CAT 2022 Question Paper Slot 2

LRDI

Instructions [25 - 29]

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.

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

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

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

A between 21 and 29

B 20 or less

C more than 35

D between 30 and 35

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

A between 21 and 40

B between 11 and 20

C more than 40

D 10 or less

29. Which of the following statements is FALSE?

A Among the three, Tohri had the highest success rate on the second day.

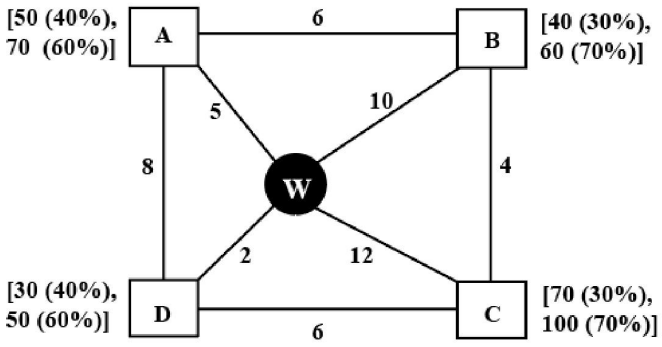
B Tohri had a higher success rate on the first day compared to the second day.

C Among the three, Tohri had the highest success rate on the first day.

D Among the three, Lahur had the lowest success rate on the first day.

Instructions [30 - 34]

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.

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

31. 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)?

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

A 33.33%

B 10.80%

C 17.64%

D 7.56%

33. 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 3.24%

D 30%

34. 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

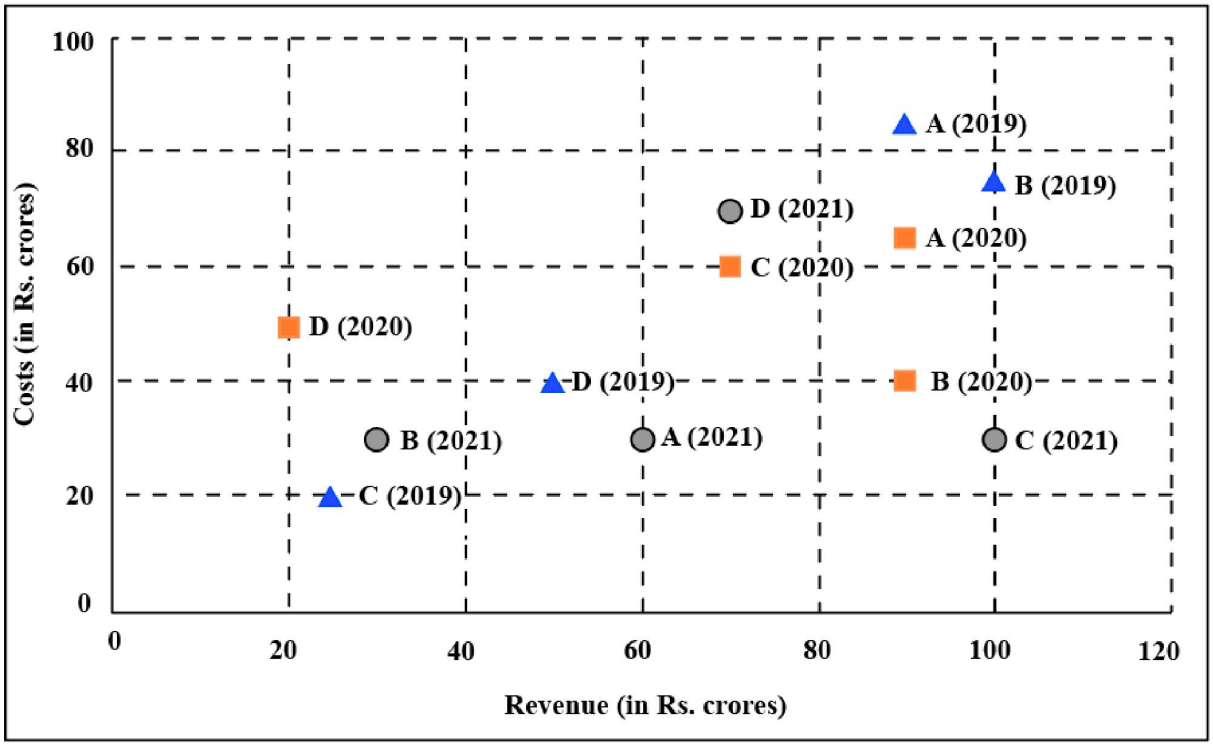
C 200

D 250

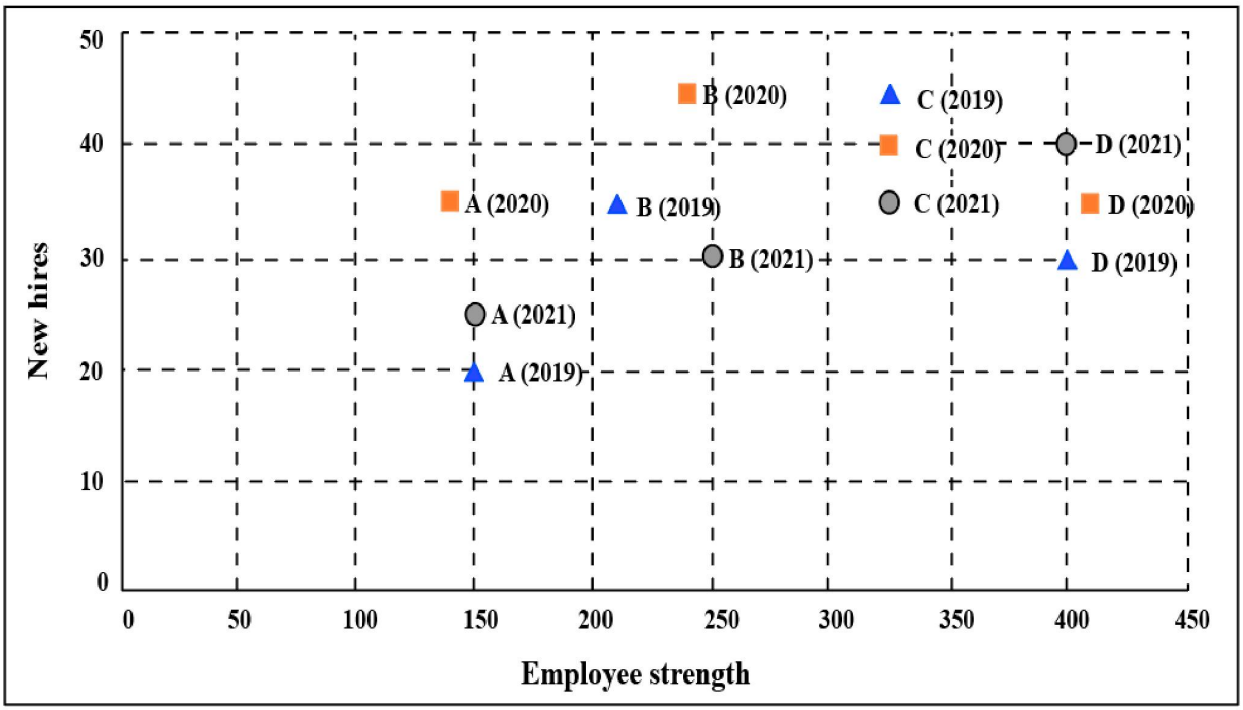
Instructions [35 - 39]

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.



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

A Company A

B Company D

C Company B

D Company C

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

A Company C

B Company A

C Company B

D Company D

37. 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 A

B Company D

C Company B

D Company C

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

A Company B

B Company D

C Company A

D Company C

39. 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 D

B Company C

C Company B

D Company A

Instructions [40 - 44]

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.

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

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

A 10

B Cannot be determined

C 50

D 60

42. 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 60

B At least 10 and at most 80

C At least 20 and at most 70

D At least 20 and at most 50

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

A 50

B 30

C 10

D 20

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

Answers

LRDI

25.**84**	26.**40**	27.**A**	28.**D**	29.**A**	30.**35**	31.**38**	32.**D**
33.**A**	34.**A**	35.**D**	36.**D**	37.**A**	38.**A**	39.**C**	40.**40**
41.**D**	42.**A**	43.**C**	44.**50**				

Explanations

LRDI

Explanation [25 - 29]:
In statement 1, it is given that all three of them met the same total number of households, and each of them sold a total of 100 items in two days. In statement 2, it is given that on both days, Lahur met the same number of households and sold the same number of items. This implies he sold 50 items per day. Let the number households Lahur met in a day be 'x'.
Total number of households each of them met in two days will be '2x'.

	Day 1		Day 2		Total	
	HHs	Items	HHs	Items	HHs	Items
Tohri					2x	100
Hokli					2x	100
Lahur	x	50	x	50	2x	100

In statement 3, it is given that Hokli could not sell any item on the second day because the first household he met on that day complained against him. This implies he met only 1 household on day 2.

	Day 1		Day 2		Total	
	HHs	Items	HHs	Items	HHs	Items
Tohri					2x	100
Hokli	2x-1	100	1	0	2x	100
Lahur	x	50	x	50	2x	100

In statement 4, it is given that Tohri met 30 more households on the second day than on the first day.
Let the number of households Tohri met on day 1 be 'a'
It is given,
a + a + 30 = 2x
a + 15 = x
a = x - 15

	Day 1		Day 2		Total	
	HHs	Items	HHs	Items	HHs	Items
Tohri	x-15	y	x+15	100-y	2x	100
Hokli	2x-1	100	1	0	2x	100
Lahur	x	50	x	50	2x	100

In statement 5, it is given that

$2\left(\frac{50}{x}\right) = \frac{y}{x-15}$ ..... (1)

$\frac{3}{4}\left(\frac{50}{x}\right) = \frac{100-y}{x+15}$ ..... (2)

$\frac{100}{x} = \frac{y}{x-15}$

$\frac{100}{y} = \frac{x}{x-15}$

$\frac{y}{100} = 1 - \frac{15}{x}$

$x = \frac{1500}{100-y}$

Substituting x in (2), we get

y = 40 and x = 25

Final Table:

	Day 1		Day 2		Total	
	HHs	Items	HHs	Items	HHs	Items
Tohri	10	40	40	60	50	100
Hokli	49	100	1	0	50	100
Lahur	25	50	25	50	50	100

25. **84**
The total number of households met by Tohri, Hokli and Lahur on the first day is 10 + 49 + 25, i.e. 84.

26. **40**
The number of items sold by Tohri on the first day is 40.

27. **A**
Lahur met 25 households on day 2. The answer is option A.

28. **D**
Tohri met 10 households on day 1. The answer is option D.

29. **A**
Among the three, Tohri had the highest success rate on the second day - this statement is incorrect. On day 2, Lahur had the highest success rate, i.e. 2 whereas Tohri's success rate is 1.5.
Tohri had a higher success rate on the first day compared to the second day - this statement is correct.
Tohri's day 1 success rate is 4 and day 2 success rate is 1.5.
Among the three, Tohri had the highest success rate on the first day - this statement is correct.
Tohri's success rate on day 1 is 4.
Hokli's success rate on day 1 is 2.04.
Lahur's success rate on day 1 is 2.
Among the three, Lahur had the lowest success rate on the first day - this statement is correct.
Tohri's success rate on day 1 is 4.
Hokli's success rate on day 1 is 2.04.
Lahur's success rate on day 1 is 2.
The answer is option A.

30. **35**
Points to be noted:
1. Starts from the warehouse and ends at a location after visiting all the locations exactly once.
2. While making the route plan, the supplier goes to the locations in decreasing order of demand. If equal demand, goes to the nearest ones first.
3. 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(Prefers minimum distance).
In the question, it is given that last location is A. The demand in the remaining places should be greater than A. This implies A demand cannot be 70 units. Therefore, it is 50 units.
The demand of the location D is 30 or 50 units. This implies this should be placed before D.
The demand of the location placed before D should be greater than or equal to 50 units. Location supplier visited before D is B(60 units of demand). It cannot be C because values of C is greater than the values of B.
Therefore, order is C - B - D - A.
From warehouse to C - 12 km
C to B - 4 km
B to D - 12 km
D to A - 7 km (through warehouse)
Total distance covered = 12 + 4 + 12 + 7 = 35 km

This question is removed from the paper because if the order is CBDA, the supplier will go to A from B (and hence the last city visited will be D).

31. **38**
Points to be noted:
1. Starts from the warehouse and ends at a location after visiting all the locations exactly once.
2. While making the route plan, the supplier goes to the locations in decreasing order of demand. If equal demand, goes to the nearest ones first.
3. 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(supplier prefers minimum distance).

In the question, it is given that total number of units delivered is 250 units.

Maximum number of widgets that can be delivered is 70 units(A) + 50 units(D) + 60 units(B) + 100 units(C) = 280 units

From this 30 units should be decreased. 30 units can be decreased only when C's demand decreases to 70 units(because the difference for remaining locations is 20 units)

Therefore, the only possibility is 70 units(A) + 50 units(D) + 60 units(B) + 70 units(C)

From statement 1, the order should be A - C - B - D(as A is nearer to warehouse than C)

Distance from Warehouse to A is 5 km

Distance from A to C is 17 km

Distance from C to B is 4 km

Distance from B to D is 12 km

Total distance covered = 5 + 17 + 4 + 12 = 38 km

32. **D**

Maximum number of widgets delivered in a day is 100 units(C) + 70 units(A) + 60 units(B) + 50 units(D), i.e. 280 units

Given, total number of widgets delivered is 260 units. This implies 20 units must be decreased from any one of the locations.

A - (70,50), B - (60,40), C - (100,70) and D - (50,30)

20 units can be decreased from A, B or D.

Demand at location C will be 100 units and supplier first visits C.

In the question, it is also given that the route ends at B.

C(100 units), _, _, B

If B's demand is 60 units, D's demand should be more than 60 units which is not possible. Therefore, B's demand should be 40 units.

20 units is decreased at location B. This implies demand at location A is 70 units and at location D is 50 units.

Order will be C(100 units) - A(70 units) - D(50 units) - B(40 units).

It is given,

C - 100 units - 70%

A - 70 units - 60%

D - 50 units - 60%

B - 40 units - 30%

Required value = 0.7*0.6*0.6*0.3 = 0.0756 = 7.56%

The answer is option D.

33. **A**

It is given that the first location visited from the warehouse is A.

If A's demand is 50 units, C's demand should be less than 50 units which is not possible. This implies demand of locations A and C is 70 units.

A(70 units) -> C(70 units)

Warehouse to A - 5km

A to C - 17 km

Distance covered = 5 + 17 = 22 km

Remaining distance = 40 - 22 = 18 km

C to B - 4 km

B to D - 12 km

Distance covered = 4 + 12 = 16 km $\neq$ 18 km

C to D - 6 km

D to B - 12 km

Distance covered = 6 + 12 = 18 km

Therefore, supplier can cover distance 18 km if he visits D before B, i.e. demand of D should be more than demand of B. This is only possible when D's demand is 50 units and B's demand is 40 units.

It is given,

D - 50 units - 60% probability

B - 40 units - 30% probability

Required value = 0.6*0.3 = 0.18 = 18%

The answer is option A.

34. **A**

Points to be noted:
1. Starts from the warehouse and ends at a location after visiting all the locations exactly once.
2. While making the route plan, the supplier goes to the locations in decreasing order of demand. If equal demand, goes to the nearest ones first.
3. 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(Prefers minimum distance).
Demand in all other locations should be less than or equal to the demand in first location. In the question, it is given that A is not first location. B and D cannot be first location. This implies C should be the first location.
It is given, total route distance is 29 km.
Warehouse to C is 12 km.
This implies remaining distance should be 29-12, i.e. 17km
This is only possible when C visits B, A and D later(4 + 6 + 7).
The order should be C - B - A - D
C's demand can be 70/100, B's demand should be 60, A's demand should be 50 and D's demand can be 30/50.
The possible number of widgets delivered can be
70 + 60 + 50 + 30 = 210
70 + 60 + 50 + 50 = 230
100 + 60 + 50 + 30 = 240
100 + 60 + 50 + 50 = 260
The answer is option A.

35. **D**

It is given,

	Revenue			Cost incurred		
Company	2019	2020	2021	2019	2020	2021
A	90	90	60	85	65	30
B	100	90	30	75	40	30
C	25	70	100	20	60	30
D	50	20	70	40	50	70

Company A:

Revenue = 240 and cost incurred = 180

Profit = 240 - 180 = 60

Company B:

Revenue = 220 and cost incurred = 145

Profit = 220 - 145 = 75

Company C:

Revenue = 195 and cost incurred = 110

Profit = 195 - 110 = 85

Company D:

Revenue = 140 and cost incurred = 160

No profit.

Company C had the highest annual profit.

The answer is option D.

36. **D**

	Revenue			Cost incurred		
Company	2019	2020	2021	2019	2020	2021
A	90	90	60	85	65	30
B	100	90	30	75	40	30
C	25	70	100	20	60	30
D	50	20	70	40	50	70

For all the companies in all three years, cost incurred is less than Revenue except for D in 2020.

Revenue is 20 and cost incurred is 50

Company D experienced the highest annual loss in 2020.

The answer is option D.

37. **A**

It is given,

	Revenue			Cost incurred		
Company	2019	2020	2021	2019	2020	2021
A	90	90	60	85	65	30
B	100	90	30	75	40	30
C	25	70	100	20	60	30
D	50	20	70	40	50	70

Measure of A's performance in 2019 = $\frac{90-85}{85} = \frac{5}{85} = 0.06$

Measure of B's performance in 2019 = $\frac{100-75}{75} = \frac{25}{75} = 0.33$

Measure of C's performance in 2019 = $\frac{25-20}{25} = \frac{5}{25} = 0.2$

Measure of D's performance in 2019 = $\frac{50-40}{40} = \frac{10}{40} = 0.25$

Company A had the lowest value.

The answer is option A.

38. **A**

It is given,

	Strength			New hires		
Company	2019	2020	2021	2019	2020	2021
A	150	140	150	20	35	25
B	210	240	250	35	45	30
C	320	320	320	45	40	35
D	400	410	400	30	35	40

Company A:

The number of employees in the beginning of 2019 = 150

The number of employees hired in 2019 = 20

The number of employees should be at the beginning of 2020 is 150+20, i.e. 170 but there are 140 only. This implies 30 left company A in 2019.

The number of employees in the beginning of 2020 = 140

The number of employees hired in 2020 = 35

The number of employees should be at the beginning of 2021 is 140+35, i.e. 175 but there are 150 only. This implies 25 left company A in 2020.

The number of employees left company A in 2019 and 2020 = 30 + 25 = 55

Company B:

Similarly, the number of employees left company B in 2019 = 210 + 35 - 240 = 5

The number of employees left company B in 2020 = 240 + 45 - 250 = 35

The number of employees left company B in 2019 and 2020 = 5 + 35 = 40

Company C:

Similarly, the number of employees left company C in 2019 = 320 + 45 - 320 = 45

The number of employees left company C in 2020 = 320 + 40 - 320 = 40

The number of employees left company C in 2019 and 2020 = 45 + 40 = 85

Company D:

Similarly, the number of employees left company D in 2019 = 400 + 30 - 410 = 20

The number of employees left company D in 2020 = 410 + 35 - 400 = 45

The number of employees left company D in 2019 and 2020 = 20 + 45 = 65

The total number of employees lost in 2019 and 2020 is least for company B.

The answer is option A.

39. **C**

It is given,

	Revenue			Cost incurred		
Company	2019	2020	2021	2019	2020	2021
A	90	90	60	85	65	30
B	100	90	30	75	40	30
C	25	70	100	20	60	30
D	50	20	70	40	50	70

	Strength			New hires		
Company	2019	2020	2021	2019	2020	2021
A	150	140	150	20	35	25
B	210	240	250	35	45	30
C	320	320	320	45	40	35
D	400	410	400	30	35	40

Company A = $\frac{90-65}{145} = \frac{25}{145} = \frac{50}{290}$

Company B = $\frac{90-40}{245} = \frac{50}{245}$

Company C = $\frac{70-60}{320} = \frac{10}{320}$

Company B had the highest profit per employee.

The answer is option C.

Explanation [40 - 44]:
It is given that the total number of products supermarket sells is 320.

cosmetic + nutrition = foreign + domestic = FDA + EU = 320 products

In statement 1, it is given that the number of foreign products is equal to the number of domestic products.

Foreign products = Domestic products = 320/2 = 160

Total(32)	Domestic (160)	Cosmetic	only EU -	Total EU -
			only FDA -	Total FDA -
			Both -	
		Nutrition	only EU -	Total EU -
			only FDA -	Total FDA -
			Both -	
	Foreign (160)	Cosmetic	EU -	
			FDA -	
		Nutrition	EU -	
			FDA -	

In statement 2, it is given that half of the domestic products were FDA approved cosmetic products, i.e. domestic, cosmetic and FDA = 80

In statement 4, it is given that there were 140 nutrition products, half of them were foreign products. This implies remaining half are domestic.

Total(32)	Domestic (160)	Cosmetic (90)	only EU -	Total EU -
			only FDA -	Total FDA - 80
			Both -	
		Nutrition (70)	only EU -	Total EU -
			only FDA -	Total FDA -
			Both -	
	Foreign (160)	Cosmetic (90)	EU -	
			FDA -	
		Nutrition (70)	EU -	
			FDA -	

In statement 5, it is given that there are 200 FDA approved products out of which 70 are foreign products and 120 are cosmetic products.
If 70 are foreign products, remaining 130 should be domestic products. In domestic products, FDA approved cosmetic products are 80. This implies FDA approved nutrition products are 130-80, i.e. 50.

There are 120 FDA approved cosmetic products.

Domestic, cosmetic and FDA approved = 80

This implies, Foreign, cosmetic and FDA approved is 120-80, i.e. 40.

There are 70 FDA approved foreign products.

This implies Foreign, nutrition and FDA approved is 70-40, i.e. 30.

Total(32)	Domestic (160)	Cosmetic (90)	only EU -	Total EU -
			only FDA -	Total FDA - 80
			Both -	
		Nutrition (70)	only EU -	Total EU -
			only FDA -	Total FDA - 50
			Both -	
	Foreign (160)	Cosmetic (90)	EU - 50	
			FDA - 40	
		Nutrition (70)	EU - 40	
			FDA - 30	

Domestic and Cosmetic = 90

Domestic, comestic and FDA approved = 80

This implies, Domestic, cosmetic and FDA not approved is 90-80, i.e. 10.

Therefore, (domestic, cosmetic and only EU) = 10

Similarly, we get (domestic, nutrition and only EU) = 70-50 = 20

Total(32)	Domestic (160)	Cosmetic (90)	only EU - 10	Total EU -
			only FDA -	Total FDA - 80
			Both -	
		Nutrition (70)	only EU - 20	Total EU -
			only FDA -	Total FDA - 50
			Both -	
	Foreign (160)	Cosmetic (90)	EU - 50	
			FDA - 40	
		Nutrition (70)	EU - 40	
			FDA - 30	

40. **40**

The number of foreign, cosmetic and FDA approved products is 40.

The answer is 40.

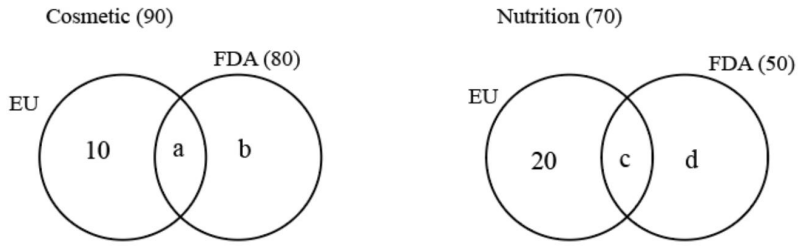
41. **D**

The number of cosmetic products which do not have FDA approval = domestic only EU + foreign EU = 10 + 50 = 60

The answer is option D.

42. **A**

In statement 3, it is given that the number of domestic products which have both the approvals = 60



In the question, it is given that a + c = 60

To find the minimum value of a, we need to maximise c.

Maximum value c can take is 50

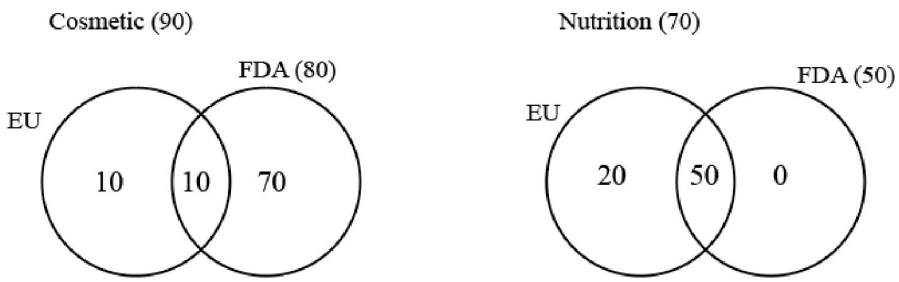
Therefore, minimum value of a is 60-50, i.e. 10.

To find the maximum value of a, we need to minimise c.

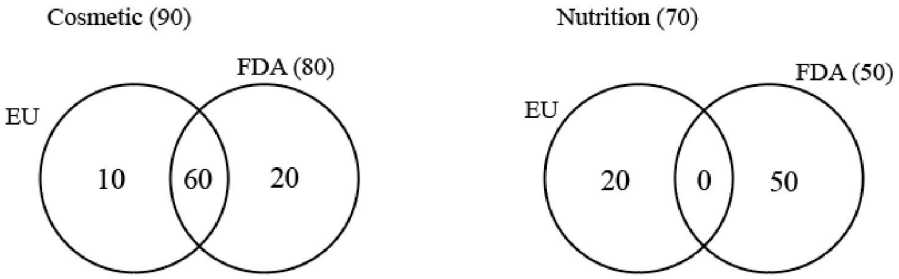
Maximum value c can take is 0.

Therefore, maximum value of a is 60-0, i.e. 60.

a is minimum:



a is maximum:



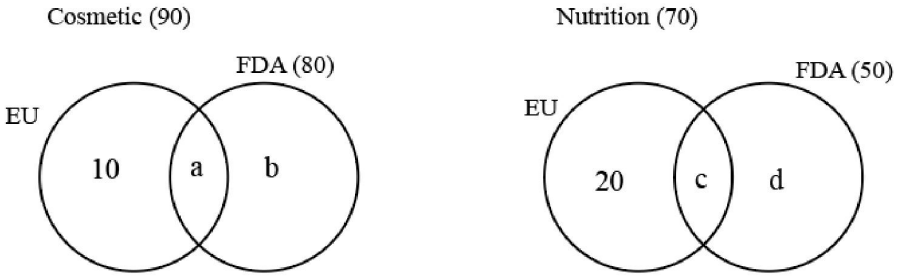
Therefore, the number of domestic cosmetic products that had both the approvals is at least 10 and at most 60.

The answer is option A.

43. **C**

In the question, it is given that 70 cosmetic products did not have EU approval.

In foreign, 40 cosmetic products did not have EU approval. This implies 30 cosmetic products should have only FDA approval in domestic products.

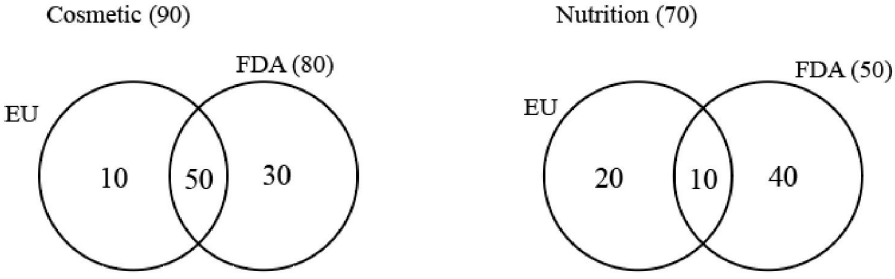


According to the above statement, b = 30

a = 80 - 30 = 50

Given, a + c = 60

c = 60 - 50 = 10



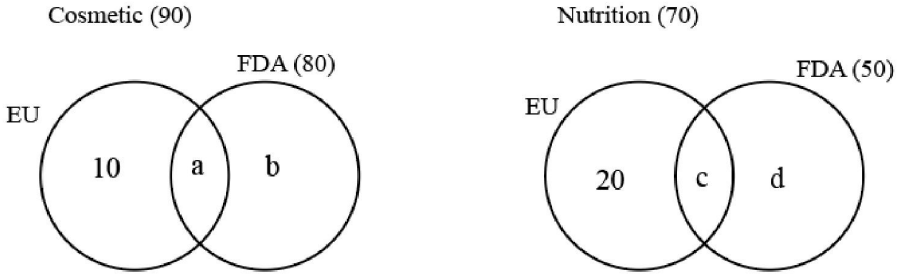
Therefore, the number of nutrition products which had both the approvals is 10.

The answer is option C.

44. **50**

In the question, it is given that 50 nutrition products did not have EU approval.

In Foreign products, there are 30 nutrition products which do not have EU approval. This implies 20 nutrition products do not have EU(have only FDA) approval in domestic products.



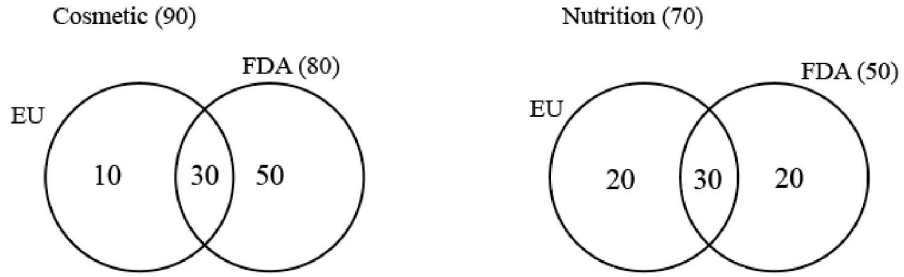
It is given, d = 20

c = 50 - 20 = 30

It is given, a + c = 60

a = 60 - 30 = 30

b = 80 - 30 = 50



Therefore, the number of domestic cosmetic products did not have EU(only FDA) approval is 50.