

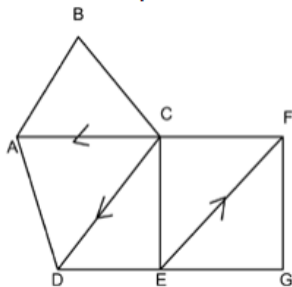
PIPES & NETWORKS

CLASS - 1

ELITES GRID

SET-1

The above network shows 7 cities - A, B, C, D, E, F, & G connected via two way roads and one-way roads. For the one-way roads, the direction of travel is as indicated by the arrows in the diagram. Roads which do not contain any arrows are two-way roads.



Q1. The number of distinct paths from city A. to city G without going through any city more than once is

- a. 4 b. 6 c. 8 d. 10

Q2. If the road connecting C & F is under repair and traffic cannot flow through it, then the number of distinct ways in which city G can be reached from city B without going through any city more than once is

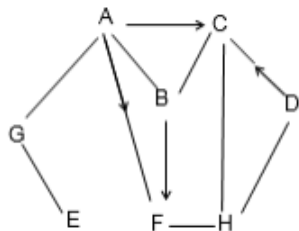
- a. 2 b. 4 c. 6 d. 8

Q3. If two-way traffic is allowed on all the roads, then the number of distinct ways of reaching city G from city D without going through any city more than once is

- a. 10 b. 11 c. 12 d. More than 12

SET-1

The network shows eight stations A through H connected via railway tracks. The tracks are designed in such a way that on some tracks the trains can only travel one way while on others, the trains ply both ways. For the one-way tracks, the direction of travel is indicated by the arrows in the diagram. Tracks which do not contain any arrows are the two-way tracks.



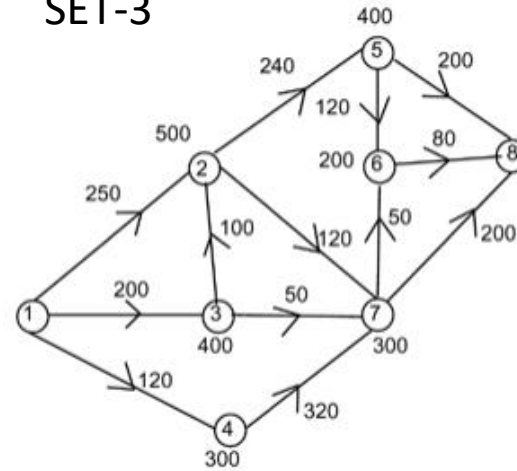
Q1. The number of distinct routes from station A to H without going through any station more than once

Q2. If a two way track between station E and C is constructed, then the number of distinct ways of reaching station D from station G without going through any station more than once is

Q3. If the track connecting A and B is under repair and cannot be used, the number of distinct ways in which station B can be reached from station E without going through any station more than once is

SET-3

The diagram shows the interconnections between a refinery (1) and the depots. (numbered 2-8) Oil from the refinery is to be transported to these depots using tankers. The capacity of the depots (in '000 liters) are given. The distance from the refinery to the depots and between the two neighboring depots is also given. Oil can be transported only in the direction in which the arrows point. So also at each depot, only after it is filled to full capacity, the remaining quantity can be passed to the next depots. Irrespective of the quantity transported, the cost of transportation is Rs 150/Km. Oil can be transmitted only in quantities which are integral multiples of 50,000 liters. All depots currently hold 50% of their capacities.



Q1. What is the minimum cost of transporting the required oil from the refinery to depot 8?

- a. 57000 b. 67500 c. 85,000 d. 1, 03,500

Q2. What should be the minimum quantity (in '000 liters) that is sent from the refinery for at least part of it to reach depot 8?

- a. 300 b. 350 c. 600 d. 650

Q3. What is the maximum quantity (in '000 liters) that can be sent from the refinery through any single route, without any quantity reaching depot 8?

- a. 800 b. 750 c. 1100 d. 1400

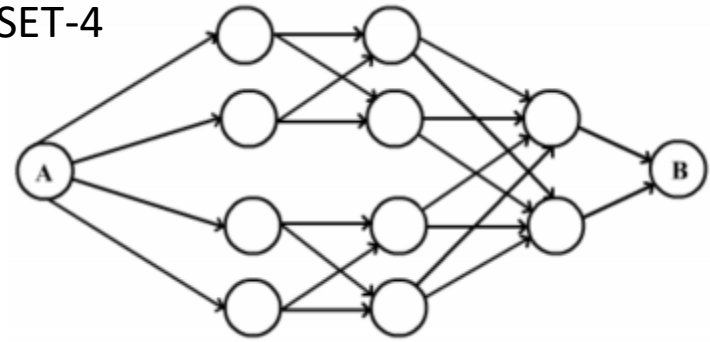
Q4. In how many different routes can oil be transported from the refinery to depot 8?

- a. 9 b. 10 c. 12 d. 13

For the network given, what is the total number of ways in which one way can reach B from A?

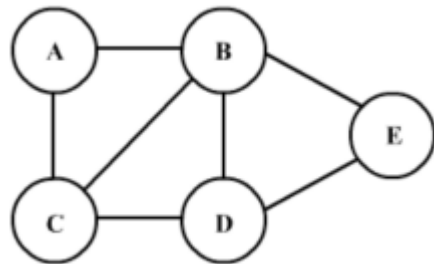
- 1) 12
- 2) 16
- 3) 20
- 4) 22

SET-4



ELITES GRID

There are 5 cities, A, B, C, D and E connected by 7 roads as shown in the figure below:



Design a route such that you start from any city of your choice and walk on each of the 7 roads once and only once, not necessarily returning to the city from which you started.

Q1. For a route that satisfies the above restrictions, which of the following statements is true?

- 1) There is no route that satisfies the above restriction.
- 2) A route can either start at C or end at C, but not both.
- 3) D can be only an intermediate city in the route.
- 4) The route has to necessarily end at E.

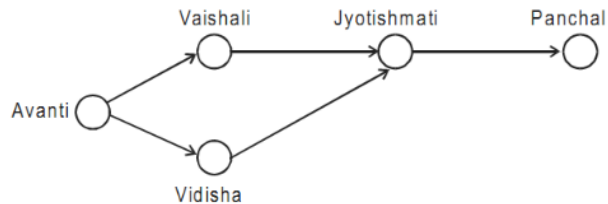
Q2. From how many different cities can one start such that the given restriction is satisfied?

- 1) One
- 2) Zero
- 3) Three
- 4) Two

SET-6

The following sketch shows the pipelines carrying material from one location to another. Each location has a demand for material.

The demand at Vaishali is 400, at Jyotishmati is 400, at Panchal is 700, and at Vidisha is 200. Each arrow indicates the direction of material flow through the pipeline. The flow from Vaishali to Jyotishmati is 300. The quantity of material flow is such that the demands at all these locations are exactly met. The capacity of each pipeline is 1,000.



1. The quantity moved from Avanti to Vidisha is
 - a. 1000
 - b. 800
 - c. 700
 - d. 200
2. The free capacity available at the Avanti-Vaishali pipeline is
 - a. 0
 - b. 100
 - c. 200
 - d. 300



The following figure represents flow of natural gas through pipeline between major cities A, B, C, D and E (in suitable unit). Assume that supply equals demand. Refer to it and answer the following questions.-

1. What is the number of units demanded in B?

- A. 350
- B. 400
- C. 450
- D. 500

2. If the number of units demanded in C is 225, what is the value of M?

- A. 1075
- B. 875
- C. 775
- D. 850

3. If the total demand in E is 80% of demand in A, what is the demand in A?

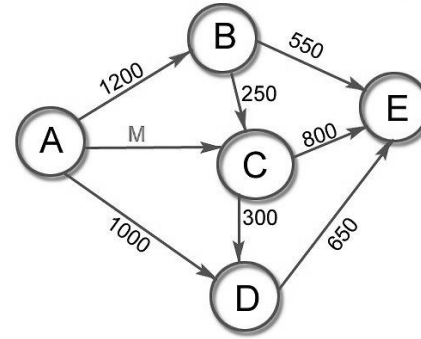
- A. 2500
- B. 2400
- C. 4500
- D. 5000

4. Assuming the information of question number 2 and 3 to be true, what is the total demand in five cities?

- A. 2925
- B. 5775
- C. 4325
- D. Cannot be determined

SET-7

Flow of Natural Gas Through Pipelines Across Major City



ELITES GRID

There are 10 cities - L, M, N, O, P, Q, R, S, T and X - some of which are connected to some of the other cities by one-way routes. The following network shows the routes by which one can travel between the cities. The direction of each arrow indicates the possible direction of travel by that route.

Q. In how many ways can one travel from city X to city T, without covering any city more than once?

SET-8

