CAT 2025 DILR SLOT 2 Question Paper with Solutions

Time Allowed :40 Minutes	Maximum Marks :66	Total Questions :22

General Instructions

Read the following instructions very carefully:

1. The total duration of the test is **40 minutes** per section.
2. Each correct answer carries **+3 marks**.
3. For multiple-choice questions (MCQs), **−1 mark** will be deducted for each wrong answer.
4. There is **no negative marking** for Type-in-the-Answer (TITA) questions.
5. Once the allotted time for a section ends, you will automatically move to the next section. You cannot go back to a previous section.
6. All answers must be entered on the computer screen using the mouse and keyboard. Rough sheets will be provided.
7. The use of calculators, mobile phones, or any other electronic device is strictly prohibited. An on-screen basic calculator will be provided.

Q1. Logical Arrangement (People × Skills)
Six employees — A, B, C, D, E, F — each specialize in exactly one of three skills: Data, Design, or Marketing (two people per skill).
The following are known:

1. A and D do not share a skill.
2. B's skill is the same as either E or F (but not both).
3. C is not in Marketing.

How many valid assignments of skills are possible?

(A) 12
(B) 16
(C) 18
(D) 24
(E) 36

Correct Answer: (B) 16

Solution:
Step 1: Understanding the Concept:

We need to group 6 distinct people into 3 distinct groups (skills) of size 2 each. We must satisfy specific constraints regarding who can be paired with whom.

Step 2: Analyzing the Constraints:

- **Base Setup:** Skills are Data, Design, Marketing. Each has 2 slots.
- **Constraint 1:** A and D are in different groups.
- **Constraint 2:** B's skill is the same as E or F, but not both.
- **Constraint 3:** C is not in Marketing.

Step 3: Detailed Logic for Constraint 2:
Since each skill has exactly 2 slots, if B shares a skill with E, the group is $\{B, E\}$. Since the group is full, F cannot be in it. Thus, the condition "same as E" is true, and "same as F" is false. This satisfies the "exclusive OR" condition.
Similarly, if B pairs with F, the group is $\{B, F\}$, satisfying the condition.
If B pairs with anyone else (A, C, or D), then B shares with neither E nor F, violating the condition.
Conclusion: B must be paired with either E or F.
Step 4: Case-by-Case Analysis:
Case 1: B is paired with E (Group $\{B, E\}$)

- Remaining People: A, C, D, F.
- Remaining Slots: 2 empty groups + 0 slots in $\{B, E\}$'s group.
- **Sub-case 1.1: $\{B, E\}$ is Marketing.**
  - Remaining Skills: Data (2 slots), Design (2 slots).
  - Constraint 3: C cannot be Marketing (Satisfied, as C is in Data or Design).
  - Constraint 1: A and D must be in different skills.
  - We place C first. C can be Data or Design (2 choices).
  - Suppose C is in Data. The Data group needs 1 more person from $\{A, D, F\}$.
  - Remaining people $\{A, D, F\}$ must fill Data(1) and Design(2).
  - To satisfy "A and D different":
    * If A is with C in Data, D must be in Design (with F). Valid.
    * If D is with C in Data, A must be in Design (with F). Valid.
    * If F is with C in Data, A and D are in Design together. **Invalid**.
  - So, there are 2 valid arrangements if C is in Data.
  - By symmetry, if C is in Design, there are 2 valid arrangements.
  - Total for Sub-case 1.1 $= 2 + 2 = 4$.
- **Sub-case 1.2: $\{B, E\}$ is Data.**
  - Remaining Skills: Design (2), Marketing (2).
  - Constraint 3: C cannot be Marketing $\implies$ C must be Design.
  - C is fixed in Design. Remaining slots: Design(1), Marketing(2).

- Remaining people: A, D, F.
- Constraint 1: A and D different.
  - If Design group is {C, A}, Marketing is {D, F}. Valid.
  - If Design group is {C, D}, Marketing is {A, F}. Valid.
  - If Design group is {C, F}, Marketing is {A, D}. Invalid (A, D same).
- Total for Sub-case 1.2 = 2.

- **Sub-case 1.3: {B, E} is Design.**
  - Remaining Skills: Data (2), Marketing (2).
  - Constraint 3: C cannot be Marketing $\implies$ C must be Data.
  - Similar logic to Sub-case 1.2.
  - Total for Sub-case 1.3 = 2.

- **Total for Case 1 =** $4 + 2 + 2 = 8$**.**

Case 2: B is paired with F (Group {B, F})

- Remaining People: A, C, D, E.
- This scenario is mathematically symmetric to Case 1 because E and F are interchangeable regarding constraints (neither has a specific constraint like C, A, or D).
- Replacing E with F in the analysis above yields the exact same count.
- **Total for Case 2 = 8.**

Step 5: Final Calculation
Total Assignments = (Ways with {B, E}) + (Ways with {B, F})
Total = $8 + 8 = 16$.

Quick Tip

In grouping problems with "Exclusive OR" conditions (A or B but not both), check if the group size forces the condition. Here, group size 2 made it impossible to be with both, simplifying the logic to "Must be with E or Must be with F".

Q2. Puzzle (Table Seating)
Eight people sit around a circular table: P, Q, R, S, T, U, V, W.
The following conditions apply:

- Q sits second to the right of P.
- S is not a neighbor of R.
- Only two people sit between T and W.
- U sits opposite V.

How many distinct seatings satisfy all conditions?

(A) 8
(B) 12
(C) 16
(D) 24
(E) 32

Correct Answer: (C) 16

Solution:
Step 1: Understanding the Arrangement
We have a circular arrangement of 8 seats. We can fix one person's position to eliminate rotational symmetry. Let's number the seats 1 to 8 in clockwise order.
Step 2: Placing Fixed Elements

- Fix **P at Seat 1**.
- Q sits second to the right of P $\implies$ **Q is at Seat 3**.
- U sits opposite V $\implies$ U and V are separated by 3 seats (indices i and $i+4$).

The pairs of opposite seats are (1,5), (2,6), (3,7), (4,8).

- (1,5): Seat 1 is P. Cannot be U or V.
- (3,7): Seat 3 is Q. Cannot be U or V.
- Available pairs for (U, V): **(2, 6)** and **(4, 8)**.

Step 3: Analyzing Cases for (U, V)
Case 1: U and V are at seats {2, 6}.

- Occupied seats: 1(P), 2(U/V), 3(Q), 6(V/U).
- Empty seats: 4, 5, 7, 8.
- Constraint: "Only two people sit between T and W". In an 8-seat circle, 2 people between implies a gap of 2 seats (seat index difference of 3).
- Check possible positions for T and W in empty seats {4, 5, 7, 8}:
  - Pair (4, 7): Distance is 3 ($4 \to 5 \to 6 \to 7$). Valid.
  - Pair (5, 8): Distance is 3 ($5 \to 6 \to 7 \to 8$). Valid.
  - Other combinations in this subset don't have exactly 2 seats between them (relative to the full circle).
- **Sub-case 1.1: T, W are in {4, 7}.**
  - Ways to arrange T, W: 2 (T at 4, W at 7 or vice versa).
  - Remaining seats for R, S: 5, 8.
  - Constraint: S is not a neighbor of R.

- Are seats 5 and 8 neighbors? No (separated by 6, 7).
- So R and S can be placed in 2 ways.
- Total $= 2 \times 2 = 4$.

- **Sub-case 1.2: T, W are in {5, 8}.**
  - Ways to arrange T, W: 2.
  - Remaining seats for R, S: 4, 7.
  - Are seats 4 and 7 neighbors? No (separated by 5, 6).
  - R, S can be placed in 2 ways.
  - Total $= 2 \times 2 = 4$.
- Permutation of U, V: U can be at 2 or 6 (2 ways).
- Total for Case 1 $= 2 \times (4 + 4) = 16$.

Case 2: U and V are at seats {4, 8}.

- Occupied seats: 1(P), 3(Q), 4(U/V), 8(V/U).
- Empty seats: 2, 5, 6, 7.
- Check possible positions for T and W (gap of 2):
  - From 2: $2 + 3 = 5$. Pair (2, 5) is available.
  - From 2: $2 - 3 \equiv 7$. Pair (2, 7) is available.
  - From 5: $5 + 3 = 8$ (Occupied).
  - From 6: $6 + 3 = 1$ (Occupied), $6 - 3 = 3$ (Occupied).
  - From 7: $7 + 3 = 2$ (Pair (7, 2)).
- Available pairs for T, W: {2, 5} and {2, 7}.
- **Sub-case 2.1: T, W are in {2, 5}.**
  - Remaining seats for R, S: 6, 7.
  - Are 6 and 7 neighbors? Yes.
  - Since S cannot be a neighbor of R, this arrangement is **Invalid**.
- **Sub-case 2.2: T, W are in {2, 7}.**
  - Remaining seats for R, S: 5, 6.
  - Are 5 and 6 neighbors? Yes.
  - Arrangement **Invalid**.
- Total for Case 2 = 0.

Step 4: Final Sum
Total distinct seatings = Case 1 + Case 2 $= 16 + 0 = 16$.

Quick Tip

In circular arrangements, always fix one person first (usually the one referenced by others). When checking neighbor constraints, checking the remaining empty slots for adjacency is the fastest method to validate or invalidate a case.

Q3. Data Interpretation (Sales Table)
A store sells four items (A, B, C, D) over three months (Jan, Feb, Mar).
The following information is known:

- Total sales of A over the three months = 300 units.
- Feb sales of C are 50 more than Jan sales of C.
- Mar sales of B are half of Feb sales of A.
- Total sales across all months for all items = 1320 units.

What are the sales in Feb for item A?

(A) 100
(B) 120
(C) 150
(D) Cannot be determined
(E) None of these

Correct Answer: (D) Cannot be determined

Solution:
Step 1: Analyzing Variables and Equations
Let X_m denote the sales of item X in month m. The variables are $A_{Jan}, A_{Feb}, \ldots, D_{Mar}$ (12 variables).
Given Equations: 1. $A_{Jan} + A_{Feb} + A_{Mar} = 300$ 2. $C_{Feb} = C_{Jan} + 50$ 3. $B_{Mar} = 0.5 \times A_{Feb}$ 4. $\sum_{All} = 1320$
Step 2: Checking Solvability
The question asks for a specific value: A_{Feb}.
We have 12 unknowns and only 4 linear equations. Even if we assume integer constraints or positive values, the degrees of freedom (8) are too high to determine a unique value for A_{Feb} without additional information (such as a table grid with some filled values, which is often provided in such exam questions but is missing here).
Step 3: Conclusion
Since there is no information linking the sales of items B, C, D (other than the total sum) or providing specific monthly breakdowns for A, it is mathematically impossible to derive a unique value for A_{Feb}.
For example, A_{Feb} could be 100 (implies $B_{Mar} = 50$), or A_{Feb} could be 200 (implies $B_{Mar} = 100$), and the other 10 variables can simply adjust to sum to 1320.
Therefore, the answer is **Cannot be determined**.

Quick Tip

In Data Interpretation questions without options, count your variables and constraints. If Variables $\gg$ Equations, look for a "Cannot be determined" option or check if you missed a visual data source (like a chart or table).

Q4. Distribution Puzzle
Four students (K, L, M, N) participate in four competitions (Quiz, Debate, Chess, Coding), one event each.
Conditions:

1. K does not do Quiz or Chess.
2. L does Coding.
3. N does not do Debate.
4. M does not do the same event type as K.

How many valid assignments are possible?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 6

Correct Answer: (B) 2

Solution:
Step 1: Direct Assignment
Since each student does exactly one distinct event:

- From Condition 2: **L = Coding**.

Remaining Students: K, M, N.
Remaining Events: Quiz, Debate, Chess.
Step 2: Determining K's Event

- Condition 1: K does not do Quiz or Chess.
- From the remaining events (Quiz, Debate, Chess), the only option left for K is **Debate**.
- So, **K = Debate**.

Step 3: Assigning M and N
Remaining Students: M, N.
Remaining Events: Quiz, Chess.

- Condition 3: N does not do Debate. (This is already satisfied since K does Debate).

- Condition 4: M does not do the same event type as K. (M $\neq$ Debate). This is also already satisfied since K has taken Debate.
- Are there any other constraints on M or N?
  - K $\neq$ Quiz/Chess (Used).
  - L = Coding (Used).
  - N $\neq$ Debate (Used).
  - M $\neq$ Debate (Used).
- We are left with allocating {Quiz, Chess} to {M, N} with no further restrictions.

Step 4: Calculation
There are 2 distinct permutations for the remaining events: 1. M = Quiz, N = Chess. 2. M = Chess, N = Quiz.
Total Valid Assignments = 2.

> Quick Tip
>
> Identify the most restrictive constraint first (here, L=Coding), then eliminate options for the next constrained variable (K). Always check if remaining conditions are redundant (like M $\neq$ K when assignments are 1-to-1).

Q5. Routes & Networks
A courier must travel from Hub S to Hub T using intermediate hubs A, B, C.
Allowed edges: $S \to A, S \to B, A \to C, B \to C, C \to T, A \to T$.
The courier cannot use more than 3 edges in total.
How many valid routes from S to T are possible?

(A) 2
(B) 3
(C) 4
(D) 5
(E) 6

Correct Answer: (B) 3

Solution:
Step 1: Visualizing the Network
We need to find paths starting at S and ending at T. Edges:

- From S: $S \to A$, $S \to B$.
- From A: $A \to C$, $A \to T$.
- From B: $B \to C$. (Note: No direct B to T).
- From C: $C \to T$.

Step 2: Enumerating Paths by Length (Number of Edges)
Constraint: Length ≤ 3.
Length 1: Direct $S \to T$.

- Does an edge exist? No.
- Count = 0.

Length 2: $S \to$ Node $\to T$.

- Via A: $S \to A \to T$. (Valid: $S \to A$ exists, $A \to T$ exists).
- Via B: $S \to B \to T$. (Invalid: $B \to T$ does not exist).
- Count = 1.

Length 3: $S \to$ Node 1 $\to$ Node 2 $\to T$.

- Path must end with $C \to T$ (since C is the only intermediate going to T besides A, and A is step 1).
- Route ending $\cdots \to C \to T$.
- Predecessors to C are A and B.
- Path 1: $S \to A \to C \to T$. (Valid).
- Path 2: $S \to B \to C \to T$. (Valid).
- Count = 2.

Length 4: $S \to \cdots \to T$.

- Invalid (Constraint: Max 3 edges).

Step 3: Final Count
Total valid routes = (Length 2 paths) + (Length 3 paths)
Total $= 1 + 2 = 3$.

> Quick Tip
>
> Systematically list paths by length (1 hop, 2 hops, 3 hops). This prevents missing paths and helps enforce the ”maximum edges” constraint easily.
