Name of Course   : **B.A. (Prog.)**

Unique Paper Code   : **62353606**

Name of Paper   : **SEC-4: Transportation and Network Flows Problems**

Semester   : **VI**

Duration   : **3 hours**

Maximum Marks   : **55 Marks**

Attempt any four questions. All questions carry equal marks.

1. 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.

2. Apply Dijkstra's Algorithm to find a shortest path from A to E, also write steps wherever possible.
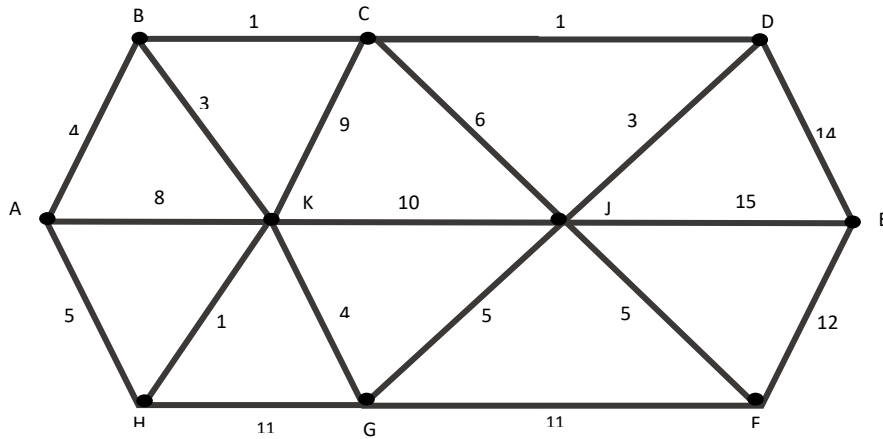

3. The network in the figure below shows the distribution route network of a company manufacturing geysers. The different nodes represent the factories supplying geysers to retail stores. The supply/demand at the nodes are shown in the figure. Units may be transshipped among the factories and stores before reaching their final destinations.
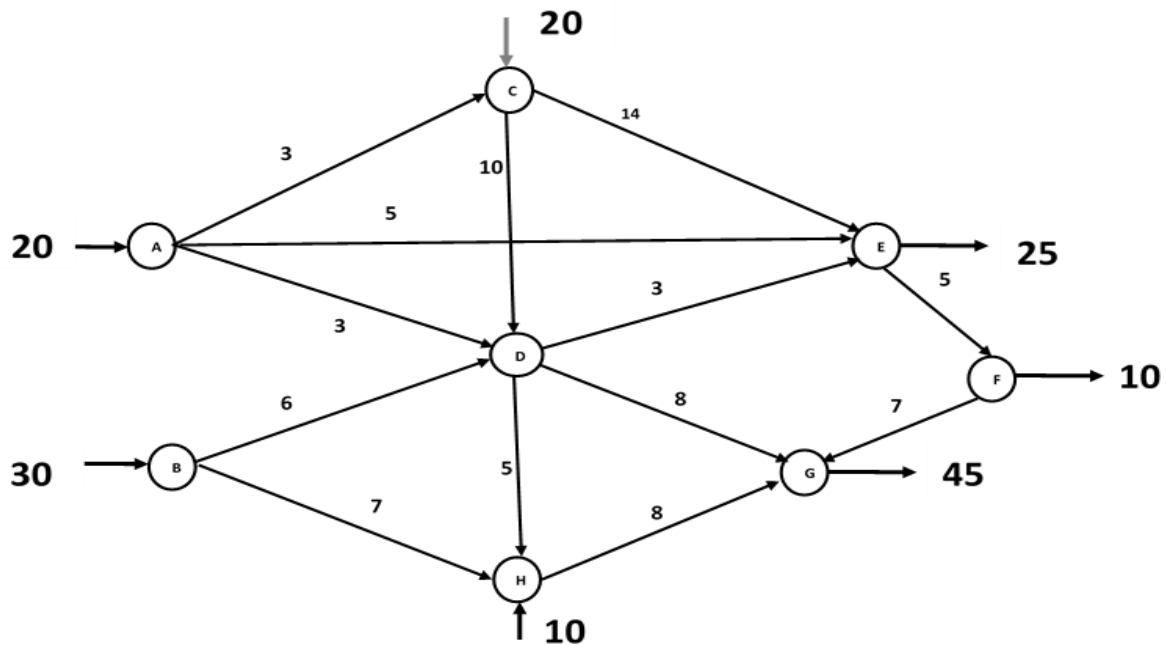
Identify pure supply nodes, pure demand nodes, transshipment nodes and buffer amount. Also develop the corresponding transshipment model table.

4. Consider the following network where the number in links represent actual distance between the corresponding nodes. Find one path, one cycle, one tree which is not a spanning tree. Find a minimal spanning tree.
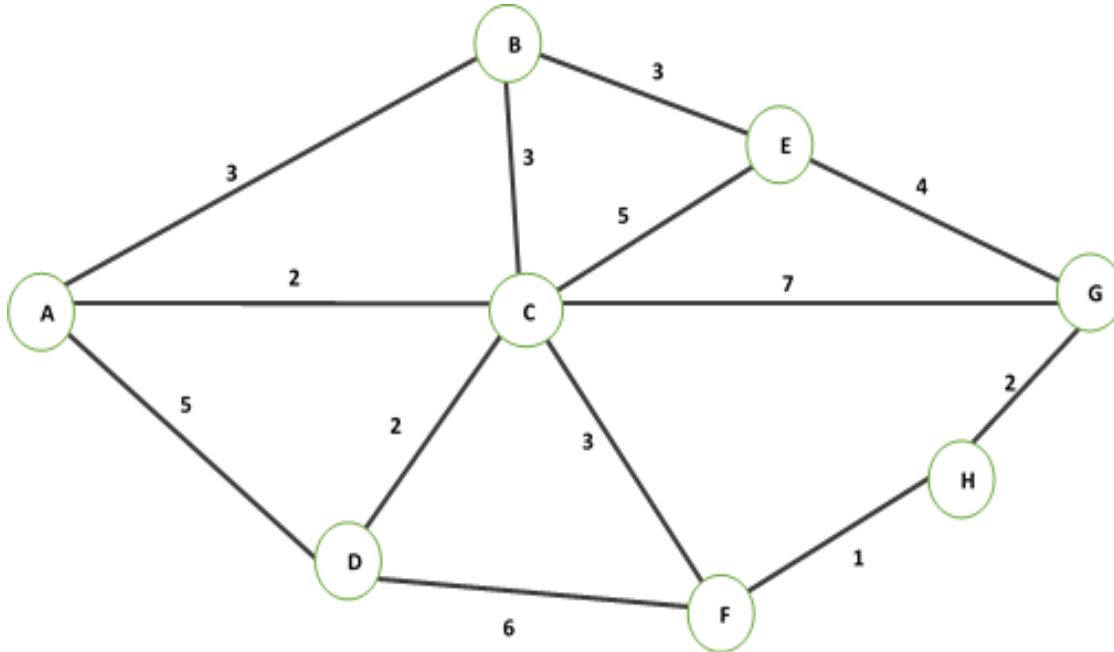
5. Consider a transportation problem with three origins and four destinations. The supply, demand and transportation cost data are given in the following matrix:

	D1	D2	D3	D4	Supply
O1	1	4	5	6	14
O2	2	9	7	8	16
O3	6	3	2	4	5
Demand	15	10	4	6	

Determine the initial basic feasible solutions of the transportation model using North West Corner Method and Vogel's Approximation Method. Compare the corresponding costs obtained from both the methods. Find the optimal cost and allocations using the initial basic feasible solution obtained from North -West Corner Method.

6. Use Hungarian method (explain each iteration) to find the optimal assignment for a problem

	1	2	3	4	5
A	11	10	18	5	7
B	14	13	12	19	6
C	5	3	4	2	4
D	15	18	17	9	12
E	10	1	19	6	14

with the following cost matrix:

Find the optimal cost of assignment. Does it have an alternate assignment with the same optimal cost? If yes, write the alternate optimal assignment.