Hall Ticket Number:

Code No. : 33012

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

M.C.A. (CBCS) III-Semester Main Examinations, December-2018

Operations Research

Time: 3 hours Max. Marks: 60

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

Q.No.	Stem of the question	M	L	CO	PO
	Part-A (10 × 2 = 20 Marks)				
1.	What is the canonical form of a LPP?	2	1	1	1
2.	State the general linear programming problem and define (i) feasible solution and (ii) basic feasible solution.	2	1,2	1	1
3.	List any three approaches used with transportation problem, for determining the starting solution.	2	1	2	1
4.	What do you understand by degeneracy in a transportation problem?	2	1	2	1
5.	Give the Linear Programming form of the assignment problem.	2	2	3	1
6.	What is Integer Programming?	2	2	3	1
7.	State the formula for EOQ under manufacturing model where shortages are allowed.	2	1	4	1
8.	What types of Games are solved graphically?	2	2	4	1
9.	What is meant by Minimize and Maximize?	2	2	5	1
10.	Define EOQ.	2	1	5	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	Solve by simplex method: Maximize $Z = 3x_1 + 5x_2 + 4x_3$ Subject to $2x_1 + 3x_2 \leq 8$ $2x_2 + 5x_3 \leq 10$ $3x_1 + 2x_2 + 4x_3 \leq 15$ $x_1, x_2, x_3 \geq 0$	4	2	1	2
b)	Solve the LPP Max $z = 2x_1 + 3x_2 + 5x_3$ Subject to $3x_1 + 10x_2 + 5x_3 \leq 15$ $33x_1 - 10x_2 + 9x_3 \leq 33$ $x_1 + 2x_2 + x_3 \geq 4$ $x_1, x_2, x_3 \geq 0$	4	2	1	2
12. a)	Explain Transshipment Model – II.	4	2	2	1
b)	Solve the transportation problem Destinations 1 2 3 Origin 1: 2 2 3 — 10 2: 4 1 2 — 15 3: 1 3 1 — 40 Demands: 20 15 30 capacities	4	2	2	2

Contd... 2

13. a) A company is faced with the problem of assigning 4 machines to 6 different jobs (one machine to one job only). The profits are estimated as follows: | 4 | 2 | 3 | 2

Job \ Machine	A	B	C	D
1	3	6	2	6
2	7	1	4	4
3	3	8	5	8
4	6	4	3.	7
5	5	2	4	3
6	5	7	6	4

Solve the problem to maximize the total profit by branch and bound technique.

13. b) Find the optimum integer solution of the integer programming problem: | 4 | 3 | 3 | 2

$$\text{Max } Z = 7x_1 + 9x_2$$
$$\text{Subject to } -x_1 + 3x_2 \le 6$$
$$7x_1 + x_2 \le 35$$
and x_1, x_2 are non-negative integers

14. a) A commodity is to be supplied at a constant rate of 200 units per day. Supplies for any amounts can be had at any required time, but each ordering costs Rs. 50.00 costs of holding the commodity in inventory is Rs. 2.00 per unit per day while the delay in the supply of the items induces a penalty of Rs. 10.00 per unit per delay of one day. Formulate the average cost function of this situation and find the optimal policy (q, t) where t is the reorder cycle period and q is the inventory level after re-order. What should be the best policy if the penalty cost becomes infinite? | 4 | 3 | 4 | 2

b) A company has a demand of 12,000 units/year for an item and it can produce 2000 such items per month. The cost of one setup is Rs. 400 and the holding cost/unit/month is Rs. 0.15. Find the optimum lot size, max inventory, manufacturing time, total time. | 4 | 2 | 4 | 2

15. a) Find the optimum strategies and the value of the game | 4 | 3 | 5 | 2

X \ Y					
4	4	-1	4	-1	2
2	2	2	3	-4	2
1	1	-3	1	0	-4

b) Solve graphically | 4 | 2 | 5 | 2

Player A \ B		1	2	3	4
	1	3	3	4	0
	2	5	4	3	7

16. a) Solve the LPP | 4 | 2 | 1 | 2

$$\text{Max } z = 2x_1 + x_2$$
$$\text{Subject to } 3x_1 + x_2 \ge 3$$
$$4x_1 + 3x_2 \ge 6$$
$$x_1 + 2x_2 \ge 2$$
$$\text{and } x_1, x_2 \ge 0$$

Contd... 3

b) Find the initial basic feasible solution for the following transportation problem by VAM

		Destination centers				
		D1	D2	D3	D4	Availability
Origin	S1	11	13	17	14	250
	S2	16	18	14	10	300
	S3	21	24	13	10	400
Requirements		200	225	275	250	

4	2	2	2	

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

a) A department has four subordinates, the subordinates and four tasks are to be performed. The subordinates differ in efficiency and tasks differ in their intrinsic difficulties. The estimate of time (in hours) each man would take to perform each tasks is given by

		Tasks			
		I	II	III	IV
Subordinate	1	8	26	17	11
	2	13	28	4	26
	3	38	19	18	15
	4	19	26	24	10

Find out how the tasks be allotted to man so as to optimize the total man-hours.

4	2	3	2	

b) A manufacturing company purchases 9000 parts of a machine for its annual requirements, ordering one month usage at a time. Each part costs Rs. 20. The ordering cost per order is Rs. 15 and the carrying charges are 15% of the average inventory per year. You have been asked to suggest a more economical purchasing policy for the company. What advice would you offer, and how much would it save the company per year?

4	2	4	2	

c) Solve the following game

	Player B		
Player A	-1	2	1
	1	-2	2
	3	4	-3

4	5	5	2	

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	57
2	Knowledge on application and analysis (Level-3 & 4)	30
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	13