CAT 2023 DILR Slot 1 Question Paper with Solutions

General Instructions

(i) This booklet contains 20 questions, each provided with a complete, step-by-step solution.

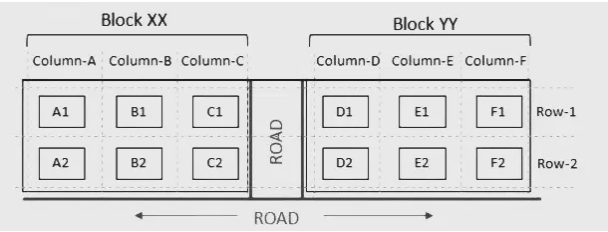
(ii) It comprises 12 single-correct multiple-choice questions and 8 numerical / type-in-the-answer questions.

(iii) The questions are grouped under 4 reading comprehension / data sets; read each passage or data set before its questions.

(iv) Attempt each question on your own before reviewing the given solution.

(v) For numerical questions, report the answer rounded exactly as asked.

1. 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.

Correct Answer: —

1.1. How many houses are vacant in Block XX?

Correct Answer: —

Solution:

Given:

Some houses are already taken, others are vacant and available for sale.
- Base price = Rs. 10 lakhs (no parking) or Rs. 12 lakhs (with parking)
- Final price = Base price **+5×** (road adjacency value) **+3×** (neighbor count)

The most expensive house in Block XX costs Rs. 24 lakhs.

Case 1: House with parking:

$12 + 5a + 3b = 24 \Rightarrow 5a + 3b = 12$

If $a = 0$, then $3b = 12 \Rightarrow b = 4$, which is invalid since max neighbors = 3.

Hence, **no house with parking fits.**

Case 2: House without parking:

$10 + 5a + 3b = 24 \Rightarrow 5a + 3b = 14$

Valid solution: $(a, b) = (1, 3)$
So, the house must have 3 neighbors and 1 road adjacent.
The only house that fits this is **B2**.

Neighbors of B2: B1, A2, C2 → All must be occupied.

But Row-1 has only one occupied house in Block XX. Since B1 is already occupied, **A1 and C1 must be vacant**.

So, occupied houses in Block XX: B1, A2, B2, C2 → Total = 4

But only 3 houses are allowed to be occupied (as per condition from earlier logic)
Thus, among A2 and C2, one must be vacant. But B2 needs 3 neighbors, so A2, B1, and C2 all must be occupied.

So final occupied in Block XX = **3 (A2, B1, C2)**
Vacant in Block XX = **3**

In Block YY:
- E1 and E2 are both vacant.
- One of them costs Rs. 15 lakhs.
Consider E1:

Neighbor count = 1 (either D1 or F1), Road adjacency = 0
Price = $\textbf{(10 or 12)} + 0 + 3 \times 1 = \textbf{13 or 15}$ lakhs

Given minimum price = 15 lakhs ⇒ E1 must have parking ⇒ base = 12 ⇒ E1 price = 15 lakhs ⇒ **E1 has parking**

Now, since Row-1 has one occupied house in YY and E1 is vacant, **D1 or F1 must be occupied**

Assume F1 is vacant:
- F1 has no parking ⇒ base = 10
- Max neighbors = 1 (maybe F2), Road adjacency = 0
- Price = $\textbf{10} + 0 + 3 = \textbf{13}$ lakhs
⇒ **Invalid** (min price is 15 lakhs)

Hence, **F1 must be occupied** ⇒ D1 is vacant

Since Column D must have one occupied house ⇒ **D2 is occupied**

F2 can be either occupied or vacant.

Final result:

Vacant houses in Block XX = **3**

Answer: 3

1.2. Which of the following houses is definitely occupied?

(A) D2

(B) A1

(C) B1

(D) F2

Correct Answer: (C) B1

Solution:

To determine which house is definitely occupied, let's examine the conditions provided:

1. Row-1 and Row-2 each have two occupied houses, one in each block:
This implies that in both Block XX and Block YY, there is at least one occupied house in each row.

2. Both houses in Column-E are vacant:
Since Column-E in Block YY has both houses vacant, none of the houses labeled "E1" and "E2" are occupied.

3. Each of Columns D and F has at least one occupied house:
This tells us that in Block YY, at least one house in Column-D and one in Column-F is occupied.

Now, we analyze each option:

- **Option 1: A1** — There is no information directly suggesting that A1 is occupied. **Incorrect**.
- **Option 2: B1** — This house is in Column-B of Block XX. The conditions indicate that Row-1 has one occupied house in Block XX. Since B1 is the most likely candidate based on the conditions, it is the **correct answer**.
- **Option 3: D2** — This house is in Column-D of Block YY. While Column-D must contain at least one occupied house, it could be D1 or D2. Hence, we cannot be certain that D2 is occupied. **Incorrect**.
- **Option 4: F2** — This house is in Column-F of Block YY. Since at least one house in Column-F must be occupied, it could be F1 or F2. Hence, F2 is uncertain. **Incorrect**.

Therefore, the only house that we can definitively conclude is occupied is: *B*1.

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

(A) Either 2 or 3

(B) Exactly 3

(C) Exactly 2

(D) Either 3 or 4

Correct Answer: (A) Either 2 or 3

Solution:

Answer: (A) **Either 2 or 3**

Explanation:

- It is given that B2 and E2 are definitely vacant.
- From the conditions, at least one of D2 or F2 is occupied.

So, the possibilities for D2 and F2 are:

- **Case 1:** One of D2 or F2 is vacant → Total vacant houses in Row 2 = B2 + E2 + (D2 or F2) = **3**
- **Case 2:** Both D2 and F2 are occupied → Total vacant houses in Row 2 = B2 + E2 = **2**

Thus, Row 2 can have **either 2 or 3** vacant houses.

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

Correct Answer: —

Solution:

Given: The price for an empty house is either Rs. 10 lakhs (without parking) or Rs. 12 lakhs (with parking).

In Block YY, both **E1** and **E2** are vacant, and one of them costs Rs. 15 lakhs. Let's analyze **E1**:

- Neighbor count = 1 (only one of D1 or F1 is occupied)
- Road adjacency = 0
- Cost of E1 = $\mathbf{(10 \text{ or } 12) + 5 \times 0 + 3 \times 1 = 13 \text{ or } 15}$ lakhs

Since Rs. 15 lakhs is the known cost of one vacant house and 15 is only possible if base price is 12 (i.e., with parking), **E1** must have parking space.

Now for E2:

- Base price = Rs. 10 lakhs (no parking)
- Road adjacency = 1
- Maximum neighbors = 2 (D2 and F2 occupied, E1 is vacant)
- Price of E2 = $\mathbf{10 + 5 \times 1 + 3 \times 2 = 21}$ lakhs

Therefore, the maximum possible price of E2 is Rs. 21 lakhs.

1.5. Which house in Block YY has parking space?

(A) E2

(B) F2

(C) E1

(D) F1

Correct Answer: (C) E1

Solution:

To determine which house in Block YY has parking space, let's review the information provided:

- Only **one house** in Block YY has parking space.
- **Column E** contains both vacant houses in Block YY.
- So the house with parking must be either **E1** or **E2**.
- Since no information points to F1 or F2 having parking, and only one house in Block YY can have it, the best choice is **E1**.

Therefore, E1 is the house in Block YY that has parking space.

Quick Tip: In the solution to the first question of this set, where only one house in YY, E1 has a parking space

So, the correct option is (C): E1

2. 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

Correct Answer: —

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

(A) Prof. Pakrasi and Prof. Qureshi

(B) Prof. Qureshi and Prof. Ramaswamy

(C) Prof. Pakrasi and Prof. Samuel

(D) Prof. Ramaswamy and Prof. Samuel

Correct Answer: (A) Prof. Pakrasi and Prof. Qureshi

Solution:

Given:

- Only **1 candidate** is from **O&Q** $\Rightarrow$ Non-candidates in O&Q $= 4$
- Departments vote as a **block**
- Minimum non-candidates $= 1$ (from B&H if 2 of 3 members are candidates)

- **Prof. R** received **5 votes** from non-candidates

Possible groupings for 5 votes:

- (a) 5
- (b) 4 + 1 ⇒ O&Q (4) + B&H (1) ⇒ implies 2 candidates in B&H
- (c) 3 + 2 ⇒ Also implies 2 candidates in some small departments

Cases (b) and (c) violate the limit of 1 candidate from O&Q and make it hard to balance remaining departments.
Case (a) is only valid if all 5 votes came from a single department. That's only possible in **M&S** (7 total members - 2 candidates = 5 voters).

So the department-wise breakdown becomes:

	F&A	M&S	O&Q	B&H
Total members	**9**	**7**	**5**	**3**
Candidates	**0**	**2**	**1**	**1**
Non-candidates	**9**	**5**	**4**	**2**

Now vote distribution by candidate:

	P	Q	R	S
Total Votes	**3**	**14**	**6**	**1**
Self Vote	**1 (S)**	**1 (R)**	**1 (P)**	**1 (Q)**
From Non-candidates	**2**	**13**	**5**	**0**
Source Dept(s)	**B&H**	**F&A + O&Q**	**M&S**	**—**

From M&S:
There are 2 candidates. Since R got 5 votes from M&S, **R is not a candidate from M&S** (his department voted for him).
So possible candidates from M&S are: (P, Q), (P, S), or (Q, S)

From vote data and department constraints, **P and Q** are the only consistent pair from M&S.

Therefore, final assignment cases:

	F&A	M&S	O&Q	B&H
Case 1	0	P, Q	R	S
Case 2	0	P, Q	S	R

Conclusion:
The correct pair of candidates from M&S is **Prof. Pakrasi and Prof. Qureshi**.

Correct answer: Option A: Prof. Pakrasi and Prof. Qureshi

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

(A) 7

(B) 8

(C) 6

(D) 9

Correct Answer: (D) 9

Solution:

Here's the extracted data and reasoning:

1. Total Votes for Prof. Qureshi:
- Prof. Qureshi received a total of **14 votes** in the election.

2. Voting Constraints:
- Each department votes as a **block**: all non-candidate members vote for the same candidate.
- A candidate **cannot receive votes from their own department**.

3. Department Sizes:
- F&A: 9 members

- M&S: 7 members
- O&Q: 5 members
- B&H: 3 members

4. Possible Voting Scenarios:
- Prof. Qureshi must have received votes from departments **other than his own**.
- The maximum votes he could receive from a **single department** is from F&A (9 votes).
- Since he got a total of 14 votes, it's plausible that he received 9 from F&A and the remaining 5 from another department (e.g., O&Q or M&S).

Conclusion:
- The maximum number of votes Prof. Qureshi could have received from a single department is **9**.

Therefore, the correct answer is: Option 4: (9)

2.3. 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) Only statement A

(B) Both statements A and B

(C) Neither statement A nor statement B

(D) Only statement B

Correct Answer: (B) Both statements A and B

Solution:

To determine the truth of statements A and B based on the information that Prof. Samuel belongs to the B&H department, let's analyze the constraints:

1. Departmental Composition:

- Each department has a limited number of faculty members.
- Only **one candidate** can be from the O&Q department.
- Prof. Samuel is confirmed to be from **B&H**, so **no other candidate** can belong to B&H.

2. Analysis of Statement A:

- Statement A: "Prof. Pakrasi belongs to M&S."
- M&S is a large department and can feasibly have one candidate.
- No restriction is violated if Prof. Pakrasi is from M&S.

⇒ **Statement A is true.**

3. Analysis of Statement B:

- Statement B: "Prof. Ramaswamy belongs to O&Q."
- Since only one candidate can be from O&Q and Prof. Samuel is in B&H, it is possible for Prof. Ramaswamy to be the sole O&Q candidate.
- This also maintains correct departmental representation.

⇒ **Statement B is true.**

4. Conclusion:

- Both statements A and B are consistent with the provided constraints.

Therefore, the correct answer is: Option 2: Both statements A and B.

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

(A) It was either Prof. Ramaswamy or Prof. Samuel.

(B) It was Prof. Samuel.

(C) It was either Prof. Pakrasi or Prof. Qureshi.

(D) It was Prof. Ramaswamy.

Correct Answer: (A) It was either Prof. Ramaswamy or Prof. Samuel.

Solution:

To deduce which candidate might belong to the O&Q department, let's apply the constraints:

1. Departmental Constraint:
- Only **one candidate** can belong to the O&Q department.
- O&Q has only **5 faculty members**, making it smaller than F&A or M&S.

2. Process of Elimination:
- **Prof. Pakrasi** and **Prof. Qureshi** received a large number of votes.
- This suggests they were likely supported by large departments (such as F&A or M&S).
- Since O&Q is a small department, it is **unlikely** that either belongs to O&Q.

3. Remaining Candidates:
- That leaves **Prof. Ramaswamy** and **Prof. Samuel**.
- Based on available data, either of them could feasibly be from O&Q.

4. Conclusion:
- The candidate from O&Q is **either Prof. Ramaswamy or Prof. Samuel**.

Therefore, the correct answer is: Option 1: It was either Prof. Ramaswamy or Prof. Samuel.

2.5. 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) Neither statement A nor statement B

(B) Both statements A and B

(C) Only statement A

(D) Only statement B

Correct Answer: (D) Only statement B

Solution:

To determine the truth of each statement based on the information provided:

1. Voting Patterns and Departmental Rules:
- All non-candidates in each department voted for a single candidate who was **not from their own department**.
- Prof. Qureshi received a substantial number of votes (14 votes), suggesting that **multiple departments voted for him**.

2. Analysis of Statement A:
- Statement A: "Non-candidates from M&S voted for Prof. Qureshi."
- If M&S had voted for Prof. Qureshi, then all non-candidates in M&S must have done so (as per the rule).
- But based on vote distribution and the need to allocate total votes properly, it is **unlikely that M&S voted for Prof. Qureshi**.
⇒ **Statement A is unlikely to be true.**

3. Analysis of Statement B:
- Statement B: "Non-candidates from F&A voted for Prof. Qureshi."
- F&A is the **largest department** (9 members), and could account for a significant portion of Qureshi's 14 votes.
- This aligns with the possibility of multiple departments supporting Qureshi.
⇒ **Statement B is likely to be true.**

4. Conclusion:
- Only Statement B is supported by the data.
Thus, the correct answer is: Option 4: Only statement B.

3. 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
Model 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.

Correct Answer: —

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

Correct Answer: —

Solution:

Given that the average ratings given by R1, R2, R3, R4, and R5 were:

- R1: $5 \times 3.4 = 17$
- R2: $5 \times 2.2 = 11$
- R3: $5 \times 3.8 = 19$
- R4: $5 \times 2.8 = 14$
- R5: $5 \times 3.4 = 17$

Similarly, the total ratings received by each movie are:

- U: $5 \times 2.2 = 11$
- V: $5 \times 3.8 = 19$
- W: $5 \times 3.4 = 17$
- X: $5 \times 3.6 = 18$
- Y: $5 \times 2.6 = 13$

The known values are filled into the matrix as follows:

	R1	R2	R3	R4	R5	Total
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**	

Conclusion: All ratings are already uniquely determined, so the number of entries that can still be uniquely determined is **0**.

Answer: $\boxed{0}$

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

Correct Answer: —

Solution:

Given the means of the ratings given by R1, R2, R3, R4, and R5 as 3.4, 2.2, 3.8, 2.8, and 3.4 respectively, we can calculate the total sum of ratings given by each rater as follows:

- R1: $5 \times 3.4 = 17$

- R2: $5 \times 2.2 = 11$
- R3: $5 \times 3.8 = 19$
- R4: $5 \times 2.8 = 14$
- R5: $5 \times 3.4 = 17$

Similarly, the sum of ratings received by U, V, W, X, and Y are:

- U: $5 \times 2.2 = 11$
- V: $5 \times 3.8 = 19$
- W: $5 \times 3.4 = 17$
- X: $5 \times 3.6 = 18$
- Y: $5 \times 2.6 = 13$

Given this information, we can capture the absolute data in the form of a table. Let's represent this partial information as follows:

	U	**V**	**W**	**X**	**Y**	**Sum**
R1	a	b	c	d	e	17
R2	f	g	h	i	j	11
R3	k	l	m	n	o	19
R4	p	q	r	s	t	14
R5	u	v	w	x	y	17
Sum	11	19	17	18	13	

Where the variables $a, b, c, \ldots, y$ represent the individual ratings given by each rater to each item. The sums at the end of each row and column represent the total ratings given by each rater and the total ratings received by each item, respectively.
Consider U: Given median = 2, mode = 2, and range = 3:

- His ratings should be of the form 1, a, 2, b, 4, where a and b are unknown.

- The total sum of his ratings is 11 (from previous calculations).
- For mode = 2, both a and b should be 2.
- Therefore, 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, where a and b are unknown.
- The total sum of his ratings is 19 (from previous calculations).
- For mode = 4, both a and b should be 4.
- Therefore, 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, where a is unknown.
- The total sum of his ratings is 17 (from previous calculations).
- Solving, we find that a = 2.
- Therefore, 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, where a is unknown.
- The total sum of his ratings is 18 (from previous calculations).
- Solving, we find that a = 3.
- Therefore, X's ratings are 1, 3, 4, 5, 5.

Consider Y: Given median = 3, mode = 1 and 4, and range = 3:

- His ratings should be of the form 1, a, 3, b, 4, where a and b are unknown.
- The total sum of his ratings is 13 (from previous calculations).
- We need to solve for a and b.
- Considering the mode, both a and b should be either 1 or 4.

- However, considering the range, the difference between the highest and lowest ratings should be 3.
- Therefore, Y's ratings are 1, 1, 3, 4, 4.

Considering column R3, the two missing entries should add up to 8. The only possibility is 4 + 4. Therefore, we can fill in 4 for row "U" and 4 for row "V."

Consider column R1, where the missing elements should add up to $17-5-4-1=7$. The possible combinations are 3 + 4 or 4 + 3.

Now, consider column R5, where the missing elements should add up to 10. We cannot have 4 + 3 + 3 as it contradicts the possible combinations for column R1. Therefore, we must have 2 + 4 + 4.

We can fill column R1 as 3 + 4 and the remaining in column R4. With this, we can complete the table.

	R1	R2	R3	R4	R5	Total
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
So, The correct answer is 0

3.3. What rating did R1 give to Xavier?

Correct Answer: —

Solution:

Given the means of the ratings given by R1, R2, R3, R4, and R5 as 3.4, 2.2, 3.8, 2.8, and 3.4 respectively, we can calculate the total sum of ratings given by each rater as follows:

- R1: $5 \times 3.4 = 17$
- R2: $5 \times 2.2 = 11$
- R3: $5 \times 3.8 = 19$
- R4: $5 \times 2.8 = 14$
- R5: $5 \times 3.4 = 17$

Similarly, the sum of ratings received by U, V, W, X, and Y are:

- U: $5 \times 2.2 = 11$
- V: $5 \times 3.8 = 19$
- W: $5 \times 3.4 = 17$
- X: $5 \times 3.6 = 18$
- Y: $5 \times 2.6 = 13$

Given this information, we can capture the absolute data in the form of a table. Let's represent this partial information as follows:

	U	**V**	**W**	**X**	**Y**	**Sum**
R1	a	b	c	d	e	17
R2	f	g	h	i	j	11
R3	k	l	m	n	o	19
R4	p	q	r	s	t	14
R5	u	v	w	x	y	17
Sum	11	19	17	18	13	

Where the variables $a,b,c,\ldots,ya,b,c,\ldots,y$ represent the individual ratings given by each rater to each item. The sums at the end of each row and column represent the total ratings given by each rater and the total ratings received by each item, respectively.
Consider U: Given median = 2, mode = 2, and range = 3:

- His ratings should be of the form 1, a, 2, b, 4, where a and b are unknown.
- The total sum of his ratings is 11 (from previous calculations).
- For mode = 2, both a and b should be 2.
- Therefore, 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, where a and b are unknown.
- The total sum of his ratings is 19 (from previous calculations).
- For mode = 4, both a and b should be 4.
- Therefore, 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, where a is unknown.
- The total sum of his ratings is 17 (from previous calculations).
- Solving, we find that a = 2.
- Therefore, 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, where a is unknown.
- The total sum of his ratings is 18 (from previous calculations).
- Solving, we find that a = 3.
- Therefore, X's ratings are 1, 3, 4, 5, 5.

Consider Y: Given median = 3, mode = 1 and 4, and range = 3:

- His ratings should be of the form 1, a, 3, b, 4, where a and b are unknown.
- The total sum of his ratings is 13 (from previous calculations).
- We need to solve for a and b.
- Considering the mode, both a and b should be either 1 or 4.
- However, considering the range, the difference between the highest and lowest ratings should be 3.
- Therefore, Y's ratings are 1, 1, 3, 4, 4.

Considering column R3, the two missing entries should add up to 8. The only possibility is 4 + 4. Therefore, we can fill in 4 for row "U" and 4 for row "V."

Consider column R1, where the missing elements should add up to $17-5-4-1=7$17−5−4−1=7. The possible combinations are 3 + 4 or 4 + 3.

Now, consider column R5, where the missing elements should add up to 10. We cannot have 4 + 3 + 3 as it contradicts the possible combinations for column R1. Therefore, we must have 2 + 4 + 4.

We can fill column R1 as 3 + 4 and the remaining in column R4. With this, we can complete the table.

	R1	R2	R3	R4	R5	Total
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.

So the correct answer is 3.

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

Correct Answer: —

Solution:

Given that the average 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 the ratings given by each reviewer is calculated as 5 times their respective means:

- **R1:** $5 \times 3.4 = 17$
- **R2:** $5 \times 2.2 = 11$
- **R3:** $5 \times 3.8 = 19$
- **R4:** $5 \times 2.8 = 14$
- **R5:** $5 \times 3.4 = 17$

Similarly, the sum of the ratings received by U, V, W, X, and Y is also calculated as 5 times their respective means:

- **U:** $5 \times 2.2 = 11$
- **V:** $5 \times 3.8 = 19$
- **W:** $5 \times 3.4 = 17$
- **X:** $5 \times 3.6 = 18$
- **Y:** $5 \times 2.6 = 13$

Capturing the absolute data provided in the partial information (a) and (b) and representing it in a table, we get:

	R1	R2	R3	R4	R5	Total	Missing Entries
U	1	2	4	2	2	**11**	

	R1	R2	R3	R4	R5	Total	Missing Entries
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**	-	

Analyzing medians:

- **R2's** median rating is **2**, given to 2 workers.
- **R5's** median rating is **4**, given to 2 workers.
- **R4's** median rating is **3**, given to only 1 worker.
- **R3's** median rating is **4**, given to 2 workers.

Correct option: (C) R4

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

(A) R3

(B) R5

(C) R4

(D) R2

Correct Answer: (C) R4

Solution:

Given that the average 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 the ratings given by each reviewer is calculated as 5 times their respective means:

- R1: $5 \times 3.4 = 17$

- R2: $5 \times 2.2 = 11$
- R3: $5 \times 3.8 = 19$
- R4: $5 \times 2.8 = 14$
- R5: $5 \times 3.4 = 17$

Similarly, the sum of the ratings received by U, V, W, X, and Y is also calculated as 5 times their respective means:

- U: $5 \times 2.2 = 11$
- V: $5 \times 3.8 = 19$
- W: $5 \times 3.4 = 17$
- X: $5 \times 3.6 = 18$
- Y: $5 \times 2.6 = 13$

Capturing the absolute data provided in the partial information and representing it in a table, we get:

	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's median rating is 2, given to 2 workers.

- R5's median rating is 4, given to 2 workers.
- R4's median rating is 3, given to only 1 worker.
- R3's median rating is 4, given to 2 workers.

So, the correct option is (C): R4.

Quick Tip: 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

4. 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.

Correct Answer: —

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

Correct Answer: —

Solution:

Visa Application Processing Schedule

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.

Total applicants: 200 (20 slots × 10 applications per slot).

50% of the applications are from the US, and the number of US applications is the same in each slot. The same applies to the other three categories.

- Total US applicants: 100 (200 × 50%) → 5 per slot
- Schengen: At least 3 per slot (e.g., Ira, Vijay, Nandini at 9:15 am)
- Others: At least 2 per slot (e.g., Mahira and Osman at 9:30 am)
- **UK:** 0 per slot (inferred from constraints)

There are 10 counters total, allocated as follows:

- 4 for US (10 min per application)
- 2 for Schengen (12.5 min per application)
- 2 for Others (5 min per application)
- 2 for UK — unused in this scenario

Example: Vijay, who was 5th in the Schengen queue, was called at 9:25 am. Hence, processing time for Schengen is 12.5 minutes.

US (10 min)				Schengen (12.5 min)		Others (5 min)	
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 at 9:15 am but entered the VPO at 9:20 am. At that time, 6 out of the 10 counters were occupied or just finishing up.

This left 4 free counters: 2 UK and 2 Others — but since UK applicants are absent, those counters remain idle.

Thus, **total UK applicants = 0**.

4.2. 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?

Correct Answer: —

Solution:

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.

So, the total number of applicants is 200 (20 slots * 10 applications per slot).

50% of the applications are from the US, and the number of US applications is the same in each slot. The same applies to the other three categories.

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

Ira, Vijay, and Nandini were scheduled for Schengen visa processing in that order at the 9:15 am slot. Since the number of Schengen applicants is the same in each slot, there must be at least 3 Schengen applicants per slot.

Mahira and Osman were scheduled in the 9:30 am slot for visa processing in the Others category, so there are at least 2 applicants in the Others category per slot.

Since there are 10 applicants per slot, and we already have 3 Schengen and 2 Others applicants, there are no UK applicants in each slot.

There are 10 counters in total, with 4 dedicated to US applications and 2 each for UK, Schengen, and Others. Each US and UK application takes 10 minutes to process. Vijay, who was 5th in the queue, was called to a counter at 9:25 am. This implies that the processing time for 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 at 9:15 am but entered the VPO at 9:20 am. When they entered, 6 out of the 10 counters were processing applications or had just finished and were ready to start new ones. Thus, there were 4 free counters: 2 UK and 2 Others (since the US and Schengen counters were busy or had just finished processing).

For the other category of applicants, the time taken to process one application is at most 5 minutes. This means the total time taken to process 40 applications is at most **200 minutes** (40 applications * 5 minutes per application).

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

(A) 9: 45am

(B) 9: 50am

(C) 9: 35am

(D) 9: 37am

Correct Answer: (A) 9: 45am

Solution:

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.

So, the total number of applicants is 200 (20 slots $\times$ 10 applications per slot).

50% of the applications are from the US, and the number of US applications is the same in each slot. The same applies to the other three categories.

So, the total number of US applicants is 100 (200 × 50%), and the number of US applicants in each slot is 5 (100 ÷ 20).

Ira, Vijay, and Nandini were scheduled for Schengen visa processing in that order at the 9:15 am slot. Since the number of Schengen applicants is the same in each slot, there must be at least 3 Schengen applicants per slot.

Mahira and Osman were scheduled in the 9:30 am slot for visa processing in the Others category, so there are at least 2 applicants in the Others category per slot.

Since there are 10 applicants per slot, and we already have 3 Schengen and 2 Others applicants, there are no UK applicants in each slot.

There are 10 counters in total, with 4 dedicated to US applications and 2 each for UK, Schengen, and Others. Each US and UK application takes 10 minutes to process. Vijay, who was 5th in the queue, was called to a counter at 9:25 am. This implies that the processing time for Schengen applications is 12.5 minutes.

US (10 min)				**Schengen (12.5 min)**		**Others (5 min)**	
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 at 9:15 am but entered the VPO at 9:20 am.

When they entered, 6 out of the 10 counters were processing applications or had just finished and were ready to start new ones. Thus, there were 4 free counters: 2 UK and 2 Others (since the US and Schengen counters were busy or had just finished processing).

Nandini's position was sixth in the queue for Schengen applications. According to the table, her processing will end at **9:45 am**.

4.4. 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 Mahira was completed before Nandini's.

(D) The application process of Osman was completed before Vijay's.

Correct Answer: (B) The application process of Mahira started after Nandini's.

Solution:

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.

So, the total number of applicants is **200** (20 slots * 10 applications per slot).

50% of the applications are from the US, and the number of US applications is the same in each slot. The same applies to the other three categories.

- Total US applicants: 100 (200 × 50%)
- US applicants per slot: 5

Ira, Vijay, and Nandini were scheduled for Schengen visa processing in that order at the 9:15 am slot. Since the number of Schengen applicants is the same in each slot, there must be at least 3 Schengen applicants per slot.

Mahira and Osman were scheduled in the 9:30 am slot for visa processing in the Others category, so there are at least 2 applicants in the Others category per slot.

Since there are 10 applicants per slot, and we already have 3 Schengen and 2 Others applicants, there are no UK applicants in each slot.

There are 10 counters in total:

- 4 dedicated to US applications (10 mins)
- 2 for Schengen (12.5 mins)
- 2 for Others (5 mins)
- 2 for UK (unused)

Vijay, who was 5th in the queue, was called to a counter at 9:25 am. This implies the processing time for Schengen applications is approximately **2.5 minutes per person**.

US (10 min)				Schengen (12.5 min)		Others (5 min)	
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 at 9:15 am but entered the VPO at 9:20 am. At that time:

- 6 out of 10 counters were busy
- 4 free counters: 2 UK and 2 Others

Evaluate Options:

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

- If Osman is 5th in the queue for Others (5 mins each), he finishes by 9:35 am.
- True: Osman's process ends before 9:45 am.

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

- Mahira starts at 9:30 am.
- Nandini (6th in Schengen) starts at 9:32:30 am.
- False: Mahira starts before Nandini.

Correct Answer: Option B is incorrect.

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

(A) 3 : 40 pm

(B) 2 : 00 pm

(C) 2: 25 pm

(D) 2 : 05 pm

Correct Answer: (D) 2 : 05 pm

Solution:

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.

So, the total number of applicants is 200 (20 slots * 10 applications per slot).

50% of the applications are from the US, and the number of US applications is the same in each slot. The same applies to the other three categories.

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

Ira, Vijay, and Nandini were scheduled for Schengen visa processing in that order at the 9:15 am slot. Since the number of Schengen applicants is the same in each slot, there must be at least 3 Schengen applicants per slot.

Mahira and Osman were scheduled in the 9:30 am slot for visa processing in the Others category, so there are at least 2 applicants in the Others category per slot.

Since there are 10 applicants per slot, and we already have 3 Schengen and 2 Others applicants, there are no UK applicants in each slot.

There are 10 counters in total, with 4 dedicated to US applications and 2 each for UK, Schengen, and Others. Each US and UK application takes 10 minutes to process. Vijay, who was 5th in the queue, was called to a counter at 9:25 am. This implies that the processing time for 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 at 9:15 am but entered the VPO at 9:20 am. When they entered, 6 out of the 10 counters were processing applications or had just finished and were ready to start new ones. Thus, there were 4 free counters: 2 UK and 2 Others (since the US and Schengen counters were busy or had just finished processing).

Let's verify the details step by step.

The first slot takes 20 minutes to complete, and the remaining 19 slots each take 15 minutes to complete the US application process. Therefore, the total time taken is calculated as follows:

- First slot: 20 minutes
- Remaining 19 slots: 19 slots * 15 minutes = 285 minutes

Total time taken = 20 minutes + 285 minutes = 305 minutes

305 minutes is equal to 5 hours and 5 minutes.

Starting at 9:00 am, adding 5 hours and 5 minutes brings us to:

9:00 am + 5 hours = 2:00 pm 2:00 pm + 5 minutes = 2:05 pm

Therefore, the correct time is 2:05 pm.

Options Check:

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

- We previously established that Osman's application process, starting at 9:30 am and being 5th in his category, ends at 9:35 am.
- **True**: Osman's process ends before 9:45 am.

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

- Mahira's application process starts at 9:30 am.

- Nandini's application process starts at 9:32:30 am.
- **False**: Mahira's process starts before Nandini's.

Therefore, the correct option is indeed **Option D.**