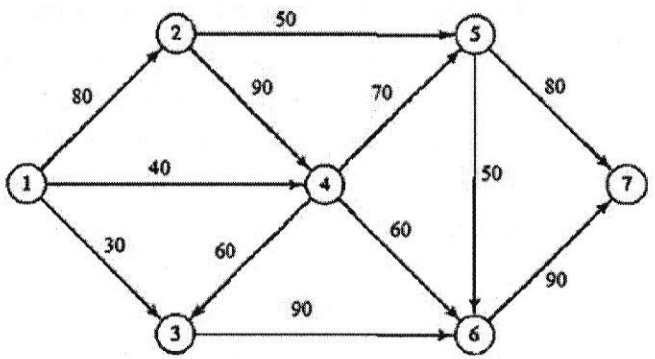


Evening Wednesday 8/5/2019

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3292 **IC**

Unique Paper Code : 62353606

Name of the Paper : Transportation and Network Flow Problem

Name of the Course : **B.A. Programe : Mathematics : SEC**

Semester : VI

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.

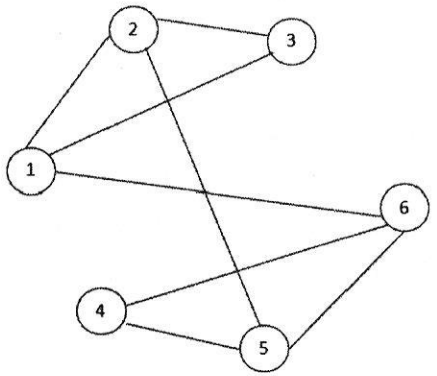
1. Three electric power plants with capacities of 20, 40 and 30 million kWh supply electricity to three cities. The maximum demands at the three cities are estimated at 30, 35 and 25 million kWh. The price per million kWh at the three cities is given in Table

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

The utility company wishes to determine the most economical plan for the distribution. Formulate the model as a transportation model. (5)

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

(i) For the Network given below, determine (a) a path (b) a cycle (c) a tree (d) a spanning tree (e) the sets N and A (6)



the distances (in miles) are given on the arcs. Arc (4, 5) is directional, so that no traffic is allowed from node 5 to node 4. List of all the other arcs allow two way traffic. Use Floyd's algorithm to determine the shortest route between (5×2=10)

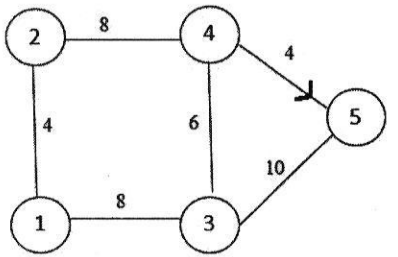
(a) node 5 to node 2

(b) node 1 to node 4

(c) node 2 to node 3

(d) node 3 to node 5

(e) node 1 to node 5



(ii) Use Dijkstra's algorithm to determine the shortest path (6+4=10)

(a) From node 1 to 5

(b) From node 2 to 7

(a) Develop the associated network for the project.

(b) Find the minimum time of completion of the project.

(c) Determine the critical path and critical activities for the project network.

3. Consider the transportation model in the given table.

(a) Use the Vogel Approximation Method (VAM) to find a starting solution.

(b) Hence find the optimal solution by the method of the multipliers. (5+5=10)

	Destination			Supply
Source	$0	$2	$1	6
	$2	$1	$5	9
	$2	$4	$3	5
Demand	5	5	10	

4. Attempt **ANY ONE** from the following :

(i) For the network given in the following figure,

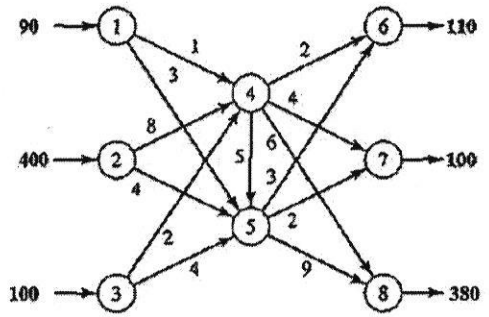
(ii) Compare the initial basic feasible solutions obtained by the Northwest-Corner method **AND** Least-Cost method for the following transportation problem. (3+3=6)

		Warehouse 1	2	3	4	Supply
Factory	1	*10*	*2*	*20*	*11*	**15**
	2	*12*	*7*	*9*	*20*	**25**
	3	*4*	*14*	*16*	*18*	**10**
	Demand	**5**	**15**	**15**	**15**	

(iii) Solve the following Assignment Problem using Hungarian Method. The Matrix entries represent the processing times in hours. (6)

		Operators 1	2	3	4	5
Jobs	1	9	11	14	11	7
	2	6	15	13	13	10
	3	12	13	6	8	8
	4	11	9	10	12	9
	5	7	12	14	10	14

(iv) The network in figure shows the routes for shipping cars from three plants (nodes 1, 2 and 3) to three dealers (nodes 6 to 8) by way of two distribution centers (nodes 4 and 5). The shipping costs per car (in $100) are shown on the arcs.

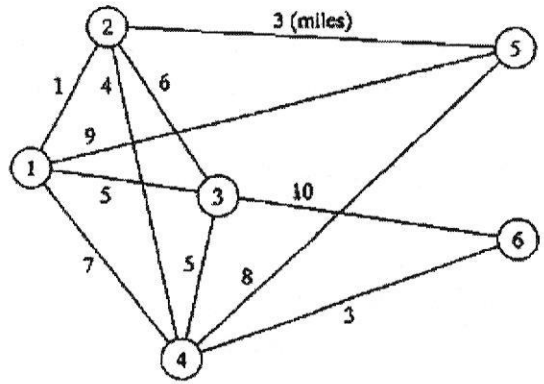


(a) Identify pure supply nodes, pure demand nodes, transshipment nodes and buffer amount.

(b) Only develop the corresponding transshipment model table. (2+4=6)

(v) A Company is in the process of providing cable service to five new housing development areas. (6)

Figure below depicts possible TV linkages among the five areas. The cable miles are shown on each arc. Determine the most economical cable network starting at node 4.



(vi) The activities associated with a certain project given below (2+1+3=6)

Activity	Predecessors	Duration (Week)
A:	--	4
B:	--	3
C:	A,B	2
D:	A,B	5
E:	B	6
F:	C	4
G:	D	3
H:	F,G	7
I:	F,G	4
J:	E,H	2

P.T.O.