

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-5 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK (Theory)

Subject Name & Code: Operation Research (3151910)

Unit 1: Introduction to Operations Research & Linear Programming

Repeated Questions:

1. **Discuss various applications of Operation Research.**
 - Appeared in: S25 (Q1a, 03 marks), S22 (Q1a, 03 marks)
 2. **What are the assumptions in Linear Programming Problem (LPP)?**
 - Appeared in: S25 (Q2a, 03 marks), S24 (Q2a, 03 marks)
 3. **Discuss various phases in solving an OR problem.**
 - Appeared in: S23 (Q1b, 04 marks), W25 (Q1b, 04 marks)
 4. **Explain graphically: (a) No feasible solution (b) Unbounded solution in LPP.**
 - Appeared in: S25 (Q1b, 04 marks), S24 (Q1a, 03 marks)
 5. **Define slack and surplus variables in LPP.**
 - Appeared in: S22 (Q2a, 03 marks)
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Other Important Questions:

1. **Define OR. Discuss origin and development of OR.**
 - Appeared in: S23 (Q1a, 03 marks)
 2. **Explain the scope of OR in various sectors.**
 - Appeared in: S23 (Q1c, 07 marks)
 3. **What is Linear Programming Problem? Discuss scope and role in solving management problems.**
 - Appeared in: S24 (Q1c, 07 marks)
 4. **Discuss limitations of OR.**
 - Appeared in: W25 (Q1a, 03 marks)
 5. **Write characteristics of Operations Research.**
 - Appeared in: W24 (Q1a, 03 marks)
 6. **Discuss limitations of LPP.**
 - Appeared in: W24 (Q1b, 04 marks)
 7. **Sketch graphical representation of: (1) Infeasible solution, (2) Redundant constraint.**
 - Appeared in: W24 (Q1c, 07 marks)
 8. **Explain relationship between primal and dual solution.**
 - Appeared in: W25 (Q2a, 03 marks)
 9. **Define: Basic Feasible Solution, Objective Function, Degenerate Solution, Optimal Feasible Solution.**
 - Appeared in: S23 (Q2b, 04 marks)
 10. **What are applications of LPP?**
 - Appeared in: S23 (Q2a, 03 marks)
 11. **Write general mathematical formulation of LP problem.**
 - Appeared in: W22 (Q1b, 04 marks)
 12. **State and explain various characteristics of Linear Programming.**
 - Appeared in: W22 (Q1a, 03 marks)
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Unit 2: Transportation & Assignment Problems

Repeated Questions:

1. **What is degeneracy in transportation problem?**
 - Appeared in: S25 (Q2b, 04 marks), W25 (Q3a OR, 03 marks), S22 (Q3a, 03 marks)
 2. **How profit maximization problem can be solved using assignment technique?**
 - Appeared in: S25 (Q4b, 04 marks), S22 (Q3a, 03 marks), W25 (Q3a, 03 marks)
 3. **Explain unbalanced assignment problems.**
 - Appeared in: S24 (Q3a, 03 marks), W22 (Q3a, 03 marks)
 4. **Discuss various methods of getting Initial Basic Feasible Solution (IBFS) in transportation problem.**
 - Appeared in: S24 (Q3a OR, 03 marks), S23 (Q3b, 04 marks)
 5. **How will you define transportation problem? Give mathematical statement.**
 - Appeared in: S24 (Q3b OR, 04 marks), S23 (Q3a, 03 marks)
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Other Important Questions:

1. **Explain significance of positive, zero, and negative opportunity cost in transportation problem.**
 - Appeared in: S22 (Q1b, 04 marks)
 2. **Is it possible to solve assignment problem using transportation technique? Explain with reason.**
 - Appeared in: S25 (Q3b, 04 marks)
 3. **Explain “Transportation problem is a special case of LPP”.**
 - Appeared in: W24 (Q3a, 03 marks)
 4. **Write canonical form of transportation problem.**
 - Appeared in: W24 (Q3a OR, 03 marks)
 5. **Write difference between transportation and assignment problems.**
 - Appeared in: W24 (Q3b OR, 04 marks)
 6. **Explain transportation problems with prohibited routes.**
 - Appeared in: W22 (Q3a OR, 03 marks)
 7. **What are trans-shipment problems? Explain with example.**
 - Appeared in: S24 (Q3b, 04 marks), W22 (Q3b OR, 04 marks)
 8. **Explain the difference between transportation and assignment problems.**
 - Appeared in: W23 (Q3a OR, 03 marks)
 9. **Describe mathematical formulation of assignment problem.**
 - Appeared in: W23 (Q3b OR, 04 marks)
 10. **What do you understand by balanced and unbalanced transportation problem? How is unbalanced problem tackled?**
 - Appeared in: W23 (Q3a, 03 marks)
 11. **Explain steps in Modified Distribution (MODI) method.**
 - Appeared in: W23 (Q3b, 04 marks)
 12. **Describe procedure to solve Travelling Salesman Problem.**
 - Appeared in: W22 (Q3b, 04 marks)
 13. **Explain steps of Travelling Salesman Problem.**
 - Appeared in: S25 (Q3c OR, 07 marks)
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Unit 3: Queuing Theory

Repeated Questions:

1. **Define the following terms relating to customer's behavior in queue:**
(A) Balking (B) Jockeying (C) Reneging
 - Appeared in: S25 (Q4a, 03 marks), S22 (Q4a OR, 03 marks), W23 (Q2b, 04 marks)
 2. **Explain Kendall's notation for queuing system.**
 - Appeared in: S24 (Q5a, 03 marks), W23 (Q4b OR, 04 marks)
 3. **Explain the queuing model as indicated by the following notation: $M/D/1 : FCFS/\infty/\infty$**
 - Appeared in: S24 (Q4b, 04 marks), W22 (Q4a, 03 marks)
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Other Important Questions:

1. **Define the elements of a Queuing System.**
 - Appeared in: S24 (Q4a OR, 03 marks), S23 (Q4a OR, 03 marks)
 2. **Classify the Queuing Models.**
 - Appeared in: W24 (Q4a, 03 marks)
 3. **What is float? Discuss in brief: (i) Total float (ii) Free float.**
 - Appeared in: S25 (Q4b, 04 marks)
 4. **Define: Queue and give its classification. Mention applications of each type of queue.**
 - Appeared in: W22 (Q4b, 04 marks)
 5. **List different methods for solving Game Problems.**
 - Appeared in: W22 (Q4a OR, 03 marks)
 6. **Write important assumptions of Game Theory.**
 - Appeared in: W22 (Q4b OR, 04 marks)
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Unit 4 – Inventory Control

(Topics: Inventory classification, Different cost associated to Inventory, Economic order quantity, Inventory models with deterministic demands, ABC analysis and VED analysis)

Repeated Questions

1. **What is inventory? Discuss benefits and limitations of inventory.**
 - Appeared in: W23 (Q4b, 04 marks), W24 (Q4b, 04 marks)
2. **Discuss various costs involved in an Inventory model.**
 - Appeared in: S25 (Q3a, 03 marks), W24 (Q5a, 03 marks)

Other Important Questions

1. **What do you mean by inventory? What are the advantages and disadvantages of it?**
 - Appeared in: S22 (Q5a, 03 marks)
2. **Why inventory is known as necessary evil?**
 - Appeared in: S23 (Q4a, 03 marks)
3. **Derive the equation for Economic Order Quantity (EOQ) for constant demand with the condition of no shortage.**
 - Appeared in: S23 (Q4b, 04 marks)
4. **Discuss different costs associated with Inventory.**
 - Appeared in: S24 (Q4a, 03 marks)
5. **Discuss ABC analysis.**
 - Appeared in: S24 (Q4b, 04 marks)
6. **Write a short note on ABC analysis of inventory control technique.**
 - Appeared in: S25 (Q3c, 07 marks)
7. **Classify the inventory with suitable examples.**
 - Appeared in: W22 (Q3a, 03 marks)
8. **Define inventory. Why is it necessary to control?**
 - Appeared in: W25 (Q4a, 03 marks)
9. **Discuss costs associated with inventory control.**
 - Appeared in: W25 (Q4b, 04 marks)

Unit 5: Replacement Theory

Repeated Questions:

1. **Explain Group Replacement Policy with suitable example.**
 - Appeared in: S25 (Q4b OR, 04 marks), S22 (Q4b OR, 04 marks)
 2. **Explain how replacement theory is used for items whose maintenance cost varies with time.**
 - Appeared in: W24 (Q4b, 04 marks)
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Other Important Questions:

1. **Explain Procedure for Group Replacement Theory.**
 - Appeared in: S25 (Q3a OR, 03 marks)
 2. **Discuss Individual Replacement vs. Group Replacement.**
 - Appeared in: S23 (Q3b OR, 04 marks)
 3. **Define: Discount Rate, Money Value, Present Worth Factor.**
 - Appeared in: S23 (Q3a OR, 03 marks)
 4. **Describe some important replacement situations.**
 - Appeared in: S24 (Q5b OR, 04 marks), W22 (Q5a OR, 03 marks)
 5. **Explain briefly difference in replacement of items that deteriorate gradually vs. items that fail suddenly.**
 - Appeared in: W25 (Q4c OR, 07 marks)
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Unit 6: Game Theory

Repeated Questions:

1. **Define in context of Game Theory: Strategy, Player, Saddle Point, Pure Strategy, Mixed Strategy.**
 - Appeared in: S25 (Q4a OR, 03 marks), W25 (Q4a OR, 03 marks), W24 (Q4a OR, 03 marks)
 2. **What is “zero-sum” in context of Game Theory?**
 - Appeared in: S22 (Q4a, 03 marks), W25 (Q4a, 03 marks), W23 (Q4a OR, 03 marks)
 3. **What is “dominance rule” in Game Theory?**
 - Appeared in: S25 (Q3a, 03 marks)
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Other Important Questions:

1. **List different methods for solving Game Problems.**
 - Appeared in: W22 (Q4a OR, 03 marks)
 2. **Write important assumptions of Game Theory.**
 - Appeared in: W22 (Q4b OR, 04 marks)
 3. **Discuss characteristics of Game Theory.**
 - Appeared in: W24 (Q4b OR, 04 marks)
 4. **Write down mathematical formula for Game Theory.**
 - Appeared in: S24 (Q4a, 03 marks), S23 (Q5a, 03 marks)
 5. **What are types of strategies for Game Theory?**
 - Appeared in: S24 (Q4b OR, 04 marks), S23 (Q5b, 04 marks)
 6. **Define: Saddle Point. How is it found?**
 - Appeared in: W25 (Q5b OR, 04 marks)
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Unit 7: Decision Theory

Repeated Questions:

1. **Explain EMV, EOL, EVPI.**
 - Appeared in: S25 (Q5a, 03 marks)
 2. **Explain following terms in Decision Theory: EMV, EOL, EVPI.**
 - Appeared in: S25 (Q5a, 03 marks)
 3. **Discuss difference between decision-making under certainty, uncertainty, and risk.**
 - Appeared in: S22 (Q5a, 03 marks), W23 (Q5a OR, 03 marks), W24 (Q5c OR, 07 marks)
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Other Important Questions:

1. **Explain Decision Tree.**
 - Appeared in: S25 (Q3b OR, 04 marks), W22 (Q2a, 03 marks)
 2. **Explain steps for Decision Theory approach.**
 - Appeared in: S25 (Q5c OR, 07 marks)
 3. **What is EMV? How is it computed as decision-making criterion?**
 - Appeared in: W25 (Q5b, 04 marks)
 4. **Explain procedure steps for Hurwicz criterion.**
 - Appeared in: W24 (Q5b, 04 marks)
 5. **Explain various steps involved in decision-making.**
 - Appeared in: S25 (Q5c OR, 07 marks), W23 (Q5a, 03 marks)
 6. **Discuss difference between decision-making under certainty and under conflict.**
 - Appeared in: W22 (Q2b, 04 marks)
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Unit 8: Project Management (PERT & CPM)

Repeated Questions:

1. **Differentiate between CPM and PERT.**
 - Appeared in: S24 (Q5a OR, 03 marks), W23 (Q5b, 04 marks), W22 (Q5b OR, 04 marks)
2. **Define: Activity, Event, Dummy Activity, Float.**
 - Appeared in: W24 (Q5a, 03 marks), W23 (Q5b OR, 04 marks)
3. **Explain predecessor, successor, and dummy activity with diagram.**
 - Appeared in: S22 (Q5a, 03 marks), W25 (Q5a OR, 03 marks)

Other Important Questions:

1. **What is replacement? Explain with real examples.**
 - Appeared in: S25 (Q5a OR, 03 marks)
2. **Explain term “Crashing of network”. Why is it required?**
 - Appeared in: S23 (Q5b, 04 marks)
3. **Discuss rules of network construction.**
 - Appeared in: S25 (Q5b OR, 04 marks)
4. **Define: Event, Activity, Total float w.r.t. CPM/PERT.**
 - Appeared in: S23 (Q5a OR, 03 marks)
5. **Explain D.R. Fulkerson’s rule for network diagram.**
 - Appeared in: W22 (Q5b, 04 marks)
6. **Explain term “Looping” in context of network scheduling.**
 - Appeared in: W24 (Q5a OR, 03 marks)
7. **Differentiate between forward and backward planning.**
 - Appeared in: W24 (Q5b OR, 04 marks)
8. **Mention any two limitations of Critical Path.**
 - Appeared in: W25 (Q5a, 03 marks)
