**Assignment of OR for 3rd year extension management students**

1. The crumb and Custard bakery makes cakes and pies. The main ingredients are flour and sugar. The following linear programming model has been developed for determining the number of cakes and pies (x1 and x2 to produce each day to maximize profit.

Max Z=x1 + 5x2

Subject to:

8x1+10x2< 25(flour, lb)

2x1+4x2< 16(sugar, lb)

x1< 5(demand for cakes)

x1,x2 >0

Solve this model using graphical and simplex method and compare the answers.

2. A Manufacturing firm produces electric motors for washing machines and vacuum cleaners. The firm has resource constraints for production time, steel and wire. The LP model determining the number of washing machine motors (x1) and vacuum cleaner motors (x1) to produce has been formulated as follows.

Maximize Z = 70x1 + 80x2

Subject to:

2x1 + x2 19 (production, hrs)

x1 + x2 14 (steel, lb)

x1 + 2x2 20 (wire, ft)

X1,x2 0

REQUIRED

1. Solve primal problem with simplex method
2. Formulate the dual of this problem and solve it with simplex method
3. Define the dual variables and explain what they mean.

3. Below is a linear programming problem.

minimize Z = 17x11 + l0x12 + 15x13 + llX21 + 14x22 + l0x23 + 9x31 + 13x32 + llx33 + 19x41 + 8x42 + 12x43

Subject to

x11 + x 12 + x 13 = 120

x 21 + x 22 + x 23 = 70

x 31 + x 32 + x 33 = 180

x 41 + x 42 + x 43 = 30

x l1 + x 21 + x 31 + x 41 = 200

x 12 + x 22 + x 32 + x 42 = 120

x 13 + x 23 + x 33 + x 43 = 80

1. Set up the transportation tableau for this problem and determine the initial solution using VAM.
2. Solve using the stepping-stone method.
3. Calculate the optimal allocation and total cost

4. An investor is considering investing in stock, real estate, or bonds under uncertain economic conditions. The payoff table of returns for the investor’s decision situation is shown below

Economic Conditions

**Investment Good Stable Poor**

Stocks $ 5,000 $ 7,000 $ 3,000

Real estate -2,000 10,000 6,000

Bonds 4,000 4,000 4,000

Determine the best investment using the following decision criteria.

1. Equal likelihood
2. Maximin
3. Maximax
4. Hurwicz ( α = 0.3)
5. Minimax regret

5. A company has three factories located in three cities viz. X, Y, Z. These factories supplies consignments to four dealers viz. A, B, C and D. The dealers are spread all over the country. The production capacity of these factories is 1000, 700 and 900 units per month respectively. The net return per unit product is given in the following table.

Solve this maximization case of transportation.

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| --- | --- | --- | --- | --- | --- |
| **FACTORIES** | **DEALERS** | | | | CAPACITY |
| **A** | **B** | **C** | **D** |
| X | 6 | 6 | 6 | 4 | 1000 |
| Y | 4 | 2 | 4 | 5 | 700 |
| Z | 5 | 6 | 7 | 8 | 900 |
| **REQUIREMENT** | **900** | **800** | **500** | **400** |  |