Hall Ticket Number:

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD M.C.A. II Year I – Semester Backlog(Old)Examinations, December-2017

Operations Research

Time: 3 hours

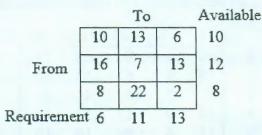
Max. Marks: 70

Code No.:241 O

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

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

- 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.



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 $(5 \times 10=50 \text{ Marks})$ (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 $x_1 + x_2 + 2x_3 \le 22$ $3x_1 + 2x_2 + x_3 \le 26$ $x_1 + x_2 + x_3 \le 18$ and $x_1, x_2, x_3 \ge 0$

- 12. a) Write the procedure for Vogel's approximation method.
 - b) Solve the following transportation problem

- 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?

	1	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 $6x_1 + 8x_2 \le 180$ $15x_2 \le 210$ and $x_1, x_2 \ge 0$

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
 A_1 30 2
Player A A_2 4 14
 A_3 6 9

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

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

 $x_1 + x_2 \le 6$
 $x_1 - x_2 \le 2$
and $x_1, x_2 \ge 0$

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

		w ₁	W_2	W ₃	W4	Capacity
	F ₁	19	30	56	10	7
Factory	F ₂	70	30	40	60	9
	F ₃	40	8	70	20	18
Requ	ireme	nt 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