**Dr. MPS Memorial College of Business Studies**

**Question Bank**

**BCA IV**

**Optimization Techniques**

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**1)** Define Operational Research. Describe its applications in brief.

**2)** Solve the following transportation problem for which the transportation cost (rupees per unit), origin availabilities and destination requirements are given below :

| Destinations→ / Origin↓ | $D_1$ | $D_2$ | $D_3$ | $D_4$ | $D_5$ | $D_6$ | Availabilities |
|---|---|---|---|---|---|---|---|
| $O_1$ | 1 | 2 | 1 | 4 | 5 | 2 | **30** |
| $O_1$ | 3 | 3 | 2 | 1 | 4 | 3 | **50** |
| $O_1$ | 4 | 2 | 5 | 9 | 6 | 2 | **75** |
| $O_1$ | 3 | 1 | 7 | 3 | 4 | 6 | **20** |
| Requirements | **20** | **40** | **30** | **10** | **50** | **25** | **175** |

**3)** State the assignment model. Describe an algorithm for the solution of the assignment problem

**4)** Answer the following questions in brief :

(a) What is feasible solution in LPP?

(b) What is degeneracy in transportation problems?

(c) What is V.A.M.?

(d) What is meant by unbalanced transportation problems?

**5)** Solve graphically the following LPP :

$$\text{Max. } Z = 3x_1 + 5x_2$$

$$\text{Subject to : } x_1 + 2x_2 \leq 2000$$

$$x_1 + x_2 \leq 1500$$

$$x_2 \leq 600$$

$$x_1, x_2 \geq 0 .$$

**6)** State a Transportation problem. When does it have unique solution?

**7)** Solve the transportation problem and find the optimal solution :

| | $D_1$ | $D_2$ | $D_3$ | $D_4$ | Available |
|---|---|---|---|---|---|
| $O_1$ | 1 | 2 | 1 | 4 | 30 |
| $O_2$ | 3 | 3 | 2 | 1 | 50 |
| $O_3$ | 4 | 2 | 5 | 9 | 20 |
| Required | 20 | 40 | 30 | 10 | 100 |

8) Under what condition is it possible for an LPP to have more than one optimal solution? What do these optimal solution represent?

**8)** (a) Solve the following assignment problem

| | Machine | | | |
|---|---|---|---|---|
| Job | A | B | C | D |
| 1 | 3 | 6 | 2 | 6 |
| 2 | 7 | 1 | 4 | 4 |
| 3 | 3 | 8 | 5 | 8 |
| 4 | 6 | 4 | 3 | 7 |
| 5 | 5 | 2 | 4 | 3 |
| 6 | 5 | 7 | 6 | 4 |

(b) Discuss sequencing of n jobs through 3 machines.

**9)** Write short notes on any three of the following:

a) Tic-Tac-Toe problem
b) History of OR.
c) Hungarian Method.
d) Job Sequencing.

**10)** Find the optimal assignment for the given assignment :

| | | Machine | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| Job | 1 | 5 | 7 | 9 |
| | 2 | 14 | 10 | 12 |
| | 3 | 15 | 13 | 16 |

**11)** Describe Johnson's algorithm for sequencing of n-jobs through 2-machines.

**12)** What is unbound solution, and how does it occur in graphical method?

**13)** How is the concept of dominance used in simplifying the solution of a rectangular game?

**14)** What are the assumptions and limitations of a game theory?

**15)** Explain the difference between pure strategy and mixed strategy.

**16)** There are 6 jobs to be processed on Machine *A*. The time required by each job on machine *A* is given in hours. Find the optimal sequence and the total time elapsed.

| Job: | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Time in hours. Machine A | 6 | 4 | 3 | 2 | 9 | 8 |

17)

Use the graphical method to minimize the time needed to process the following jobs on the machine shown, i.e. each machine finds the job which should be done first. Also calculate the total elapsed time to complete both the jobs.

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

18) What is an infeasible solution, and how does it occur? How is this condition recognized in the graphical method?

19) What conditions must exist in a simplex table to establish the existence of an alternate solution? No feasible solution? Unbound solution? Degeneracy?

20) What do you mean by two-person zero sum game? What is pure strategy in game theory?

21) Explain mini-max and maxi-min principle used in the theory of games.

22)

***Solve the following LPP using Simplex /Big M/Two-phase any suitable method***

Maximize $Z = 3X_1 + 2X_2$

Subject to $X_1 + X_2 \leq 4$

$X_1 - X_2 \leq 2$

$X_1, X_2 \geq 0$

23) Define Operations Research?

24) What is linear programming?

25) What are slack and surplus variables?

26) Explain the scope of OR.

27) Write down the mathematical formulation for transportation problem.

28) Explain MODI method?

29) Write down the steps involved in solving Assignment problem using Hungarian Method.

**Note: These questions are for your help only. For more and deep understanding of any topic, it is suggested to read books thoroughly.**