**Assignment 2**

**Operation Research**

**BTech Sem IV (20-21 Batch)**

Q1. Describe graphically what the simplex method does step by step to solve the following problem. (4.1.6)

Maximize *Z* = 2*x*1 + 3*x*2,

subject to

-3*x*1 + *x*2 1

\_4*x*1 + 2*x*2  20

\_4*x*1 + *x*2 10

-*x*1 + 2*x*2  5

and

*x*1 0, *x*2 0.

Q2. Describe graphically what the simplex method does step by step to solve the following problem. (4.1.7)

Minimize *Z =* 5*x*1 + 7*x*2,

subject to

2*x*1 + 3*x*2, 147

3*x*1 + 4*x*2, 210

*x*1 - *x*2, 63

and

*x*1 0, *x*2 0.

Q3. Consider the following problem. (4.2.2)

Maximize *Z =* *x*1 + 2*x*2,

subject to

*x*1 + 3*x*2  8

*x*1 + *x*2  4

and

*x*1 0, *x*2 0.

**(a)** Introduce slack variables in order to write the functional constraints in augmented form.

**(b)** For each CPF solution, identify the corresponding BF solution by calculating the values of the slack variables. For each BF solution, use the values of the variables to identify the nonbasic variables and the basic variables.

**(c)** For each BF solution, demonstrate (by plugging in the solution) that, after the nonbasic variables are set equal to zero, this BF solution also is the simultaneous solution of the system of equations obtained in part (*a*).

**(d)** Repeat part (*b*) for the corner-point infeasible solutions and the corresponding basic infeasible solutions.

**(e)** Repeat part (*c*) for the basic infeasible solutions.

Q4. Consider the problem in Q3. . (4.3.3)

1. Work through the simplex method (in algebraic form) step by step to solve the model
2. Verify the optimal solution you obtained by using a software package based on the simplex method.