

General Instructions

- (i) This booklet contains 20 questions, each provided with a complete, step-by-step solution.
- (ii) It comprises 14 single-correct multiple-choice questions and 6 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. A few salesmen are employed to sell a product called TRICCEK among households in various housing complexes. On each day, a salesman is assigned to visit one housing complex. Once a salesman enters a housing complex, he can meet any number of households in the time available. However, if a household makes a complaint against the salesman, then he must leave the housing complex immediately and cannot meet any other household on that day. A household may buy any number of TRICCEK items or may not buy any item. The salesman needs to record the total number of TRICCEK items sold as well as the number of households met in each day. The success rate of a salesman for a day is defined as the ratio of the number of items sold to the number of households met on that day. Some details about the performances of three salesmen - Tohri, Hokli and Lahur, on two particular days are given below.

1. Over the two days, all three of them met the same total number of households, and each of them sold a total of 100 items.
2. On both days, Lahur met the same number of households and sold the same number of items.

3. Hokli could not sell any item on the second day because the first household he met on that day complained against him.
4. Tohri met 30 more households on the second day than on the first day.
5. Tohri's success rate was twice that of Lahur's on the first day, and it was 75% of Lahur's on the second day.

Correct Answer: —

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1.1. What was the total number of households met by Tohri, Hokli and Lahur on the first day?

Correct Answer: —

SOLUTION:

The numerical value is 84.

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1.2. How many TRICCEK items were sold by Tohri on the first day?

Correct Answer: —

SOLUTION:

Forty

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1.3. How many households did Lahur meet on the second day?

- (A) more than 35
- (B) between 30 and 35
- (C) 20 or less
- (D) between 21 and 29

Correct Answer: (D) between 21 and 29

SOLUTION:

from 21 to 29

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1.4. How many households did Tohri meet on the first day?

- (A) between 21 and 40
- (B) more than 40
- (C) between 11 and 20
- (D) 10 or less

Correct Answer: (D) 10 or less

SOLUTION:

Maximum 10

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1.5. Which of the following statements is FALSE?

- (A) Tohri had a higher success rate on the first day compared to the second day.
- (B) Among the three, Lahur had the lowest success rate on the first day.
- (C) Among the three, Tohri had the highest success rate on the second day.
- (D) Among the three, Tohri had the highest success rate on the first day.

Correct Answer: (C) Among the three, Tohri had the highest success rate on the second day.

SOLUTION:

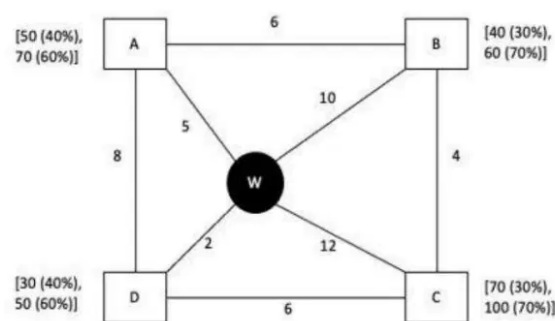
Tohri demonstrated the highest success rate on day two among the trio.

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2. Every day a widget supplier supplies widgets from the warehouse (W) to four locations – Ahmednagar (A), Bikrampore (B), Chitrachak (C), and Deccan Park (D). The daily demand for widgets in each location is uncertain and independent of each other. Demands and corresponding probability values (in parenthesis) are given against each location (A, B, C, and D) in the figure below. For example, there is a 40% chance that the demand in Ahmednagar will be 50 units and a 60% chance that the demand will be 70 units. The lines in the figure connecting the locations and warehouse represent two-way roads connecting those places with the distances (in km) shown beside the line. The distances in both the directions along a road are equal. For example, the road from Ahmednagar to Bikrampore and the road from Bikrampore to Ahmednagar are both 6 km long.

Every day the supplier gets the information about the demand values of

the four locations and creates the travel route that starts from the warehouse and ends at a location after visiting all the locations exactly once. While making the route plan, the supplier goes to the locations in decreasing order of demand. If there is a tie for the choice of the next location, the supplier will go to the location closest to the current location. Also, while creating the route, the supplier can either follow the direct path (if available) from one location to another or can take the path via the warehouse. If both paths are available (direct and via warehouse), the supplier will choose the path with minimum distance.



Correct Answer: —

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2.1. If the last location visited is Ahmednagar, then what is the total distance covered in the route (in km)?

Correct Answer: —

SOLUTION:

Key Observations:

1. The route originates at the warehouse, visits all other locations precisely once, and terminates at a subsequent location.
2. The route construction prioritizes locations with higher demand. If demands are equal, the nearest location is selected.

3. The supplier may opt for a direct route or a route via the warehouse, selecting the option with the shortest distance.

Further Information:

The final destination is A. Demands at all other locations must exceed A's demand. Consequently, A's demand is set to 50 units, not 70.

Location D's demand can be 30 or 50 units. This dictates that D must precede any location with a demand of 50 units or greater.

Location B, with a demand of 60 units, is visited immediately before D. C cannot precede B because C's demand values are higher than B's. Therefore, the sequence is C - B - D - A.

Distances Traveled:

- Warehouse to C: 12 km
- C to B: 4 km
- B to D: 12 km
- D to A (via warehouse): 7 km

Total distance: $12 + 4 + 12 + 7 = 35$ km.

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2.2. If the total number of widgets delivered in a day is 250 units, then what is the total distance covered in the route (in km)?

Correct Answer: —

SOLUTION:

Observations:

1. The delivery sequence commences at the warehouse and concludes at the final destination, ensuring each location is visited precisely once.
2. The route selection prioritizes locations with higher demand. If demands are equal, proximity to the current location is the deciding factor.
3. The supplier can opt for a direct route or a route that includes a stop at the warehouse, selecting the shortest path.

Summary:

1. The aggregate quantity to be delivered totals 250 units.
2. The maximum deliverable quantity is 280 units, considering the individual maximum demands: A (70 units), D (50 units), B (60 units), and C (100 units).
3. To fulfill the 250-unit delivery requirement, location C's demand must be adjusted to 70 units.
4. Consequently, the optimized delivery route is $A \rightarrow C \rightarrow B \rightarrow D$, with the following adjusted demand figures: A (70 units), D (50 units), B (60 units), and C (70 units).
5. Based on the first observation, the optimal sequence is $A \rightarrow C \rightarrow B \rightarrow D$, as location A is closer to the warehouse than location C.
6. The individual segment distances are:
 - Warehouse to A: 5 km
 - A to C: 17 km
 - C to B: 4 km
 - B to D: 12 km
7. The total cumulative distance for the route is 38 km ($5 + 17 + 4 + 12$).

This established plan guarantees the delivery of 250 units while adhering to all specified constraints and achieving the minimum total

travel distance.

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2.3. What is the chance that the total number of widgets delivered in a day is 260 units and the route ends at Bikrampore?

- (A) 7.56%
- (B) 17.64%
- (C) 10.80%
- (D) 33.33%

Correct Answer: (A) 7.56%

SOLUTION:

- The maximum daily widget delivery capacity is 280 units, allocated as follows: C (100 units), A (70 units), B (60 units), and D (50 units).
- The total widgets delivered amount to 260 units, necessitating a reduction of 20 units from either location A, B, or D.
- To accommodate reduction constraints, the delivery sequence is C (100 units), A (70 units), D (50 units), followed by B (40 units).
- The fulfilled demand percentages at each location are:
 - C: 100 units (70% of demand)
 - A: 70 units (60% of demand)
 - D: 50 units (60% of demand)
 - B: 40 units (30% of demand)
- The calculated value, based on these percentages, is $0.7 * 0.6 * 0.6 * 0.3 = 0.0756$.

Consequently, the overall demand fulfillment rate under these circumstances is 7.56%

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2.4. If the first location visited from the warehouse is Ahmednagar, then what is the chance that the total distance covered in the route is 40 km?

- (A) 18%
- (B) 5.4%
- (C) 30%
- (D) 3.24%

Correct Answer: (A) 18%

SOLUTION:

Initial assumption: Location A is the first stop. If A's demand is 50 units, C's demand must be less than 50 units. This scenario is not feasible. Thus, the demand for both A and C is set to 70 units.

- The visitation sequence is A (70 units) -> C (70 units). Distances: Warehouse to A (5 km), A to C (17 km). Total distance covered: $5 + 17 = 22$ km.
- Remaining distance to cover: $40 \text{ km} - 22 \text{ km} = 18 \text{ km}$.
- The subsequent route segments are C to B (4 km) and B to D (12 km), totaling 16 km.
- To cover the remaining 18 km, the path from C to D (6 km) and D to B (12 km) is utilized.
- To satisfy the conditions, D's demand is 50 units (probability 60%), and B's demand is 40 units (probability 30%).

- The calculated probability is $0.6 * 0.3 = 0.18$, representing an 18% probability.

Consequently, the probability of meeting the stipulated conditions is 18%.



2.5. If Ahmednagar is not the first location to be visited in a route and the total route distance is 29 km, then which of the following is a possible number of widgets delivered on that day?

- (A) 210
- (B) 220
- (C) 200
- (D) 250

Correct Answer: (A) 210

SOLUTION:

1. The route originates at the warehouse and concludes at a destination after visiting every location exactly once.
2. The supplier prioritizes locations in descending order of demand, and for equal demands, selects the nearest locations first.
3. The supplier may utilize a direct route or a route via the warehouse, opting for the shorter path.
4. Demand at all locations, excluding the first, must not exceed the demand of the first location.
5. Given the constraints, location A is not the starting point, and B and D are excluded as starting locations. Therefore, C is designated as the initial location.

With these conditions and a total route distance of 29 km, the sequence of visited locations is $C \rightarrow B \rightarrow A \rightarrow D$.

Potential demands for each location are as follows:

- C: 70 or 100
- B: 60
- A: 50
- D: 30 or 50

The total number of widgets delivered can be:

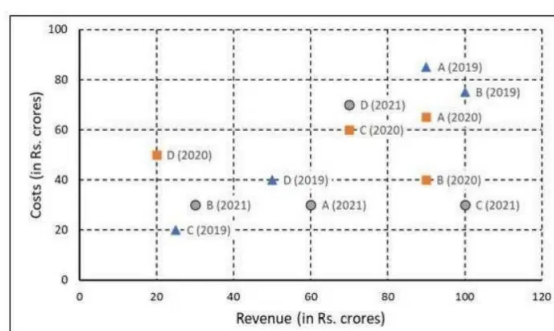
1. $70 + 60 + 50 + 30 = 210$
2. $70 + 60 + 50 + 50 = 230$
3. $100 + 60 + 50 + 30 = 240$
4. $100 + 60 + 50 + 50 = 260$

Consequently, the correct option is A.

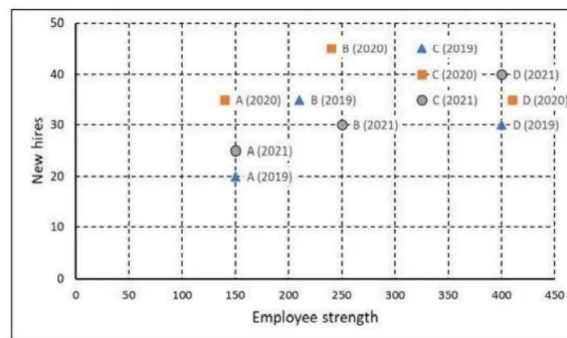
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3. The two plots below show data for four companies code-named A, B, C, and D over three years - 2019, 2020, and 2021.

The first plot shows the revenues and costs incurred by the companies during these years. For example, in 2021, company C earned Rs.100 crores in revenue and spent Rs.30 crores. The profit of a company is defined as its revenue minus its costs.



The second plot shows the number of employees employed by the company (employee strength) at the start of each of these three years, as well as the number of new employees hired each year (new hires). For example, Company B had 250 employees at the start of 2021, and 30 new employees joined the company during the year.



Correct Answer: —

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3.1. Considering all three years, which company had the highest annual profit?

- (A) Company B
- (B) Company C
- (C) Company D
- (D) Company A

Correct Answer: (B) Company C

SOLUTION:

Financial performance for Companies A, B, C, and D is presented below, detailing revenue, costs, and profit:

1. Company A:

- Revenue: 240
- Cost Incurred: 180
- Profit: 60

2. Company B:

- Revenue: 220
- Cost Incurred: 145
- Profit: 75

3. Company C:

- Revenue: 195
- Cost Incurred: 110
- Profit: 85

4. Company D:

- Revenue: 140
- Cost Incurred: 160
- Result: Loss

Company C achieved the highest annual profit at 85.

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3.2. Which of the four companies experienced the highest annual loss in any of the years?

- (A) Company B
- (B) Company C
- (C) Company A
- (D) Company D

Correct Answer: (D) Company D

SOLUTION:

The provided data details the financial performance of companies over three years. For all companies, costs incurred were less than revenue. An exception occurred with Company D in 2020, reporting a revenue of 20 and costs incurred of 50.

Company D incurred its highest annual loss in 2020, calculated as:
 $\text{Loss} = \text{Revenue} - \text{Cost Incurred} = 20 - 50 = -30.$

This resulted in a loss of 30 for Company D in 2020, which was the maximum annual loss recorded among the specified companies and years.

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3.3. The ratio of a company's annual profit to its annual costs is a measure of its performance. Which of the four companies had the lowest value of this ratio in 2019?

- (A) Company D
- (B) Company C
- (C) Company B
- (D) Company A

Correct Answer: (D) Company A

SOLUTION:

In 2019, the performance measure for A was calculated as follows:
 $(90-85)/85 = 5/85 = 0.06$. A subsequent calculation yielded $(100-75)/75 = 25/75 = 0.33$. Another performance measure was $(25-20)/25 = 5/25 = 0.2$. The final calculated measure was $(50-40)/40 =$

$10/40 = 0.25$. Company A recorded the lowest value among these measures.

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3.4. The total number of employees lost in 2019 and 2020 was the least for:

- (A) Company D
- (B) Company B
- (C) Company A
- (D) Company C

Correct Answer: (B) Company B

SOLUTION:

Company A:

- Company A commenced 2019 with 150 employees.
- 20 employees were added during 2019.
- The projected employee count for early 2020 was 170; however, the actual figure was 140, indicating 30 employee departures in 2019.
- The employee count at the start of 2020 was 140.
- In 2020, 35 employees were hired.
- The projected employee count for early 2021 was 175; however, only 150 were present, suggesting 25 employee departures in 2020.
- A total of 55 employees departed Company A across 2019 and 2020.

Company B

- In 2019, Company B began with 210 employees, hired 35, resulting in a total of 240 employees. A reduction to 240 indicates 5 employee departures.
- In 2020, Company B started with 240 employees, hired 45, reaching a total of 285. A reduction to 250 indicates 35 employee departures.
- A total of 40 employees departed Company B across 2019 and 2020.

Company C:

- In 2019, Company C began with 320 employees, hired 45, resulting in a total of 320 employees. This indicates 45 employee departures.
- In 2020, Company C started with 320 employees, hired 40, reaching a total of 360. A reduction to 320 indicates 40 employee departures.
- A total of 85 employees departed Company C across 2019 and 2020.

Company D:

- In 2019, Company D began with 400 employees, hired 30, resulting in a total of 410 employees. A reduction to 410 indicates 20 employee departures.
- In 2020, Company D started with 410 employees, hired 35, reaching a total of 445. A reduction to 400 indicates 45 employee departures.
- A total of 65 employees departed Company D across 2019 and 2020.

Company B had the lowest total employee departures in 2019 and 2020.

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3.5. Profit per employee is the ratio of a company's profit to its employee strength. For this purpose, the employee strength in a year is the average of the employee strength at the beginning of that year and the beginning of the next year. In 2020, which of the four companies had the highest profit per employee?

- (A) Company B
- (B) Company A
- (C) Company C
- (D) Company D

Correct Answer: (A) Company B

SOLUTION:

Corporation B

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4. A speciality supermarket sells 320 products. Each of these products was either a cosmetic product or a nutrition product. Each of these products was also either a foreign product or a domestic product. Each of these products had at least one of the two approvals – FDA or EU.

The following facts are also known:

1. There were equal numbers of domestic and foreign products.
2. Half of the domestic products were FDA approved cosmetic products.
3. None of the foreign products had both the approvals, while 60 domestic

products had both the approvals.

4. There were 140 nutrition products, half of them were foreign products.

5. There were 200 FDA approved products. 70 of them were foreign products and 120 of them were cosmetic products.

Correct Answer: —

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4.1. How many foreign products were FDA approved cosmetic products?

Correct Answer: —

SOLUTION:

The supermarket offers 320 products, categorized as cosmetic, nutrition, foreign, domestic, FDA approved, and EU approved. The distribution is as follows:

1. Foreign products and domestic products each number 160.
2. 80 domestic products are FDA approved cosmetic products (half of the domestic products).
3. 140 products are nutrition-based, with 70 foreign and 70 domestic.
4. Out of 200 FDA approved products, 70 are foreign and 120 are cosmetic.
5. Of the FDA approved domestic products, 80 are cosmetic, and 50 are nutrition.

Additional findings include:

- There are 120 FDA approved cosmetic products in total.
- 70 FDA approved foreign products are also FDA approved.

- The remaining 130 domestic products consist of 80 FDA approved cosmetic items and 50 FDA approved nutrition items.
- Domestic and cosmetic products combined total 90, with 80 of these being FDA approved.
- Consequently, 10 domestic cosmetic products are not FDA approved.
- The count of domestic, nutrition, and exclusively EU approved products is 20.

In summary, there are 40 foreign, cosmetic, and FDA approved products.

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4.2. How many cosmetic products did not have FDA approval?

- (A) 10
- (B) 60
- (C) 50
- (D) Cannot be determined

Correct Answer: (B) 60

SOLUTION:

The supermarket stocks 320 products across cosmetic and nutrition categories. Foreign and domestic products are equally represented, with all items conforming to FDA and EU standards. Additional details follow:

1. Foreign and domestic products are numerically equal, each constituting 50% of the total, amounting to 160 items per category.

2. Eighty domestic products are FDA-approved cosmetics, representing half of all domestic items.
3. Of the 140 nutrition products, 70 are foreign and 70 are domestic.
4. Within the 200 FDA-approved products, 70 are foreign. Additionally, 120 of these are cosmetic products, leading to 50 FDA-approved domestic nutrition products.
5. There are 120 FDA-approved cosmetic products in total; 80 are domestic and 40 are foreign.

Further details:

- Seventy FDA-approved foreign products include 30 foreign nutrition products.
- Domestic cosmetic products total 90 when combined with other product types; 80 of these are FDA-approved, indicating 10 domestic cosmetic products are not FDA-approved.
- Domestic nutrition products not FDA-approved total 20 (calculated as $70 - 50$).

Consequently, 60 cosmetic products lack FDA approval, comprising 10 domestic EU-compliant products and 50 foreign EU-compliant products.

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4.3. Which among the following options best represents the number of domestic cosmetic products that had both the approvals?

- (A) At least 10 and at most 80
- (B) At least 20 and at most 70
- (C) At least 20 and at most 50
- (D) At least 10 and at most 60

Correct Answer: (D) At least 10 and at most 60

SOLUTION:

The supermarket offers 320 products, encompassing cosmetics and nutrition. Product origin (foreign/domestic) and approvals (FDA/EU) are balanced. The following information is provided:

1. There are 160 foreign products and 160 domestic products, comprising equal halves of the total.
2. Eighty domestic products are FDA-approved cosmetics.
3. Out of 140 nutrition products, 70 are foreign and 70 are domestic.
4. Two hundred products are FDA-approved, with 70 being foreign and 130 domestic. Of these domestic FDA-approved products, 80 are cosmetics and 50 are nutrition items.
5. A total of 120 products are FDA-approved cosmetics; 80 are domestic and 40 are foreign. Additionally, 70 products are FDA-approved and foreign, meaning 30 are foreign nutrition products.

Further analysis reveals:

- Domestic cosmetic products total 90. Of these, 80 have FDA approval, leaving 10 domestic cosmetic products without FDA approval.
- Sixty domestic products hold both FDA and EU approvals.

- Let 'a' be the number of domestic cosmetic products without FDA approval, and 'c' be the number of domestic cosmetic products with both FDA and EU approvals.
- The relationship is defined as $a + c = 60$.

To determine the minimum and maximum values of 'a':

- The maximum value of 'c' is 50. This results in a minimum value of $a = 60 - 50 = 10$.
- The minimum value of 'c' is 0. This results in a maximum value of $a = 60 - 0 = 60$.

Consequently, the number of domestic cosmetic products lacking FDA approval ranges from a minimum of 10 to a maximum of 60, contingent on the quantity of products with dual FDA and EU approvals.

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4.4. If 70 cosmetic products did not have EU approval, then how many nutrition products had both the approvals?

- (A) 10
- (B) 20
- (C) 30
- (D) 50

Correct Answer: (A) 10

SOLUTION:

Ten

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4.5. If 50 nutrition products did not have EU approval, then how many domestic cosmetic products did not have EU approval?

Correct Answer: —

SOLUTION:

Fifty