Roll No. | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 09

BBA (Sem.–5)

OPERATION RESEARCH

Subject Code : BBA-501-18

M.Code : 78193

Date of Examination : 19-11-2025

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTIONS-B consists of FOUR Sub-sections : Units-I, II, III & IV.**
3. **Each Sub-section contains TWO questions each, carrying TEN marks each.**
4. **Student has to attempt any ONE question from each Sub-section.**

SECTION-A

1. Answer briefly :

a) Define the objective function in Linear Programming.

b) What is the difference between feasible solution and optimal solution in LPP?

c) State the condition for a transportation problem to be balanced.

d) What is an assignment matrix? Give an example.

e) What do you understand by "dummy activity" in network analysis?

f) State two assumptions of PERT.

g) What is meant by preventive replacement?

h) Define reorder level in inventory control.

i) State the importance of sensitivity analysis in Operations Research.

j) Mention two managerial decisions that can be supported using Operations Research models.

SECTION-B

UNIT-I

2. **Solve the following LPP using the Simplex Method:**

   Maximize:$F = 5x^1 + 4x^2$

   Subject to: $6x_1 + 4x_2 \leq 24$, $x_1 + 2x_2 \leq 6$, $-x_1 + x_2 \leq 1$, $x_1, x_2 \geq 0$.

3. Discuss the basics of Operations Research (OR), covering its definition, scope, objectives, phases of study, types of models and limitations. Illustrate your answer with relevant examples from business or industry.

UNIT-II

4. **Solve the following transportation problem using Vogel's Approximation Method (VAM) to obtain the initial solution:**

	D1	D2	D3	Supply
O1	19	30	50	7
O2	70	30	40	9
O3	40	8	70	18
Demand	5	8	21	

5. Explain the steps of the Hungarian Method with a general example. How can the assignment model be used to solve the Travelling Salesman Problem (TSP)?

UNIT-III

6. A project has the following activities with three-time estimates (in weeks). Draw the project network. Calculate the expected time and variance for each activity using PERT formulas. Identify the critical path and expected project completion time. Find the probability of completing the project within 12 weeks.

Activity	A	B	C	D	E
Predecessor	-	A	A	B, C	C
Optimistic (t_o)	2	3	1	2	3
Most likely (t_m)	4	5	2	3	4
Pessimistic (t_p)	6	9	3	4	5

7. Explain the concept of sequencing models in Operations Research. Detail the solution methodology for sequencing n jobs through 2 machines and extend this to sequencing n jobs through 3 machines. Highlight the key principles, rules and challenges involved.

UNIT-IV

8. Explain the concept of replacement policy for items that fail suddenly. Give at least one real-life example where such a model is applied.

9. A company faces demand at the rate of 2,500 units per year for a certain product. The ordering cost per order is Rs. 150 and holding cost per unit per year is Rs. 2. The purchase price per unit is Rs. 20. **Determine the following:**

   a) EOQ (Economic Order Quantity)

   b) Total annual cost (excluding stock-out cost)

   c) Number of orders per year.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.