

**Indian Maritime University**  
**(A Central University, Govt of India)**

**End Semester Examinations – December 2025**

**Programme Name: BBA (LRE)**

**Semester: III**

**Subject Code: UG31T3305**

**Subject Name: OPERATIONS RESEARCH FOR BUSINESS**

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Date: 15.12.2025	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

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General Instructions :

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in respective section.

**Section A**

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. For maximising a linear programming problem, the simplex method is terminated when all the net-evaluation are
  - a) Negative
  - b) Non-negative
  - c) Zero
  - d) Non-positive
2. If two constraints do not intersect in the positive quadrant of the graph, then
  - a) One of the constraint is redundant
  - b) The solution is infeasible
  - c) The solution is unbounded
  - d) None of the above
3. The assignment problem is a special case of transportation problem in which number of origins
  - a) Equals the number of destinations
  - b) Is greater than the number of destinations
  - c) Is less than the number of destinations
  - d) Is less than or equal to the number of destinations
4. The initial solution of a T.P. is obtained by
  - a) North-West corner rule would invariably be optimum
  - b) Least cost method does not provide the least cost solution to T.P.
  - c) VAM would invariably be very near to optimum solution.
  - d) Modi method is infeasible

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5. Queue can form only when
    - a) Arrival exceeds service capacity
    - b) Arrivals equal service capacity
    - c) Service facility is capable to serve all the arrivals at a time
    - d) There is more than one service facility
  6. Priority queue discipline may be classified as
    - a) Finite or infinite
    - b) Limited or unlimited
    - c) Pre-emptive or non-pre-emptive
    - d) All of the above
  7. A minimal spanning tree involves
    - a) All the nodes with cycles allowed
    - b) All the nodes with cycles not allowed
    - c) The shortest path between starting and ending nodes
    - d) A constructed network with all directed potential links
  8. A dummy activity is used in network diagram, when
    - a) Two parallel activities have the same tail and head events
    - b) The chain of activities may have a common event, yet be independent by themselves
    - c) Both (a) and (b)
    - d) None of the above
  9. A mixed strategy game can be solved by
    - a) Matrix method
    - b) Algebraic method
    - c) Graphical method
    - d) All of the above
  10. A customer's behaviour of jumping from one queue to another is called
    - (a) Jocking
    - (b) Reneging
    - (c) Collusion
    - (d) Balking

### **Section B**

Five Questions of 02 Marks each

11. Distinguish between decision-making under certainty, and decision making under uncertainty.
12. Describe the Rule of dominance
13. What is the Hungarian method?
14. Explain the significance of the system utilization factor.
15. Define Total slack and Free slack?

### Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

16. Solve the LP problem using graphical method

Maximize  $Z=2X_1 + X_2$

Subject to constraints:

$$X_1 + 2X_2 \leq 10$$

$$X_1 + X_2 \leq 8$$

$$X_1 - X_2 \leq 2$$

$$X_1 - 2X_2 \leq 2$$

$$X_1, X_2 \geq 0$$

17. Use simplex method to solve the following LPP:

Maximize  $Z= 4X_1+10X_2$

Subject to constraints:

$$2X_1+X_2 \leq 50$$

$$2X_1+5X_2 \leq 100$$

$$2X_1+3X_2 \leq 90$$

$$X_1, X_2 \geq 0$$

18. Use Vogel's Approximation Method to obtain an initial basic feasible solution of the transportation problem:

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

19. Solve the following Assignment Problem:

	A	B	C	D
I	1	4	6	3
II	9	7	10	9
III	4	5	11	7
IV	8	7	8	5

20. Discuss the elements of queueing System.

21. A Project has the following time schedule:

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Time	2	2	1	4	8	5	3	1	5	4	3

Construct PERT network and compute: i) Total float for each activity, and ii) Critical path and its duration.

22. Solve the following 2x2 game graphically:

Player A	Player B			
	B1	B2	B3	B4
A1	2	1	0	-2
A2	1	0	3	2