

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – December 2022
Programme Name: BBA (LRE)
Semester: II
Subject Code: UG31T2205
Subject Name: Quantitative Techniques II

Date: 01.12.2022

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

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. Objective function of a linear programming problem is
 - (a) A constraint
 - (b) Function to be optimized
 - (c) A relation between the variables
 - (d) None of these
2. The purpose of the transportation approach for locational analysis is to minimize
 - (a) Total shipping costs
 - (b) Total variable costs
 - (c) Total fixed costs
 - (d) The number of shipments
3. Maximization problem of an assignment problem is transformed into a minimization problem by
 - (a) Adding each entry in a column from the maximization value in that column
 - (b) Subtracting each entry in a column from the maximum value in that column
 - (c) Subtracting each entry in the table from the maximum value in that table
 - (d) Any one of the above

4. When the number of shipments in a feasible solution is $> m+n-1$
 - (a) The solution is optimal
 - (b) There is degeneracy and an artificial allocation must be created
 - (c) A dummy source must be created
 - (d) A dummy destination must be created
5. In a zero sum game
 - (a) What one player wins, the other loses
 - (b) The sum of each player's winnings if the game is played many times must be zero.
 - (c) The game is fair each person has an equal chance of winning.
 - (d) Long run profits must be zero
6. The shortest possible time in which an activity can be achieved under ideal circumstances is known as ____
 - (a) Pessimistic time estimate
 - (b) Optimistic time estimate
 - (c) Expected Time estimate
 - (d) The most likely time estimate
7. The difference between the maximum time available and the actual time needed to perform an activity is known as ____
 - (a) Free float
 - (b) Independent float
 - (c) Total float
 - (d) Half float
8. Feasible region is the set of points which satisfy
 - (a) The objective function
 - (b) Some of the given constraints
 - (c) All of the given constraints
 - (d) None of these
9. For maximization in assignment problem, the objective is to maximize the ____
 - (a) Profit
 - (b) Optimization
 - (c) Cost
 - (d) None of the above
10. The principle of dominance are applicable when
 - (a) The payoff matrix is a profit matrix for the player A and a loss matrix for the player B
 - (b) The payoff matrix is a profit matrix for the player B and a loss matrix for the player A
 - (c) The payoff matrix is a profit matrix
 - (d) The payoff matrix is a square matrix

Section B

Five Questions of 02 Marks each

11. The payoff matrix of a game is given. Find the solution of the game to the player A and B

		B	
		I	II
A	I	2	3
	II	8	4

12. Find the initial basic feasible solution for the below

	D₁	D₂	D₃	D₄	SUPPLY
S₁	19	30	50	10	7
S₂	70	30	40	60	9
S₃	40	8	70	20	18
DEMAND	5	8	7	14	

13. Solve the following game theory problem using Minimax- Maximin principle

	Player B	
	B ₁	B ₂
A ₁	9	2
A ₂	8	6
A ₃	6	4

14. The standard weight of special purpose brick is 5 kg and it contains two basic ingredient B₁ and B₂. B₁ cost Rs.5 per kg and B₂ cost Rs. 8 per kg. Strength consideration dictate that the brick should contain not more than 4 kg of B₁ and minimum 2 kg of B₂. Since the demand for the product is likely to be related to the price of the brick. Formulate the problem as LPP to minimize cost of bricks.

15. At barber's shop, the customers arrive at the average interval of 6 minutes and the barber takes on an average 5 minutes for serving the person. Calculate:
- Counter utilization level
 - Average no: of customers in service

Section C

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

16. The monthly maintenance work in a machine shop consists of 10 steps A to J. The interrelationship between them are identified by event numbers:

Steps	Event Numbers	Duration (days)
A	1-2	3
B	2-3	5
C	2-4	8
D	3-5	4
E	3-6	2
F	4-6	9
G	4-7	3
H	5-8	12
I	6-8	10
J	7-8	6

- (a) Draw a network
 (b) Identify the critical path and critical activities
17. Find the initial feasible solution by Vogel's Approximation Method?

	W1	W2	W3	W4	Supplies
F1	21	16	15	3	11
F2	17	18	14	23	13
F3	32	27	18	41	19
Demand	6	10	12	15	

18. Solve the following using dominance property and find the value of the game.

		Player B		
		I	II	III
Player A	I	4	5	8
	II	6	4	6
	III	4	2	4

19. A Project has the following activities and characteristics:

**Estimated
duration in
days**

Activity	Optimistic	Most likely	Pessimistic
1-2	2	5	8
1-3	4	10	16
1-4	1	7	13
2-5	5	8	11
3-5	2	8	14
4-6	6	9	12
5-6	4	7	10

- (a) Find expected duration of each activity
 (b) Find variances of activities on critical path

20. An airlines organisation has no reservation clerk on duty in its local branch at any given time. The clerk handles information regarding passenger reservations and flight timings. Assume that the number of customers arriving during any given period is poisson distributed with an arrival rate of eight per hour and that the reservation clerk can service a customer in six minutes on an average, with an exponentially distributed service time.
- What is the probability that the system is busy?
 - What is the average time a customer spends in the system?
 - What is the average length of the queue?
 - What is the average number of customers in the system?
21. Solve using the Hungarian method. Assign the jobs for different machines so as to minimize the total cost

		Machines				
		A	B	C	D	E
Job	1	13	8	16	18	19
	2	9	15	24	9	12
	3	12	9	4	4	4
	4	6	12	10	8	13
	5	15	17	18	12	20

22. Solve following LPP using Simplex method
- Maximize $Z = 7X_1 + 6X_2$
- Subject to: $X_1 + X_2 \leq 4$
- $2X_1 + X_2 \leq 6$
- Where $X_1, X_2 \geq 0$

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