Hall Ticket Number:

Code No.:241 O

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

M.C.A. II Year I – Semester Backlog(Old)Examinations, December-2017

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 × 2=20 Marks)

1. Explain the significance of artificial variable.
2. Explain with example an L.P problem which has no feasible solution.
3. Determine an initial basic feasible solution to the following transportation problem using least cost method.

		To			Available
		10	13	6	10
From		16	7	13	12
		8	22	2	8
Requirement		6	11	13	

4. Define transshipment problem.
5. State the common features of the assignment and transportation problem.
6. Explain an infeasible assignment problem.
7. Explain priniciple of optimality in the context of dynamic programming.
8. Write two applications of dynamic programming.
9. For a two person zero-sum game the pay off matrix for player A is $\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$ with no saddle point. Obtain the optimal strategies.
10. Define strictly determinable game.

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

11. a) Write the steps involved in Simplex Method.

    b) Solve the following linear programming problem by Simplex Method.

    Maximize $Z = 3x_1 + 3x_2 + 7x_3$

    Subject to $x_1 + x_2 + 2x_3 \leq 22$

    $3x_1 + 2x_2 + x_3 \leq 26$

    $x_1 + x_2 + x_3 \leq 18$

    and $x_1, x_2, x_3 \geq 0$

Contd...2

12. a) Write the procedure for Vogel's approximation method.

b) Solve the following transportation problem

		Destination			
		1	2	3	Supply
Source	1	2	7	4	5
	2	3	3	1	8
	3	5	4	7	7
	4	1	6	2	14
Demand:		2	9	18	

13. a) Write the steps involved in Hungarian method for assignment problem.

b) Five wagons are available at stations 1,2,3,4 and 5 these are required at five stations I, II, III, IV and V. The milages between various stations are given by the table below. How should the wagons be transported so as to minimize the total mileage covered?

	I	II	III	IV	V
1	10	5	9	18	11
2	13	9	6	12	14
3	3	2	4	4	5
4	18	9	12	17	15
5	11	6	14	19	10

14. a) Define dynamic programming problem. List and explain the terminologies of dynamic programming problem. What are the applications of dynamic programming?

b) Solve the following linear programming problem by dynamic programming technique.

Maximize $Z = 30x_1 + 15x_2$

Subject to $6x_1 + 8x_2 \leq 180$

$15x_2 \leq 210$

and $x_1, x_2 \geq 0$

15. a) Solve the following game by using the principle of dominance.

		Player B					
		I	II	III	IV	V	VI
Player A	1	4	2	0	2	1	1
	2	4	3	1	3	2	2
	3	4	3	7	-5	1	2
	4	4	3	4	-1	2	2
	5	4	3	3	-2	2	2

b) Solve the following game:

		Player B	
		B_1	B_2
Player A	A_1	30	2
	A_2	4	14
	A_3	6	9

Contd...3

16. a) Use graphical method, to find the minimum value of $z = -x_1 + 2x_2$

Subject to $-x_1 + 3x_2 \leq 10$

$x_1 + x_2 \leq 6$

$x_1 - x_2 \leq 2$

and $x_1, x_2 \geq 0$

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

		W_1	W_2	W_3	W_4	Capacity
Factory	F_1	19	30	56	10	7
	F_2	70	30	40	60	9
	F_3	40	8	70	20	18
Requirement		5	8	7	14	

17. Write short notes on any **two** of the following:

a) The procedure to solve assignment problem by branch and bound technique.

b) Gomory's cutting plane method

c) The assumptions underlying game theory

*****