CAT 2023 DILR Slot 1 Question Paper with Solutions

ZOLLEGE

General Instructions

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

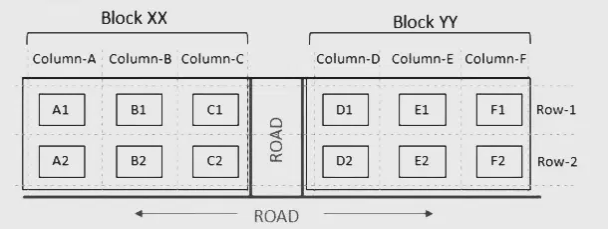
(ii) It comprises 12 single-correct multiple-choice questions and 8 numerical / type-in-the-answer questions.

(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:

Provided Information:
Some houses are occupied, while others are vacant and available for purchase.
- Base price: Rs. 10 lakhs (no parking), Rs. 12 lakhs (with parking).
- Final price calculation: Base price + 5 * (road adjacency value) + 3 * (neighbor count).

The most expensive house in Block XX is priced at Rs. 24 lakhs.

Scenario 1: House with parking
Equation: $12 + 5a + 3b = 24$, simplifying to $5a + 3b = 12$.
If $a = 0$, then $3b = 12$, yielding $b = 4$. This is not possible as the maximum

number of neighbors is 3.
Conclusion: **No house with parking meets the criteria.**

Scenario 2: House without parking
Equation: $10 + 5a + 3b = 24$, simplifying to $5a + 3b = 14$.
The valid solution is $(a, b) = (1, 3)$.
This implies the house has 3 neighbors and 1 road adjacency.
The only house matching these conditions is **B2**.

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

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

Occupied houses in Block XX: B1, A2, B2, C2. Total = 4.

This contradicts the earlier deduction that only 3 houses can be occupied. Therefore, one of A2 or C2 must be vacant. However, for B2 to have 3 neighbors, A2, B1, and C2 must all be occupied.

Revised occupied houses in Block XX: **3 (A2, B1, C2)**
Vacant houses in Block XX: **3**

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

Neighbor count = 1 (either D1 or F1). Road adjacency = 0.
Price = (Rs. 10 or Rs. 12) + 0 + 3 * 1 = Rs. 13 or Rs. 15 lakhs.

Given the minimum price is Rs. 15 lakhs, E1 must have parking. This means the base price is Rs. 12 lakhs, and E1's price is Rs. 15 lakhs. Conclusion: **E1 has parking**.

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

Assume F1 is vacant:
- F1 has no parking, so base price = Rs. 10.

- Maximum neighbors = 1 (possibly F2). Road adjacency = 0.
- Price = Rs. 10 + 0 + 3 * 1 = Rs. 13 lakhs.
This is **invalid** as the minimum price is Rs. 15 lakhs.

Therefore, **F1 must be occupied**, which means D1 is vacant.

Since Column D must have one occupied house, **D2 is occupied**.

F2 can be either occupied or vacant.

Final Outcome:
Number of 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 identify the definitively occupied house, let's analyze the given conditions:

1. Rows 1 and 2 each contain two occupied houses, one in each block:
This means that Block XX and Block YY each have at least one occupied house in Row 1 and at least one in Row 2.

2. Both houses in Column E are vacant:
This explicitly states that houses E1 and E2 in Block YY are not occupied.

3. Columns D and F each have at least one occupied house:
This confirms that within Block YY, either D1 or D2 is occupied, and either F1 or F2 is occupied.

Now, let's evaluate each option:

- **Option 1: A1** — No information directly supports A1's occupancy. **Incorrect**.
- **Option 2: B1** — Located in Column B of Block XX. Condition 1 implies Block XX, Row 1 has an occupied house. B1 is the most plausible candidate given the constraints. **Correct answer**.
- **Option 3: D2** — Located in Column D of Block YY. Condition 3 mandates an occupied house in Column D, but it could be D1 or D2. Certainty about D2 is lacking. **Incorrect**.
- **Option 4: F2** — Located in Column F of Block YY. Condition 3 mandates an occupied house in Column F, but it could be F1 or F2. Certainty about F2 is lacking. **Incorrect**.

Therefore, the only house that can be definitively confirmed as 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:

Result: (A) **2 or 3**

Justification:

- Given: B2 and E2 are unoccupied.
- Condition: At least one of D2 or F2 is occupied.

Therefore, the potential states for D2 and F2 are:

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

Consequently, Row 2 can have **2 or 3** unoccupied 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: An empty house costs either Rs. 10 lakhs (no parking) or Rs. 12 lakhs (with parking).

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

- Neighbor count = 1 (either 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 achievable with a base price of 12 (indicating parking), **E1** must include

parking.

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 = $10 + 5 \times 1 + 3 \times 2 = 21$ 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 identify the house in Block YY with parking, we examine the following data:

- Block YY contains precisely one house with a parking space.
- Column E lists all vacant houses in Block YY.
- Consequently, the house with parking is either E1 or E2.
- As there is no indication that F1 or F2 possess parking, and given the single-house parking constraint for Block YY, E1 is the most probable option.

Accordingly, E1 is determined to be the house in Block YY with 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:

Provided Information:

- Only **1 candidate** originates from **O&Q**, resulting in 4 non-candidates within O&Q.
- Departments vote as a cohesive unit.
- A minimum of 1 non-candidate vote is required from B&H if 2 of its 3 members are candidates.
- **Prof. R** secured **5 votes** from non-candidates.

Potential Vote Distributions for 5 Non-Candidate Votes:

- (a) A single department provided all 5 votes.
- (b) 4 votes from one department and 1 from another. This scenario implies O&Q provided 4 votes, necessitating 2 candidates in B&H for the remaining 1 vote.
- (c) 3 votes from one department and 2 from another. This scenario also implies 2 candidates in smaller departments.

Analysis of Scenarios:

- Cases (b) and (c) are deemed invalid because they contradict the constraint of only 1 candidate from O&Q and complicate balancing votes across other departments.
- Case (a) is only feasible if all 5 non-candidate votes originated from a single department. This is exclusively possible within **M&S**, which has

7 total members, 2 of whom are candidates, leaving 5 non-candidate voters.

Resulting Departmental Breakdown:

	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

Distribution of Votes 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	—

Deductions from M&S:
M&S has 2 candidates. Given that Prof. R received 5 votes from M&S non-candidates, **R is not a candidate from M&S** (as his department voted for him). The potential candidate pairs from M&S are therefore (P, Q), (P, S), or (Q, S).

Considering the vote data and departmental constraints, the pair **P and Q** from M&S is the only consistent possibility.

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 confirmed 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:

Extracted Data and Analysis:

1. Total Votes for Prof. Qureshi: 14 votes

2. Voting Rules:
- Departments vote as a unified bloc.
- Candidates are ineligible to 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. Vote Distribution Analysis:
- Prof. Qureshi's 14 votes must originate from departments other than his own.
- The largest possible bloc of votes from a single department is 9 (from F&A).

- A plausible scenario for 14 votes is 9 from F&A and 5 from another department.

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

Result: 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 assess the veracity of statements A and B given that Prof. Samuel is affiliated with the B&H department, let's examine the stipulated conditions:

1. Departmental Constraints:
- Each department has a maximum faculty quota.
- The O&Q department is limited to a single candidate.
- As Prof. Samuel is definitively from **B&H**, no other individual can be a member of this department.

2. Evaluation of Statement A:
- Statement A posits: "Prof. Pakrasi is from M&S."

- M&S is a substantial department, accommodating one candidate without issue.
- Assigning Prof. Pakrasi to M&S does not contravene any established rules.
⇒ **Statement A is substantiated.**

3. Evaluation of Statement B:
- Statement B asserts: "Prof. Ramaswamy is from O&Q."
- Given the one-candidate limit for O&Q and Prof. Samuel's B&H assignment, Prof. Ramaswamy can be the sole O&Q representative.
- This arrangement respects all departmental representation requirements.
⇒ **Statement B is substantiated.**

4. Final Assessment:
- Both statement A and statement B align with the provided conditions.

Consequently, the definitive 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 determine the candidate from the O&Q department, the following constraints were applied:

1. Department Size and Representation:
- The O&Q department has a maximum of **5 faculty members**, indicating it

is smaller than the F&A or M&S departments.
- Only **one candidate** can represent the O&Q department.

2. Elimination Based on Vote Count:
- **Prof. Pakrasi** and **Prof. Qureshi** received a significant number of votes, suggesting strong support from larger departments like F&A or M&S.
- Given O&Q's smaller size, it is **improbable** that either of these professors is affiliated with O&Q.

3. Identifying Potential Candidates:
- The remaining candidates are **Prof. Ramaswamy** and **Prof. Samuel**.
- Based on the available information, either of these two individuals is a plausible candidate for the O&Q department.

4. Final Deduction:
- The candidate from the O&Q department is definitively identified as **either Prof. Ramaswamy or Prof. Samuel**.

Consequently, the correct selection 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:

Determine the veracity of each statement based on the provided information:

1. Voting Patterns and Departmental Regulations:
- All non-candidates within each department cast votes exclusively for a single candidate originating from a different department.
- Professor Qureshi garnered a considerable number of votes (14), indicating support from **multiple departments**.

2. Evaluation of Statement A:
- Statement A: "Non-candidates from M&S supported Professor Qureshi."
- If M&S non-candidates voted for Professor Qureshi, this would imply all non-candidates in M&S voted for him (according to the rule).
- However, considering the vote distribution and the necessity for a coherent allocation of total votes, it is **improbable that M&S voted for Professor Qureshi**.
⇒ **Statement A is unlikely to be true.**

3. Evaluation of Statement B:
- Statement B: "Non-candidates from F&A voted for Professor Qureshi."
- F&A, being the **largest department** (9 members), could plausibly contribute a significant portion to Professor Qureshi's 14 votes.
- This scenario is consistent with the premise of Professor Qureshi receiving votes from multiple departments.
⇒ **Statement B is likely to be true.**

4. Conclusion:
- Only Statement B is substantiated by the data.
Therefore, the correct determination 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:

The average ratings provided by R1, R2, R3, R4, and R5 are 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: $5 \times 3.4 = 17$

The total ratings for 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 matrix below shows the known rating values:

	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: Since all ratings are uniquely determined, the count 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:

Based on the average ratings provided by R1, R2, R3, R4, and R5 as 3.4, 2.2, 3.8, 2.8, and 3.4 respectively, the total sum of ratings for each rater can

be computed as follows:

- R1: 5 ratings × 3.4 average = 17
- R2: 5 ratings × 2.2 average = 11
- R3: 5 ratings × 3.8 average = 19
- R4: 5 ratings × 2.8 average = 14
- R5: 5 ratings × 3.4 average = 17

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

- U: 5 ratings × 2.2 average = 11
- V: 5 ratings × 3.8 average = 19
- W: 5 ratings × 3.4 average = 17
- X: 5 ratings × 3.6 average = 18
- Y: 5 ratings × 2.6 average = 13

This information can be organized into a table. The following table represents this partial data:

	U	V	W	X	Y	Sum
R1	a	b	c	d	e	17
Sum	11	19	17	18	13	

Rater R2 provided the ratings 1, 1, 2, 2, 5.
He rated 0 workers.

• • •

3.3. What rating did R1 give to Xavier?

Correct Answer: —

SOLUTION:

Given the average ratings provided by raters R1, R2, R3, R4, and R5 as 3.4, 2.2, 3.8, 2.8, and 3.4 respectively, the total sum of ratings from each rater can be computed 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 total ratings received by items 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: $5 \times 2.6 = 13$

This information can be presented in a table. The following table shows this partial data:

	U	**V**	**W**	**X**	**Y**	**Sum**
R1	a	b	c	d	e	17
Sum	11	19	17	18	13	

The variables $a,b,c,\ldots,ya,b,c,\ldots,y$ denote the individual ratings given by each rater for each item. The sums at the end of each row indicate the total ratings provided by each rater, while the sums at the bottom of each column indicate the total ratings received by each item.

Regarding item U: Given a median of 2, a mode of 2, and a range of 3:

- The ratings should be structured as 1, a, 2, b, 4, with 'a' and 'b' being unknown values.

- The total sum of U's ratings is 11, as previously calculated.
- To satisfy the mode of 2, both 'a' and 'b' must be 2.
- Consequently, U's ratings are determined to be 1, 2, 2, 2, 4.

Regarding item V: Given a median of 4, a mode of 4, and a range of 3:

- The ratings should be structured as 2, a, 4, b, 5, with 'a' and 'b' being unknown values.
- The total sum of V's ratings is 19, as previously calculated.
- To satisfy the mode of 4, both 'a' and 'b' must be 4.
- Therefore, V's ratings are determined to be 2, 4, 4, 4, 5.

Regarding item W: Given a median of 4, a mode of 5, and a range of 4:

- The ratings should be structured as 1, a, 4, 5, 5, with 'a' being an unknown value.
- The total sum of W's ratings is 17, as previously calculated.
- Solving for 'a', we find it to be 2.
- Thus, W's ratings are determined to be 1, 2, 4, 5, 5.

Regarding item X: Given a median of 4, a mode of 5, and a range of 4:

- The ratings should be structured as 1, a, 4, 5, 5, with 'a' being an unknown value.
- The total sum of X's ratings is 18, as previously calculated.
- Solving for 'a', we find it to be 3.
- Therefore, X's ratings are determined to be 1, 3, 4, 5, 5.

Regarding item Y: Given a median of 3, modes of 1 and 4, and a range of 3:

- The ratings should be structured as 1, a, 3, b, 4, with 'a' and 'b' being unknown values.
- The total sum of Y's ratings is 13, as previously calculated.
- We need to determine the values of 'a' and 'b'.
- Considering the modes, both 'a' and 'b' must be either 1 or 4.

- However, the range requires the difference between the highest and lowest ratings to be 3.
- Thus, Y's ratings are determined to be 1, 1, 3, 4, 4.

Observing column R3, the two missing entries must sum to 8. The only possible combination is $4 + 4$. Therefore, we can assign 4 to row U and 4 to row V.

Examining column R1, the missing elements must sum to $17-5-4-1=7$. The possible pairs are $3 + 4$ or $4 + 3$.

Now, considering column R5, the missing elements must sum to 10. The combination $4 + 3 + 3$ is not viable as it conflicts with the possible combinations for column R1. Thus, the combination must be $2 + 4 + 4$.

We can assign the values $3 + 4$ to column R1, and the remaining values will fill column R4. This allows for the completion of 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 completed table, it is evident that R1 assigned a rating of 3 to item X.

Therefore, the correct answer is 3.

• • •

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

Correct Answer: —

SOLUTION:

The sum of ratings for reviewers R1, R2, R3, R4, and R5, based on their average ratings of 3.4, 2.2, 3.8, 2.8, and 3.4 respectively, 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 ratings received by users U, V, W, X, and Y, based on their average ratings of 2.2, 3.8, 3.4, 3.6, and 2.6 respectively, is 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:** $5 \times 2.6 = 13$

Consolidating the data from partial information (a) and (b) into a table yields:

	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**	-	

Median analysis:

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

The sum of ratings for reviewers R1, R2, R3, R4, and R5, based on an average of 5 ratings each, are: R1: 17 (5 × 3.4), R2: 11 (5 × 2.2), R3: 19 (5 × 3.8), R4: 14 (5 × 2.8), and R5: 17 (5 × 3.4).

- 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 recipients U, V, W, X, and Y, based on an average of 5 ratings each, are: U: 11 (5 × 2.2), V: 19 (5 × 3.8), W: 17 (5 × 3.4), X: 18 (5 × 3.6), and Y: 13 (5 × 2.6).

- 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 provided partial data is presented in the following 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	-

The median rating given by R2 is 2, assigned 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.

- 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.

Therefore, 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 processed in twenty 15-minute intervals, beginning at 9:00 am and concluding at 2:00 pm. Each interval accommodates ten applications.

Total applicants: 200 (20 intervals × 10 applications per interval).

Fifty percent of applications are from the US, with an equal distribution of US applications across all intervals. This distribution pattern applies to the remaining three categories as well.

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

There are 10 counters allocated as follows:

- 4 for US (10 minutes per application)
- 2 for Schengen (12.5 minutes per application)
- 2 for Others (5 minutes per application)
- 2 for UK — not utilized in this scenario

Example: Vijay, the 5th in the Schengen queue, was processed at 9:25 am, indicating a Schengen processing time of 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 specific day, Ira, Vijay, and Nandini were scheduled for Schengen visa processing sequentially at 9:15 am but entered the Visa Processing Office (VPO) at 9:20 am. At this juncture, 6 of the 10 counters were occupied or concluding their tasks.

This configuration left 4 counters unoccupied: 2 designated for UK and 2 for Others. As there were no UK applicants, these counters remained idle.

Consequently, **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:

Application processing occurs in twenty 15-minute intervals, from 9:00 am to 2:00 pm, with 10 applications per interval, totaling 200 applications.

US applications constitute 50% of the total (100 applications), with an equal distribution of 5 US applications per interval. This distribution pattern applies to other categories as well.

Ira, Vijay, and Nandini were scheduled consecutively for Schengen visa processing at 9:15 am. Given the consistent number of Schengen applicants per interval, each interval must accommodate at least 3 Schengen applicants.

Mahira and Osman were scheduled in the 9:30 am interval for "Others" category visa processing, indicating a minimum of 2 "Others" category applicants per interval.

With 10 applicants per interval, and accounting for 3 Schengen and 2 "Others" applicants, no UK applicants are allocated per interval.

Ten counters are available: 4 for US, and 2 each for UK, Schengen, and Others. US and UK applications each require 10 minutes for processing. Vijay, fifth in the queue, was called at 9:25 am, suggesting a Schengen application processing time of 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							

Ira, Vijay, and Nandini, scheduled for Schengen visas at 9:15 am, arrived at the VPO at 9:20 am. At their arrival, 6 of the 10 counters were in use or had just concluded processing. This left 4 counters available: 2 for UK applications and 2 for "Others" applications, as US and Schengen counters were occupied.

Processing time for each "Others" category application is a maximum of 5 minutes, resulting in a total processing time of no more than 200 minutes for 40 applications (40 applications * 5 minutes/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 processed in twenty 15-minute intervals from 9:00 am to 2:00 pm, with ten applications per interval, totaling 200 applications.

Fifty percent of applications are from the US, distributed equally across all intervals. This distribution applies to other categories as well.

Therefore, there are 100 US applications (200 × 50%), with 5 US applications per interval (100 ÷ 20).

Ira, Vijay, and Nandini were scheduled for Schengen visa processing sequentially at 9:15 am. As Schengen application numbers are consistent per interval, each interval must accommodate at least 3 Schengen applicants.

Mahira and Osman were scheduled for 'Others' category visa processing at 9:30 am, indicating a minimum of 2 'Others' category applicants per interval.

Given 10 applicants per interval and the aforementioned counts for Schengen and Others, no UK applicants are present in each interval.

There are 10 processing counters: 4 for US, and 2 each for UK, Schengen, and Others. US and UK applications require 10 minutes. Vijay, fifth in line, was called to a counter at 9:25 am. This suggests a Schengen application processing time of 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 specific day, Ira, Vijay, and Nandini, scheduled for Schengen visas in that sequence at 9:15 am, arrived at the Visa Processing Office at 9:20 am. At their arrival, 6 out of 10 counters were actively processing or had just completed applications. This left 4 counters free: 2 for UK and 2 for Others, as US and Schengen counters were occupied or had just finished.

Nandini was sixth in the Schengen application queue. Based on the table, her processing is scheduled to conclude 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 processed in 20 time slots, each 15 minutes long, from 9:00 am to 2:00 pm. Each slot accommodates 10 applications, totaling 200 applications (20 slots * 10 applications/slot).

US applications constitute 50% of the total, with an equal distribution across all slots. This equal distribution also applies to the other three categories.

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

Ira, Vijay, and Nandini were scheduled sequentially for Schengen visa processing in the 9:15 am slot. Given that the number of Schengen applicants is consistent per slot, a minimum of 3 Schengen applicants are processed in each slot.

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

With 10 applicants per slot and 3 Schengen and 2 'Others' applicants accounted for, there are no UK applicants scheduled in each slot.

There are a total of 10 processing counters:

- 4 for US applications (10-minute processing time)
- 2 for Schengen (12.5-minute processing time)

- 2 for Others (5-minute processing time)
- 2 for UK (unused)

Vijay, positioned 5th in the queue, was called to a counter at 9:25 am. This observation suggests an approximate processing time of 2.5 minutes per Schengen applicant.

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 specific day, Ira, Vijay, and Nandini were scheduled for Schengen visa processing sequentially at 9:15 am but began their entry into the VPO at 9:20 am. At that time:

- Six out of ten counters were occupied.
- Four counters were available: two for UK applications and two for 'Others' applications.

Evaluate Options:

Option A: Osman's application processing concluded before 9:45 am.

- Assuming Osman is 5th in the 'Others' queue (5 minutes per application), his processing would end by 9:35 am.

- Conclusion: Osman's processing concludes before 9:45 am. This statement is True.

Option B: Mahira's application processing commenced after Nandini's.

- Mahira's processing begins at 9:30 am.
- Nandini (6th in the Schengen queue) begins processing at 9:32:30 am.
- Conclusion: Mahira's processing begins before Nandini's. This statement is False.

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 processed in twenty 15-minute intervals, from 9:00 am to 2:00 pm, with ten applications per interval.

This results in a total of 200 applications (20 intervals * 10 applications/interval).

50% of applications are from the US, distributed equally among the intervals. The same distribution applies to the other three categories.

Consequently, there are 100 US applications (200 * 50%), meaning 5 US applications per interval (100 / 20).

Ira, Vijay, and Nandini were scheduled for Schengen visa processing, in that order, at the 9:15 am interval. As Schengen applications are evenly distributed, each interval must have at least 3 Schengen applicants.

Mahira and Osman were scheduled for visa processing in the 'Others' category at the 9:30 am interval, indicating at least 2 applicants in this category per interval.

With 10 applications per interval and 3 Schengen and 2 'Others' applicants already accounted for, there are no UK applicants in each interval.

Ten counters are available: 4 for US, 2 for UK, 2 for Schengen, and 2 for 'Others'. US and UK applications each take 10 minutes. Vijay, 5th in the queue, was called to a counter at 9:25 am, implying a processing time of 12.5 minutes for Schengen applications.

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 specific day, Ira, Vijay, and Nandini were scheduled for Schengen visa processing in that sequence at 9:15 am but arrived at the VPO at 9:20 am. Upon their arrival, 6 out of 10 counters were busy or had just finished processing and were ready for new applications. This left 4 available

counters: 2 for UK and 2 for 'Others', as US and Schengen counters were occupied or had just completed processing.

Let's verify the details systematically.

The first interval requires 20 minutes to complete, while the subsequent 19 intervals each take 15 minutes for US application processing. The total processing time is calculated as follows:

- First interval: 20 minutes
- Remaining 19 intervals: 19 intervals * 15 minutes = 285 minutes

Total processing time = 20 minutes + 285 minutes = 305 minutes.

305 minutes is equivalent to 5 hours and 5 minutes.

Adding 5 hours and 5 minutes to the 9:00 am start time results in:

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

Therefore, the completion time is 2:05 pm.

Options Verification:

Option A: Osman's application process concluded before 9:45 am.

- It was previously determined that Osman's application process, commencing at 9:30 am and being the fifth in his category, concludes at 9:35 am.
- **True**: Osman's process ends before 9:45 am.

Option B: Mahira's application process commenced after Nandini's.

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

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