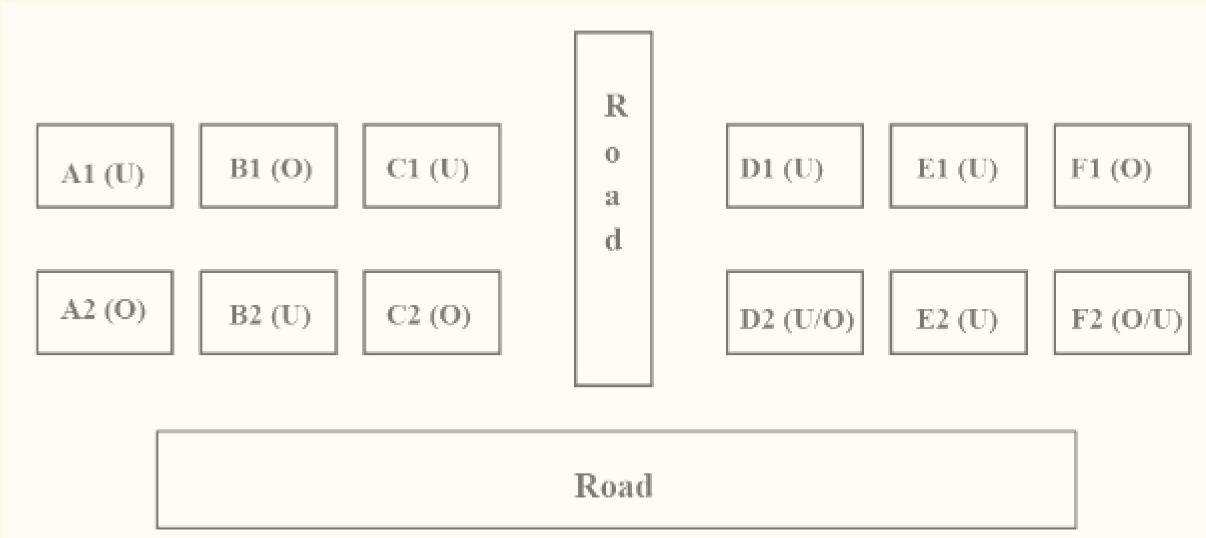
CAT 2023 Slot 1 DILR Solution

Ques 1. How many houses are vacant in Block XX?
Answer: 3
Solu. 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) + 5x (road adjacency value) + 3 x (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, the final diagram is given below:



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

Ques 2. Which of the following houses is definitely occupied?

A. A1
B. D2
C. B1
D. F2

Solu. 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) + 5x (road adjacency value) + 3 : (neighbor count).
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Hence, there can be two cases for the maximum quoted price of a house in block XX.
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Hence, case 1 is invalid.
Case 2: House without parking space: Rightarrow10+5a+3b=24 Rightarrow 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)
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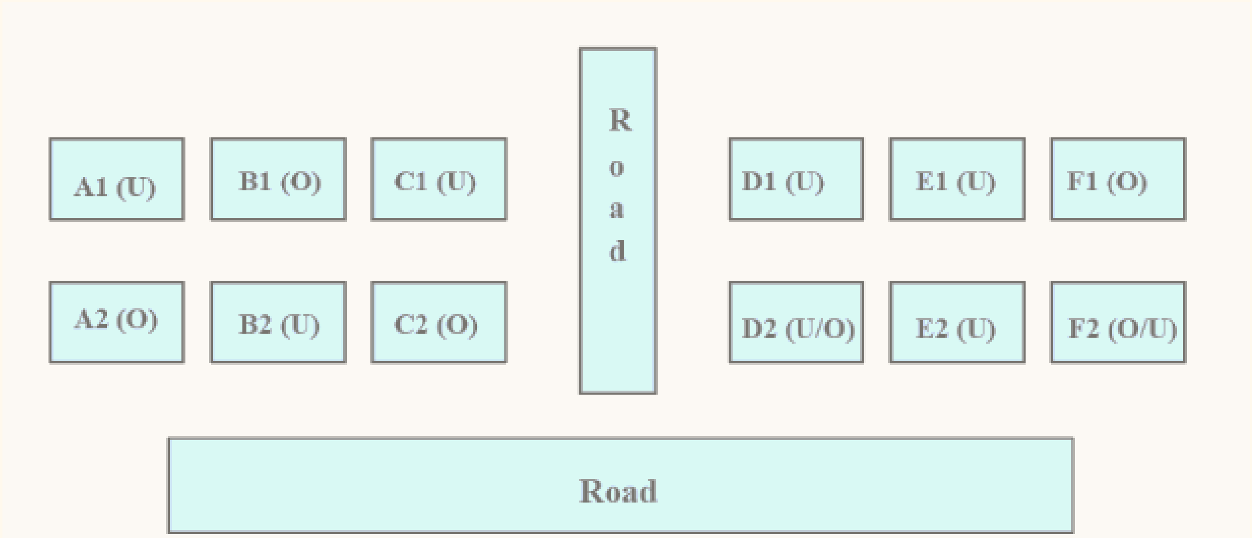
It is also known that the minimum quoted price of a house in block YY is Rs. 15 lakhs, and one such house is in Column E.
Case 1: The minimum quoted house is E2:
We know that the road adjacency of E2 is 1, hence we can calculate whether the house has parking space or not, and the neighbor count (b)
If 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, the final diagram is given below:



From the diagram, we can see that B1 is definitely occupied. The rest opinions are not definitely correct.
The correct option is C

Ques 3. 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

Solu. 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) + 5x (road adjacency value) + 3 x (neighbor count).
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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 Rightarrow5a+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 Rightarrow 5a + 3b = 14 Rightarrow (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, A 2, 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, the final 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

Ques 4. What is the maximum possible quoted price (in lakhs of Rs.) for a vacant house in Column-E?

Solu. 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) + 5x (road adjacency value) + 3 x (neighbor count).
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Case 2: House without parking space:
=> 10+5a+3b24 => 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.

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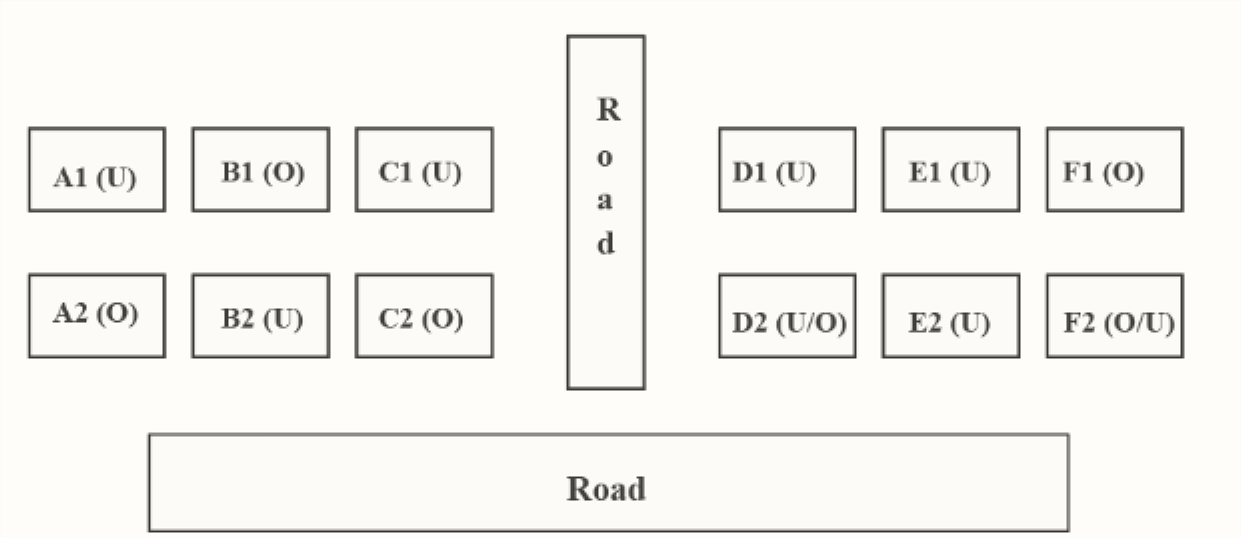
Therefore, the final diagram is given below:



From the diagram, the vacant house with the maximum possible quoted price in column E is E2 when both D2 and F2 are 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.)

Ques 5. Which house in Block YY has parking space?
A E1
B F2
C E2
D F1

Solu. 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 x (road adjacency value) + 3 x (neighbor count).
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Hence, the house must have 3 neighbors and 1 road connected to it.
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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)
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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+3b15 => 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.
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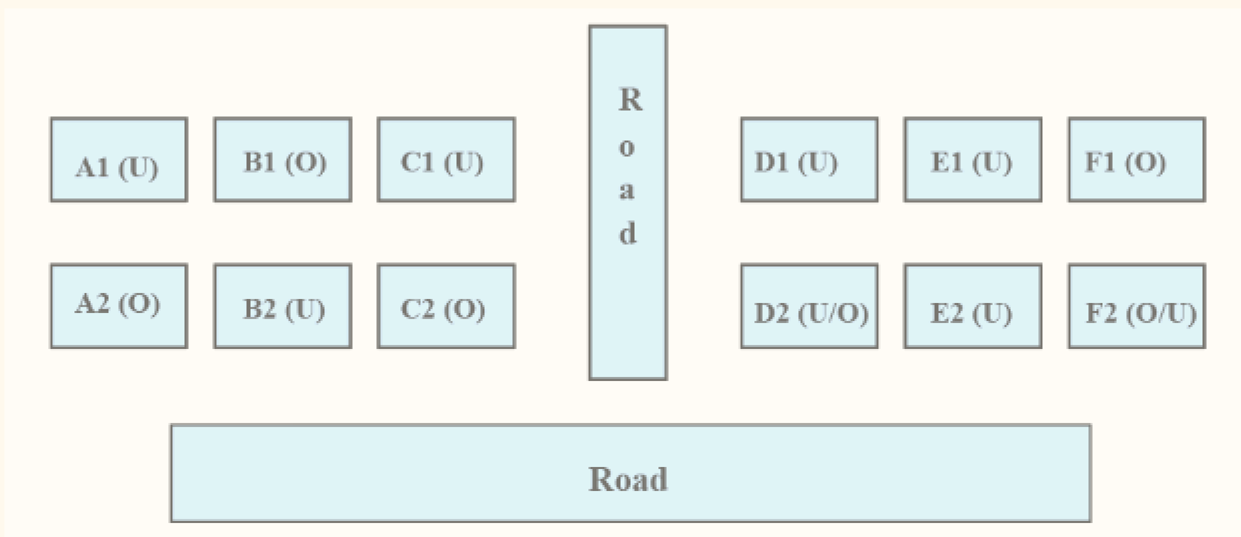

From the diagram, we can see that E1 has the parking space (case 2).
The correct option is A

Ques 6. 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

Solu. A

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

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 (PS) 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.

Ques 7. Which of the following can be the number of votes that Prof. Qureshi received from a single department?
A7
B6
C8
D9

Solu. As 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
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.
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So, the possible combinations of candidates in MS are (P,Q), (Q,S), (PS).
Now we also know that no one can vote for a candidate in their own department, so we can eliminate (PS) 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.

Ques 8. 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

Solu. D
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
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).
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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 (PS) 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

Ques 9. 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.

Solu. B
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

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 (PS) 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.

Ques 10. 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

Solu. B
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
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 (1), 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.......(1)
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.

Ques 15. Which among the following restaurants gave its median rating to exactly one of the workers?
A R2
B R5
C R4
D R3

Solu. 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, R 2, 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 Rightarrow 1 + 2 + 4 + a + b =11 Rightarrow 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 Rightarrow 2 + 4 + 5 + a + b =19 Rightarrow 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 Rightarrow 1 + a + 4 + 5 + 5 =17 Rightarrow 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.

Ques 18. 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

Solu. 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							

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. Hence, at 9.20 am, there are exactly four free counters. Out of these 4, 2 is the UK counter, and the other two are other counters. (Since the US counters and Schengen Counters were either processing applications, or had finished processing one and were ready to start processing the next.)
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

Ques 20. 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

Solu. 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
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							

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. Hence, at 9.20 am, there are exactly four free counters. Out of these 4, 2 is the UK counter, and the other two are other counters. (Since the US counters and Schengen Counters were either processing applications, or had finished processing one and were ready to start processing the next.)

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