Operation Research

Question Bank

1. Define Operations research & explain the methodology of OR.
2. Describe the different steps of formulation of Mathematical Model.
3. Explain the limitation of OR.
4. What is L.P.P? Write the general & canonical form of L.P.P.
5. Formulate the mathematical model of Assignment Problem.
6. Define Operation Research.
7. Define Linear Programming Problem.
8. Write the General & Standard form of LPP.
9. Write the origin of Operational Research.
10. Define Degenerate & Non Degenerate solution of Transportation Problem.
11. Explain Least cost Method .
12. What is Un -Balance Transportation Problem? How can it overcome?
13. Solve the following problem by Graphical Method.

$$\begin{aligned} &\text{Min } z = 20x + 40y \\ &\text{Subject to the constra int} \\ &\quad 36x + 6y \le 108 \\ &\quad 3x + 12y \ge 36 \\ &\quad 20x + 10y \ge 100 \\ &\text{and } \ x \ge 0, y \ge 0 \end{aligned}$$

14. Solve the following Problem by Big-Method.

$$\begin{aligned} &Max\, Z = 5X_1 + 3X_2 \\ &subject\ to\ constra\ \text{int} \\ &X_1 + 4X_2 \ge 6 \\ &2X_1 + X_2 \le 1 \\ &\& \ X_1 \ge 0, X_2 \ge 0 \end{aligned}$$

15. Find the Optimal Basic feasible solution of following Transportation Problem.

	A	B	C	Supply
	4	8	8	76
	16	24	16	82
	8	16	24	70
Demand	72	102	41	

16. Explain the Vogel Approximation Method & Formulate the Mathematical Model of Transportation Problem.
17. Solve the following Problem by Graphical Method.

a)
$$Min\ Z = -X_1 + 2X_2$$
$$subject\ to\ constra\ \text{int}$$
$$-X_1 + 3X_2 \le 10$$
$$X_1 + X_2 \le 6$$
$$X_1 - X_2 \le 2$$
$$\&\ X_1 \ge 0, X_2 \ge 0$$

b)
$$Max\ Z = X_1 + X_2$$
$$subject\ to\ constra\ \text{int}$$
$$-3X_1 + X_2 \ge 3$$
$$X_1 + X_2 \le 1$$
$$\&\ X_1 \ge 0, X_2 \ge 0$$

18. Solve the following Problem by Simplex Method.

a)
$$Max\ Z = 3X_1 + 5X_2 + 4x_3$$
$$subject\ to\ constra\ \text{int}$$
$$2X_1 + 3X_2 \le 8$$
$$2X_2 + 5X_3 \le 10$$
$$3X_1 + 2X_2 + 4x_3 \le 15$$
$$\&\ X_1 \ge 0, X_2 \ge 0, x_3 \ge 0$$

b)
$$Min\ Z = X_1 - 3X_2 + 2x_3$$
$$subject\ to\ constra\ \text{int}$$
$$3X_1 - X_2 + 2x_3 \le 7$$
$$-2X_1 + 4X_2 \le 12$$
$$-4X_1 + 3X_2 + 8x_3 \le 10$$
$$\&\ X_1 \ge 0, X_2 \ge 0, x_3 \ge 0$$

19. Solve the following Problem by Big-M Method.

a)
$$Min\ Z = 12X_1 + 20X_2$$
$$subject\ to\ constra\ \text{int}$$
$$6X_1 + 8X_2 \ge 100$$
$$7X_1 + 12X_2 \ge 120$$
$$\&\ X_1 \ge 0, X_2 \ge 0$$

b)
$$Max\ Z = 3X_1 + 2X_2$$
$$subject\ to\ constra\ \text{int}$$
$$3X_1 + 4X_2 \ge 12$$
$$2X_1 + X_2 \le 2$$
$$\&\ X_1 \ge 0, X_2 \ge 0$$

20. Write the characteristics of Standard form of Linear Programming Problem.
21. Explain the application of OR.
22.) Define Basic Feasible solution, & Optimal Solution & Linear Programming Problem.
23. Explain Duality
24. Explain Optimality test of Transportation Problem.
25. Apply the Principle of Duality to solve the following Problem

$$\text{Min } Z = 2X_1 + 2X_2$$
$$\text{S.t} \quad 2X_1 + 4X_2 \ge 1$$
$$X_1 + 2X_2 \ge 1$$
$$2X_1 + X_2 \ge 1 \qquad \text{and } X_1 \ge 0 \ \&\ X_2 \ge 0$$

26. Solve the Assignment Problem

	Jobs			
Clerks	M	5	2	0
	4	7	5	6
	5	8	4	3
	3	6	6	2

28. Explain the Queuing System & its component.

29. In a railway yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service times distribution also follows exponential with an average 36 minutes. Calculate the following.

(1) The mean queue size (length)
(2) The probability that queue size exceed 10.
(3) If the arrival of train increases to an average 33 per day, what will be the change in (1) & (2).