Operations Research Assignment-2022 (Writing Codes in Python / C++)

1. Find the optimum solution of the LPP using the B.F.S. Method:

   (a)

   $$\begin{aligned} &\max: \quad Z = C^T X \\ &\text{s. to} \quad AX = b, \quad X \geq 0 \end{aligned}$$

   (b)

   $$\begin{aligned} &\min: \quad Z = C^T X \\ &\text{s. to} \quad AX = b, \quad X \geq 0 \end{aligned}$$

2. Find the optimum solution of the LPP using the Simplex Method:

   $$\begin{aligned} &\max: \quad Z = C^T X \\ &\text{s. to} \quad AX \leq b, \quad X \geq 0 \end{aligned}$$

3. Find the optimum solution of the LPP using the Big-M Method:

   (a)

   $$\begin{aligned} &\max: \quad Z = C^T X \\ &\text{s. to} \quad AX \begin{pmatrix} \leq \\ = \\ \geq \end{pmatrix} b, \quad X \geq 0 \end{aligned}$$

   (b)

   $$\begin{aligned} &\min: \quad Z = C^T X \\ &\text{s. to} \quad AX \begin{pmatrix} \leq \\ = \\ \geq \end{pmatrix} b, \quad X \geq 0 \end{aligned}$$

4. Find the optimum solution of the LPP using the Two-Phase Simplex Method:

$$\max / \min : \quad Z = C^T X$$
$$\text{s. to} \quad AX \begin{pmatrix} \leq \\ = \\ \geq \end{pmatrix} b, \quad X \geq 0$$

5. Find the optimum solution of the LPP using the Dual-Simplex Method:

$$\min : \quad Z = C^T X$$
$$\text{s. to} \quad AX \geq b, \quad X \geq 0$$

6. Find the optimum solution of the LPP using the Revised-Simplex Method:

$$\max : \quad Z = C^T X$$
$$\text{s. to} \quad AX \leq b, \quad X \geq 0$$

7. Find the optimum solution of the Integer Programming Problem by Cutting Plane Method of Gomory.

8. Find the B.F.S.(Phase-I solution) of the Balanced Transportation Method by using:

   (a) North West Corner Rule (NWCR)

   (b) Least Cost Method (LCM)

   Test the B.F.S. for optimality. Find the Phase II solution by MODI (MOdified DItribution) method.

9. Find the optimal solution of the Assignment Problem (size: n by n)using Hungarian Method.

10. (a) Find the solution of a $m \times n$ stable game.

    (b) Find the solution of a $m \times n$ unstable game using Primal-Dual LP Method.

Note: **Write your code in Python and C++**
Send your Codes to : mpbiswal.iitkgp2022@gmail.com by 31-03-2022
(Only one e-mail is permitted - Early Submission is better)