**3.1 FUNDAMENTALS OF D.I.**

Introduction to the Topic

Data Interpretation means reading and understanding the given data forms and finding the answers based on the given data. The section of Data interpretation doesn’t required knowledge of very high level mathematics but the basic knowledge of numbers and its operations is an added advantage while dealing with the questions of this section. This section tests the ability of a candidate to comprehend, analyze and synthesize the data given and then use some calculations and logic to find the final answer.

To perform well in this section a candidate should be well versed with some basic data representation forms like tables, line charts, bar charts (histograms), pie charts etc. The questions of data interpretation contains one or more data forms. Apart from understanding the data representation forms a candidate should also be aware about some basic concepts of quantitative aptitude like percentages, profit and loss, ratio & proportions, averages etc. to calculate faster and score high in this section.

Relevance in CAT

The topic of Data Interpretation is an integral part of CAT examination. Since the beginning the questions have regularly featured in the CAT examination. The questions have been calculation intensive in the beginning and slowly moved towards using logic or coupling logic with calculations. Data Interpretation used to be separate section in the late 90’s and then went to become a section of Logical Reasong and Data Interpretation in the early 2000. Prior to 2015 the DI was part of Quantitative section. In the new pattern the DI is again a seperate section.

Basic Fundamentals

■ **Percentage**

The term percent means division by hundred. A fraction whose denominator is 100 is called a percentage. It is denoted by the symbol %. 

Percentage is a very useful tool for comparison in this topic. Let us say Raman has hit the target 138 times out of 215 shots he fired while Mansher hit the target 87 times out of 149 shots he fired. This can be compared better by using percentages.

Hit rate of Raman = 

Hit rate of Mansher = 

This shows that Raman has a better hit percentage as comared to Mansher.

Let us now see some fractions and their percentage equivalents. Remembering these can help reduce the time of calculation while finding the answer.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Percentage Equivalent of Imporatant Fractions** | | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

* Some important points about Percentage

● By how much a value *N* is more/less than *P*.

= 

● Percentage increase/decrease

**=**

■ **Growth RAtes**

There are two ways in which annual growth rates, over a period of time, can be calculated viz. the Simple Annual Growth Rate (SAGR) and the Compounded Annual Growth Rate (CAGR). SAGR is sometimes also termed as average annual growth rate.

As their name suggest the formulas are based on the concpet of simple and compound interest. SAGR is related to Simple Interest while CAGR is related to Compound Interest.

Let us say the initial value is *I* and the final value is *F* and the calculation is done for *n* years. Then the formulas of SAGR and CAGR are:

Formulas for SAGR & CAGR

● SAGR = 

● CAGR = 

Here, (*n* − 1) will be the number of time periods and it is always one less than the number of years.

Example 1: A company has sales value of 300 crores in year 2010 and its sales value is 400 crores in year 2013. Find the SAGR and CAGR?

Solution:

The number of years (*n*) = 4

Initial value = (*I*) = 400

SAGR = 

CAGR = 

A question will specially ask if the compounded annual growth rate is to be found out. Else we will calculate the simple annual growth rate, the same way we do in calculating interests.

If there is a case of population or value of any item being depreciated over the years then automatically compounded annual growth rate will be used.

■ **RAtio**

Ratio is a comparision of two or more quantitites of same or similar type by method of division. The ratio of any two numbers *x* and *y* (*x*, *y* ≠ 0) can be written as  or *x* : *y*.

If *a* is a positive number and *a* > *y*, then

● If  = 1, then 

● If  > 1, then 

● If  < 1, then 

If *a* is a positive number and *a* < *y*, then

● If  = 1, then 

● If  > 1, then 

● If  < 1, then 

■ **average**

Average = 

In other words, if *x*1, *x*2, *x*3, ..... *xn* be *n* numbers, then their average = 

Let us say Kohli scored 4, 144, 58, 156, 12, 24, 66 and 173 runs in 8 innings that he played on the tour of Australia. We can calculate his average score per match as

= 

An important point to note here is, the average will not mean that he scored 79.625 runs in each innings.

Some important points about Averages

● If the each value increased by *x*, then the average of the group also increases by *x*.

● If the each value is decreased by *x*, then the average of the group also decreases by *x*.

● If the each value is multiplied by *x*, then the average of the group becomes *x* times the orignal average.

● If the each value is divided by *x* (*x* ≠ 0), then the average of the group is also divided by *x*.

■ **weighted average**

When two or more groups of items are taken together, and we are required to find the total average of all the items together (all the groups considered as one group) then we need to know either the values individually or average and number of values in each group.

Let say the data is given as: Ratan scored an average of 65 marks in the 4 subjects while Ram has scored 72 marks in the 3 subjects.

Weighted Average = 

= 

To genralize we can say that:

Weighted Average = 

Where *n*1, *n*2, *n*3 are the number of elements in each group and *x*1, *x*2, *x*3 are the averages of each group.

Data Representation Forms

The data can be represented in various forms like tables, line charts, bar charts, pie charts, spider webs, triangular charts. The most commonly used data forms in these questions are:

I. Tables

II. Line Charts

III. Bar Charts (Histograms)

IV. Pie Charts

V. Mixed Graphs

VI. Caselets

Forms I to V are all pictorial forms of data representation and mixed graphs generally used more than one type of data representation forms. While caselets are just like a short reading comprehension passages containing numerical data.

Let us now see each of these data forms in detail.

**■ Tables**

Tables are one of the most simplest way of representing the data. Not only the data representation is easier but comprehending the data is also easy as the data is systematically arranged in rows and columns. The rows and columns have headings which describe the data present in them. The table may contain data pertaining to one or more variables.

The questions on tables which are asked in CAT can be based on a table containing complete data or so be passed on table containing partial data, which has to be filled with help of the points that follow the table.

The table below is a typical example of data in the form of the table with only one variable. It shows the value of Wheat production in 5 different countries for 5 years.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Wheat Production (in ‘000 metric tons)** | | | | | |
|  | **2010** | **2011** | **2012** | **2013** | **2014** |
| India | 80800 | 86870 | 94880 | 93510 | 95910 |
| Pakistan | 23900 | 25000 | 23300 | 24000 | 25000 |
| China | 115180 | 117400 | 121023 | 121930 | 126000 |
| Myanmar | 182 | 185 | 185 | 180 | 180 |
| Bangladesh | 972 | 996 | 1260 | 1280 | 1300 |

The heading of the table describes that the data is in ‘000 metric tons. So, each value is to be multiplied by 1000 before while solving the for five question based on the given. The rows contain the name of countries and the columns contain the wheat production of these countries in 5 different years. If we read the data for wheat production in Myanmar in 2012, then it produced 185000 metric tons of wheat in that year.

Let us see another example of a table, the table given below is a multivariable table as it contains the information about runs scored and balls faced by 5 different players in 4 different matches they played.

(**R** = Runs ; **B** = Balls)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Match 1** | | **Match 2** | | **Match 3** | | **Match 4** | |
|  | **R** | **B** | **R** | **B** | **R** | **B** | **R** | **B** |
| ABD | 77 | 58 | 24 | 16 | 162 | 66 | 30 | 47 |
| Dhoni | 45 | 56 | 24 | 40 | 58 | 37 | 18 | 12 |
| Misbah | 56 | 86 | 76 | 84 | 7 | 21 | 73 | 121 |
| Morgan | 17 | 41 | 0 | 6 | 46 | 42 | 27 | 47 |
| McCullum | 65 | 49 | 15 | 12 | 77 | 25 | 50 | 24 |

Rows show the name of the players while the columns give information about both the runs and the balls played by each of the players in the 4 matches.

Let us now see some examples based on the concept of tables.

**Example 2:** The proportion of male students and the proportion of vegetarian students in a school are given below. The school has a total of 800 students, 80% of whom are in the Secondary Section and rest are equally divided between Class 11 and 12.

|  |  |  |
| --- | --- | --- |
|  | **Male (M)** | **Vegetarian (V)** |
| Class 12 | 0.6 |  |
| Class 11 | 0.55 | 0.5 |
| Secondary Section |  | 0.55 |
| Total | 0.475 | 0.53 |

I. What is the percentage of male students in the secondary section?

II. In Class 12, twenty five per cent of the vegetarians are male. What is the difference between the number of female vegetarians and male non-vegetarians?

III. What is the percentage of vegetarian students in Class 12? **[CAT 2007]**

**Solution:**

By using the information given we get the following points:

Students in secondary section = 640

Students in class 11 = 80

Students in class 12 = 80

Total males = 0.475 × 800 = 380

Males in class 11 = 0.55 × 80 = 44

Females in class 11 = 80 – 44 = 36

Males in class 12 = 0.6 × 80 = 48

Females in class 12 = 80 – 48 = 32

Males in secondary section = 380 – 44 – 48 = 288

Females in secondary section = 640 – 288 = 352

Total vegetarians = 0.53 × 800 = 424

Vegetarians in secondary section = 0.55 × 640 = 352

Non-vegetarians in secondary section = 640 – 352 = 288

Vegetarians in class 11 = 0.5 × 80 = 40

Non-vegetarians in class 11 = 40

Vegetarians in class 12 = 424 – 352 – 40 = 32

Non Vegetarians in class 12 = 80 – 32 = 48

We can show the students in the following table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Total Students** | **Gender** | | **Food Preference** | |
| **Males** | **Females** | **Veg** | **Non Veg.** |
| Class 12 | 80 | 48 | 32 | 32 | 48 |
| Class 11 | 80 | 44 | 36 | 40 | 40 |
| Secondary Section | 640 | 288 | 352 | 352 | 288 |
| Total | 800 | 380 | 420 | 424 | 376 |

I. Percentage of male student in secondary section =  = 45%

II. Male vegetarians = 0.25 × 32 = 8

Female vegetarians = 32 – 8 = 24

Male non vegetarians = 48 – 8 = 40

Difference = 40 – 24 = 16

III. Percentage of vegetarian students in class 12 =  = 40%

**Example 3:** The table below shows the details about the car market in India in the year 2013 and 2014. The data is given terms of number of cars sold and the revenue earned by the firms.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **2013** | | | **2014** | | |
|  | **Maruti** | **Hyundai** | **Total** | **Maruti** | **Hyundai** | **Total** |
| **Revenue** |  | | | | | |
| Amount (Rs. Crores) | P | 500 | Q | 2000 | Y | Z |
| Market Share | 30% | 12.5% | 100% | A | B | 100% |
| Growth | 25% | R | S | C | 50% | 35% |
| **Car’s Sold** |  | | | | | |
| Cars (‘000) | T | W | 300 | 120 | F | 480 |
| Market Share | U | 22.5% | 100% | D | G | 100% |
| Growth | V | X | 30% | E | 40% | H |

Answer of any question can be used to solve the next questions.

I. What is the average cost of a Hyundai Car in 2013?

II. What is growth rate in revenue of Maruti in 2014?

III. The average cost of a Maruti car in 2013 is 0.75 times the average cost of a car (market as the whole). What is market share of Maruti in terms of cars sold in year 2013?

IV. If Maruti earned a profit of 25%, then what is profit earned by Maruti in 2013?

V. The average cost of a Maruti car in 2012 was Rs. 80,000, determine the growth rate in number of cars sold by Maruti in 2013?

**Solution:**

**Values of Variable in Revenue**

We know the value of Revenue of Hyundai for the year 2013. With help of it, we can find the value of Q.

Q =  = Rs.4000 crores

With this we can find the value of P =  = Rs. 1200 crores

R and S cannot be found out so far as the values for year 2012 are not known.

The total revenue of the car market grew by 35% in 2014, so the value of Z =  = Rs.5400 crores

There is a growth of 50% in 2014 in revenue of Hyundai, so finding the value of Y

=  = Rs.750 crores

Finding the market shares of Maruti and Hyundai we get:

A =  = 37.03%

B =  = 13.88%

Now we know the revenue of Maruti for year 2013 and 2014 so we can find the growth rate in 2014.

C =  = 66.66%

**Values of Variable in number of Cars Sold**

We can find the value of W as market share is given =  = 67.5

We can find the value of F, as there is growth of 40% =  = 95.4

Value of total market is given so we can find the market share = G =  = 19.875%

We can find the value of D =  = 25%

The growth in the number of cars sold can also be found out as the values for 2013 and 2014 are known.

H = = 60%

Putting the values in the table we get the following:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **2013** | | | **2014** | | |
|  | **Maruti** | **Hyundai** | **Total** | **Maruti** | **Hyundai** | **Total** |
| **Revenue** |  | | | | | |
| Amount (Rs. Crores) | 1200 | 500 | 4000 | 2000 | 750 | 5400 |
| Market Share | 30% | 12.5% | 100% | 37.03% | 13.88% | 100% |
| Growth | 25% | R | S | 66.66% | 50% | 35% |
| **Car’s Sold** |  | | | | | |
| Cars (‘000) | T | 67.5 | 300 | 120 | 94.5% | 480 |
| Market Share | U | 22.5% | 100% | 25% | 19.875% | 100% |
| Growth | V | X | 30% | E | 40% | 60% |

I. Average cost of Hyundai car in 2013 =  = Rs.74074.07

II. The average growth in revenue of Maruti in 2014 can be directly seen from the table and the value is 66.66%.

III. ⇒ T = 120

From this we can find the value of U (market share according to the number of cars sold) =  = 40%

IV. Revenue = 1.25 × cost

Cost =  = 3200

Profit = 4000 – 3200 = Rs.800 crores

V. We will first find the revenue in 2012. We will use the value 1200 of 2013 and the growth rate in 2013 which was 25%.

Revenue in 2012 =  = 960

Now,

= 

*i.e*. 

So, cars sold in 2012 = 120000

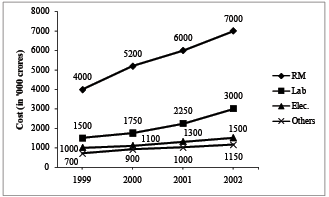
Growth rate in number of cars sold will be 0% as the number of cars sold by Maruti is same in both the years.

■ Line Charts

Line chart is a type of chart which displays information as a series of data points connected by straight lines. It is one of the most commonly used data form after the tables.

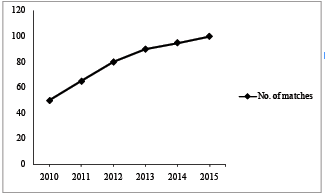
A typical line chart is drawn on *x - y* axis with *x* axis being labelled with years names and various other attributes, while *y* axis generally contains their numerical values. Line charts some times display data points or sometimes are drawn with simple line segments. A line chart may also contain multiple lines to display information of various items. The chart below shows a line chart showing values for different components of costs across 4 years.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **RM** | **Lab** | **Elec.** | **Others** |
| 1999 | 4000 | 1500 | 1000 | 700 |
| 2000 | 5200 | 1750 | 1100 | 900 |
| 2001 | 6000 | 2250 | 1300 | 1000 |
| 2002 | 7000 | 3000 | 1500 | 1150 |



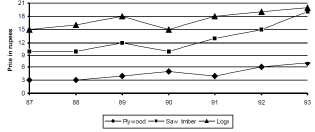
So, we can easily read the data by looking at the graph. The value of RM in 2002 is 7000.

Sometimes the line chart may not have data markers on it. Let us understand with help of an chart about how to find the value in such case.



Now, if we need to find the value of the number of matches in 2013, we will draw a line parallel to *x*-axis from the data point of 2013. The point on *y*-axis where this line cuts it, is the value of number of matches in 2013.

**Example 4:** In the following chart, the price of logs shown is per cubic metre & for that of plywood and saw timber it is per tonne.



I. What is the maximum percentage increase in price per cubic metre or per tonne over the previous year?

II. Which product shows the maximum percentage increase in price over the period?

III. If 1 m3 = 750 kg for saw timber, find in which year was the difference in prices of saw timber and logs the least?

IV. If one cubic metre = 700 kg for plywood and 800 kg for saw timber, find in which year was the difference in the prices of plywood and saw timber (per cubic metre) the maximum?

V. If the volume sales of plywood, saw timber and logs were 40%, 30% and 30% respectively, then what was the average realisation in 1993 per cubic metre of sales?(Weight of one cubic metre of saw timber and plywood both = 750 kg)

VI. In the previous question, if in 1994, prices increased by 5%, 1% and 10% while the volume sales break-up was 40%, 30% and 30% for plywood, saw timber and logs respectively, then what was the average realisation?

**Solutions:**

I. The data can be represented in the following table.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Plywood | | Saw timber | | Logs | |
|  | Price | % increase | Price | % increase | Price | % increase |
| 87 | 3 | − | 10 | − | 15 | − |
| 88 | 3 | − | 10 | − | 16 | 6.67% |
| 89 | 4 | 33.33% | 12 | 20% | 18 | 12.5% |
| 90 | 5 | 25% | 10 | − | 15 | − |
| 91 | 4 | − | 13 | 30% | 18 | 20% |
| 92 | 6 | 50% | 15 | 15.38% | 19 | 5.55% |
| 93 | 7 | 16.66% | 19 | 26.66% | 20 | 5.26% |

Thus, we can see that the maximum increase is 50%.

II.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Price in 1987 | Price in 1993 | Percentage increase |
| Plywood | 3 | 7 | 133.33% |
| Saw timber | 10 | 19 | 90% |
| Logs | 15 | 20 | 33.33% |

Thus, we see that the maximum percentage increase over the period is shown by plywood.

III. Since the price of saw timber is given in rupees per tonne and that of log is given in rupees per cubic metre, we cannot compare the two. Hence, using the given conversion, let us convert the price of saw timber in per cubic metre. The table will be as follows:

[Note: 1 tonne = **** = 1.33 cubic m]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Saw timber (Price in Rs./tonnes)** | **Saw timber (Price in Rs./cubic metres)** | **Logs (Price in Rs./cubic metres** | **Difference in price** |
| 1989 | 12 | 9 | 18 | 9 |
| 1990 | 10 | 7.50 | 15 | 7.50 |
| 1991 | 13 | 9.75 | 18 | 8.25 |
| 1992 | 15 | 11.25 | 19 | 7.75 |

Thus, we see that the difference is least in the year 1990.

IV. As in the previous table, we can draw a similar table

for saw timber and logs.

[**Note:** One tonne of plywood = cubic m = 1.43

cubic m and one tonne of saw timber =  cubic

m = 1.25 cubic m.]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Saw timber (Price in Rs./tonnes)** | **Saw timber (Price in Rs./cubic metres)** | **Plywood (Price in Rs./tonnes** | **Plywood** | **Difference in price** |
| 1989 | 12 | 9.60 | 4 | 2.80 | 6.80 |
| 1990 | 10 | 8.00 | 5 | 3.50 | 4.50 |
| 1991 | 13 | 10.40 | 4 | 2.80 | 7.60 |
| 1992 | 15 | 12.00 | 6 | 4.20 | 7.80 |

Hence, it can be seen that the difference is maximum for 1992.

V. Note that one tonne = m3 = 1.33 m3, for both plywood and saw timber.

In 1993, price of logs = Rs. 20 per cubic metre.

Price of plywood =  = Rs. 5.26 per cubic metre.

And price of saw timber =  = 14.28 per cubic

metre.

Now the sales volume of plywood, saw timber and logs are in the ratio 4 : 3 : 3. So the average realisation per cubic metre of sales is indeed the weighted average.

This is given as 

= Rs. 12.4

= Rs. 13 (Approximately)

VI. The only change would be the accounting for price

increase. This is given as

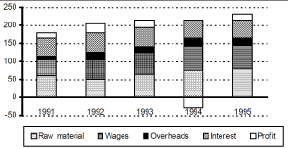
= 

= Rs. 13.15

■ Bar Charts

**Bar chart (also known as histogram) is a data form in which data is represented in the form of rectangular bars with the lengths proportional to the value they represent. Again in this type generally** *x*-axis will have variables and *y*-axis will have their values, and this can also be shown the other way round also. Drawing a line parallel to *x*-axis from top of bar will give the value of that bar (the value is where this parallel line cuts the *y*-axis).

**Example 5:** The graph given below gives the yearly details of money invested in producing a certain product over the years 1991 to 1995. It also gives the profit (in ‘000 rupees).



I. In which year was the increase in raw material maximum?

II. In which period was the change in profit maximum?

III. Which component of the cost production has remained more or less constant over the period?

IV. In which year were the overheads, as a percentage of the raw material, maximum?

V. What percentage of the costs did the profits form over the period?

VI. If the interest component is not included in the total cost calculation, which year would show the maximum profit per unit cost?

**Solutions:**

The values in the graph can be represented in the table given below.

Here O.H. is overheads and Int. is interest, P/C is profit/cost.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Raw  Material | Wages | O.H. | Interest | Profit |
| 1991 | 60 | 45 | 10 | 50 | 15 |
| 1992 | 50 | 55 | 20 | 55 | 25 |
| 1993 | 65 | 60 | 15 | 55 | 20 |
| 1994 | 75 | 65 | 25 | 50 | − 30 |
| 1995 | 80 | 65 | 20 | 50 | 15 |
| Total | 330 | 290 | 90 | 260 | 45 |

I. We can see that the increase in raw material has been maximum in 1993, viz. 15 points increase.

II. The change in the profit is maximum in 1993-94. In this

year, there is a 50 points drop in the profits.

III. It can be seen that the interest has remained more or

less constant over the given period.

IV.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Raw Material  (RM) | O.H. | 100 |
| 1991 | 60 | 10 | 16.66% |
| 1992 | 50 | 20 | 40% |
| 1993 | 65 | 15 | 23.07% |
| 1994 | 75 | 25 | 33.33% |
| 1995 | 80 | 20 | 25% |

Thus, it can be seen from the above table that the over-heads as a percentage of raw material is maximum for 1992.

V. The total profits over the period

= (15 + 25 + 20 – 30 + 15) = 45

Total costs

= (330 + 290 + 90 + 260) = 970

Hence, profit/costs =  = 4.6%

= 5% (Approximately)

VI. If the interest component is not included in the cost, the data can be represented as follows.

|  |  |  |
| --- | --- | --- |
| Year | Profit |  |
| 1991 | 15 | 13.04% |
| 1992 | 25 | 20% |
| 1993 | 20 | 14.28% |
| 1994 | − 30 | − |
| 1995 | 15 | 9.09% |

Hence, we can see from the table that maximum profit

per unit cost is in 1992.

■ Pie Charts

A pie chart is a circular graphic representation of data, which is divided into portions to depict numerical values. In a pie chart the length of arcs is proportional to the value that the portions represent. In a pie chart the values can be represented as numerical values, percentages or degrees. As a pie chart is a circle it will always add up to either 100% or 360°.

So, 100% = 360°

1% = 3.6**°**

We can use this relation to convert the values from degrees to percentage or vice versa.

Some important points about Pie Charts

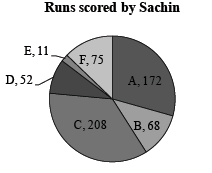
● For conversion ⇒ 

● Converting values to degrees or percentage

Percentage to degree = 

Percentage to percentage =

The diagram below represents a pie chart which shows runs scored by Sachin in 6 different matches.



Total Runs = 172 + 68 + 208 + 52 + 11 + 75 = 586

We can also show the pie chart in turns of percentages or degrees using following conversions.



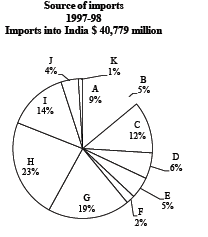


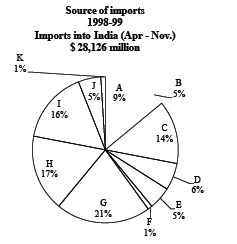
**Example 6:** Consider the information provided in the figure below relating to India’s foreign trade in 1997-98 and the first

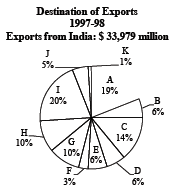
eight months of 1998-99. Total trade with a region is defined as the sum of exports and imports from that

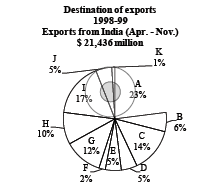
region. Trade deficit is defined as the excess of imports over exports. Trade deficit may be negative.

|  |  |  |  |
| --- | --- | --- | --- |
| A. | USA | G. | Other East European countries |
| B. | Germany | H. | OPEC |
| C. | Other EU | I. | Asia |
| D. | UK | J. | Other LDCs |
| E. | Japan | K. | Others |
| F. | Russia |  |  |









I. What is the region with which India had the highest total trade in 1997-98?

II. In 1997-98 the amount of Indian exports (in million US dollars) to the region with which India had the lowest total trade, is approximately:

III. In 1997-98, the trade deficit with respect to India (in billion US dollars) for the region with the highest trade deficit, is approximately equal to:

IV. What is the region with the lowest trade deficit with India in 1997-98?

**Solutions:**

I. Total trade with a region is defined as:

The sum of exports and imports from that region, from the pie charts for 1997-98, we have the following sectors occupying maximum area.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Country** | **Exports** | **Imports** | **Trade** |
| H | OPEC | 3397.9 | 9379.2 | 12777 |
| I | Asia | 6796 | 5709 | 12505 |
| G | East Europe | 3397 | 7748 | 11145.9 |
| C | EU | 4757 | 4893.5 | 9650.5 |
| A | USA | 6456 | 3670 | 10126 |

H – OPEC has the maximum trade.

II. From the pie chart, the region having lowest trade is K.

1% of imports + 1% of exports

Indian exports are 1% of 3397.9 which is roughly

340 US $ million.

III.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Import** | **Exports from India** | **Trade deficit** |
| A | 3670.11 | 6456.01 | − 2785.9 |
| B | 2038.95 | 2038.74 | 0.21 |
| C | 4893.48 | 4757.06 | 136.42 |
| D | 2446.74 | 2038.74 | 408 |
| E | 2038.95 | 2038.74 | 0.21 |
| F | 815.58 | 1019.37 | − 203.79 |
| G | 7748.01 | 3397.9 | 4350.11 |
| H | 9379.17 | 3397.9 | 5981.27 |
| I | 5709.06 | 6795.8 | − 1086.74 |
| J | 1631.16 | 1698.95 | − 67.79 |

So, we see that region H has highest trade deficit of

approximately $6,000 million or $6 billion.

IV. From the pie chart for 1997-98, we get that USA which

is a region A has the lowest trade deficit.

(9% of imports – 19% of total exports)

= 

= – 2785.9 million dollars

■ Caselets

**Caselets are a paragraph of data containing numerical values. In such questions the values of data are to be plucked out of the paragraph to find the solutions.**

**Example 7:** Prakash has to decide whether or not to test a batch of 1000 widgets before sending them to the buyer. In case he decides to test, he has two options: Test (I) or Test (II). Test I cost Rs. 2 per widget. However, the test is not perfect. It sends 20% of the bad ones to the buyer as good. Test II costs Rs. 3 per widget. It brings out all the bad ones.

A defective widget identified before sending can be corrected at a cost of Rs. 25 per widget. All defective widgets are

identified at the buyers end and penalty of Rs. 50 per defective widget has to be paid by Prakash.

I. Prakash should not test if the number of bad widgets in the lot is:

II. If there are 120 defective widgets in the lot, Prakash:

III. If the number of defective widgets in the lot is between 200 and 400, Prakash:

IV. If Prakash is told that the lot has 160 defective widgets, he should:

V. If there are 200 defective widgets in the lot, Prakash:

**Solutions:**

I. Let the total number of bad widgets be *x* and hence the total number of good ones will be (1000 − *x*).

If he takes test I his total cost will be : Rs.2(1000) + 25 0.8*x* + 50 0.2*x*

If he takes test II his total cost will be : Rs. 3(1000) + 25 *x*

Now, it will be worth testing if the cost of testing is less than the cost of penalty levied on the defective pieces.

Let us now test of all the values mentioned in all the questions & answer choices.

|  |  |  |  |
| --- | --- | --- | --- |
| **No. of defectives** | **Cost of Test I** | **Cost of Test II** | **Penalty if not tested** |
| 100 | Rs. 5000 | Rs. 5500 | Rs. 5000 |
| 120 | Rs. 5600 | Rs. 6000 | Rs. 6000 |
| 160 | Rs. 6800 | Rs. 7000 | Rs. 8000 |
| 190 | Rs. 7700 | Rs. 7750 | Rs. 9500 |
| 200 | Rs. 8000 | Rs. 8000 | Rs. 10000 |
| 400 | Rs. 14000 | Rs. 13000 | Rs. 20000 |

It is obvious that for number of defectives above 100 cost of any testing is cheaper than the penalty. But for 100 defectives the cost of penalty is the same as that for testing. Hence below 100 defectives, the penalty will be less than the cost of testing and hence it is not worth testing.

II. If there are 120 widgets, he should go for test I as it is cheaper.

III. It is clear from the table that if the number of defectives is between 200 & 400, he should go for Test II as it is cheaper.

IV. In case of 160 defectives he should use test I as it is cheaper.

V. If there are 200 defective widgets in the lot, Prakash may use either Test I or Test II as the cost of both the Tests is

same = Rs.8000.

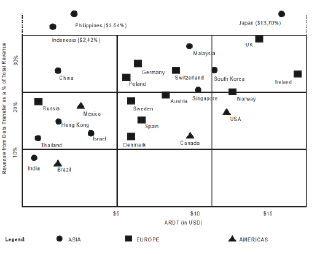
■ Mixed & Others graphs

The questions of DI are sometimes based on more than one graphs or sometimes are based on different data forms like scatter graphs, spider charts etc.

**Example 8:** Telecom operators get revenue from transfer of data and voice. Average revenue received from transfer of

each unit of data is known as ARDT. In the diagram below, the revenue received form data transfer as

percentage of total revenue received and the ARDT in US Dollars (USD) are given for various countries. **[CAT 2008]**



I. It was found that the volume of data transfer in India is the same as that of Singapore. Then which of the following statements is true?

a. Total revenue is the same in both countries.

b. Total revenue in India is about 2 times that of Singapore.

c. Total revenue in India is about 4 times that of Singapore.

d. Total revenue in Singapore is about 4 time that of India.

II. It is expected that by 2010, revenue from data transfer as a percentage of total revenue will triple for India and double for Sweden. Assume that in 2010, the total revenue in India is twice that of Sweden and that the volume of data transfer is the same in both the countries. What is the percentage increase of ARDT in India if there is no change in ARDT in Sweden?

III. What is the difference in the volume of data transfer between UK & Spain?

**Solutions:**

I. (d)

Let volume of data transfer in India = Volume of data

transfer in Singapore = *X*

**For India:**

ARDT for India ≈ $ 1 (approx)

∴ Revenue from data transfer = $ *X* (approx)



⇒ 

**For Singapore:**

ARDT = $9 (approx)

∴ Revenue from data transfer = $ 9*X* (approx)



⇒

**= **

**So, the statement given in option (d) is true.**

**II. Let total Revenue of Sweden in 2010 =** *x*

Therefore total Revenue of India in 2010 = 2*x*

**For Sweden in 2010:**

ARDT = $ 6

Revenue from data transfer = 2 × 18% of *x*

Volume of data transfer = 

**For India in 2010:**

Let ARDT = *y*

Revenue from data transfer = 3 9% of 2*x*

Volume of data transfer = 

Therefore

Therefore % change in ARDT of India

= 

III. **For UK:**

= 

Revenue from Data transfer = Total Revenue

ARDT = $ 13 (approx.)

Volume of Data transfer = 

≈ 

**For Spain:**

= 

ARDT = 6.5 (approx.)

Volume of Data transfer = 

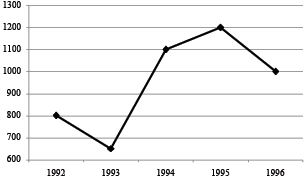
≈ 

So, we can say that there is no difference in the volume of data transfer between UK & Spain.

**Example 9:** The first table gives the percentage of students in MBA class, who sought employment in the areas of finance, marketing and software. The second table gives the average starting salaries of the students per month, (rupees in thousands) in these areas. The third table gives the number of students who passed out in each year.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Finance** | **Marketing** | **Software** | **Others** |
| 1992 | 22 | 36 | 19 | 23 |
| 1993 | 17 | 48 | 23 | 12 |
| 1994 | 23 | 43 | 21 | 13 |
| 1995 | 19 | 37 | 16 | 28 |
| 1996 | 32 | 32 | 20 | 16 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Finance** | **Marketing** | **Software** |
| 1992 | 5450 | 5170 | 5290 |
| 1993 | 6380 | 6390 | 6440 |
| 1994 | 7550 | 7630 | 7050 |
| 1995 | 8920 | 8960 | 7760 |
| 1996 | 9810 | 10220 | 8640 |



I. By how much the number of students who get jobs in finance is less than the students getting marketing jobs, in the 5 years?

II. What is the percentage increase in the average salary of finance from 1992 to 1996?

III. The average annual rate at which the initial salary offered in software increases is?

IV. What is the average monthly salary offered to a management graduate in 1993?

V. In 1994, students seeking jobs in finance earned \_\_\_ more than those opting for software (per annum).

**Solutions:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Number of students employed** | **Number of students employed from finance** | **Number of students employed from marketing** |
| 1992 | 800 | 0.22 × 800 = 176 | 0.36 × 800 = 288 |
| 1993 | 650 | 0.17 × 650 = 110.5 | 0.48 × 650 = 312 |
| 1994 | 1100 | 0.23 × 1100 = 253 | 0.43 × 1100 = 473 |
| 1995 | 1200 | 0.19 × 1200 = 228 | 0.37 × 1200 = 444 |
| 1996 | 1000 | 0.32 × 1000 = 320 | 0.32 × 1000 = 320 |
|  |  | 1087.5 | 1837 |

Difference in number of students employed from

finance and marketing = 1837 – 1087.5 = 749.5 ≈ 750.

II. Percentage increase in the average salary of finance

= 

III. Average annual rate at which the initial salary offered

in software increases

= 

IV. Average monthly salary offered to a management

graduate in 1993 = 

V.

|  |  |  |
| --- | --- | --- |
| Year | Number of candidates employed from finance | Number of candidates employed from software |
| 1994 | 0.23 × 1100 = 253 | 0.21 × 1100 = 231 |

Students seeking jobs in finance earned = 253 7550 = Rs. 19,10,150

Students seeking jobs in softwere earned = 231 7050 = Rs. 16,28,550

Difference in the amount earned = 1910150 – 1628550

= Rs. 2,81,600

= Rs. 2.81 lakh per month or Rs. 33.8 lakh per annum.

Important points to remember while solving Data Interpretation question

● Get the overall picture: Invest starting few minutes to scan all the questions of the section.

● Read the Directions: Directions of each question are very important as they will tell you how to proceed in the question.

● Read the Data: Read and understand the data carefully before actually working with the data, as it will give you a clear picture of how to proceed.

● Understanding the co-relations: If there are multiple data forms being used, understand the relation between them before starting with the solution of the set.