method to determine the tour that will minimize the total distance of visiting all cities and returning home.

From Item	To Item				
	A	B	C	D	E
A	-	375	600	150	190
B	375	-	300	350	175
C	600	300	-	350	500
D	160	350	350	-	300
E	190	175	500	300	-

[This question paper contains 8 printed pages.]

Your Roll No. ....

Sr. No. of Question Paper : 1473   C

Unique Paper Code   : 42353504

Name of the Paper   : SEC – Transportation and Network Flow Problems

Name of the Course   : B.Sc. (Math Sci) – II / B.Sc. (Phy Sci) – II

Semester   : V

Duration : 3 Hours   Maximum Marks : 55

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. This question paper has **FOUR** questions in all.

3. **All** questions are compulsory.

1. Three electric power plants with capacities of 25, 40 and 30 million kWh supply electricity to three cities. The maximum demands at the three cities are

P.T.O.

estimated at 30, 35 and 25 million kWh. The price per million kWh at the three cities is given in the table

Table: Price / Million kWh

		City	
		1	2	3
	1	$600	$700	$400
Plant	2	$320	$300	$350
	3	$500	$480	$450

Formulate the problem as a transportation model.

(5)

2. Attempt any **five** parts from the following :

(i) Compare the initial basic feasible solution obtained by the Northwest-Corner method and Least-Cost Method for the following transportation problem :

(6)

4. Attempt any **one** of the following :

(10)

(i) Find the shortest route from node 1 to each other nodes using for the following network given below. Also, write down the route as well.
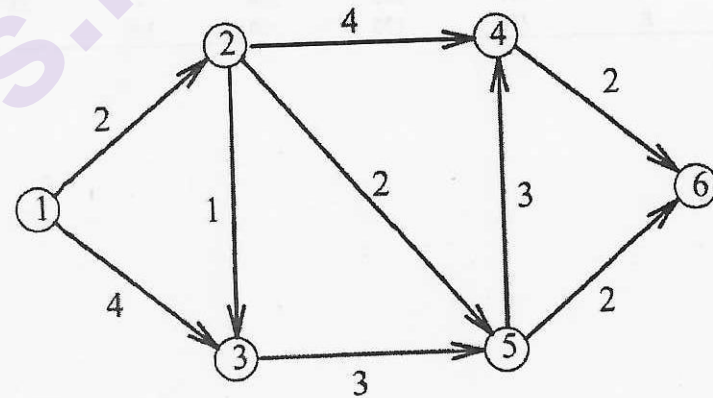
(ii) A salesman must travel from city to city to maintain his accounts. This week he has to leave his home base and visit each other city and return home. The table shows the distance (in kilometres) between the various cities. The home city is city A. Use the assignment

P.T.O.

(a) Develop the associated network for the project.

(b) Determine the critical path and critical activities for the project.   (2+4=6)

3. Three fertilizer factories X, Y, and Z located at different places of the country, produce 6, 4, and 5 lakh tones of urea respectively. Under the directive of the Central Government, they are to distributed to 3 states A, B, and C as 5, 3 and 7 lakh tones respectively. The transportation cost per ton in rupees is given below :   (5+5=10)

	A	B	C
X	11	17	16
Y	15	12	14
Z	20	12	15

(a) Use the Vogel Approximation method to find the initial basic feasible solution.

(b) Use the starting feasible solution (from above part) to find the optimal solution.

	Destination				Supply
Source	1	2	3	4	6
	4	3	2	0	8
	0	2	2	1	10
Demand	4	6	8	6	24

(ii) In a company, five jobs J1, J2, J3, J4 and J5 are to be assigned to five machines M1, M2, M3, M4 and M5. The processing costs are as given in the following matrix. Find the allocation that will minimize the overall processing cost.   (6)

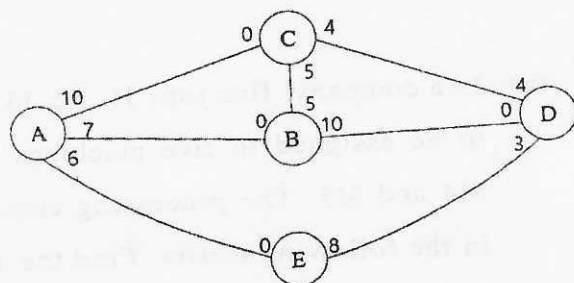|		Machines			
	M1	M2	M3	M4	M5
J1	5	11	10	12	4
J2	2	4	6	3	5
J3	3	12	5	14	6
J4	6	14	4	11	7
J5	7	9	8	12	5

Jobs

P.T.O.

(iii) In the network shown below, find the flow pattern that gives the maximal flow from node A (source) to node D (sink) where the arc capacities are mentioned on respective arcs.
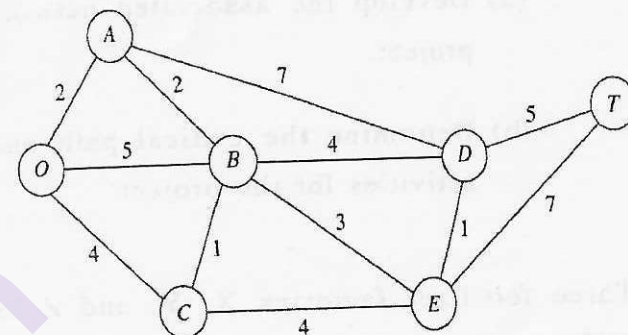
(6)

(iv) Midwest TV cable Company is in the process of providing cable service to new housing development areas. The below figure depicts possible TV linkages among the areas. The cable miles are shown on each arc. Determine the most economical cable network starting at node O.

(6)

(v) Draw the NetWork defined by the sets

N = {1, 2, 3, 4, 5}:

A = {(1, 2), (1, 3), (2, 3), (2, 5), (3, 4), (3, 5), (4, 2), (4, 5)}

Also determine (a) a path (b) a cycle (c) a tree (d) a spanning tree.

(6)

(vi) A project schedule has the following characteristics :

Activity	Times (weeks)	Activity	Times (weeks)
A 1 – 2	4	G 5 – 6	4
B 1 – 3	1	H 5 – 7	8
C 2 – 4	1	I 6 – 8	1
D 3 – 4	1	J 7 – 8	2
E 3 – 5	6	K 8 – 10	5
F 4 – 9	5	L 9 – 10	7

P.T.O.