

NCERT SOLUTIONS

CLASS - 11th



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Class : 11th
Subject : Statistics
Chapter : 8
Chapter Name : Index Numbers

Q1 An index number which accounts for the relative importance of the items is known as

- (i) weighted index
- (ii) simple aggregative index
- (iii) simple average of relatives

Answer. Option (i) is correct. Weighted index accounts for the relative importance of the items.

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Q2 In most of the weighted index numbers the weight pertains to

- (i) base year
- (ii) current year
- (iii) both base and current year

Answer. Option (i) is correct. In the weighted index, weight pertains to base year.

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Q3 The impact of change in the price of a commodity with little weight in the index will be

- (i) small
- (ii) large
- (iii) uncertain

Answer. Option (i) is correct. If the commodity has a low weightage, it will have lesser impact due to price changes.

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Q4 A consumer price index measures changes in

- (i) retail prices
- (ii) wholesale prices

(iii) producers prices

Answer. Option (i) is correct. The consumers are affected by prices in retail. Hence, a better analysis is possible by measuring the price index in retail.

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Q5 The item having the highest weight in consumer price index for industrial workers is

- (i) Food
- (ii) Housing
- (iii) Clothing

Answer. Option (i) is correct. Food is the most important component, hence it is the item with the highest weight.

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Q6 In general, inflation is calculated by using

- (i) wholesale price index
- (ii) consumer price index
- (iii) producers' price index

Answer. Option (i) is correct. Wholesale price index indicates the inflation rate of the economy as a whole.

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Q7 Why do we need an index number?

Answer. We need index numbers for the following reasons:

1. We can measure the change in pricing.
2. We can study the change in standard of living.
3. We can determine the rate of production.
4. Index numbers also help in the policy making.

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Q8 What are the desirable properties of the base period?

Answer. The desirable properties of a base period are:

- 1. It should not be too recent or too old.
- 2. It should be neither too long nor too short.
- 3. The data for each year in the base period must be available.
- 4. The base period must be updated to adjust the changes over the time.

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Q9 Why is it essential to have different CPI for different categories of consumers?

Answer. It is essential to have different CPI for different categories of consumers because the consumption basket of different categories of consumers differs a lot. Hence, all the consumers don't consume in the same manner.

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Q10 What does a consumer price index for industrial workers measure?

Answer. The consumer price index for industrial workers measures the change in prices of the commodities consumed by industrial workers. It gives an accurate idea of inflation and its effect on the consumer.

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Q11 What is the difference between a price index and a quantity index?

Answer. The differences between price index and quantity index are:

Price Index	Quantity Index
It measures general changes in prices between the current and the base years.	It measures the average change in commodities which are consumed.
It is measured by Simple Aggregative method and Simple Average of Price Relative method.	It is measured by weighted average of price relative method and Weighted Aggregative Method
It takes into consideration the prices of both the base and current years.	It considers weights of commodities based on their quantities.

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Q12 Is the change in any price reflected in a price index number?

Answer. No, the price index number reflects only relative values, hence a change in price keeps it unaffected.

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Q13 Can the CPI for urban non-manual employees represent the changes in the cost of living of the President of India?

Answer. No, because the consumption basket of the President of India and the urban non-manual employees is different.

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Q14 The monthly per capita expenditure incurred by workers for an industrial centre during 1980 and 2005 on the following items are given below. The weights of these items are 75,10, 5, 6 and 4 respectively. Prepare a weighted index number for cost of living for 2005 with 1980 as the base.

Items	Price in 1980	Price in 2005
Food	100	200
Clothing	20	25
Fuel & lighting	15	20
House rent	30	40
Misc	35	65

Answer. The cost of living index can be calculated as :

Commodity	Price in 1980	Price in 2005 (P_1)	Weight (W)	Price relatives (R)	RW
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	(P_0)	(P_1)		$R = \frac{P_0}{P_1} \times 100$	
Food	100	200	75	$\frac{200}{100} \times 100 = 200$	15,000
Clothing	20	25	10	$\frac{25}{20} \times 100 = 125$	1250
Fuel and lighting	15	20	5	$\frac{20}{15} \times 100 = 133.33$	666.65
House Rent	30	40	6	$\frac{40}{30} \times 100 = 133.33$	799.98
Miscellaneous	35	65	4	$\frac{65}{35} \times 100 = 185.71$	742.84
			$\sum W = 100$		$\sum RW = 18,459.47$

Cost of Living (CPI) = $\frac{\sum RW}{\sum W}$

$\frac{18,459.47}{100}$

= 184.59

The CPI shows an increase of 84.59% to the base year.

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Q15 Read the following table carefully and give your comments.

INDEX OF INDUSTRIAL PRODUCTION BASE 1993–94

Industry	Weight in %	1996-97	2003-04
General index	100	130.8	189.0
Mining and quarrying	10.73	118.2	146.9
Manufacturing	79.58	133.6	196.6
Electricity	10.69	122.0	172.6

Answer. The following observations can be made from the table:

- 1. The manufacturing section has the highest weight.
- 2. The General index is higher in 2003-2004 than in 1996-1997.
- 3. The mining industry has shown the lowest growth.

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Q16 Try to list the important items of consumption in your family.

Answer. The important items of consumption in our family are:

- 1. Food
- 2. Clothes
- 3. Transport
- 4. Electricity
- 5. Education

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Q17 If the salary of a person in the base year is Rs 4,000 per annum and the current year salary is Rs 6,000, by how much should his salary be raised to maintain the same standard of living if the CPI is 400?

Answer. Current year salary = Rs 400
Then, base year salary = Rs 4000
Current year salary = Rs 6000
Let's assume base year CPI as 100.

Salary for initial standard of living = $\left(\frac{4000}{100}\right) \times 400$
= Rs 16000

Amount required to maintain the same standard of living = 16000- 6000
= Rs 10000

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Q18 The consumer price index for June, 2005 was 125. The food index was 120 and that of other items 135. What is the percentage of the total weight given to food?

Answer. We know that CPI = 125

Using the formula, $CPI = \frac{\sum WR}{\sum W}$, we get:

$$125 = \frac{[120X + 135(100 - X)]}{1000}$$
$$X = 66.67$$

Therefore, the weight given to food is 66.67%.

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Q19 An enquiry into the budgets of the middle class families in a certain city gave the following information;

Expenses on items	Food 35%	Fuel 10%	Clothing 20 %	Rent 15 %	Misc. 20%
Price (in Rs) in 2004	1500	250	750	300	400
Price (in Rs) in 1995	1400	200	500	200	250

What is the cost of living index during the year 2004 as compared with 1995?

Answer. The Cost of Living Index can be calculated as:

Item	Base year price in 1980 (P_0)	Current year price in 2005 (P_1)	Weight (W)	Relative prices (R) $R = \frac{P_1}{P_0} \times 10$	RW
Food	35	1400	1500	$\frac{1500}{1400} \times 100 =$	3749.90
Fuel	10	200	250	$\frac{250}{200} \times 100 =$	1250
Clothing	20	500	750	$\frac{750}{500} \times 100 =$	3000
Rent	15	200	300	$\frac{300}{200} \times 100 =$	2250
Misc	20	250	400	$\frac{400}{250} \times 100 =$	3200
			$\sum W = 100$		$\sum RW = 13449.9$

Now, CPI = $\frac{\sum WR}{\sum W}$
 $= \frac{13449.9}{100}$
 $= 134.49$

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Q20 Record the daily expenditure, quantities bought and prices paid per unit of the daily purchases of your family for two weeks. How has the price change affected your family?

Answer. The observations and quantities are organised in the table below:

Week 1

Days	Bread		Total expense	Milk		Total expense
	Price per loaf	Quantity		Price per litre	Quantity	
Monday	25	2	50	40	1	40
Tuesday	24	1	24	39	2	78
Wednesday	24	1.5	36	38	1.5	57
Thursday	23	2	46	40	1	40
Friday	24	1	24	39	2	78
Saturday	22	2.5	55	37	1	37
Sunday	24	2	48	39	1.5	58.5
			283			330

Week 2						
Days	Bread		Total expense	Milk		Total expense
	Price per loaf	Quantity		Price per litre	Quantity	
Monday	26	2	52	42	1	42
Tuesday	23	2	46	40	2	80
Wednesday	24	1.5	36	39	2	78
Thursday	25	2	50	39	1	39
Friday	26	1	26	40	2	80
Saturday	22	2.5	55	39	1	39
Sunday	23	2	46	39	1.5	58.5
			307			358

Since the total expense has increased, an increase in price will lead to an increase in the expenses of the family.

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Q21 Given the following data-

Year	CPI of Industrial Workers (1982=100)	CPI of agricultural Workers (1986-87)	WPI (1993-94=100)
1995-96	313	234	121.6
1996-97	342	256	127.2
1997-98	366	264	132.8
1998-99	414	293	140.7
1999-00	428	306	145.3
2000-01	444	306	155.7
2001-02	463	309	161.3
2002-03	482	319	166.8
2003-04	500	331	175.9

Source: Economic Survey, 2004–2005, Government of India

(i) Comment on the relative values of the index numbers.

(ii) Are they comparable?

Answer. Inflation using the CPI of Industrial Workers can be calculated as:

Year	CPI of Industrial Workers (1982 =100)	Inflation rate (in %)
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1995-96	313	$\frac{313 - 100}{100} \times = 213$
1996-97	342	$\frac{342 - 100}{100} \times = 242$
1997-98	366	$\frac{366 - 100}{100} \times = 266$
1998-99	414	$\frac{414 - 100}{100} \times = 314$
1999-00	428	$\frac{428 - 100}{100} \times = 328$
2000-01	444	$\frac{444 - 100}{100} \times = 344$
2001-02	463	$\frac{463 - 100}{100} \times = 363$
2002-03	482	$\frac{482 - 100}{100} \times = 382$
3004-04	500	$\frac{500 - 100}{100} \times = 400$

Inflation using CPI of agricultural labourers:

Year	CPI of agricultural labourers (1986-87 =100)	Inflation rate (in %)
1995-96	234	$\frac{234 - 100}{100} \times = 134$
1996-97	256	$\frac{256 - 100}{100} \times = 156$
1997-98	264	$\frac{264 - 100}{100} \times = 164$

1998-99	293	$\frac{293 - 100}{100} \times = 193$
1999-00	306	$\frac{306 - 100}{100} \times = 206$
2000-01	306	$\frac{306 - 100}{100} \times = 206$
2001-02	309	$\frac{309 - 100}{100} \times = 209$
2002-03	319	$\frac{319 - 100}{100} \times = 219$
2003-04	331	$\frac{331 - 100}{100} \times = 231$

Inflation using WPI:

Year	WPI (1993-94=100)	Inflation rate (in %)
1995-96	121.6	$\frac{121.6 - 100}{100} \times = 21.6$
1996-97	127.2	$\frac{127.2 - 100}{100} \times = 28.2$
1997-98	132.8	$\frac{132.8 - 100}{100} \times = 32.8$
1998-99	140.7	$\frac{140.7 - 100}{100} \times = 40.7$
1999-00	145.3	$\frac{145.3 - 100}{100} \times = 45.3$
2000-01	155.7	$\frac{155.7 - 100}{100} \times = 55.7$

2001-02	161.3	$\frac{161.3 - 100}{100} \times = 61.3$
2002-03	166.8	$\frac{166.8 - 100}{100} \times = 66.8$
2003-04	175.9	$\frac{175.9 - 100}{100} \times = 75.9$

Therefore, the inflation rate is highest for Industrial Workers and Lowest for WPI.

(ii) No, they cannot be compared as the base years are different.

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Q22 The monthly expenditure (Rs.) of a family on some important items and the Goods and Services Tax (GST) rates applicable to these items is as follows:

Item	Monthly Expense	GST Rate in %
Cereals	1500	0
Egg	250	0
Fish, Meat	250	0
Medicines	50	5
Biogas	50	5
Transport	100	5
Butter	50	12
Babool	10	12
Tomato Ketchup	40	12
Biscuits	75	18
Cakes, Pastries	25	18

Branded Garments	100	18
Vacuum Cleaner, Car	1000	28

Calculate the average tax rate as far as this family is concerned

Answer.

Category	Expenditure Weight (W)	GST Rate (X)	WX
Category 1	2000	0	0
Category 2	200	0.05	10
Category 3	100	0.12	12
Category 4	200	0.18	36
Category 5	1000	0.28	280
	3500		338

Average Tax Rate = $\left(\frac{338}{3500}\right) = 0.966 = 9.66\%$