Hall Ticket Number:

Code No.: 212

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

M.C.A. II Year I – Semester (Main) Examinations, January – 2016

Operations Research

Time: 3 hours Max. Marks: 70

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

Part-A (10 X 2=20 Marks)

1. Define i) feasible solution ii) degenerate solution
2. Construct the dual to the primal problem
   Maximize $z = 3x_1 + 5x_2$
   $2x_1 + 6x_2 \le 50$
   $3x_1 + 2x_2 \le 35$
   $5x_1 - 3x_2 \le 10$
   $x_2 \le 20$
   Where $x_1, x_2 \ge 0$.
3. Write mathematical model for general transportation problem.
4. Find the initial basic feasible solution to the following transportation problem.

		To				
		D_1	D_2	D_3	D_4	Available (units)
From	O_1	5	4	2	1	130
	O_2	2	3	7	5	100
	O_3	5	4	5	6	30
Demand (units)		40	50	70	100	

5. Define unbalanced assignment problem.
6. Distinguish between transportion and assignment model.
7. Explain 'stage' in the context of dynamic programming.
8. Define integer programming problem.
9. State minimax theorem for two person zero sum game.
10. Define mixed strategy.

Part-B (5 X 10=50 Marks)
(All bits carry equal marks)

11. a) Write graphical method algorithm.

    b) Solve the following linear programming problem by Big M Method.
    Minimize $Z = 2x_1 + 3x_2$
    Subject to $x_1 + x_2 \ge 6$
    $7x_1 + x_2 \ge 14$
    and $x_1, x_2 \ge 0$

Contd... 2

12. a) Write the procedure of U-V-Method in transportation problem.

    b) Write a short note on Transshipment problem.

13. a) Explain the procedure to solve integer programming problem.

    b) Solve the following assignment problem.

Job \ Operator	1	2	3	4	5
1	5	6	8	6	4
2	4	8	7	7	5
3	7	7	4	5	4
4	6	5	6	7	5
5	4	7	8	6	8

14. a) A distance network consists of 11 nodes which are distributed as shown in the following table. Find the shortest path from node 1 to node 11 and the corresponding distance.

Arc	Distance
1 – 2	8
1 – 3	7
1 – 4	1
2 – 5	5
3 – 5	9
3 – 6	2
3 – 7	8
4 – 7	10

Arc	Distance
5 – 8	12
5 – 9	7
6 – 9	9
7 – 9	6
7 – 10	13
8 – 11	4
9 – 11	2
10 – 11	15

    b) Solve the following linear programming using dynamic programming technique

Maximize $Z = 30x_1 + 15x_2 + 6x_3$

Subject to $6x_1 + 8x_2 + 9x_3 \leq 120$

$12x_2 + 6x_3 \leq 180$

and $x_1, x_2, x_3 \geq 0$

15. a) Explain dominance property.

    b) Solve the following 2 × 5 game by graphical method

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

16. a) Use two phase simplex method to solve the linear programming problem

$$\text{maximize } z = 5x_1 + 3x_2$$
$$\text{subject to } 2x_1 + x_2 \leq 1$$
$$x_1 + 4x_2 \geq 6$$
$$x_1, x_2 \geq 0.$$

b) Find initial basic feasible solution of the transportation problem by using Vogel's approximation method.

		A	B	C	D	E	Plant capacity
	1	1	2	6	2	3	800
	2	3	4	5	8	1	600
From plants	3	3	1	1	2	6	200
	4	4	7	3	5	4	400
Demand		400	200	600	300	500	

17. Write short notes on any *two* of the following:
   a) Explain the working procedure of Hungarian algorithm..
   b) Define dynamic programming problem and write its applications.
   c) Zero sum game and non zero sum games.

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