B.E. COMPUTER SCIENCE AND ENGINEERING FOURTH YEAR SECOND SEMESTER HOME ASSIGNMENT 2020

Subject: OPTIMIZATION TECHNIQUES AND OPERATIONS RESEARCH **Time:** 24 hours
Full marks:50 **Submission Deadline:** By 26th June Morning 11.00 am

In the present assignment(1-4) some abbreviations are used. Write the question first after putting appropriate value, then solve:

RL= Last two digit of your Roll_no
MN= Your primary Mobile_no which was given to google sheet (if two digits are 0 put 99 there)
FN= (Add the ASCII code of your First Name) % 70 (if 0 put 99 there)
LN= (Add the ASCII code of your Last First and Last Name) % 70 (if 0 put 99 there)
FLN= (Add the ASCII code of your Last First and Last Name) % 70(if 0 put 99 there)
RLM = RL + MN (if 0 put 99 there)
MFN = MN + FN (if 0 put 99 there)
MLN = MN + LN (if 0 put 99 there)

1. Solve the following LPP problem using revised simplex method. (Explain every steps clearly with formulas) 10

$$Max\ Z = MFNx_1 + MLN\ x_2$$
$$MNx_1 + RLx_2 \leq 1000$$
$$x_1 + MN\ x_2 \leq 800$$
$$x_1 + x_2 \leq 400$$
$$x_1, x_1 \geq 0$$

2. A company knows that the demand of one of its most important products are 1, 2,3,4 over the next four months. The company must plan the production of ten units. If any production appears in a period, there is a set up cost of 300*FLN kRs.. In addition there is a production cost of 100* MLN kRs. for each produced unit. If a unit is put in inventory there is an inventory cost of Rs. 50*FN kRs per unit. Five units at most can be produced in a month and at most four units can be put in inventory. How should the company plan their production to satisfy the demand and minimize production and inventory costs? There are no units in inventory at the beginning of month 1. 10

   Solve the above problem using dynamic programming problem after formulation.

3. Consider the following optimization problem 10

$$\text{Min } f(x_1, x_2) = (x_1 - MN)^2 + (x_2 + LN)^2 + x_1x_2$$
$$\text{s.t. } {x_1}^2 + {x_2}^2 \leq 9$$
$$LN * x_1 + MN * x_2 \geq 6$$
$$x_1, x_2 \geq 0$$

   1. Determine a point $\boldsymbol{x}$ that satisfies KKT conditions**.**
   2. Draw the feasible reason graphically. Plot the gradients of the objective function and the active constraints in the point $\boldsymbol{x'} = (\mathbf{2}, \mathbf{0})^{\boldsymbol{T}}$. Determine graphically if this point is a KKT point or not.
   3. Are any of the point $\boldsymbol{x}$ and $\boldsymbol{x'}$ a global optima?

4 Find the initial basic feasible solution using Least cost method of the following transportation problem: 10

Warehouse

Factory	W1	W2	W3	W4	Factory Capacity
F1	RL	LN	MFN	FLN	90*MN
F2	MN	FLN	MLN	RL	75*RL
F3	FN	RLM	LN	MN	72*FLN
Warehouse Requirement	MN*RL	RL*LN	MN*FN	50*MLN	

Then solve it using
a) Modified Distribution Method (MODI)
b) Stepping Stone Method.

5. a. How optimization effects the algorithms of machine learning? Describe two examples (two different learning algorithms) with your own words after formulating the algorithm mathematically 5

b. How convexity effects the solution of non-linear problem? Describe with your own formulated example 3

c. Explain in your words how duality effects the sensitivity analysis involving the terminology relaxation and restriction 2