CAT 2023 Slot 1 Question Paper

DILR

Instructions [25 - 29]

A visa processing office (VPO) accepts visa applications in four categories - US, UK, Schengen, and Others. The applications are scheduled for processing in twenty 15- minute slots starting at 9:00 am and ending at 2:00 pm. Ten applications are scheduled in each slot.

There are ten counters in the office, four dedicated to US applications, and two each for UK applications, Schengen applications and Others applications. Applicants are called in for processing sequentially on a first-come-first-served basis whenever a counter gets freed for their category. The processing time for an application is the same within each category. But it may vary across the categories. Each US and UK application requires 10 minutes of processing time. Depending on the number of applications in a category and time required to process an application for that category, it is possible that an applicant for a slot may be processed later.

On a particular day, Ira, Vijay and Nandini were scheduled for Schengen visa processing in that order. They had a 9:15 am slot but entered the VPO at 9:20 am. When they entered the office, exactly six out of the ten counters were either processing applications, or had finished processing one and ready to start processing the next.

Mahira and Osman were scheduled in the 9:30 am slot on that day for visa processing in the Others category.

The following additional information is known about that day.

1. All slots were full.
2. The number of US applications was the same in all the slots. The same was true for the other three categories.
3. 50% of the applications were US applications.
4. All applicants except Ira, Vijay and Nandini arrived on time.
5. Vijay was called to a counter at 9:25 am.

25. How many UK applications were scheduled on that day?

26. What is the maximum possible value of the total time (in minutes, nearest to its integer value) required to process all applications in the Others category on that day?

27. Which of the following is the closest to the time when Nandini's application process got over?

A 9:50 am

B 9:37 am

C 9:35 am

D 9:45 am

28. Which of the following statements is false?

A The application process of Osman was completed before 9:45 am.

B The application process of Mahira started after Nandini's.

C The application process of Osman was completed before Vijay's.

D The application process of Mahira was completed before Nandini's.

29. When did the application processing for all US applicants get over on that day?

A 2:05 pm

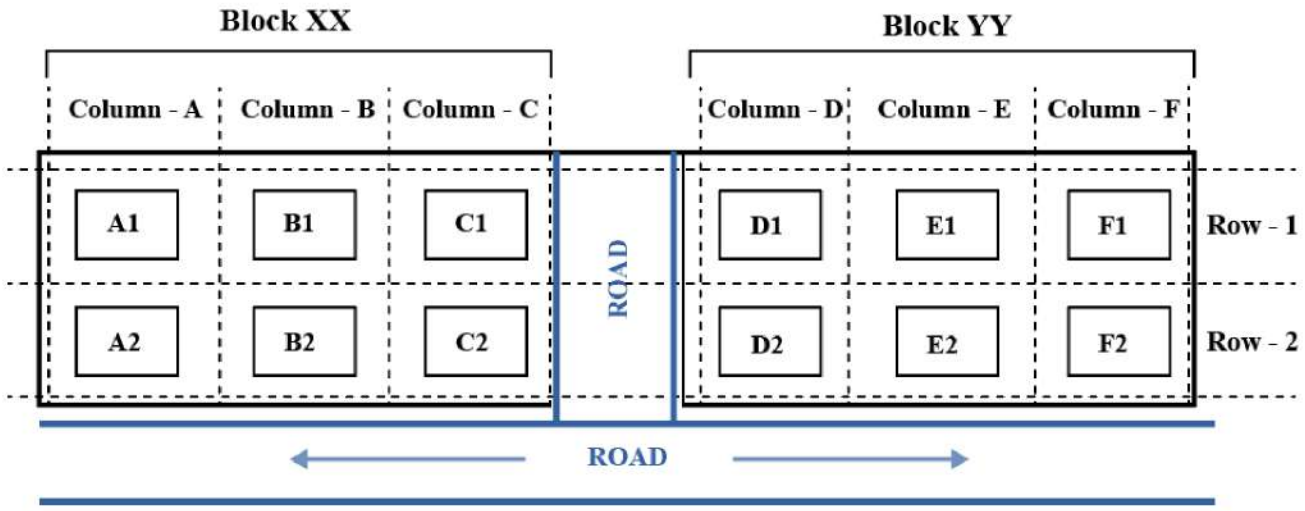
B 2:25 pm

C 2:00 pm

D 3:40 pm

Instructions [30 - 34]

The schematic diagram below shows 12 rectangular houses in a housing complex. House numbers are mentioned in the rectangles representing the houses. The houses are located in six columns - Column-A through Column-F, and two rows - Row-1 and Row-2. The houses are divided into two blocks - Block XX and Block YY. The diagram also shows two roads, one passing in front of the houses in Row-2 and another between the two blocks.



Some of the houses are occupied. The remaining ones are vacant and are the only ones available for sale.

The road adjacency value of a house is the number of its sides adjacent to a road. For example, the road adjacency values of C2, F2, and B1 are 2, 1, and 0, respectively. The neighbour count of a house is the number of sides of that house adjacent to occupied houses in the same block. For example, E1 and C1 can have the maximum possible neighbour counts of 3 and 2, respectively.

The base price of a vacant house is Rs. 10 lakhs if the house does not have a parking space, and Rs. 12 lakhs if it does. The quoted price (in lakhs of Rs.) of a vacant house is calculated as (base price) + 5 × (road adjacency value) + 3 × (neighbour count). The following information is also known.

1. The maximum quoted price of a house in Block XX is Rs. 24 lakhs. The minimum quoted price of a house in block YY is Rs. 15 lakhs, and one such house is in Column-E.
2. Row-1 has two occupied houses, one in each block.
3. Both houses in Column-E are vacant. Each of Column-D and Column-F has at least one occupied house.
4. There is only one house with parking space in Block YY.

30. How many houses are vacant in Block XX?

31. Which of the following houses is definitely occupied?

A A1

B D2

C B1

D F2

32. Which of the following options best describes the number of vacant houses in Row-2?

A Exactly 3

B Either 3 or 4

C Exactly 2

D Either 2 or 3

33. What is the maximum possible quoted price (in lakhs of Rs.) for a vacant house in Column-E?

34. Which house in Block YY has parking space?

A E1

B F2

C E2

D F1

Instructions [35 - 39]

Five restaurants, coded R1, R2, R3, R4 and R5 gave integer ratings to five gig workers -

Ullas, Vasu, Waman, Xavier and Yusuf, on a scale of 1 to 5.

The means of the ratings given by R1, R2, R3, R4 and R5 were 3.4, 2.2, 3.8, 2.8 and 3.4 respectively.

The summary statistics of these ratings for the five workers is given below.

	Ullas	Vasu	Waman	Xavier	Yusuf
Mean rating	2.2	3.8	3.4	3.6	2.6
Median rating	2	4	4	4	3
Modal rating	2	4	5	5	1 and 4
Range of rating*	3	3	4	4	3

* Range of ratings is defined as the difference between the maximum and minimum ratings awarded to a worker.

The following is partial information about ratings of 1 and 5 awarded by the restaurants to the workers.

(a) R1 awarded a rating of 5 to Waman, as did R2 to Xavier, R3 to Waman and Xavier, and R5 to Vasu.

(b) R1 awarded a rating of 1 to Ullas, as did R2 to Waman and Yusuf, and R3 to Yusuf.

35. How many individual ratings cannot be determined from the above information?

36. To how many workers did R2 give a rating of 4?

37. What rating did R1 give to Xavier?

38. What is the median of the ratings given by R3 to the five workers?

39. Which among the following restaurants gave its median rating to exactly one of the workers?

A R2

B R5

C R4

D R3

Instructions [40 - 44]

Faculty members in a management school can belong to one of four departments - Finance and Accounting (F&A), Marketing and Strategy (M&S), Operations and Quants (O&Q) and Behaviour and Human Resources (B&H). The numbers of faculty members in F&A, M&S, O&Q and B&H departments are 9, 7, 5 and 3 respectively.

Prof. Pakrasi, Prof. Qureshi, Prof. Ramaswamy and Prof. Samuel are four members of the school's faculty who were candidates for the post of the Dean of the school. Only one of the candidates was from O&Q.

Every faculty member, including the four candidates, voted for the post. In each department, all the faculty members who were not candidates voted for the same candidate. The rules for the election are listed below.

1. There cannot be more than two candidates from a single department.
2. A candidate cannot vote for himself/herself.
3. Faculty members cannot vote for a candidate from their own department.

After the election, it was observed that Prof. Pakrasi received 3 votes, Prof. Qureshi received 14 votes, Prof. Ramaswamy received 6 votes and Prof. Samuel received 1 vote. Prof. Pakrasi voted for Prof. Ramaswamy, Prof. Qureshi for Prof. Samuel, Prof. Ramaswamy for Prof. Qureshi and Prof. Samuel for Prof. Pakrasi.

40. Which two candidates can belong to the same department?

A Prof. Pakrasi and Prof. Qureshi

B Prof. Pakrasi and Prof. Samuel

C Prof. Qureshi and Prof. Ramaswamy

D Prof. Ramaswamy and Prof. Samuel

41. Which of the following can be the number of votes that Prof. Qureshi received from a single department?

A 7

B 6

C 8

D 9

42. If Prof. Samuel belongs to B&H, which of the following statements is/are true?
Statement A: Prof. Pakrasi belongs to M&S.
Statement B: Prof. Ramaswamy belongs to O&Q

A Neither statement A nor statement B

B Only statement B

C Only statement A

D Both statements A and B

43. What best can be concluded about the candidate from O&Q?

A It was Prof. Samuel.

B It was either Prof. Ramaswamy or Prof. Samuel.

C It was Prof. Ramaswamy.

D It was either Prof. Pakrasi or Prof. Qureshi.

44. Which of the following statements is/are true?

Statement A: Non-candidates from M&S voted for Prof. Qureshi.
Statement B: Non-candidates from F&A voted for Prof. Qureshi.

A Both statements A and B

B Only statement B

C Only statement A

D Neither statement A nor statement B

Answers

25.**0**	26.**200**	27.**D**	28.**B**	29.**A**	30.**3**	31.**C**	32.**D**
33.**21**	34.**A**	35.**0**	36.**0**	37.**3**	38.**4**	39.**C**	40.**A**
41.**D**	42.**D**	43.**B**	44.**B**				

Explanations

25.**0**
It is given that the applications are scheduled for processing in twenty 15-minute slots starting at 9:00 am and ending at 2:00 pm. Ten applications are scheduled in each slot.

Hence, the total number of applicants = (20*10) = 200. It is also known that 50% of the applications were US applications, and the number of US applications was the same in all the slots. The same was true for the other three categories.

Hence, the number of total number of US applicants = (200*50%) = 100, and the number of US applicants in each slot = (100/20) = 5

It is also known that Ira, Vijay, and Nandini were scheduled for Schengen visa processing in that order. They had a 9:15 am slot. Since the number of Schengen applicants was the same in all the slots, it implies the number of Schengen applicants in each slot is at least 3.

Similarly, it is given that Mahira and Osman were scheduled in the 9:30 am slot on that day for visa processing in the Others category, which implies the number of other category applicants in each slot is at least 2. Since the number of total applicants in each slot is 10, this implies the number of Schengen and other applicants in each slot is 3, and 2, respectively. Hence, the number of UK applicants is 0 in each slot.

It is also known that the number of total counters is 10, among which four are dedicated to US applications, and two each for UK applications, Schengen applications, and Others applications. It is given that each US and UK application requires 10 minutes of processing time, and Vijay was called to a counter at 9:25 am. (Who is 5th in the queue). It can only be possible when the processing time of Schengen applications is 12.5 minutes.

US (10 min)				Schengen (12.5 min)		Others (5 min process)	
End Time				End Time		End Time	
C1	C2	C3	C4	C1	C2	C1	C2
9.10	9.10	9.10	9.10	9.12.30	9.12.30	9.05	9.05
9.20	9.25	9.25	9.25	9.25	9.32.30	9.20	9.20
9.30	9.35	9.40	9.40	9.37.30	9.45	9.35	9.35
9.40	9.45	9.50	9.55				
9.55	9.55	10.00	10.05				
10.10	10.10	10.10	10.15				
10.20							

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From the table, we can say that the total number of UK applicants in each slot is zero, Hence, the total number of applicants is zero.

26. **200**

It is given that the applications are scheduled for processing in twenty 15-minute slots starting at 9:00 am and ending at 2:00 pm. Ten applications are scheduled in each slot.

Hence, the total number of applicants = (20*10) = 200. It is also known that 50% of the applications were US applications, and the number of US applications was the same in all the slots. The same was true for the other three categories.

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End Time				End Time		End Time	
C1	C2	C3	C4	C1	C2	C1	C2
9.10	9.10	9.10	9.10	9.12.30	9.12.30	9.05	9.05
9.20	9.25	9.25	9.25	9.25	9.32.30	9.20	9.20
9.30	9.35	9.40	9.40	9.37.30	9.45	9.35	9.35
9.40	9.45	9.50	9.55				
9.55	9.55	10.00	10.05				
10.10	10.10	10.10	10.15				
10.20							

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For the other applicants, the time taken to process one application is at most 5 minutes, which implies the total time taken to process 40 applications is at most (40*5) = 200 minutes.

27. **D**

It is given that the applications are scheduled for processing in twenty 15-minute slots starting at 9:00 am and ending at 2:00 pm. Ten applications are scheduled in each slot.

Hence, the total number of applicants = (20*10) = 200. It is also known that 50% of the applications were US applications, and the number of US applications was the same in all the slots. The same was true for the other three categories.

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End Time				End Time		End Time	
C1	C2	C3	C4	C1	C2	C1	C2
9.10	9.10	9.10	9.10	9.12.30	9.12.30	9.05	9.05
9.20	9.25	9.25	9.25	9.25	9.32.30	9.20	9.20
9.30	9.35	9.40	9.40	9.37.30	9.45	9.35	9.35
9.40	9.45	9.50	9.55				
9.55	9.55	10.00	10.05				
10.10	10.10	10.10	10.15				
10.20							

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Nandini's position was sixth in the queue in the Schengen Applications. From the table, we can see that her process will end at 9.45 am.

The correct option is D

28. **B**

It is given that the applications are scheduled for processing in twenty 15-minute slots starting at 9:00 am and ending at 2:00 pm. Ten applications are scheduled in each slot.

Hence, the total number of applicants = (20*10) = 200. It is also known that 50% of the applications were US applications, and the number of US applications was the same in all the slots. The same was true for the other three categories.

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End Time				End Time		End Time	
C1	C2	C3	C4	C1	C2	C1	C2
9.10	9.10	9.10	9.10	9.12.30	9.12.30	9.05	9.05
9.20	9.25	9.25	9.25	9.25	9.32.30	9.20	9.20
9.30	9.35	9.40	9.40	9.37.30	9.45	9.35	9.35
9.40	9.45	9.50	9.55				
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10.10	10.10	10.10	10.15				
10.20							

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Let's check the options.

Option A: The application process of Osman was completed before 9:45 am. => True (Since he is 5th in the queue, his process will end at 9.35 am)

Option B: The application process of Mahira started after Nandini's. => The application process for Mahira starts at 9.30 am, and the application process for Nandini starts at 9.32.30 am => False.

The correct option is B

29. **A**

It is given that the applications are scheduled for processing in twenty 15-minute slots starting at 9:00 am and ending at 2:00 pm. Ten applications are scheduled in each slot.

Hence, the total number of applicants = (20*10) = 200. It is also known that 50% of the applications were US applications, and the number of US applications was the same in all the slots. The same was true for the other three categories.

Hence, the number of total number of US applicants = (200*50%) = 100, and the number of US applicants in each slot = (100/20) = 5

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It is also known that the number of total counters is 10, among which four are dedicated to US applications, and two each for UK applications, Schengen applications, and Others applications. It is given that each US and UK application requires 10 minutes of processing time, and Vijay was called to a counter at 9:25 am. (Who is 5th in the queue). It can only be possible when the processing time of Schengen applications is 12.5 minutes.

US (10 min)				Schengen (12.5 min)		Others (5 min process)	
End Time				End Time		End Time	
C1	C2	C3	C4	C1	C2	C1	C2
9.10	9.10	9.10	9.10	9.12.30	9.12.30	9.05	9.05
9.20	9.25	9.25	9.25	9.25	9.32.30	9.20	9.20
9.30	9.35	9.40	9.40	9.37.30	9.45	9.35	9.35
9.40	9.45	9.50	9.55				
9.55	9.55	10.00	10.05				
10.10	10.10	10.10	10.15				
10.20							

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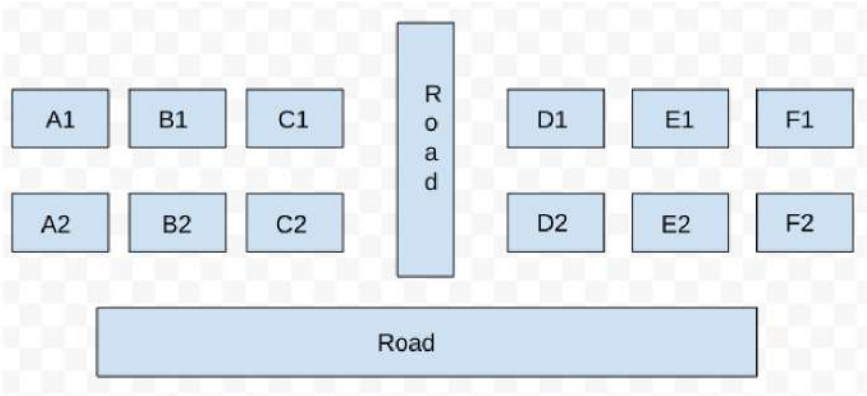
From the table, we can see that the first slot takes 20 minutes to complete, and after that remaining 19 slots take 15 minutes each to complete the US application process.

Hence, the total time taken = 20+15*19 = 305 minutes = 5 hrs 5 minutes. Hence, the time will be (9 am + 5hrs 5 minutes) = 2.05 pm

The correct option is A

30. **3**



It is given that some of the houses are occupied. The remaining ones are vacant and are the only ones available for sale.

The base price of a vacant house is Rs. 10 lakhs if the house does not have a parking space, and Rs. 12 lakhs if it does. The quoted price (in lakhs of Rs.) of a vacant house is calculated as (base price) + 5 × (road adjacency value) + 3 × (neighbor count).

It is also known that the maximum quoted price of a house in Block XX is Rs. 24 lakhs

Hence, there can be two cases for the maximum quoted price of a house in block XX.

Case 1: House with parking space:

=> 12+5a+3b = 24 => 5a+3b = 12 (a = road adjacency value, b= neighbor count)

The only value for which the equation satisfies is (a = 0, and b=4). But the value of b can't be 4 because the maximum neighbor count can be at most 3.

Hence, case 1 is invalid.

Case 2: House without parking space:

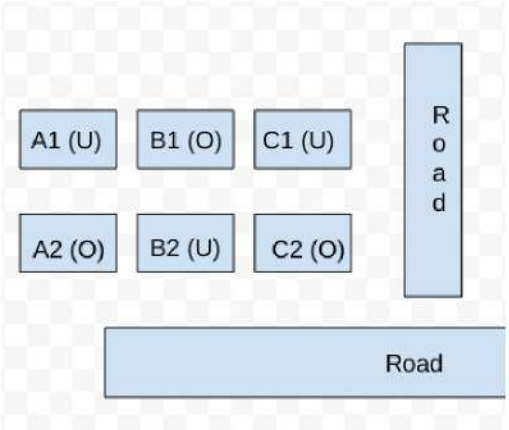
=> 10+5a+3b = 24 => 5a+3b = 14

=> (a, b) = (1, 3)

Hence, the house must have 3 neighbors and 1 road connected to it. Hence, the only possible case is B2. Therefore, the neighbor houses of B2, which are (B1, A2, and C2) are occupied.

It is known that Row 1 has two occupied houses, one in each block. Since B1 is already occupied, it implies A1, and C1 are vacant.

Hence, the configuration of block XX is given below: (Where U = Unoccupied/ Vacant, and U = Occupied)



Now for block YY, we know that both houses in Column E are vacant. Each of Column-D and Column-F has at least one occupied house. There is only one house with parking space in Block YY.

It is also known that the minimum quoted price of a house in block YY is Rs. 15 lakhs, and one such house is in Column E.

Case 1: The minimum quoted house is E2:

We know that the road adjacency of E2 is 1, hence we can calculate whether the house has parking space or not, and the neighbor count (b)

If the house has parking space, then: 12+5*1+3*b = 15 => 3b = -2 (which is not possible)

Hence, the house has no parking space => 10+5*1+3b = 15 => b = 0

b = 0 implies all the neighbor house of E2 is vacant, which are (E1, D2, and F2).

It is known that each of Column-D and Column-F has at least one occupied house, which implies D1, and F1 must be occupied.

But D1 and F1 can't be occupied together since the total number of occupied houses in Row 1 is 2 (one in each block).

Hence, This case is invalid.

Case 2: The minimum quoted house is E1:

We know that the road adjacency of E1 is 0, hence we can calculate whether the house has parking space or not, and the neighbor count (b).

i) If the house has no working space, then: 10+5*0+3b = 15 => b = 5/3 (this is not possible since b has to be an integer value)

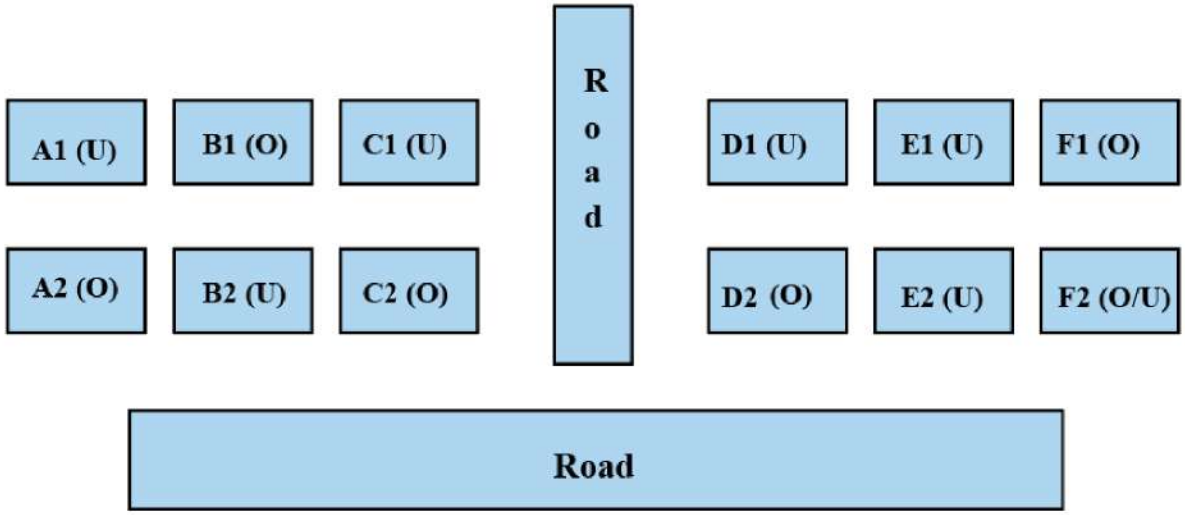
Hence, the house has parking space => 12+5*0+3b = 15 => b = 1 => One neighbor house is occupied among D1 and F1.

Let's take the case of house D1 being occupied and F1 being empty. In that case, the value of house F1 would be 10(there is no parking space)+ (5*0) + (3*the number of neighbours)
Here, even if we take the number of neighbors to be 1, which is the maximum for F1 in this case, the value of F1 would be a maximum of 13. This is lower than the lowest-value house in block YY. Therefore, F1 cannot be empty.

Since F1 is occupied and we know that there is only one house occupied in row 1 of each block, D1 becomes unoccupied. D2 becomes occupied because it is given in the question that each of Column-D and Column-F has at least one occupied house.
Here, the value of D1 is 18 as D2 is occupied.

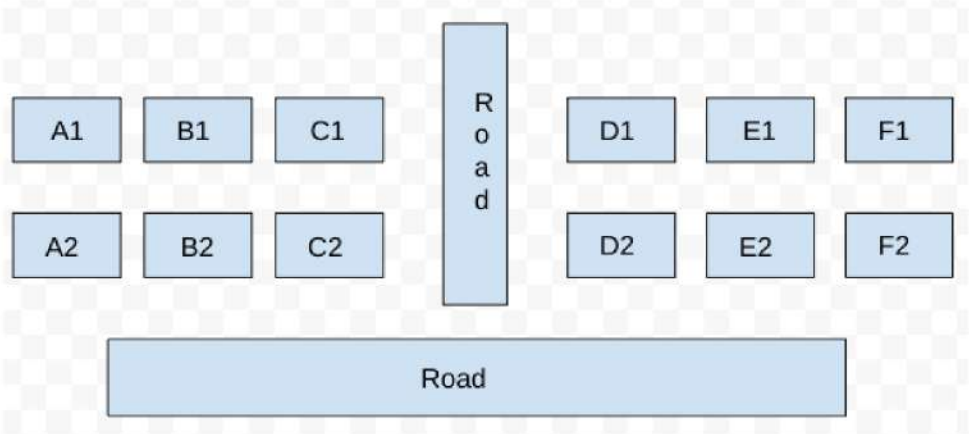
We do not know the status of house F2.

Therefore, thefinal diagram is given below:



From the diagram, we can see that 3 houses are vacant in block XX.

31. **C**



It is given that some of the houses are occupied. The remaining ones are vacant and are the only ones available for sale.

The base price of a vacant house is Rs. 10 lakhs if the house does not have a parking space, and Rs. 12 lakhs if it does. The quoted price (in lakhs of Rs.) of a vacant house is calculated as (base price) + 5 × (road adjacency value) + 3 × (neighbor count).

It is also known that the maximum quoted price of a house in Block XX is Rs. 24 lakhs

Hence, there can be two cases for the maximum quoted price of a house in block XX.

Case 1: House with parking space:

=> 12+5a+3b = 24 => 5a+3b = 12 (a = road adjacency value, b= neighbor count)

The only value for which the equation satisfies is (a = 0, and b=4). But the value of b can't be 4 because the maximum neighbor count can be at most 3.

Hence, case 1 is invalid.

Case 2: House without parking space:

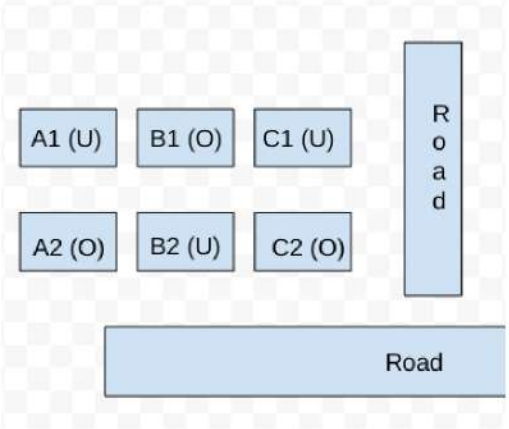
=> 10+5a+3b = 24 => 5a+3b = 14

=> (a, b) = (1, 3)

Hence, the house must have 3 neighbors and 1 road connected to it. Hence, the only possible case is B2. Therefore, the neighbor houses of B2, which are (B1, A2, and C2) are occupied.

It is known that Row 1 has two occupied houses, one in each block. Since B1 is already occupied, it implies A1, and C1 are vacant.

Hence, the configuration of block XX is given below: (Where U = Unoccupied/ Vacant, and U = Occupied)



Now for block YY, we know that both houses in Column E are vacant. Each of Column-D and Column-F has at least one occupied house. There is only one house with parking space in Block YY.

It is also known that the minimum quoted price of a house in block YY is Rs. 15 lakhs, and one such house is in Column E.

Case 1: The minimum quoted house is E2:

We know that the road adjacency of E2 is 1, hence we can calculate whether the house has parking space or not, and the neighbor count (b)

If the house has parking space, then: 12+5*1+3*b = 15 => 3b = -2 (which is not possible)

Hence, the house has no parking space => 10+5*1+3b = 15 => b = 0

b = 0 implies all the neighbor house of E2 is vacant, which are (E1, D2, and F2).

It is known that each of Column-D and Column-F has at least one occupied house, which implies D1, and F1 must be occupied.

But D1 and F1 can't be occupied together since the total number of occupied houses in Row 1 is 2 (one in each block).

Hence, This case is invalid.

Case 2: The minimum quoted house is E1:

We know that the road adjacency of E1 is 0, hence we can calculate whether the house has parking space or not, and the neighbor count (b).

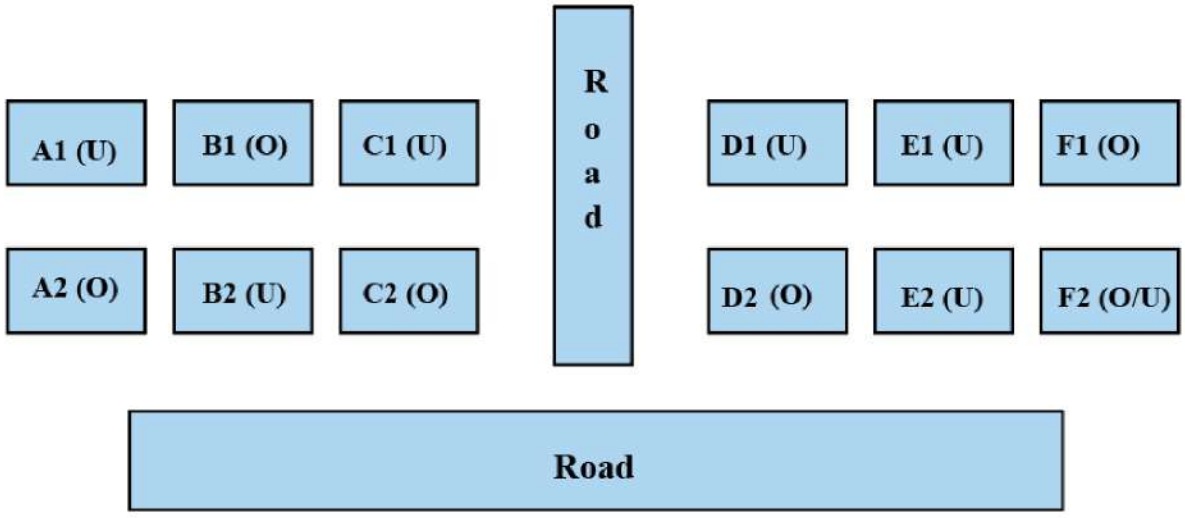
i) If the house has no working space, then: 10+5*0+3b = 15 => b = 5/3 (this is not possible since b has to be an integer value)

Hence, the house has parking space => 12+5*0+3b = 15 => b = 1 => One neighbor house is occupied among D1 and F1.

Let's take the case of house D1 being occupied and F1 being empty. In that case, the value of house F1 would be 10(there is no parking space)+ (5*0) + (3*the number of neighbours)
Here, even if we take the number of neighbors to be 1, which is the maximum for F1 in this case, the value of F1 would be a maximum of 13. This is lower than the lowest-value house in block YY. Therefore, F1 cannot be empty.
Since F1 is occupied and we know that there is only one house occupied in row 1 of each block, D1 becomes unoccupied. D2 becomes occupied because it is given in the question that each of Column-D and Column-F has at least one occupied house.
Here, the value of D1 is 18 as D2 is occupied.

We do not know the status of house F2.

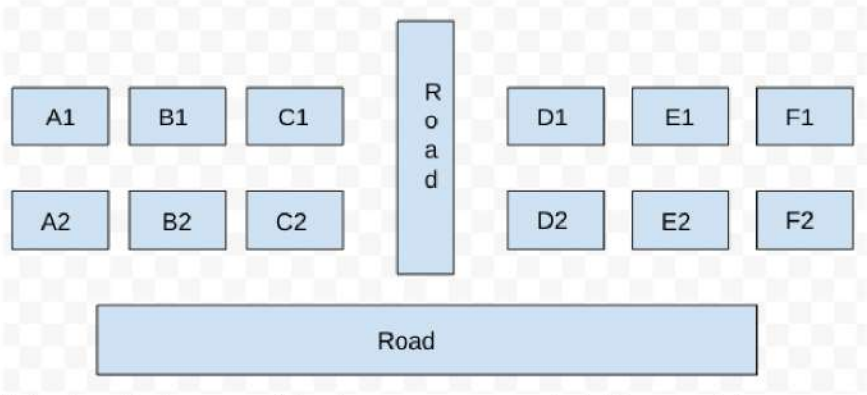
Therefore, the final diagram is given below:



From the diagram, we can see that B1 and D2 are definitely occupied. The rest of the options are not definitely correct.

The correct options are both B and C.

32. **D**



It is given that some of the houses are occupied. The remaining ones are vacant and are the only ones available for sale.

The base price of a vacant house is Rs. 10 lakhs if the house does not have a parking space, and Rs. 12 lakhs if it does. The quoted price (in lakhs of Rs.) of a vacant house is calculated as (base price) + 5 × (road adjacency value) + 3 × (neighbor count).

It is also known that the maximum quoted price of a house in Block XX is Rs. 24 lakhs

Hence, there can be two cases for the maximum quoted price of a house in block XX.

Case 1: House with parking space:

=> 12+5a+3b = 24 => 5a+3b = 12 (a = road adjacency value, b= neighbor count)

The only value for which the equation satisfies is (a = 0, and b=4). But the value of b can't be 4 because the maximum neighbor count can be at most 3.

Hence, case 1 is invalid.

Case 2: House without parking space:

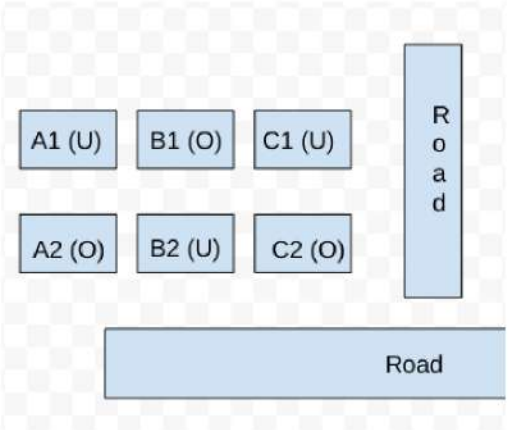
=> 10+5a+3b = 24 => 5a+3b = 14

=> (a, b) = (1, 3)

Hence, the house must have 3 neighbors and 1 road connected to it. Hence, the only possible case is B2. Therefore, the neighbor houses of B2, which are (B1, A2, and C2) are occupied.

It is known that Row 1 has two occupied houses, one in each block. Since B1 is already occupied, it implies A1, and C1 are vacant.

Hence, the configuration of block XX is given below: (Where U = Unoccupied/ Vacant, and U = Occupied)



Now for block YY, we know that both houses in Column E are vacant. Each of Column-D and Column-F has at least one occupied house. There is only one house with parking space in Block YY.

It is also known that the minimum quoted price of a house in block YY is Rs. 15 lakhs, and one such house is in Column E.

Case 1: The minimum quoted house is E2:

We know that the road adjacency of E2 is 1, hence we can calculate whether the house has parking space or not, and the neighbor count (b)

If the house has parking space, then: 12+5*1+3*b = 15 => 3b = -2 (which is not possible)

Hence, the house has no parking space => 10+5*1+3b = 15 => b = 0

b = 0 implies all the neighbor house of E2 is vacant, which are (E1, D2, and F2).

It is known that each of Column-D and Column-F has at least one occupied house, which implies D1, and F1 must be occupied.

But D1 and F1 can't be occupied together since the total number of occupied houses in Row 1 is 2 (one in each block).

Hence, This case is invalid.

Case 2: The minimum quoted house is E1:

We know that the road adjacency of E1 is 0. Hence, we can calculate whether the house has parking space or not, and the neighbor count (b).

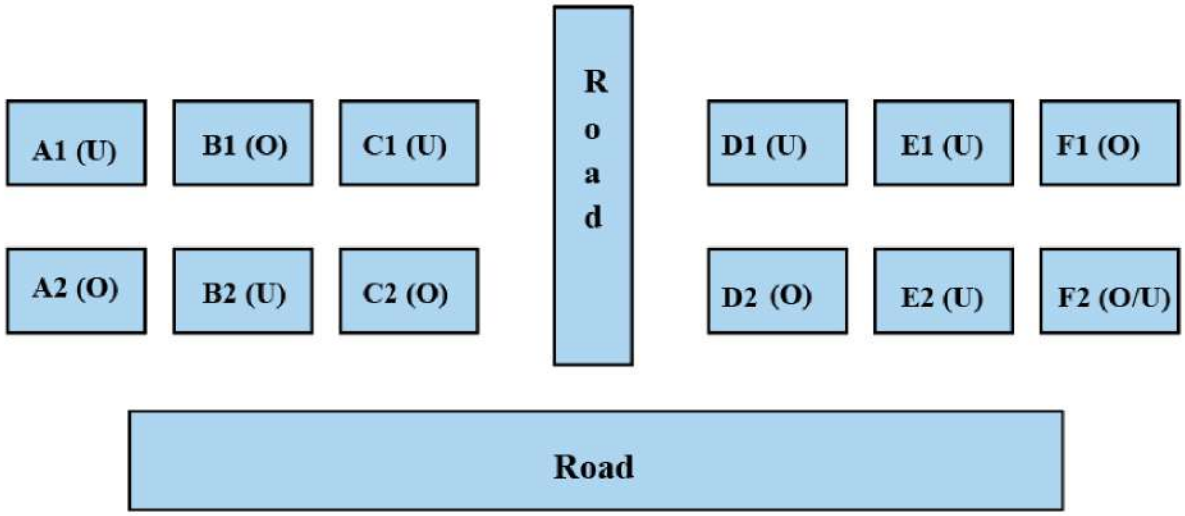
i) If the house has no working space, then: 10+5*0+3b = 15 => b = 5/3 (this is not possible since b has to be an integer value)

Hence, the house has parking space => 12+5*0+3b = 15 => b = 1 => One neighbor house is occupied among D1 and F1.

Let's take the case of house D1 being occupied and F1 being empty. In that case, the value of house F1 would be 10(there is no parking space)+ (5*0) + (3*the number of neighbours)
Here, even if we take the number of neighbors to be 1, which is the maximum for F1 in this case, the value of F1 would be a maximum of 13. This is lower than the lowest-value house in block YY. Therefore, F1 cannot be empty.
Since F1 is occupied and we know that there is only one house occupied in row 1 of each block, D1 becomes unoccupied. D2 becomes occupied because it is given in the question that each of Column-D and Column-F has at least one occupied house.
Here, the value of D1 is 18 as D2 is occupied.

We do not know the status of house F2.

Therefore, thefinal diagram is given below:

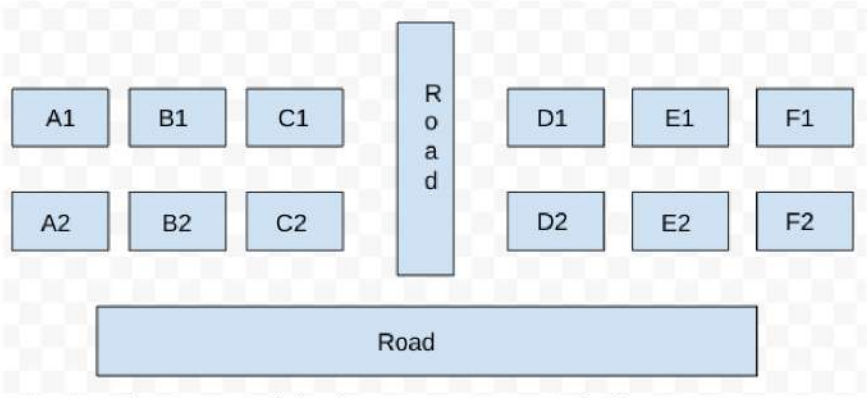


From the diagram, we can say that the number of vacant houses in Row 2 in Block XX is 1, and the number of vacant houses in Row 2 in Block YY is either 1 or 2.

Hence, the total number of vacant houses is either 2 or 3

The correct option is D

33.**21**



It is given that some of the houses are occupied. The remaining ones are vacant and are the only ones available for sale.

The base price of a vacant house is Rs. 10 lakhs if the house does not have a parking space, and Rs. 12 lakhs if it does. The quoted price (in lakhs of Rs.) of a vacant house is calculated as (base price) + 5 × (road adjacency value) + 3 × (neighbor count).

It is also known that the maximum quoted price of a house in Block XX is Rs. 24 lakhs

Hence, there can be two cases for the maximum quoted price of a house in block XX.

Case 1: House with parking space:

=> 12+5a+3b = 24 => 5a+3b = 12 (a = road adjacency value, b= neighbor count)

The only value for which the equation satisfies is (a = 0, and b=4). But the value of b can't be 4 because the maximum neighbor count can be at most 3.

Hence, case 1 is invalid.

Case 2: House without parking space:

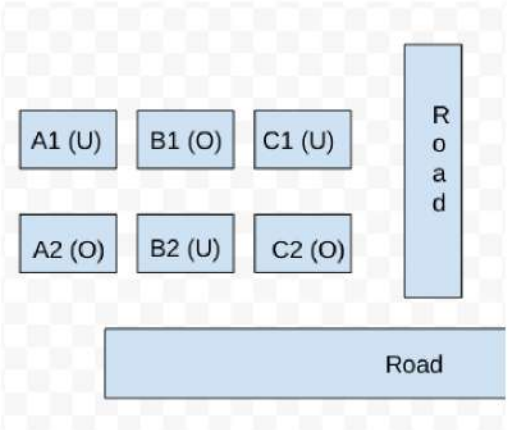
=> 10+5a+3b = 24 => 5a+3b = 14

=> (a, b) = (1, 3)

Hence, the house must have 3 neighbors and 1 road connected to it. Hence, the only possible case is B2. Therefore, the neighbor houses of B2, which are (B1, A2, and C2) are occupied.

It is known that Row 1 has two occupied houses, one in each block. Since B1 is already occupied, it implies A1, and C1 are vacant.

Hence, the configuration of block XX is given below: (Where U = Unoccupied/ Vacant, and U = Occupied)



Now for block YY, we know that both houses in Column E are vacant. Each of Column-D and Column-F has at least one occupied house. There is only one house with parking space in Block YY.

It is also known that the minimum quoted price of a house in block YY is Rs. 15 lakhs, and one such house is in Column E.

Case 1: The minimum quoted house is E2:

We know that the road adjacency of E2 is 1, hence we can calculate whether the house has parking space or not, and the neighbor count (b)

If the house has parking space, then: 12+5*1+3*b = 15 => 3b = -2 (which is not possible)

Hence, the house has no parking space => 10+5*1+3b = 15 => b = 0

b = 0 implies all the neighbor house of E2 is vacant, which are (E1, D2, and F2).

It is known that each of Column-D and Column-F has at least one occupied house, which implies D1, and F1 must be occupied.

But D1 and F1 can't be occupied together since the total number of occupied houses in Row 1 is 2 (one in each block).

Hence, This case is invalid.

Case 2: The minimum quoted house is E1:

We know that the road adjacency of E1 is 0, hence we can calculate whether the house has parking space or not, and the neighbor count (b).

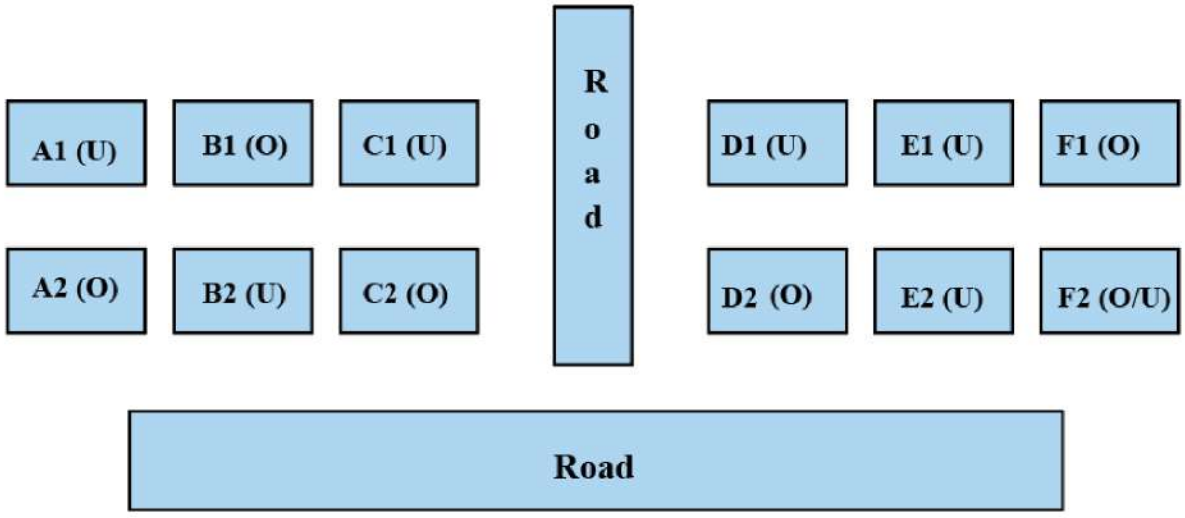
i) If the house has no working space, then: 10+5*0+3b = 15 => b = 5/3 (this is not possible since b has to be an integer value)

Hence, the house has parking space => 12+5*0+3b = 15 => b = 1 => One neighbor house is occupied among D1 and F1.

Let's take the case of house D1 being occupied and F1 being empty. In that case, the value of house F1 would be 10(there is no parking space)+ (5*0) + (3*the number of neighbours)
Here, even if we take the number of neighbors to be 1, which is the maximum for F1 in this case, the value of F1 would be a maximum of 13. This is lower than the lowest-value house in block YY. Therefore, F1 cannot be empty.
Since F1 is occupied and we know that there is only one house occupied in row 1 of each block, D1 becomes unoccupied. D2 becomes occupied because it is given in the question that each of Column-D and Column-F has at least one occupied house.
Here, the value of D1 is 18 as D2 is occupied.

We do not know the status of house F2.

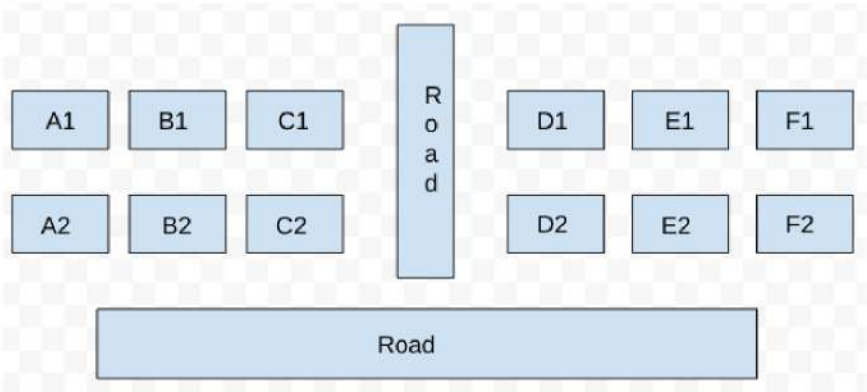
Therefore, thefinal diagram is given below:



From the diagram, the vacant house with the maximum possible quoted price in column E is E2 when F2 is occupied.

The maximum possible quoted price of E2 is 10+5*1+3*2 = 21 Lacs. (E2 has no parking space because E1 has the parking space, and it is given that there is only one house with parking space in Block YY.)

34.**A**



It is given that some of the houses are occupied. The remaining ones are vacant and are the only ones available for sale.

The base price of a vacant house is Rs. 10 lakhs if the house does not have a parking space, and Rs. 12 lakhs if it does. The quoted price (in lakhs of Rs.) of a vacant house is calculated as (base price) + 5 × (road adjacency value) + 3 × (neighbor count).

It is also known that the maximum quoted price of a house in Block XX is Rs. 24 lakhs

Hence, there can be two cases for the maximum quoted price of a house in block XX.

Case 1: House with parking space:

=> 12+5a+3b = 24 => 5a+3b = 12 (a = road adjacency value, b= neighbor count)

The only value for which the equation satisfies is (a = 0, and b=4). But the value of b can't be 4 because the maximum neighbor count can be at most 3.

Hence, case 1 is invalid.

Case 2: House without parking space:

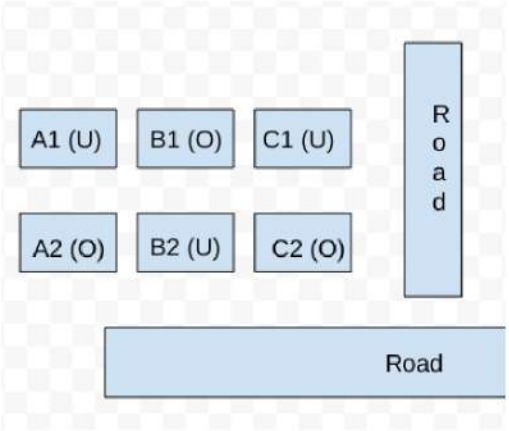
=> 10+5a+3b = 24 => 5a+3b = 14

=> (a, b) = (1, 3)

Hence, the house must have 3 neighbors and 1 road connected to it. Hence, the only possible case is B2. Therefore, the neighbor houses of B2, which are (B1, A2, and C2) are occupied.

It is known that Row 1 has two occupied houses, one in each block. Since B1 is already occupied, it implies A1, and C1 are vacant.

Hence, the configuration of block XX is given below: (Where U = Unoccupied/ Vacant, and U = Occupied)



Now for block YY, we know that both houses in Column E are vacant. Each of Column-D and Column-F has at least one occupied house. There is only one house with parking space in Block YY.

It is also known that the minimum quoted price of a house in block YY is Rs. 15 lakhs, and one such house is in Column E.

Case 1: The minimum quoted house is E2:

We know that the road adjacency of E2 is 1, hence we can calculate whether the house has parking space or not, and the neighbor count (b)

If the house has parking space, then: 12+5*1+3*b = 15 => 3b = -2 (which is not possible)

Hence, the house has no parking space => 10+5*1+3b = 15 => b = 0

b = 0 implies all the neighbor house of E2 is vacant, which are (E1, D2, and F2).

It is known that each of Column-D and Column-F has at least one occupied house, which implies D1, and F1 must be occupied.

But D1 and F1 can't be occupied together since the total number of occupied houses in Row 1 is 2 (one in each block).

Hence, This case is invalid.

Case 2: The minimum quoted house is E1:

We know that the road adjacency of E1 is 0, hence we can calculate whether the house has parking space or not, and the neighbor count (b).

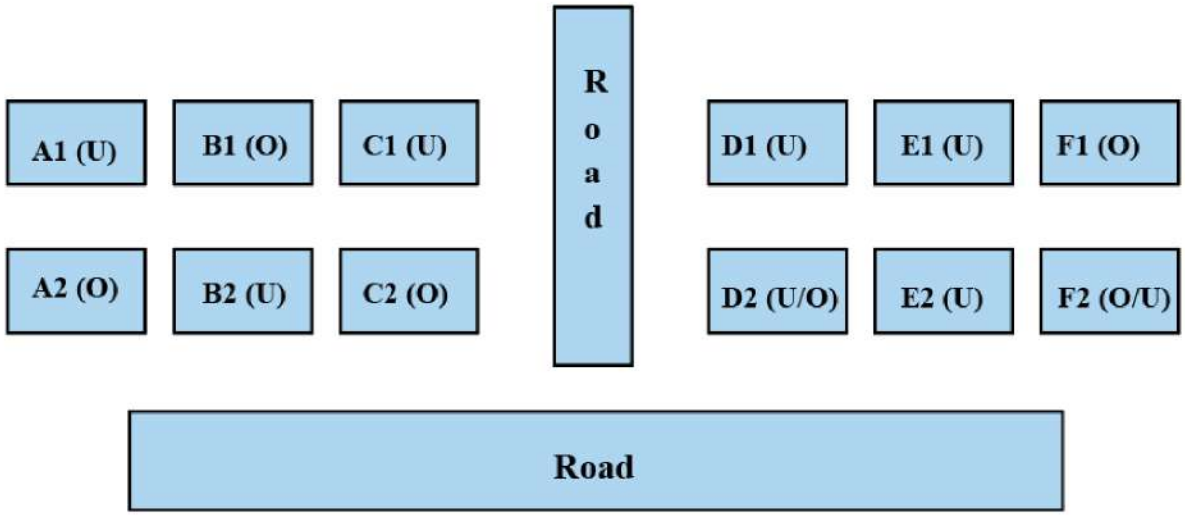
i) If the house has no working space, then: 10+5*0+3b = 15 => b = 5/3 (this is not possible since b has to be an integer value)

Hence, the house has parking space => 12+5*0+3b = 15 => b = 1 => One neighbor house is occupied among D1 and F1.

Let's take the case that house D1 is occupied and F1 is empty. In that case, the value of house F1 would be 10(there is no parking space)+ (5*0) + (3*the number of neighbours)
Here, even if we take the number of neighbours to be 1, which is maximum for F1 in this case, the value of F1 would be a maximum of 13. This is lower than the lowest value house in block YY. Therefore, F1 cannot be empty.
Let us see the other scenario of D1 being unoccupied.
Here, the value of D1 can be 15 or 18 depending on if D2 is unoccupied or occupied respectively.

We do not know the status of houses D2 and F2.

Therefore, thefinal diagram is given below:



From the diagram, we can see that E1 has the parking space (case 2).

The correct option is A

35.**0**
Given that the means of the ratings given by R1, R2, R3, R4 and R5 were 3.4, 2.2, 3.8, 2.8 and 3.4 respectively.

=> The sum of ratings given by R1, R2, R3 R4, R5 are 5*means = 17, 11, 19, 14, and 17 respectively.

Similarly the sum of ratings received by U, V, W, X and Y are 5*means = 11, 19, 17, 18, and 13 respectively.

Also capturing the absolute data given in the partial information (a) and (b) and representing as a table, we get:

	R1	R2	R3	R4	R5	Total
U	1					11
V					5	19
W	5	1	5			17
X		5	5			18
Y		1	1			13
Total	17	11	19	14	17	

Now,

Consider U

Given median = 2, mode = 2 and range = 3

=> His ratings should be of the form 1, a , 2, b, 4 => 1 + 2 + 4 + a + b = 11 => a + b = 4. For mode = 2 => a = b = 2

=> U's ratings are 1, 2, 2, 2, 4.

Consider V

Given median = 4, mode = 4 and range = 3

=> His ratings should be of the form 2, a, 4, b, 5 => 2 + 4 + 5 + a + b = 19 => a + b = 8 => For mode = 4 => a = b = 4

=> V's ratings are 2, 4, 4, 4, 5.

Consider W

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => 1 + a + 4 + 5 + 5 = 17 => a = 2

=> W's ratings are 1, 2, 4, 5, 5.

Consider X

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => a + 1 + 4 + 5 + 5 = 18 => a = 3

=> X's ratings are 1, 3, 4, 5, 5

Consider Y

Given median = 3, mode = 1 & 4, Range = 3

=> His ratings are 1, 1, 3, 4, 4.

Capturing this data in the table, we get:

	R1	R2	R3	R4	R5	Total	Entries
U	1					11	2,2,2,4
V					5	19	2,4,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R3 => The two missing entries should add up to 19 - 1 - 5 - 5 = 8, (only possibility is 4 + 4)
=> We can fill the row "U" and 4 in the row "V"

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V			4		5	19	2,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R2 => Missing entry should be 11 - 2 - 1 - 5 - 1 = 2

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Consider column R1, the missing elements should add up to 17 - 5 - 4 - 1 = 7 (3 + 4 or 4 + 3) ----(1)

Consider R5, the missing elements should add up to 10 => 2 + 4 + 4 or 4 + 3 + 3 (not possible) as (1) requires a 3.

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X		5	5		4	18	1,3
Y		1	1		4	13	3,4
Total	17	11	19	14	17		

Now, we can fill column R1 as 3 + 4 and the remaining in column R4 and we can get the complete table

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X	3	5	5	1	4	18	
Y	4	1	1	3	4	13	
Total	17	11	19	14	17		

=> All ratings can be determined uniquely => 0.

36.**0**

Given that the means of the ratings given by R1, R2, R3, R4 and R5 were 3.4, 2.2, 3.8, 2.8 and 3.4 respectively.

=> The sum of ratings given by R1, R2, R3 R4, R5 are 5*means = 17, 11, 19, 14, and 17 respectively.

Similarly the sum of ratings received by U, V, W, X and Y are 5*means = 11, 19, 17, 18, and 13 respectively.

Also capturing the absolute data given in the partial information (a) and (b) and representing as a table, we get:

	R1	R2	R3	R4	R5	Total
U	1					11
V					5	19
W	5	1	5			17
X		5	5			18
Y		1	1			13
Total	17	11	19	14	17	

Now,

Consider U

Given median = 2, mode = 2 and range = 3

=> His ratings should be of the form 1, a , 2, b, 4 => 1 + 2 + 4 + a + b = 11 => a + b = 4. For mode = 2 => a = b = 2

=> U's ratings are 1, 2, 2, 2, 4.

Consider V

Given median = 4, mode = 4 and range = 3

=> His ratings should be of the form 2, a, 4, b, 5 => 2 + 4 + 5 + a + b = 19 => a + b = 8 => For mode = 4 => a = b = 4

=> V's ratings are 2, 4, 4, 4, 5.

Consider W

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => 1 + a + 4 + 5 + 5 = 17 => a = 2

=> W's ratings are 1, 2, 4, 5, 5.

Consider X

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => a + 1 + 4 + 5 + 5 = 18 => a = 3

=> X's ratings are 1, 3, 4, 5, 5

Consider Y

Given median = 3, mode = 1 & 4, Range = 3

=> His ratings are 1, 1, 3, 4, 4.

Capturing this data in the table, we get:

	R1	R2	R3	R4	R5	Total	Entries
U	1					11	2,2,2,4
V					5	19	2,4,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R3 => The two missing entries should add up to 19 - 1 - 5 - 5 = 8, (only possibility is 4 + 4)
=> We can fill the row "U" and 4 in the row "V"

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V			4		5	19	2,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R2 => Missing entry should be 11 - 2 - 1 - 5 - 1 = 2

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Consider column R1, the missing elements should add up to 17 - 5 - 4 - 1 = 7 (3 + 4 or 4 + 3) ----(1)

Consider R5, the missing elements should add up to 10 => 2 + 4 + 4 or 4 + 3 + 3 (not possible) as (1) requires a 3.

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X		5	5		4	18	1,3
Y		1	1		4	13	3,4
Total	17	11	19	14	17		

Now, we can fill column R1 as 3 + 4 and the remaining in column R4 and we can get the complete table

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X	3	5	5	1	4	18	
Y	4	1	1	3	4	13	
Total	17	11	19	14	17		

R2 gave ratings of 1, 1, 2, 2, 5 => He gave 4 to 0 workers => 0 is the answer.

37.**3**

Given that the means of the ratings given by R1, R2, R3, R4 and R5 were 3.4, 2.2, 3.8, 2.8 and 3.4 respectively.

=> The sum of ratings given by R1, R2, R3 R4, R5 are 5*means = 17, 11, 19, 14, and 17 respectively.

Similarly the sum of ratings received by U, V, W, X and Y are 5*means = 11, 19, 17, 18, and 13 respectively.

Also capturing the absolute data given in the partial information (a) and (b) and representing as a table, we get:

	R1	R2	R3	R4	R5	Total
U	1					11
V					5	19
W	5	1	5			17
X		5	5			18
Y		1	1			13
Total	17	11	19	14	17	

Now,

Consider U

Given median = 2, mode = 2 and range = 3

=> His ratings should be of the form 1, a , 2, b, 4 => 1 + 2 + 4 + a + b = 11 => a + b = 4. For mode = 2 => a = b = 2

=> U's ratings are 1, 2, 2, 2, 4.

Consider V

Given median = 4, mode = 4 and range = 3

=> His ratings should be of the form 2, a, 4, b, 5 => 2 + 4 + 5 + a + b = 19 => a + b = 8 => For mode = 4 => a = b = 4

=> V's ratings are 2, 4, 4, 4, 5.

Consider W

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => 1 + a + 4 + 5 + 5 = 17 => a = 2

=> W's ratings are 1, 2, 4, 5, 5.

Consider X

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => a + 1 + 4 + 5 + 5 = 18 => a = 3

=> X's ratings are 1, 3, 4, 5, 5

Consider Y

Given median = 3, mode = 1 & 4, Range = 3

=> His ratings are 1, 1, 3, 4, 4.

Capturing this data in the table, we get:

	R1	R2	R3	R4	R5	Total	Entries
U	1					11	2,2,2,4
V					5	19	2,4,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R3 => The two missing entries should add up to 19 - 1 - 5 - 5 = 8, (only possibility is 4 + 4) => We can fill the row "U" and 4 in the row "V"

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V			4		5	19	2,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R2 => Missing entry should be 11 - 2 - 1 - 5 - 1 = 2

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Consider column R1, the missing elements should add up to 17 - 5 - 4 - 1 = 7 (3 + 4 or 4 + 3) ----(1)

Consider R5, the missing elements should add up to 10 => 2 + 4 + 4 or 4 + 3 + 3 (not possible) as (1) requires a 3.

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X		5	5		4	18	1,3
Y		1	1		4	13	3,4
Total	17	11	19	14	17		

Now, we can fill column R1 as 3 + 4 and the remaining in column R4 and we can get the complete table

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X	3	5	5	1	4	18	
Y	4	1	1	3	4	13	
Total	17	11	19	14	17		

=> From the table, we can see that R1 gave a rating of 3 to Xavier.

38.**4**

Given that the means of the ratings given by R1, R2, R3, R4 and R5 were 3.4, 2.2, 3.8, 2.8 and 3.4 respectively.

=> The sum of ratings given by R1, R2, R3 R4, R5 are 5*means = 17, 11, 19, 14, and 17 respectively.

Similarly the sum of ratings received by U, V, W, X and Y are 5*means = 11, 19, 17, 18, and 13 respectively.

Also capturing the absolute data given in the partial information (a) and (b) and representing as a table, we get:

	R1	R2	R3	R4	R5	Total
U	1					11
V					5	19
W	5	1	5			17
X		5	5			18
Y		1	1			13
Total	17	11	19	14	17	

Now,

Consider U

Given median = 2, mode = 2 and range = 3

=> His ratings should be of the form 1, a , 2, b, 4 => 1 + 2 + 4 + a + b = 11 => a + b = 4. For mode = 2 => a = b = 2

=> U's ratings are 1, 2, 2, 2, 4.

Consider V

Given median = 4, mode = 4 and range = 3

=> His ratings should be of the form 2, a, 4, b, 5 => 2 + 4 + 5 + a + b = 19 => a + b = 8 => For mode = 4 => a = b = 4

=> V's ratings are 2, 4, 4, 4, 5.

Consider W

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => 1 + a + 4 + 5 + 5 = 17 => a = 2

=> W's ratings are 1, 2, 4, 5, 5.

Consider X

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => a + 1 + 4 + 5 + 5 = 18 => a = 3

=> X's ratings are 1, 3, 4, 5, 5

Consider Y

Given median = 3, mode = 1 & 4, Range = 3

=> His ratings are 1, 1, 3, 4, 4.

Capturing this data in the table, we get:

	R1	R2	R3	R4	R5	Total	Entries
U	1					11	2,2,2,4
V					5	19	2,4,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R3 => The two missing entries should add up to 19 - 1 - 5 - 5 = 8, (only possibility is 4 + 4) => We can fill the row "U" and 4 in the row "V"

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V			4		5	19	2,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R2 => Missing entry should be 11 - 2 - 1 - 5 - 1 = 2

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Consider column R1, the missing elements should add up to 17 - 5 - 4 - 1 = 7 (3 + 4 or 4 + 3) ----(1)

Consider R5, the missing elements should add up to 10 => 2 + 4 + 4 or 4 + 3 + 3 (not possible) as (1) requires a 3.

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X		5	5		4	18	1,3
Y		1	1		4	13	3,4
Total	17	11	19	14	17		

Now, we can fill column R1 as 3 + 4 and the remaining in column R4 and we can get the complete table

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X	3	5	5	1	4	18	
Y	4	1	1	3	4	13	
Total	17	11	19	14	17		

=> Ratings give by R3 are 1, 4, 4, 5, 5 => Median = 4.

39.**C**

Given that the means of the ratings given by R1, R2, R3, R4 and R5 were 3.4, 2.2, 3.8, 2.8 and 3.4 respectively.

=> The sum of ratings given by R1, R2, R3 R4, R5 are 5*means = 17, 11, 19, 14, and 17 respectively.

Similarly the sum of ratings received by U, V, W, X and Y are 5*means = 11, 19, 17, 18, and 13 respectively.

Also capturing the absolute data given in the partial information (a) and (b) and representing as a table, we get:

	R1	R2	R3	R4	R5	Total
U	1					11
V					5	19
W	5	1	5			17
X		5	5			18
Y		1	1			13
Total	17	11	19	14	17	

Now,

Consider U

Given median = 2, mode = 2 and range = 3

=> His ratings should be of the form 1, a , 2, b, 4 => 1 + 2 + 4 + a + b = 11 => a + b = 4. For mode = 2 => a = b = 2

=> U's ratings are 1, 2, 2, 2, 4.

Consider V

Given median = 4, mode = 4 and range = 3

=> His ratings should be of the form 2, a, 4, b, 5 => 2 + 4 + 5 + a + b = 19 => a + b = 8 => For mode = 4 => a = b = 4

=> V's ratings are 2, 4, 4, 4, 5.

Consider W

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => 1 + a + 4 + 5 + 5 = 17 => a = 2

=> W's ratings are 1, 2, 4, 5, 5.

Consider X

Given median = 4, mode = 5 and range = 4

=> His ratings should be of the form 1, a, 4, 5, 5 => a + 1 + 4 + 5 + 5 = 18 => a = 3

=> X's ratings are 1, 3, 4, 5, 5

Consider Y

Given median = 3, mode = 1 & 4, Range = 3

=> His ratings are 1, 1, 3, 4, 4.

Capturing this data in the table, we get:

	R1	R2	R3	R4	R5	Total	Entries
U	1					11	2,2,2,4
V					5	19	2,4,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R3 => The two missing entries should add up to 19 - 1 - 5 - 5 = 8, (only possibility is 4 + 4)
=> We can fill the row "U" and 4 in the row "V"

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V			4		5	19	2,4,4
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Now, consider column R2 => Missing entry should be 11 - 2 - 1 - 5 - 1 = 2

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5			17	2,4
X		5	5			18	1,3,4
Y		1	1			13	3,4,4
Total	17	11	19	14	17		

Consider column R1, the missing elements should add up to 17 - 5 - 4 - 1 = 7 (3 + 4 or 4 + 3) ----(1)

Consider R5, the missing elements should add up to 10 => 2 + 4 + 4 or 4 + 3 + 3 (not possible) as (1) requires a 3.

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X		5	5		4	18	1,3
Y		1	1		4	13	3,4
Total	17	11	19	14	17		

Now, we can fill column R1 as 3 + 4 and the remaining in column R4 and we can get the complete table

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	11	
V	4	2	4	4	5	19	
W	5	1	5	4	2	17	
X	3	5	5	1	4	18	
Y	4	1	1	3	4	13	
Total	17	11	19	14	17		

=> R2 median rating is 2 => given to 2 workers

=> R5 median rating is 4 => given to 2 workers

=> R4 median rating is 3 => given to only 1 worker.

=> R3 median rating is 4 => given to 2 workers.

Explanation [40 - 44]:

Now, we know there is only 1 candidate from OQ, which means that the number of non-candidate voters in OQ will be 4.

We also know that the non-candidates in a particular department voted as a block, and we also know that the least number of non-candidate voters in a particular department can be 1 (BH, 3-2 faculty).

Now, we also know that R got 5 votes from non-candidates.

Now we can write 5 as

i)5

ii)4+1

iii)3+2

40.**A**

Considering case (i) 4+1. This is only possible when there is 1 candidate from OQ, and there are 2 candidates from BH. This implies that the number of candidates in FA and MQ is 1. Now, if we consider FA and MQ and put only 1 candidate there, it implies that there are 15 non-candidate voters between them. Now we know this is not possible since the maximum number of non-candidate voters a candidate can get is 13. (Please note that non-candidates of a particular department vote as a block).

On similar grounds, we can eliminate Case (iii) as it also implies there is only 1 candidate in FA and MQ.

Now, considering Case (i), we know that 5+0 will happen only one when there are 5 non-candidates in a single department. This is only possible in MS (Out of 7, there will be 2 candidates and 5 non-candidates).

So we can conclude that MS has 2 candidates and that they voted Prof. R.....(i)

We also know that Prof P got 2 votes from Non-candidates. This is only possible when BH has 1 candidate.

So, we can conclude that the number of professors in FA, MS, OQ, BH is 0,2,1,1

	FA	MS	OQ	BH
Total number of voters	9	7	5	3
Number of candidates	0	2	1	1
Number of non-candidates	9	5	4	2

Thus, we get the following table:

	P	Q	R	S
Total Votes	3	14	6	1
Candidate Vote	1(S)	1(R)	1(P)	1(Q)
Votes from non candidates	2	13	5	0
	BH	FA+OQ	MS	

Now, if we consider Department MS, we know that there are 2 candidates from MS and R can't be one of them as the people in that department voted for him..... (3 rd condition).

So the possible combinations of candidates in MS are (P,Q), (Q,S), (P,S).

Now we also know that no one can vote for a candidate in their own department, so we can eliminate (P,S) and (Q,S) as we know that S voted for P and Q voted for S).

So we can infer that P and Q are from MS.

	FA	MS	OQ	BH
Case 1	0	P, Q	R	S
Case 2	0	P, Q	S	R

Now, among the given options, Only Option A is true. Therefore, Option A is the correct answer.

41. **D**

Considering case (i) 4+1. This is only possible when there is 1 candidate from OQ, and there are 2 candidates from BH. This implies that the number of candidates in FA and MQ is 1. Now, if we consider FA and MQ and put only 1 candidate there, it implies that there are 15 non-candidate voters between them. Now, we know this is not possible since the maximum number of non-candidate voters a candidate can get is 13. (Please note that non-candidates of a particular department vote as a block).

On similar grounds, we can eliminate Case (iii) as it also implies there is only 1 candidate in FA and MQ.

Now, considering Case (i), we know that 5+0 will happen only once when there are 5 non-candidates in a single department. This is only possible in MS (Out of 7, there will be 2 candidates and 5 non-candidates).

So we can conclude that MS has 2 candidates and that they voted Prof. R.....(i)

We also know that Prof P got 2 votes from Non-candidates. This is only possible when BH has 1 candidate.

So, we can conclude that the number of professors in FA, MS, OQ, BH is 0,2,1,1

	FA	MS	OQ	BH
Total number of voters	9	7	5	3
Number of candidates	0	2	1	1
Number of non-candidates	9	5	4	2

Thus, we get the following table:

	P	Q	R	S
Total Votes	3	14	6	1
Candidate Vote	1(S)	1(R)	1(P)	1(Q)
Votes from non candidates	2	13	5	0
	BH	FA+OQ	MS	

Now, if we consider Department MS, we know that there are 2 candidates from MS and R can't be one of them as the people in that department voted for him..... (3 rd condition).

So, the possible combinations of candidates in MS are (P,Q), (Q,S), (P,S).

Now we also know that no one can vote for a candidate in their own department, so we can eliminate (P,S) and (Q,S) as we know that S voted for P and Q voted for S).

So, we can infer that P and Q are from MS.

	FA	MS	OQ	BH
Case 1	0	P, Q	R	S
Case 2	0	P, Q	S	R

Now, we can see that the number of votes that Prof Qureshi received from a single department can be 9 or 5 (if R is from OQ) or 4 (if R is not from OQ).

So, among the options, only Option D can be true. Therefore, Option D is the correct answer.

42. **D**

Considering case (i) 4+1. This is only possible when there is 1 candidate from OQ, and there are 2 candidates from BH. This implies that the number of candidates in FA and MQ is 1. Now, if we consider FA and MQ and put only 1 candidate there, it implies that there are 15 non-candidate voters between them. Now we know this is not possible since the maximum number of non-candidate voters a candidate can get is 13. (Please note that non-candidates of a particular department vote as a block).

On similar grounds, we can eliminate Case (iii) as it also implies there is only 1 candidate in FA and MQ.

Now, considering Case (i), we know that 5+0 will happen only one when there are 5 non-candidates in a single department. This is only possible in MS (Out of 7, there will be 2 candidates and 5 non-candidates).

So we can conclude that MS has 2 candidates and that they voted Prof. R.....(i)

We also know that Prof P got 2 votes from Non-candidates. This is only possible when BH has 1 candidate.

So, we can conclude that the number of professors in FA, MS, OQ, BH is 0,2,1,1

	FA	MS	OQ	BH
Total number of voters	9	7	5	3
Number of candidates	0	2	1	1
Number of non-candidates	9	5	4	2

Thus, we get the following table:

	P	Q	R	S
Total Votes	3	14	6	1
Candidate Vote	1(S)	1(R)	1(P)	1(Q)
Votes from non candidates	2	13	5	0
	BH	FA+OQ	MS	

Now, if we consider Department MS, we know that there are 2 candidates from MS and R can't be one of them as the people in that department voted for him..... (3 rd condition).

So the possible combinations of candidates in MS are (P,Q), (Q,S), (P,S).

Now we also know that no one can vote for a candidate in their own department, so we can eliminate (P,S) and (Q,S) as we know that S voted for P and Q voted for S).

So we can infer that P and Q are from MS.

	FA	MS	OQ	BH
Case 1	0	P, Q	R	S
Case 2	0	P, Q	S	R

We have been told Prof Samuel belongs to B&H. So we have to consider only Case 1. In Case 1 we can see that Prof Prakash belongs to MS and Prof Ramaswamy belongs to OQ.

Therefore, both the statements are true.

So, the correct answer is Option D

43. **B**

Considering case (i) 4+1. This is only possible when there is 1 candidate from OQ, and there are 2 candidates from BH. This implies that the number of candidates in FA and MQ is 1. Now, if we consider FA and MQ and put only 1 candidate there, it implies that there are 15 non-candidate voters between them. Now we know this is not possible since the maximum number of non-candidate voters a candidate can get is 13. (Please note that non-candidates of a particular department vote as a block).

On similar grounds, we can eliminate Case (iii) as it also implies there is only 1 candidate in FA and MQ.

Now, considering Case (i), we know that 5+0 will happen only one when there are 5 non-candidates in a single department. This is only possible in MS (Out of 7, there will be 2 candidates and 5 non-candidates).

So we can conclude that MS has 2 candidates and that they voted Prof. R.....(i)

We also know that Prof P got 2 votes from Non-candidates. This is only possible when BH has 1 candidate.

So, we can conclude that the number of professors in FA, MS, OQ, BH is 0,2,1,1

	FA	MS	OQ	BH
Total number of voters	9	7	5	3
Number of candidates	0	2	1	1
Number of non-candidates	9	5	4	2

Thus, we get the following table:

	P	Q	R	S
Total Votes	3	14	6	1
Candidate Vote	1(S)	1(R)	1(P)	1(Q)
Votes from non candidates	2	13	5	0
	BH	FA+OQ	MS	

Now, if we consider Department MS, we know that there are 2 candidates from MS and R can't be one of them as the people in that department voted for him..... (3 rd condition).

So the possible combinations of candidates in MS are (P,Q), (Q,S), (P,S).

Now we also know that no one can vote for a candidate in their own department, so we can eliminate (P,S) and (Q,S) as we know that S voted for P and Q voted for S).

So we can infer that P and Q are from MS.

	FA	MS	OQ	BH
Case 1	0	P, Q	R	S
Case 2	0	P, Q	S	R

From the 2 cases, we can see that the candidate from OQ can either be Prof Ramaswamy or Prof Samuel.

Therefore, the correct answer is Option B.

44.**B**

Considering case (i) 4+1. This is only possible when there is 1 candidate from OQ, and there are 2 candidates from BH. This implies that the number of candidates in FA and MQ is 1. Now, if we consider FA and MQ and put only 1 candidate there, it implies that there are 15 non-candidate voters between them. Now we know this is not possible since the maximum number of non-candidate voters a candidate can get is 13. (Please note that non-candidates of a particular department vote as a block).

On similar grounds, we can eliminate Case (iii) as it also implies there is only 1 candidate in FA and MQ.

Now, considering Case (i), we know that 5+0 will happen only one when there are 5 non-candidates in a single department. This is only possible in MS (Out of 7, there will be 2 candidates and 5 non-candidates).

So we can conclude that MS has 2 candidates and that they voted Prof. R.....(i)

We also know that Prof P got 2 votes from Non-candidates. This is only possible when BH has 1 candidate.

So, we can conclude that the number of professors in FA, MS, OQ, BH is 0,2,1,1

	FA	MS	OQ	BH
Total number of voters	9	7	5	3
Number of candidates	0	2	1	1
Number of non-candidates	9	5	4	2

Thus, we get the following table:

	P	Q	R	S
Total Votes	3	14	6	1
Candidate Vote	1(S)	1(R)	1(P)	1(Q)
Votes from non candidates	2	13	5	0
	BH	FA+OQ	MS	

Now, if we consider Department MS, we know that there are 2 candidates from MS and R can't be one of them as the people in that department voted for him..... (3 rd condition).

So the possible combinations of candidates in MS are (P,Q), (Q,S), (P,S).

Now we also know that no one can vote for a candidate in their own department, so we can eliminate (P,S) and (Q,S) as we know that S voted for P and Q voted for S).

So we can infer that P and Q are from MS.

	FA	MS	OQ	BH
Case 1	0	P, Q	R	S
Case 2	0	P, Q	S	R

Since Prof Qureshi belongs to MS, non-candidates from MS can't vote for him. We can see that the non-candidates from FA voted for him. So, only statement B is true. Therefore, the correct answer is Option B.