

**INDIAN MARITIME UNIVERSITY**  
(A Central University, Govt. of India)  
**End Semester Examinations – June-July 2019**  
**Semester II**  
**B.B.A (Logistics, Retailing and E-Commerce)**  
**Quantitative Techniques II**  
**(UG31T1205/UG31T2205)**

Date: 14-06-2019  
Time: 3 Hrs

Max Marks: 100  
Pass Marks: 50

**PART – A**  
**(Answer all the Questions)**

10 x 1 = 10

1. A general linear programming problem is in standard form, if
  - a. the constraints are strict equations
  - b. the constraints are inequalities of ' $\leq$ ' type
  - c. the constraints are inequalities of ' $\geq$ ' type
  - d. the decision variables are unrestricted in sign.
  
2. When we solve a system of simultaneous linear equations by using '*Two-phase Simplex method*', the values of decision variable may be
  - a. positive
  - b. negative
  - c. zero
  - d. positive and/or negative
  
3. The dummy source or destination in a T.P is introduced to
  - a. prevent solutions to become degenerate
  - b. to satisfy rim conditions
  - c. ensure that total cost does not exceed a limit
  - d. solve the balanced transportation problem
  
4. The method used for solving an assignment problem is called
  - a. MODI method
  - b. reduced matrix method
  - c. Hungarian method
  - d. none of the above
  
5. Queue can form only when
  - a. arrivals exceed service capacity
  - b. arrivals equal service capacity
  - c. service facility is capable to serve all the arrivals at a time
  - d. there are 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 typical application of minimal spanning tree involves
  - a. construction of paved roads that link several towns
  - b. determining the least cost path between two cities
  - c. finding the shortest route communication network
  - d. determining least cost flow pattern from refineries to various outlets
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. When maximum and minimum values of the game are same, then
  - a. there is a saddle point
  - b. solution does not exist
  - c. strategies are mixed
  - d. none of the above
10. The minimum expected opportunity loss (EOL) is equal to
  - a. EMV
  - b. EVPI
  - c. minimum regret
  - d. both a and b

**PART – B**

**(Answer any six out of eight)**

6 x 7= 42

11. Use the graphical method to solve the following LPP:  
 Maximize  $Z = 3x_1 + 4x_2$ ;  
 Subject to constraints :  
 $x_1 + x_2 \leq 450$   
 $2x_1 + x_2 \leq 600$   
 $x_1, x_2 \geq 0$ .
12. Solve by Big M Method  
 Minimize  $Z = 60x_1 + 80x_2$   
 Subject to constraints :  
 $x_2 \geq 200$   
 $x_1 \leq 400$   
 $x_1 + x_2 = 500$  and  $x_1, x_2 \geq 0$ .



17. Solve the following game :

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

18. A manager has a choice between

- (i) A risky contract promising Rs. 7 lakhs with probability 0.6 and Rs. 4 lakhs with probability 0.4, and
- (ii) A diversified portfolio consisting of two contracts with independent outcomes each promising Rs. 3.5 lakhs with probability 0.6 and Rs. 2 lakhs with probability 0.4.

Construct a decision tree for using EMV criteria. Can you arrive at the decision using EMV criteria?

### PART - C

**(Question No.19 is compulsory and answer any three questions from the remaining)**

4 x 12 = 48

19. What do you mean by queuing theory? Discuss the elements of queuing system and limitations of queuing theory.

20. Solve the following LPP using simplex method

$$\begin{aligned} \text{Max } Z &= 15x_1 + 6x_2 + 9x_3 + 2x_4 \\ \text{subject to } &2x_1 + x_2 + 5x_3 + 6x_4 \leq 20 \\ &3x_1 + x_2 + 3x_3 + 25x_4 \leq 24 \\ &7x_1 + 7x_4 \leq 70 \quad \text{and } x_1, x_2, x_3, x_4 \geq 0 \end{aligned}$$

21. Solve the problem given using the two-phase method. The problem is

$$\begin{aligned} \text{Min } Z &= 40x_1 + 24x_2 \\ \text{Subject to constraints } &20x_1 + 50x_2 \geq 4800 \\ &80x_1 + 50x_2 \geq 7200 \\ &\text{and } x_1, x_2 \geq 0 \end{aligned}$$

22. Find the initial basic feasible solution to the following transportation problem using VAM, given the cost matrix. And also check whether it is optimum or not.

	D1	D2	D3	D4	SUPPLY
S1	20	25	28	31	200
S2	32	28	32	41	180
S3	18	35	24	32	110
DEMAND	150	40	180	170	

23. Following is the pay-off matrix for player A:

Player B

	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
<b>I</b>	2	4	3	8	4
<b>II</b>	5	6	3	7	8
<b>III</b>	6	7	9	8	7
<b>IV</b>	4	2	8	4	3

Using dominance property, obtain the optimal strategies for both the payers and determine the value of the game.

24. The research department of Hindustan Lever has recommended to the marketing department to launch a shampoo of three different types. The marketing manager has to decide one of the types of shampoo to be launched under the following estimated payoffs for various levels of sales:

Types of shampoo	Estimated levels of sale (units)		
	15,000	10,000	5,000
Egg shampoo	30	10	10
Clinic shampoo	40	15	5
Delux Shampoo	55	20	3

What will be the marketing manager's decision if (i) Minmax (ii) laplace (iii) Hurwitz are applied? ( $\alpha = 0.5$ )

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