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VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD M.C.A. (CBCS) III-Semester Main Examinations, January-2018

Operations Research

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A $(10 \times 2 = 20 \text{ Marks})$

- 1. What is the significance of slack & surplus variables?
- 2. Name the three basic parts of the simplex technique.
- 3. Write mathematical model for general transportation problem.
- 4. Explain any one of the three methods of finding initial feasible solution of a transportation problem.
- 5. What is the optimality criterion in the assignment problem?
- 6. Explain one example to explain the need for integer programming problem.
- 7. Classify inventory.
- 8. Define EoQ.

b

- 9. Explain: (i) Minimax and Maximin principle. ii) Pure and mixed strategies.
- 10. Consider the game G with the following payoff:

		B_1	B ₂	
Player A	A ₁	2	6	
	A ₂	-2	λ	

Show that G is strictly determinable whatever λ may be.

Part-B $(5 \times 10 = 50 \text{ Marks})$

11. a) Solve the following problem graphically

$$Max \ z = -x_1 + 2x_2$$

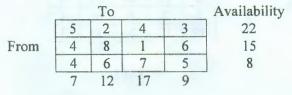
subject to $x_1 - x_2 \le -1$
 $-0.5x_1 + x_2 \le 2$
 $x_1, x_2 \ge 0$
) Maximize $z = 3x_1 - x_2$
 $2x_1 + x_2 \le 2$
 $x_1 + 3x_2 \ge 3$
 $x_2 \le 4$, $x_1, x_2 \ge 0$.

Sources

12. a) Find an optimal solution to the following transportation cost problem.

	Х	Y	Z	Supply
А	2	7	4	50
В	3	3	7	70
С	5	4	1	80
D	1	6	2	140
Demand	70	90	180	

b) Determine an initial basic feasible solution to the following transportation problem using [5] row minima method.



[5]

[5]

[5]

[4] [4]

[6]

[4]

[5]

[5]

13. a) Four new machines M_1, M_2, M_3 and M_4 one to be installed in a machine shop. There are [6] five vacant places A, B, C, D and E available. Because of limited space, machine M_2 cannot be placed at C and M_3 cannot be placed at A. C_{ij} , the assignment cost of machine *i* to place *j* in rupees given below. Find optimal assignment schedule.

:: 2 ::

	А	В	С	D	Е
M_1	4	6	10	5	6
M ₂	7	4	20	5	4
Ma	-	6	9	6	2
M ₁ M ₂ M ₃ M ₄	9	3	7	2	3

b) Explain the methods used in solving integer programming problem.

- 14. a) Explain various costs involved in inventory theory.
 - b) A stockist has to supply 12,000 units of a product per year to his customer. The demand [6] is fixed and known and the shortage cost is assumed is to be infinite. The inventory holding cost is Rs 0.20 per unit per month and the ordering cost per order is Rs 350. Determine (i) the optimum lot size Q_0 (ii) Optimum scheduling period to (iii) minimum total variable yearly cost.
- 15. a) Solve the following 2 \times 5 game by graphical method

		Player B						
		1	2	3	4	5		
Player A	1	-5	5	0	-1	8		
	2	8	-4	-1	6	-5		

b) Explain how to solve a 2 x n game by graphical method

16. a) (i) Construct the dual of primal problem

 $Maximize \ z = 2x_1 + x_2 + x_3$

 $x_1 + x_2 + x_3 \ge 6$ $3x_1 - 2x_2 + 3x_3 = 3$

$$-4x_1 + 3x_2 - 6x_3 = 1 \qquad x_1, \ x_2 \quad x_3 \ge 0$$

(ii) Prove that dual of a dual is primal.

- b) Solve the following transhipment problem Available

-		
So	urc	es.

	S ₁	S_2	D_1	D_2	
S_1	0	2	3	4	5
S2	2	0	2	4	25
D_1	3	2	0	1	
D_2	4	4	1	0	
			20	10	

Required

- 17. Answer any *two* of the following:
 - a) Describe on algorithm for the solution of the assignment problem.
 - b) Define: Inventory and Derive the EoQ formula $q_0 = \sqrt{\frac{2c_3R}{c_1}}$, where the symbols have usual [5] meanings.
 - c) Solve the following game by dominance. Player R

	I layer D					
		1	2	3	4	5
Player A	1	6	15	30	21	6
1 layor 71	2	3	3	6	6	4
	3	12	12	24	35	3

[5]

[5]