type B, Convert the problem as a LP model in order to determine the number of hats to be produced of each type so as to maximize the profit.

    (CO1) [Comprehension]

PART C

10. Apply Simplex method to find the solution for the below LPP
    $$Max \ (z) = x + 1.5y$$
    $$Subject \ to,$$
    $$x + 2y \le 160,$$
    $$3x + 2y \le 240,$$
    $$x, y \ge 0.$$

    (CO2) [Application]