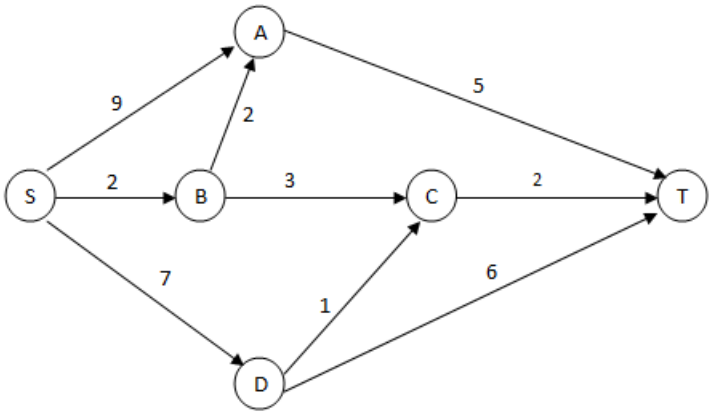
Logical Reasoning Questions for CAT

Questions

Instructions

A significant amount of traffic flows from point S to point T in the one-way street network shown below. Points A, B, C, and D are junctions in the network, and the arrows mark the direction of traffic flow. The fuel cost in rupees for travelling along a street is indicated by the number adjacent to the arrow representing the street. –



Motorists traveling from point S to point T would obviously take the route for which the total cost of traveling is the minimum. If two or more routes have the same least travel cost, then motorists are indifferent between them. Hence, the traffic gets evenly distributed among all the least cost routes.

The government can control the flow of traffic only by levying appropriate toll at each junction. For example, if a motorist takes the route S-A-T (using junction A alone), then the total cost of travel would be Rs 14 (i.e., Rs 9 + Rs 5) plus the toll charged at junction A.

Question 1

If the government wants to ensure that all motorists travelling from S to T pay the same amount (fuel costs and toll combined) regardless of the route they choose and the street from B to C is under repairs (and hence unusable), then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve this goal is:

A 2,5,3,2

B 0,5,3,2

C 1,5,3,2

D 2,3,5,1

E 1,3,5,1

Answer: C

Video Solution

Explanation:
Let the toll charged at junctions A, B, C, and D be a,b,c and d respectively. Then the so that equal amount is collected through all route we have, 9+a+5=2+b+2+a+5=10+d+c=13+d. Then from the options only option C satisfies the above equality. hence option C.

Question 2

If the government wants to ensure that no traffic flows on the street from D to T, while equal amount of traffic flows through junctions A and C, then a feasible set of toll charged (in rupees) at junctions A, B, C,and D respectively to achieve this goal is:

A 1,5,3,3

B 1,4,4,3

C 1,5,4,2

D 0,5,2,3

E 0,5,2,2

Answer: E

Video Solution

Explanation:
Let the toll charged at junctions A, B, C, and D be a,b,c and d respectively. Now since we want equal traffic through A and C , total cost through routes passing from A and C should be equal. So we have (9+a+5) + (2+b+2+a+5) = (2+3+b+c+2) + (7+d+1+c+2) . Only option E satisfy the above equality.

Question 3

If the government wants to ensure that all routes from S to T get the same amount of traffic, then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve this goal is:

A 0, 5, 2, 2

B 0,5,4,1

C 1,5,3,3

D 1, 5, 3,2

E 1,5,4,2

Answer: D

Video Solution

Explanation:
Now the fuel cost along different routes are :
SAT = 14
SBAT = 9
SBCT = 7
SDCT = 10
SDT = 13
Now , if we consider option D . Total cost for all routes comes out to be same which is 15. Hence option D.

Question 4

If the government wants to ensure that the traffic at S gets evenly distributed along streets from S to A, from S to B, and from S to D, then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve this goal is:

A 0,5,4,1

B 0,5,2,2

C 1,5,3,3

D 1,5,3,2

E 0,4,3,2

Answer: A

Video Solution

Explanation:
Total cost = fuel cost + toll
Total cost along SAT : 14+tollA
Total cost along SBAT : 9+tollA+tollB
Total cost along SDT : 13+tollD
Now when option A is considered , total costs come out to be same.
Hence option A is correct.

Question 5

The government wants to devise a toll policy such that the total cost to the commuters per trip is minimized. The policy should also ensure that not more than 70 per cent of the total traffic passes through junction B. The cost incurred by the commuter travelling from point S to point T under this policy will be:

A Rs 7

B Rs 9

C Rs 10

D Rs 13

E Rs 14

Answer: C

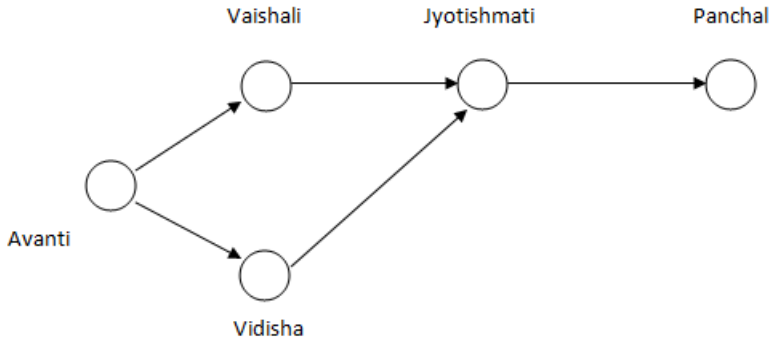
Video Solution

Explanation:
The costs of the routes are as given below:
S - B - C - T = 7
S - B - A - T = 9
S - D - C - T = 10
S - D - T = 13
S - A -T = 14
Hence now 100% of the traffic flows through S - B - C - T
Now if we make the cost of traveling through S - B - C - T same as some other route not going through B, then the traffic will be equally distributed between these two routes. The lowest such route is S-D-C-T. The difference in cost = 3. Hence if we levy a toll of Rs.3 at B, the costs of SBCT and SBAT become 10,12 respectively and other routes are not affected. So 50% traffic flows through SBCT and 50% flows through SDCT . Hence cost in this policy = 10.

Instructions

Directions for the following three questions: Answer the questions based on the pipeline diagram below.

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.



Question 6

The quantity moved from Avanti to Vidisha is

A 200

B 800

C 700

D 1,000

Answer: D

Video Solution

Explanation:
We know that quantity between Vaishali and jyotishmati is 300,

So quantity in avanti-vaishal route should be 700.

Now at jyotishmati the required quantity is 400+700 = 1100.

But through vaishali only 300 comes , so 800 should come through Vidisha-jyotishmati route.

Now demand at vidisha is 200. So total quantity required in avanti - vidisha route is 800+200=1000. Hence option D.

Question 7

The free capacity available at the Avanti-Vaishali pipeline is

A 0

B 100

C 200

D 300

Answer: D

Video Solution

Explanation:
We know that quantity between Vaishali and jyotishmati is 300,

So quantity in avanti-vaishal route should be 400+300=700.

So free capacity is 1000-700=300. Hence option D .

Question 8

What is the free capacity available in the Avanti-Vidisha pipeline?

A 300

B 200

C 100

D 0

Answer: D

Video Solution

Explanation:
We know that quantity between Vaishali and jyotishmati is 300, So quantity in avanti-vaishal route should be 700. Now at jyotishmati the required quantity is 400+700 = 1100.

But through vaishali only 300 comes , so 800 should come through Vidisha-jyotishmati route.

Now demand at vidisha is 200. So total quantity required in avanti - vidisha route is 800+200=1000.

Hence, free capacity available = 1000-1000=0. Hence option D.

Instructions

A new airlines company is planning to start operations in a country. The company has identified ten different cities which they plan to connect through their network to start with. The flight duration between any pair of cities will be less than one hour. To start operations, the company has to decide on a daily schedule.
The underlying principle that they are working on is the following:
Any person staying in any of these 10 cities should be able to make a trip to any other city in the morning and should be able to return by the evening of the same day.

Question 9

If the underlying principle is to be satisfied in such a way that the journey between any two cities can be performed using only direct (non-stop) flights, then the minimum number of direct flights to be scheduled is:

A 45

B 90

C 180

D 135

Answer: C

Video Solution

Explanation:
There are ten cities. We need to find the minimum number of flights required to travel from any city to any city. Any two cities can be selected in 10C2 ways. Now for these two cities, a person will need minimum 4 flights. (1 to go from A to B, 1 to go from B to A. Similarly, 1 to return to A and 1 to return to B) Thus, minimum number of required flights = 45*4 = 180.

Question 10

Suppose three of the ten cities are to be developed as hubs. A hub is a city which is connected with every other city by direct flights each way, both in the morning as well as in the evening. The only direct flights which will be scheduled are originating and/or terminating in one of the hubs. Then the minimum number of direct flights that need to be scheduled so that the underlying principle of the airline to serve all the ten cities is met without visiting more than one hub during one trip is:

A 54

B 120

C 96

D 60

Answer: C

Video Solution

Explanation:

From each hub, there will be flights to 7 cities. So total total number of flights originating or terminating at each hub = 7*4 = 28. For all three hubs, it would be 28*3 = 84

There are three hubs in total. Each hub must also be interconnected. The total number of flights between any two hubs will be 4. For three hubs it will be 12.

Hence, the required number will be 84 + 12 = 96.