Hall Ticket Number:

Code No. : 33002

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 × 2 = 20 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.
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 × 10 = 50 Marks)

11. a) Solve the following problem graphically [5]

$$Max\ z = -x_1 + 2x_2$$
$$subject\ to\ x_1 - x_2 \leq -1$$
$$-0.5x_1 + x_2 \leq 2$$
$$x_1, x_2 \geq 0$$

b) Maximize $z = 3x_1 - x_2$ [5]

$$2x_1 + x_2 \leq 2$$
$$x_1 + 3x_2 \geq 3$$
$$x_2 \leq 4, \quad x_1, x_2 \geq 0.$$

12. a) Find an optimal solution to the following transportation cost problem. [5]

		X	Y	Z	Supply
Sources	A	2	7	4	50
	B	3	3	7	70
	C	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 row minima method. [5]

		To				Availability
From		5	2	4	3	22
		4	8	1	6	15
		4	6	7	5	8
		7	12	17	9	

Contd... 2

13. a) Four new machines M_1, M_2, M_3 *and* M_4 one to be installed in a machine shop. There are 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. [6]

	A	B	C	D	E
M_1	4	6	10	5	6
M_2	7	4	-	5	4
M_3	-	6	9	6	2
M_4	9	3	7	2	3

b) Explain the methods used in solving integer programming problem. [4]

14. a) Explain various costs involved in inventory theory. [4]

b) A stockist has to supply 12,000 units of a product per year to his customer. The demand 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. [6]

15. a) Solve the following 2 × 5 game by graphical method [6]

		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 [4]

16. a) (i) Construct the dual of primal problem [5]

$$Maximize\ z = 2x_1 + x_2 + x_3$$
$$x_1 + x_2 + x_3 \geq 6$$
$$3x_1 - 2x_2 + 3x_3 = 3$$
$$-4x_1 + 3x_2 - 6x_3 = 1 \qquad x_1,\ x_2\ \ x_3 \geq 0$$

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

b) Solve the following transhipment problem [5]

					Available
	S_1	S_2	D_1	D_2	
S_1	0	2	3	4	5
Sources S_2	2	0	2	4	25
D_1	3	2	0	1	
D_2	4	4	1	0	
Required			20	10	

17. Answer any ***two*** of the following:

a) Describe on algorithm for the solution of the assignment problem. [5]

b) Define: Inventory and Derive the *EoQ formula* $q_0 = \sqrt{\frac{2c_3R}{c_1}}$, where the symbols have usual meanings. [5]

c) Solve the following game by dominance. [5]

		Player B				
		1	2	3	4	5
Player A	1	6	15	30	21	6
	2	3	3	6	6	4
	3	12	12	24	35	3

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