Career Launcher
Analysis of CAT – 2006
Section – I [Logical Data Interpretation]
Set – 111

Section I has 25 questions
Answer Questions 1 to 5 on the basis of the information given below:
K, L, M, N, P, Q, R, S, U and W are the only ten members in a department. There is a proposal to form a team from within the members of the department, subject to the following conditions:

- A team must include exactly one among P, R, and S.
- A team must include either M or Q, but not both.
- If a team includes K, then it must also include L, and vice versa.
- If a team includes one among S, U, and W, then it must also include the other two.
- L and N cannot be members of the same team.
- L and U cannot be members of the same team.

The size of a team is defined as the number of members in the team.

1. Who cannot be a member of a team of size 3?
(1) L (2) M (3) N (4) P (5) Q

2. Who can be a member of a team of size 5?
(1) K (2) L (3) M (4) P (5) R

3. What would be the size of the largest possible team?
(1) 8 (2) 7 (3) 6 (4) 5 (5) cannot be determined

4. What could be the size of a team that includes K?
(1) 2 or 3 (2) 2 or 4 (3) 3 or 4 (4) Only 2 (5) Only 4

5. In how many ways a team can be constituted so that the team includes N?
(1) 2 (2) 3 (3) 4 (4) 5 (5) 6

For questions 1 to 5:
From statement one, team would include exactly one among P, R, S
$\Rightarrow$ P (or) R (or) S.

From statement two, team would include either M, or Q
$\Rightarrow$ M but ~ Q
(or) Q but ~ M

From statement three, if a team includes K, it will include L or vice versa.
$\Rightarrow$ K, L always accompany each other.

From statement four, if one of S, U, W is included, then the other two also have to be included.
$\Rightarrow$ S, U, W are always together.

From statement five, L and N cannot be included together
$\Rightarrow$ L, N are never together.

From statement six, L and U cannot be included together.
$\Rightarrow$ L, U are never together.

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1. (1) From statements one and two ; one of P, R, S and
one of M, Q are to be selected.

But from statement three; (K, L) are always together.
Hence 'L' cannot be included in a team of 3 members.

2. (3) Again, from statement one; one of P, R, S has to be selected.

To make a team of '5'
'S' will be chosen (which leaves out P and R)
$\Rightarrow$ If 'S' is chosen 'U' has to be chosen (statement four)
$\Rightarrow$ If 'U' is chosen 'L' cannot be chosen (statement five)
$\Rightarrow$ K cannot be chosen (statement three)

And from statement two; one of M (or) Q has to be chosen.

3. (4) From statements one and two
Two members are to be selected.

Of the remaining seven;
To maximize the size of the team.
We would chose S,
$\Rightarrow$ U and W are included in the team (statement four)

We cannot include K (or) L because we would then have to leave out N and U
(from statements five and six)

4. (5) If 'K' is included 'L' has to be included (statement three)
If 'L' is chosen neither N nor U can be chosen (statements five and six)
$\Rightarrow$ S, W are also not included because S, U, W have to be always together. (Statement four)

Hence one of P (or) R would be selected (statement one) and one of M (or) Q would be selected statement (two)
$\Rightarrow$ (K, L) and two of the above five have to be included.

5. (5) If a team includes N, it cannot include 'L'.
And therefore not even 'K' (from statement five and three)

According to statement one
One of P (or) R (or) S has to be included.
According to statement two
One of M (or) Q has to be selected.

So the following cases are possible
P Q N,
R Q N
P M N,
R M N

If 'S' is selected
S U W M N
S U W Q N

are the only possible cases.
Hence in all 4 + 2 = 6 ways can be constituted.

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Answer Questions 6 to 10 on the basis of the information given below:

In a Class X Board examination, ten papers are distributed over five Groups — PCB, Mathematics, Social Science, Vernacular and English. Each of the ten papers is evaluated out of 100. The final score of a student is calculated in the following manner. First, the Group Scores are obtained by averaging marks in the papers within the Group. The final score is the simple average of the Group Scores. The data for the top ten students are presented below. (Dipan's score in English Paper II has been intentionally removed in the table.)

Name of the student	PCB Group			Mathematics Group	Social Science Group		Vernacular Group		English Group		Final Score
	Phy.	Chem.	Bio.		Hist.	Geo.	Paper I	Paper II	Paper I	Paper II	
Ayesha (G)	98	96	97	98	95	93	94	96	96	98	96.2
Ram (B)	97	99	95	97	95	96	94	94	96	98	96.1
Dipan (B)	98	98	98	95	96	95	96	94	96	??	96.0
Sagnik (B)	97	98	99	96	96	98	94	97	92	94	95.9
Sanjiv (B)	95	96	97	98	97	96	92	93	95	96	95.7
Shreya (G)	96	89	85	100	97	98	94	95	96	95	95.5
Joseph (B)	90	94	98	100	94	97	90	92	94	95	95
Agni (B)	96	99	96	99	95	96	82	93	92	93	94.3
Pritam (B)	98	98	95	98	83	95	90	93	94	94	93.9
Tirna (G)	96	98	97	99	85	94	92	91	87	96	93.7

Note: B or G against the name of a student respectively indicates whether the student is a boy or a girl.

6. How much did Dipan get in English Paper II?
(1) 94 (2) 96.5 (3) 97 (4) 98 (5) 99

7. Among the top ten students, how many boys scored at least 95 in at least one paper from each of the groups?
(1) 1 (2) 2 (3) 3 (4) 4 (5) 5

8. Had Joseph, Agni, Pritam and Tirna each obtained Group Score of 100 in the Social Science Group, then their standing in decreasing order of final score would be:
(1) Pritam, Joseph, Tirna, Agni (2) Joseph, Tirna, Agni, Pritam
(3) Pritam, Agni, Tirna, Joseph (4) Joseph, Tirna, Pritam, Agni
(5) Pritam, Tirna, Agni, Joseph

9. Students who obtained Group Scores of at least 95 in every group are eligible to apply for a prize. Among those who are eligible, the student obtaining the highest Group Score in Social Science Group is awarded this prize. The prize was awarded to:
(1) Shreya (2) Ram (3) Ayesha
(4) Dipan (5) No one from the top ten

10. Each of the ten students was allowed to improve his/her score in exactly one paper of choice with the objective of maximizing his/her final score. Everyone scored 100 in the paper in which he or she chose to improve. After that, the topper among the ten students was:
(1) Ram (2) Agni (3) Pritam (4) Ayesha (5) Dipan

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For questions 6 to 10:

6. (3) Let Dipan get x marks in paper II

Dipan's average in PCB group = 98
Maths group = 95
S.S. group = 95.5
Vernacular group = 95
English group = $\left(\frac{96+x}{2}\right)$

Sum of all = 96 × 5

So $95.5 + 96 \times 3 + 48 + \frac{x}{2} = 96 \times 5$

$\Rightarrow \frac{x}{2} = 96 \times 2 - 95.5 - 48$

$x = 2(96.5 - 48) = 2 \times 48.5 = 97$

So, answer is (3)

7. (1) The only boy getting 95 in atleast one of the subjects of the group among all the groups is Dipan. So answer is option (1).

8. (1) A group score of 100 in Social Science would have Increased the scores as follows:

	Score Increase	**Group Score**	**Final Score Increase**	**Final group Score**
Pritam	22	11	$\frac{11}{5} = 2.2$	96.1
Joseph	9	4.5	$\frac{4.5}{5} = .9$	95.9
Tirna	21	10.5	$\frac{10.5}{5} = 2.1$	95.8
Agni	9	4.5	$\frac{4.5}{5} = .9$	95.4

So, the order is Pritam > Joseph > Trina > Agni.
Option (1)

9. (4) The student having atleast 95 in every group is Dipan, so the answer is Dipan, option (4).

10. (5) Let us increase the score in one of the subjects of the following candidates

	Least Scores	**Contribution in net Score**	**Final Score**
Ram	94 in group of 2	3 in 5 groups	96.1 + .6 = 96.7
Agni	82 in group of 2	9 in 5 groups	94.3 + 1.8 = 96.1
Pritam	83 in group of 2	8.5 in 5 groups	93.9 + 1.7 = 95.6
Ayesha	93 in group of 2	3.5 in 5 groups	96.2 + .7 = 96.9
Dipan	95 in group of 1	5 in 5 groups	96 + 1 = 97.0

So, Dipan will end with a highest total.
So the answer is option (5)

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Answer Questions 11 to 15 on the basis of the information given below:

Mathematicians are assigned a number called Erdös number (named after the famous mathematician, Paul Erdös). Only Paul Erdös himself has an Erdös number of zero. Any mathematician who has written a research paper with Erdös has an Erdös number of 1. For other mathematicians, the calculation of his/her Erdös number is illustrated below:

Suppose that a mathematician X has co-authored papers with several other mathematicians. From among them, mathematician Y has the smallest Erdös number. Let the Erdös number of Y be y. Then X has an Erdös number of y+1 . Hence any mathematician with no co-authorship chain connected to Erdös has an Erdös number of infinity.

In a seven day long mini-conference organized in memory of Paul Erdös, a close group of eight mathematicians, call them A, B, C, D, E, F, G and H, discussed some research problems. At the beginning of the conference, A was the only participant who had an infinite Erdös number. Nobody had an Erdös number less than that of F.

- On the third day of the conference F co-authored a paper jointly with A and C. This reduced the average Erdös number of the group of eight mathematicians to 3. The Erdös numbers of B, D, E, G and H remained unchanged with the writing of this paper. Further, no other co-authorship among any three members would have reduced the average Erdös number of the group of eight to as low as 3.
- At the end of the third day, five members of this group had identical Erdös numbers while the other three had Erdös numbers distinct from each other.
- On the fifth day, E co-authored a paper with F which reduced the group's average Erdös number by 0.5. The Erdös numbers of the remaining six were unchanged with the writing of this paper.
- No other paper was written during the conference.

11. How many participants in the conference did not change their Erdös number during the conference?
(1) 2 (2) 3 (3) 4 (4) 5 (5) cannot be determined

12. The person having the largest Erdös number at the end of the conference must have had Erdös number (at that time):
(1) 5 (2) 7 (3) 9 (4) 14 (5) 15

13. How many participants had the same Erdös number at the beginning of the conference?
(1) 2 (2) 3 (3) 4 (4) 5 (5) Cannot be determined

14. The Erdös number of C at the end of the conference was:
(1) 1 (2) 2 (3) 3 (4) 4 (5) 5

15. The Erdös number of E at the beginning of the conference was:
(1) 2 (2) 5 (3) 6 (4) 7 (5) 8

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For questions 11 to 15:
As only Paul Erdös was having an Erdös number of zero so the minimum Erdös number among A, B, C, D, E, F, G, H should be 1 or greater than one. At the end of the third day F co-authored a paper with A and C. F had the minimum Erdös number among the 8 people. So if F's Erdös number is y, then A and C's Erdös number should change to (y + 1) after third day. As A and C decreased the average by maximum possible extent, it means C had the second-height Erdös number among all eight, as A had an Erdös number of infinity.
Suppose Erdös numbers of A, B, C, D, E, F, G, H are y + 1, b, y + 1, c, d, e, y, g, h respectively at the end of third day.
$\therefore$ (y + 1 + b + y + 1 + c + d + e + y + g + h) = 24 = (3 × 8)
3y + 2 + b + c + d + g + h = 24
When E co-authored with F, the average Erdös number reduced again, it means, E's Erdös number was not the same with A & C initially. As at the end of third day, 5 people had same Erdös number, they should be A, C and any 3 out of B, D, G, H. Suppose those 3 people are B, D, G. Then
(3y + 2 + y + 1 + y + 1 + h) = 24
6y + h + e = 19 …(i)
On the fifth day E co-authored a paper with F and hence Erdös number of E changed to (y + 1). Also the average decreased by 0.5 that means the total decreased by $8 \times 0.5 = 4$
Hence, e – (y + 1) = 4
$\Rightarrow e - y = 5$
Putting the value of e in equation (i), we get
6y + h + (5 + y) = 19
7y + h = 14
Only possible value of y = 1 as h cannot be zero.
So after 3rd round Erdös number of A, C, E, F were 2, 2, 2, 1 respectively.

11. (4) Only A, C, E changed their Erdös number, rest 5 did not change their Erdös number.

12. (2) At the end of conference 6 people including E were having an Erdös number of 2 and F was having 1 as Erdös number. So 8th person was having an Erdös number of $\left[20 - (2 \times 6 + 1)\right] = 7$

13. (2) As at the end of 3rd round 5 people were having same Erdös number. A and C changed their Erdös number after coauthoring with F. So, the other 3 would have same Erdös number in the beginning.

14. (2) 2

15. (3) After co-authoring with F, E was having Erdös number of 2, which was 4 less than initial Erdös number of E. So answer is 2 + 4 = 6.

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Answer Questions 16 to 20 on the basis of the information given below:

Two traders, Chetan and Michael, were involved in the buying and selling of MCS shares over five trading days. At the beginning of the first day, the MCS share was priced at Rs 100, while at the end of the fifth day it was priced at Rs 110. At the end of each day, the MCS share price either went up by Rs 10, or else, it came down by Rs 10. Both Chetan and Michael took buying and selling decisions at the end of each trading day. The beginning price of MCS share on a given day was the same as the ending price of the previous day. Chetan and Michael started with the same number of shares and amount of cash, and had enough of both. Below are some additional facts about how Chetan and Michael traded over the five trading days.

- Each day if the price went up, Chetan sold 10 shares of MCS at the closing price. On the other hand, each day if the price went down, he bought 10 shares at the closing price.
- If on any day, the closing price was above Rs 110, then Michael sold 10 shares of MCS, while if it was below Rs 90, he bought 10 shares, all at the closing price.

16. If Chetan sold 10 shares of MCS on three consecutive days, while Michael sold 10 shares only once during the five days, what was the price of MCS at the end of day 3?
(1)Rs 90 (2) Rs 100 (3) Rs 110 (4) Rs 120 (5) Rs 130

17. If Chetan ended up with Rs 1300 more cash than Michael at the end of day 5, what was the price of MCS share at the end of day 4?
(1) Rs 90 (2) Rs 100 (3) Rs 110 (4) Rs 120
(5) Not uniquely determinable

18. If Michael ended up with 20 more shares than Chetan at the end of day 5, what was the price of the share at the end of day 3?
(1) Rs 90 (2) Rs 100 (3) Rs 110 (4) Rs 120 (5) Rs 130

19. If Michael ended up with Rs 100 less cash than Chetan at the end of day 5, what was the difference in the number of shares possessed by Michael and Chetan (at the end of day 5)?
(1) Michael had 10 less shares than Chetan.
(2) Michael had 10 more shares than Chetan.
(3) Chetan had 10 more shares than Michael,
(4) Chetan had 20 more shares than Michael.
(5) Both had the same number of shares.

20. What could have been the maximum possible increase in combined cash balance of Chetan and Michael at the end of the fifth day?
(1) Rs 3700 (2) Rs 4000 (3) Rs 4700 (4) Rs 5000 (5) Rs 6000

For questions 16 to 20:

16. (3)

	Day 1	Day 2	Day 3	Day 4	Day 5
Start price	100	90	100	110	120
End price	90	100	110	120	110

In the above table Chetan sold shares on Day 2, Day 3 and Day 4 whereas Michael sold shares on Day 4 only.
Therefore at the end of day 3 the price of Share is Rs. 110.

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17. (2)

	Day 1	Day 2	Day 3	Day 4	Day 5
Start price	100	90	100	110	100
End price	90	100	110	100	100

Let initial amount with Chetan and Michael is y.
Total Money with Chetan = y – 900 + 1000 + 1100 + 1200 – 1100 = y + 1300
Total money with Michael = y
Therefore Chetan ended up with Rs.1300 more cash than Michael.
Therefore at the end of day 4 the price of Share is Rs. 100.

18. (1)

	Day 1	Day 2	Day 3	Day 4	Day 5
Start price	100	90	80	90	100
End price	90	80	90	100	110

Assume initial number of share with Chetan and Michael is x. In the above table Chetan buy 10 share each on day 1, day 2 and sold 10 share on day 3, day 4 and day 5.

$\therefore$ Total shares with Chetan is x – 10.
In the above table Michael buy shares only on day 2.
$\therefore$ Total shares with Michael is x + 10.
$\therefore$ Michael had 20 shares more then Chetan.
Therefore at the end of day 3 the price of share is Rs. 90.

19. (5)

	Day 1	Day 2	Day 3	Day 4	Day 5
Start price	100	90	100	110	120
End price	90	100	110	120	110

Let initial amount with Chetan and Michael is Y.
Total money with Chetan = Y – 900 + 1000 + 1100 + 1200 – 1100 = Y + 1300
Total money with Michael = Y + 1200
Therefore difference between Chetan and Michael is Rs. 100 and Number of shares with Michael and Chetan is same.

20. (4)

	Day 1	Day 2	Day 3	Day 4	Day 5
Start price	100	110	120	130	120
End price	110	120	130	120	110

Let initial amount with Chetan and Michael is Y.
Chetan sold shares on Day 1, Day 2, Day 3 whereas buys shares on Day 4 and Day 5.
Total Money with Chetan is = Y + 110 × 10 + 120 × 10 + 130 × 10 – 120 × 10 – 110 × 10 = Y + 1300
Total money with Michael = Y + 1200
Total money with Michael = Y + 120 × 10 + 130 × 10 + 120 × 10
= Y + 3700
Total money with Michael & Chetan = 2Y + 5000.
Therefore maximum possible increase is 5000.

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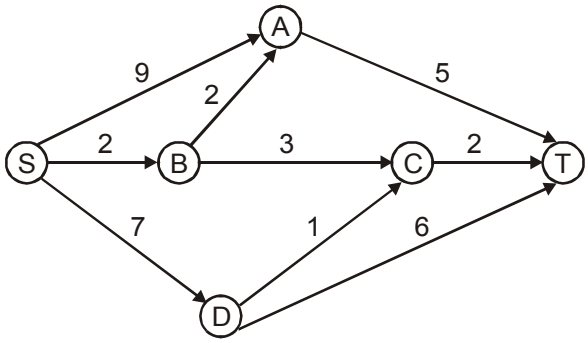
Answer Questions 21 to 25 on the basis of the information given below:

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 travelling from point S to point T would obviously take the route for which the total cost of travelling 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.

21. 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:
(1)1,5,3,3 (2)1,4,4,3 (3)1,5,4,2 (4) 0,5,2,3 (5)0,5,2,2

22. 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:
(1) 2,5,3,2 (2) 0,5,3, 1 (3) 1,5,3,2 (4)2,3,5,1 (5)1,3,5,1

23. 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:
(1) 0,5,4,1 (2) 0,5,2,2 (3) 1,5,3,3 (4) 1,5,3,2 (5) 0,4,3,2

24. 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:
(1) 0,5,2,2 (2) 0,5,4,1 (3) 1,5,3,3 (4)1,5,3,2 (5)1,5,4,2

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25. 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:
(1) Rs. 7 (2) Rs. 9 (3) Rs. 10 (4) Rs. 13 (5) Rs. 14

For questions 21 to 25:
In this set the fuel cost for each of the path is given. In addition there are four toll collection junctions.

21. (5) No traffic flows on the street from D to T
Now we have fuel cost on different paths as
SAT $\rightarrow$ (9 + 5) = Rs. 14 + toll at junction A
SBAT $\rightarrow$ (2 + 2 + 5) = Rs. 9 + toll at junction A and B
SBCT $\rightarrow$ (2 + 3 + 2) = Rs. 7 + toll at junction B and C
SDCT $\rightarrow$ (7 + 1 + 2) = Rs. 10 + toll at junction D and C
Now checking the options we find that toll at junction A is 0 or 1.
When toll is 0, fuel cost on SAT = (14 + 0) = Rs. 14
When toll is 1, fuel cost on SAT = (14 + 1) = Rs. 15
The fuel cost on all the paths should be equal.
Option, (1), (2), (3) can be ruled out as in all these options toll at C and D adds up to more than Rs. 5.
As fuel cost on SDCT is Rs. 10 without toll, so with toll it cannot exceed Rs. 15 (i.e. toll of path SAT).
Option (4) is ruled out as in this option SAT comes out to be Rs. 14 and SDCT sums up to 15.
Correct answer is option (5).

22. (2) Available routes are
SAT $\rightarrow$ Rs. 14 SBAT $\rightarrow$ Rs. 9
SDCT $\rightarrow$ Rs. 10 SDT $\rightarrow$ Rs. 13

Now, (fuel cost of SAT) – (fuel of SDT) = (14 – 13) = Rs. 1.
Hence toll at junction D should be 1 more than the toll at A. So option (1), (4) and (5) are ruled out.
Now, (fuel cost of SAT) – (fuel cost of SBAT) = (14 – 9) = Rs. 5. So toll at junction B should be Rs. 5 more than toll at junction A. So correct answer is option (2).

23. (1) Available paths are
SAT $\rightarrow$ Rs. 14 SBCT $\rightarrow$ Rs. 7
SBAT $\rightarrow$ Rs. 9 SDCT $\rightarrow$ Rs. 10
SDT $\rightarrow$ Rs. 13

(Fuel cost on path SAT) – (fuel cost on path SDT) = (14 – 13) = Rs. 1. Hence, toll at junction D should be 1 more than the toll at junction A.
So option (2), (3) and (5) are ruled out.
Now we have to concentrate on the streets S-A, S-B and S-D.
Remaining options are (1) and (4).
If we consider option (1) the cost of traveling along the routes are
SAT $\rightarrow$ Rs. 14 SBCT $\rightarrow$ Rs. 16
SBAT $\rightarrow$ Rs. 14 SDCT $\rightarrow$ Rs. 15
SDT $\rightarrow$ Rs. 14
Obviously motorists will choose routes SAT, SBAT and SDT only, thus dividing the traffic equally among streets S-A, S-B and S-D.
Hence correct option is (1).

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24. (4) Available routes are
SAT $\rightarrow$ Rs. 14
SBAT $\rightarrow$ Rs. 9
SBCT $\rightarrow$ Rs. 7
SDCT $\rightarrow$ Rs. 10
SDT $\rightarrow$ Rs. 13
Fuel cost on path SAT – fuel cost on path SDT = 14 – 13 = Rs. 1.
So the toll at junction D should be 1 more than toll at junction A. So option 1 and 3 are ruled out.
Fuel cost on path SAT – fuel cost on path SBCT = 14 – 7 = Rs. 7.
So sum of toll at junction B and C should be 7 more than the toll at A. Hence only option (4) matches.

25. (3) We have to find a path on which minimum cost is incurred and such that total traffic through B does not exceed 70%
So, option (5) is ruled out because we can send al traffic through SDCT or SDT and meet all conditions.
Option (1) is also ruled out as in that case all traffic will be passed through SBCT [not possible as traffic at B can't be more than 70%]
Option (2) is also ruled out as it is possible only when toll at junction C is 2. In that case also all traffic will pass through B.
Option (3) can be the answer, when toll at junction B is 4 and toll at junction C is 0. Then SDCT will have toll equal to Rs. 10.
As Rs. 10 is lesser than Rs. 13 so option (4) is also ruled out.
Answer is option (3).

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