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| **SESSION** | **MARCH 2023** |
| **PROGRAM** | **MASTER of business administration (MBA)** |
| **SEMESTER** | **III** |
| **course CODE & NAME** | **DOMS304– APPLICATIONS OFOPERATIONS RESEARCH** |
| **CREDITS** | **4** |
| **nUMBER OF ASSIGNMENTS & Marks** | **02**  **30 Marks each** |

**Assignment Set – 1**

**1. Solve the given LPP using Big-M method:**

**Maximize Z = x1 + 2x2 +3x3-x4**

**Subject to: x1 + 2x2+3x3 = 15**

**2x1 + x2 + 5x3 = 20**

**x1 + 2x2+ x3 + x4 = 10**

**x1, x2, x3, x4 ≥ 0**

**Ans 1.**

The Big M method is a version of the Simplex Algorithm that first finds a feasible solution by adding artificial variables to the problem.

Given:

Maximize Z = x1 + 2x2 +3x3-x4

Subject to:

1. x1 + 2x2 + 3x3 = 15

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**2(a) What is Linear Programming Problem? Write its Assumptions and limitations.**

**Ans 2(a**)

**Linear Programming Problem**

Linear Programming (LP) is a mathematical method used to determine the best outcome or solution from a given set of requirements or constraints. The "linear" part comes from the fact that the problems are described using linear relationships. These problems involve optimizing (maximizing or minimizing) a linear objective function, subject to a set of linear equality or

**2(b) Write in brief about the Sensitivity analysis.**

**Ans 2(b**)

**Sensitivity analysis**

Sensitivity analysis is a model model more leaning on financial side that determines how target variables are affected based on changes in input variables. It is a popular way to predict the outcome of a decision given a certain range of variables in the set of data analysis.

Now the question can be connected with operational efficiency which leans on Quality-Cost-

**Assignment Set – 2**

**4. What do you mean by Dynamic programming problem? Use Dynamic programming approach to solve the following problem:**

**Minimize Z = y12 + y22 + y32**

**Subject to constraints: y1 + y2 + y3 ≥ 15 and y1, y2, y3 ≥ 0**

**Ans:**

Dynamic programming is a method for solving complex problems by breaking them down into simpler subproblems. It is applicable to problems exhibiting the properties of overlapping subproblems and optimal substructure (described below).

1. Overlapping subproblems: This means that subproblems may re-occur multiple times. Hence, the computations of these recurring subproblems can be stored and reused, leading to significant computational savings.
2. Optimal substructure: This means that an optimal solution to the problem can be obtained by using optimal solutions to its subproblems.

**5. Solve the following integer programming problem using Gomory’s cutting plane method:**

**Maximize Z = 4x1 + 3x2**

**Subject to: x1 + 2x2 ≤ 4**

**2x1 + x2 ≤ 6**

**and x1, x2 are non-negative integers**

**Ans:**

Before we start, it's important to note that the Gomory's cutting plane method is for Integer Programming (IP) problems and involves two main steps:

1. Solving the problem as a linear programming problem, i.e., without the integer restriction.
2. Then, we add Gomory's cutting planes to the LP relaxation in order to find an integer solution.

**6. Write short notes on the following:**

**i) Quadratic Programming problem**

**ii) Simulation Annealing Method**

**Ans 6.**

**i) Quadratic Programming Problem**

Quadratic Programming (QP) is a specialized type of mathematical optimization problem, which falls under the broader category of nonlinear programming. As the name suggests, a quadratic programming problem involves the minimization or maximization of a quadratic function, subject to linear