MMS/M07 7510

Management Science

Paper: CP-201

Time: Three Hours] [Maximum Marks : 70

Note :- Attempt FIVE questions in all. Question No.1 is compulsory.
All questions carry equal marks.

1. (i) Operations research approach is :

(a) Multi-disciplinary

(b) Scientific

(c) Intuitive

(d) all of the above.

(ii) A model is :

(a) an essence of reality

(b) an approximation

(c) an idealization

(d) all of the above.

(w) A constraint in an LP model restricts :

(a) value of objective function

(b) value of a decision variable

(c) use of the available resource

(d). all of the above.

(iv) Which of the following is not a characteristic of LP model:

(a) Alternative course of action

(b) an objective function of maximization type

(c) limited amount of resources

(d) non-negativity condition on the value of decision variables.

(v) In the optimal simplex table, $c_j - z_j = 0$ value indicates:

(a) unbounded solution

(b) cycling

(c) alternative solution

(d) infeasible solution.

(vi) If an optimal solution is degenerate, then :

(a) there are alternative optimal solutions

(b) the solution is infeasible

(c) the solution is of no use to the decision-maker

(d) none of the above.

(viI) One disadvantage of using North-West Comer Rule to find initial solution to the transportation problem is that:

(a) it is complicated to use

(b) it does not take into account cost of transportation

(c) it leads to a degenerate initial solution

(d) all of the above.

(viii) The dummy source or destination in a transportation problem is added to :

(a) Satisfy rim conditions

(b) prevent solution from becoming degenerate

(c) Ensure that total cost does not exceed a limit

(d) none of the above

(ix) The method used for solving an assignment problem is called

(a) reduced matrix method

(b) MODI method

(c) Hungarian method

(d) none of the above.

(x) Maximization assignment problem is transformed into a minimization problem by:

(a) adding each entry in a column from the maximum value in that column

(b) subtracting each entry in a column from the maximum value in that column

(c) subtracting each entry in the table from the maximum value in that table

(d) anyone of the above.

(xi) What happens when maximum and minimum values of the game

(a) no solution exists

(b) solution is mixed

(c) saddle point exists

(d) none of the above.

(xii) The objective of network analysis is to -:

(a) Minimize total project duration

(b) Minimize total project cost

(c) Minimize production delays, interruption and conflicts

(d) all of the above.

(xiii) If an activity has zero slack, it implies that -:

(a) it lies on the critical path

(b) it is a dummy activity

(c) the project is progressing well

(d) none of the above.

(xiv) As per Laplace criterion of decision making, researcher

(a) select the best expected payoff value (maximum for profit and minimum for cost

(b) select an alternative with best anticipated weighted average

(c) select the course of action with the smallest anticipated opportunity-less value.

(d) Select the best rated value. By using Branch-and-Bound technique, solve the following integer programming problem:

2 By using Branch and Boundtechnique, solve the following integer programming problems

Max Z = 7x} +9X2

Subj ect to :

$-X_1 + 3X_2 \leq 6$

$7x_1 + X_2 \leq 535$

$(0 \leq X_1, X_2 \leq 7)$

and xI' ~ are integers.

3. A Production Engineer wants to. .assign four new methods to three work centres. The assiinment of the new methods will increase production and they are given. belo,,:. If only one method can be assigned to a work centr~, determine the optimum assignment:

Increase in production (unit)

		A	B	C
Methods	1	10	7	8
	2	8	9	7
	3	7	12	6
	4	10	10	8

4. Solve the following transportation problem in which cell entries represent unit costs.

From	To			Available
	2	7	4	5
	1	1	1	
	5	4	7	8
	1	6	2	7
Required	7	9	18	14

5. (a) "Simulation is an especially valuable tool in a situation where the mathematics needed to describe a system which is realistically tool complex to yield analytical solutions "Elucidate.

(b) Discuss the Monte-Carlo method *of* solving a problem illustrating it by outlining a procedure to solve a specified problem *of* your choice by the same.

6. A glass factory specializing in crystal is developing a substantial backlog and the firm's management 1s considering theree courses *of* action: (S1) arrange for sub-contracting, (S2) begin overtime, (S3) construct new facilities. The correct choice depends largely upon future demand which may be; low, medium, or high. By consensus, management ranks the respective probabilities as 0.01,0.50, 0.40. A cost analysis reveals the effect upon the profits that is shown in the table below:

Profit (Rs.OOO) *if* demand is	Courses *of* action		
	Sl	S2 "	S3
Low (p=0.10)	10	-20	. - 150
Medium (0=0.50)	50	60	20
High (p=0.40)	50.	100	200

Show this decision situation in the form of a decision tree and indicate. the most preferred decision and corresponding expected value.

7. Solve the game whose payoff matrix is :

$$\begin{bmatrix} -1 & -2 & 8 \\ 7 & 5 & -1 \\ 6 & 1 & 12 \end{bmatrix}$$

(i) Find the optimal strategies for A and B
(ii) Value of game to A.

8. A company makes two kinds of leather belts. Belt A is a high quality belt and belt B is of lower quality. The respective profits are Rs. 4 and Rs. 3 per Belt. The production of each of type A requires twice as much time as a belt of type B, and if all belts were of type B, the company could make 1000 per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle and only 400 per day are available. There are only 700 buckles a day available for belt B.

What should be the daily production of each type of belt?

Formulate this problem as **LP** model and solve it by Simplex Method.