

M.SC Degree Examinations – Even semester 2021

II year IV semester

Operations Research

Max marks : 25

Answer any Five questions (5x5=25)

1. Use the revised simplex method to solve the following LP problems

$$\text{Maximum } Z = x_1 + x_2 + 3x_3$$

subject to the constraints

$$3x_1 + 2x_2 + x_3 \leq 3$$

$$2x_1 + x_2 + 2x_3 \leq 2$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

2. Determine the value of u_1 , u_2 and u_3 so as to

$$\text{Maximize } Z = u_1 \cdot u_2 \cdot u_3$$

Subject to the constraints

$$u_1 + u_2 + u_3 = 10$$

$$\text{and } u_1, u_2, u_3 \geq 0$$

3. Each unit of an item costs a company Rs. 40 Annual holdings costs are 18 per cent of unit cost for interest charges, 1 per cent for insurance, 2 percent allowances for obsolescence Rs 2 for building overheads, Rs 1.50 for damages and loss, and Rs 4 miscellaneous costs. Annual demand for the item is constant at 1,000 units and each order costs Rs 100 to place.

- (a) Calculate EOQ and the total costs associated with stocking the item
- (b) If the supplier of the item will only deliver batches of 250 units, how are the stock holding costs affected?

(c) If the supplier relaxes his order size requirement, but the company has limited warehouse space and can stock a maximum of 100 units at any time what would be the optimal ordering policy and associated costs?

4. Derive the EOQ model with gradual supply and shortage allowed
5. Use Wolfe's method to solve the quadratic programming problem

subject to the constraint

$$x_1 + 2x_2 \leq 2$$

and $x_1, x_2 \geq 0$

6. Find the optimum value of the objective functions when subject to the following three sets of constraints separately

$$\text{Maximum } Z = 10x_1 - x_1^2 + 10x_2 - x_2^2,$$

Subject to the constraints

$$x_1 + x_2 \leq 9$$

$$x_1 - x_2 \geq 6$$

$$x_1, x_2 \geq 0$$

7. At a certain airport it takes exactly 5 minutes to land an aeroplane once it is given the signal to land. Although incoming planes have scheduled arrival times the wide variability in arrival times produces an effect which makes the incoming planes appear to arrive in a Poisson fashion at an average rate of 6 per hour. This produces occasional stock ups at the airport which can be dangerous and costly. Under these circumstances how much time will a pilot expect to spend circling the field waiting to land ?