Name of the Course	: B.Sc. Prog
Semester	: VI
Unique Paper Code	: 42353604
Name of the Paper	: SEC-4: Transportation and Network Flow Problems

Duration: **2 Hours**

Maximum Marks: **55**

Attempt any four questions. All questions carry equal marks. All symbols have usual meaning.

1. Consider the Transportation model in the given table. Use the Vogel Approximation method (VAM) to find a starting solution. Hence find the optimal solution by the method of multipliers.



2. 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.



3. 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. Also, compute the optimum flow in each arc along with the direction of flow.



4. The tourism department of a country plans to develop a wild area for tourism. Four sites in the area are designated for automobile access. These sites and the distances (in miles) between them are listed in the table below.

	А	В	С	D	E
Α	-	5	19	19	25
В	5	-	8	16	13
С	19	8	-	18	5
D	19	16	18	-	17
E	25	13	5	17	-

Draw a model depicting the above network and give an example of the following (a) Path (b) Cycle (c) Tree (d) Spanning tree.

Also, the department wants to minimize the miles of roadways required to provide the desired accessibility. Determine how roads should be built to achieve this objective.

5. 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



Q6. The activities associated with a certain project are given below

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

Develop the associated network for the project and find the minimum time of completion of the project. Also determine a critical path and critical activities for the project network. Find Early Start Time and Latest Finish Time of each activity.