[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2366 **H**

Unique Paper Code : 62364447

Name of the Paper : Network Models and Scheduling Techniques

Name of the Course : **B.A. (Prog.) Operational Research**

Semester : IV

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions in all.
3. **All** questions carry equal marks.

1. (a) What is an Assignment Problem? Give some application of Assignment Problem. (7)

(b) The following table provides all the necessary information on the availability of supply at each warehouse, the requirement of each market, and the unit transportation cost (in Rs.) from each warehouse to each market.

	P	Q	R	S	Supply
A	6	3	5	4	22
B	5	9	2	7	15
C	5	7	8	6	8
Demand	7	12	17	9	

Find the optimal transportation schedule and minimum transportation cost. (8)

2. (a) Find initial basic feasible solution by using North-West corner rule, Least Cost method and Vogel's approximation method, compare the three solutions. (7)

	A	B	C	Supply
I	2	4	1	40
II	6	3	2	50
III	4	5	6	20
IV	3	2	1	30
V	5	2	5	10
Demand	50	60	40	

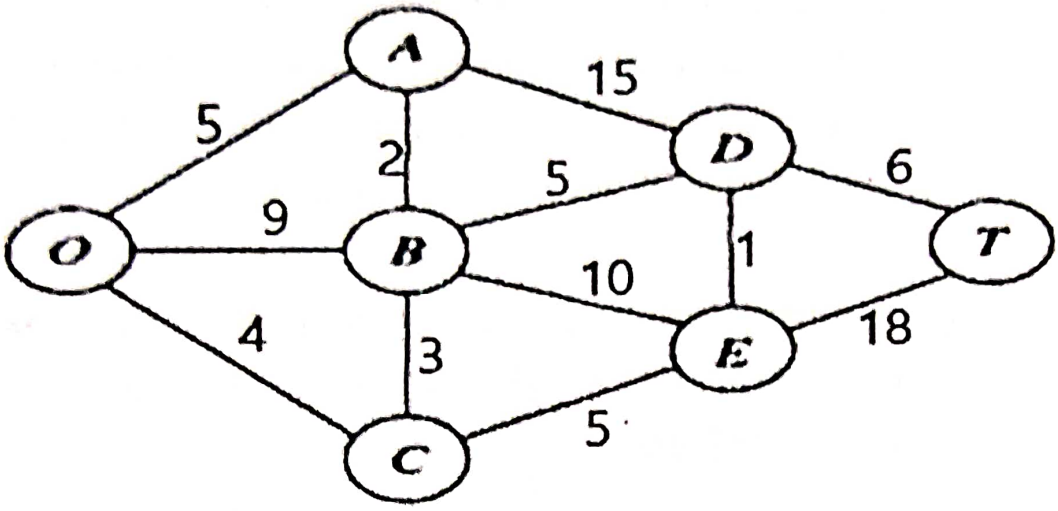
(b) A national truck retail service has surplus of one truck in each of cities 1, 2, 3, 4, 5 and 6; and a deficit of one truck in each of the cities A, B, C, D, E and F. The distance (in Km) between the cities with surplus and cities with deficit are displayed in the table below.

	A	B	C	D	E	F
1	31	62	29	42	15	41
2	12	19	39	55	71	40
3	17	29	50	41	22	22
4	35	40	38	42	27	33
5	19	30	29	16	20	23
6	72	30	30	50	41	20

Assign trucks from surplus cities to deficit cities so as to minimize the distance. (8)

3. (a) Formulate transportation problem as a linear programming problem. How do you solve an unbalanced transportation problem? (7)

(b) The network in the following figure gives the distances in miles between pairs of cities. Use Dijkstra's algorithm to find the shortest route between



(i) Cities O and T;

(ii) Cities A and E. (8)

4. Consider a project which consists of the following activities with corresponding time duration:

Activity	Time duration (in weeks)
1 → 2	15
1 → 3	15
2 → 3	3
2 → 5	5
3 → 4	8
3 → 6	12
4 → 5	1
4 → 6	14
5 → 6	3
6 → 7	14

Draw the network to represent the project. Compute earliest occurrence time and latest occurrence time for each event and also find the critical path and the minimum time of completion of project. (15)

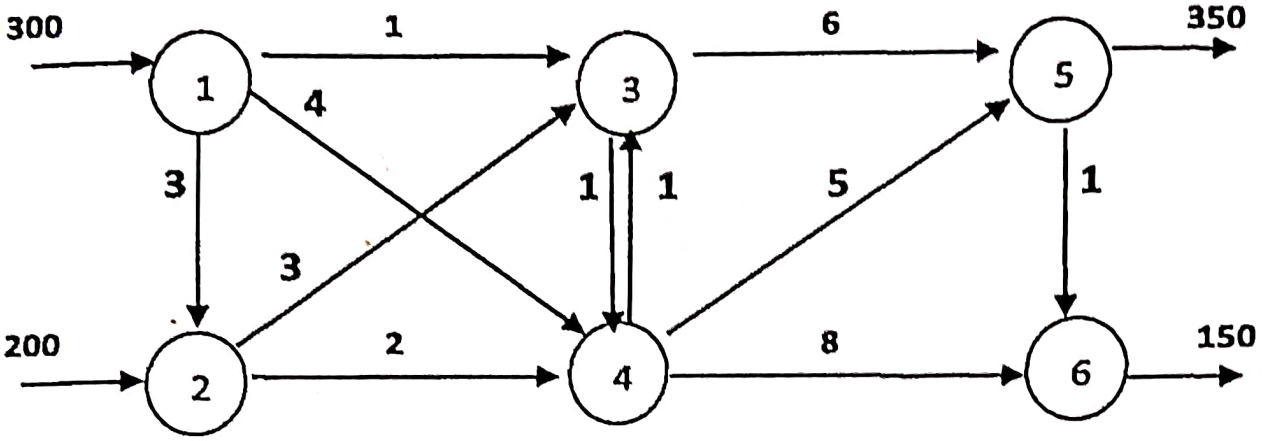
5. (a) A salesman has to visit five cities A, B, C, D and E. The distances (in hundred km) between the five cities are as follows :

	A	B	C	D	E
A	∞	17	16	18	14
B	17	∞	18	15	16
C	16	18	∞	19	17
D	18	15	19	∞	18
E	14	16	17	18	∞

If the salesman starts from city A and has to come back to city A, which route should he select so that total distance travelled by him is minimized? (8)

(b) The following network gives the shipping routes from nodes 1 and 2 to nodes 5 and 6 via nodes 3 and 4. The unit shipping costs are shown on the respective arcs. Identify pure supply nodes, pure

demand nodes, transshipment nodes and buffer amount. Formulate the problem as a transshipment model and find the optimum shipping schedule. (7)



6. (a) Differentiate between PERT and CPM. (5)

(b) A small project involves 7 activities, and their time estimates are listed in the following table.

Activities are identified by their beginning (i) and ending (j) node numbers

Activity	Estimated Duration (weeks)		
(i – j)	Optimistic	Most Likely	Pessimistic
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	2	8
2 – 5	1	1	1
3 – 5	2	5	14
4 – 6	2	5	8
5 – 6	3	6	15

(i) Draw the network diagram of the activities in the project.

(ii) Find the expected duration and variance for each activity. What is the expected project length? (10)