Paper III : Operations Research

Section—A $1 \times 10 = 10/0 \cdot 5 \times 10 = 5$

1. Linear programming is :

(a) A constrained optimization model

(b) A mathematical programming

(c) A constrained decision making model

(d) All of the above.

2. Any solution to GLPP which also satisfies the non-negaitve restrictions of the problem is called :

(a) basic solution (b) optimum solution

(c) feasible solution (d) none of the above.

3. In a transportation problem the opportunity cost (d_{ij}) for unoccupied cells is obtained by :

(a) $C_{ij} - (u_L + v_j)$ (b) $-(U_L - V_j) - C_{ij}$

(c) $C_{ij} + (u_L + v_j)$ (d) None of the above.

4. In network analysis, CPM is :

(a) Event Oriented (b) Activity oriented

(c) probabilistic in Nature (d) All of these.

5. The time gap between placing an order and its actual arrival in the inventory is known as :

(a) Slack Time (b) Lead Time (c) Surplus Time (d) None of these.

6. If a customer decides not to enter the queue because of its length, he is said to have :

(a) Reneged (b) Balked (c) Jokeyed (d) None of these.

7. Decision variables in an operation research model are :

(a) Controllable (b) Uncontrollable (c) Parameters (d) Constants.

8. Which of the followikng O.R. problems can not be expressed as a network flow problem ?

(a) an assignment problem (b) a transportation problem

(c) a replacement problem (d) a queuing problem.

9. The problem of replacement is not concerned about the :

(a) items that deteriorate graphically

(b) items that fail suddenly

(c) determination of optimum replacement interval

(d) maintenance of an item to work out profitability.

10. The Bellman's principle of optimality is used in :

(a) Goal programming (b) Dynamic programming

(c) Game theory (d) None of these.

Section—B $2 \times 5 = 10/1 \times 5 = 5$

1. Explain the graphical method for solving the LPP problem.

2. Obtain an initial basic feasible solution to the following transportation problem using the North-West corner rule :

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

3. Solve the sequencing problem and find the total elapsed time 2-jobs and 5-machines :

		Machines				
Job-1	Sequence &	A	B	C	D	E
	Time (hrs)	2	3	4	6	2
Job-2	Sequence &	C	A	D	E	B
	Time (hrs)	4	5	3	2	6

4. Explain the principal assumptions made while dealing with sequencing problems.

5. Show that assignment problem is a particular case of transportation problem.

6. Specify the characteristics of M | M | 1 queue model.

7. Discuss the importance of inventory models.

8. Write a note on duality in a linear programming problem.

9. Write different steps to solve an Assignment problem by Hungarian method.

10. Define the following terms in Network analysis :

(a) Critical Path, (b) Total Float.

Section—C $10 \times 3 = 30/5 \times 3 = 15$

1. Use simpiex method to solve the following L.P.P. :

Maximize $Z = 4x_1 + 10x_2$

Subject to $2x_1 + x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90; x_1 \geq 0, x_2 \geq 0.$

2. A company has factories at F_1, F_2 and F_3 which supply warehouses at W_1, W_2 and W_3. Weekly factory capacities are 200, 160 and 90 units respectively. Weekly warehouses requirements are 180, 120 and 150 units respectively. Unit shipping costs (in rupees) are as follows :

	Wharehouse			
Factory	W_1	W_2	W_3	Supply
F_1	16	20	12	200
F_2	14	8	18	160
F_3	26	24	16	90
Demand	180	120	150	450

Determine the optimum distribution for this company to minimize shipping costs.

3. What is critical path ? A certain project is composed of activities whose time estimates are given below :

Activity	1–2	1–3	1–4	2–5	3–5	4–6	5–6	6–7	5–7
Duration	1	3	2	1	3	2	4	6	3

Draw the project network and find out the critical path.

4. (a) What is Degeneracy in transportation problems ? How it is eliminated ?

(b) Show that in an assignment problem, if we multiply each element of the effective new matrix by same fixed costant, then the optimum solution remains unchanged.

5. (a) Discuss different types of replacement problem.

(b) The cost of a machine is raised 6100 and its scraped value is only raise 100 the maintenance cost are found from experience to be are as :

Year	:	1	2	3	4	5	6	7	8
Maintenance cost	:	100	250	400	600	900	1250	1600	2000