Index Numbers

In this Chapter

- Concept of Index Number
- Consumer Price Index (CPI)
- Wholesale Price Index (WPI)

Concept of Index Number

Index numbers are used to measure changes in the variables such as price and quantity of goods and services across two time periods.

It is the ratio of a measure taken for one time period called as **current period** to the same measure taken for another time period, commonly known as **base period.** It is a unit free measure. The measures or variables under consideration may be

- The price of a particular commodity like wheat, gold, steel, etc or a group of commodities like consumer goods, cereals, etc.
- Volume of trade, factory production, industrial and agriculture production, exports or imports, prices of stocks or shares, sales or profits of a firm and so on.
- The national income of a country, wage structure of workers in various sectors, bank deposits, cost of living of persons of a particular community, class or profession, etc.

Mathematically, Index Number for Period **N**

$$= \left(\frac{\text{Value of variable under consideration in Period N}}{\text{Value of variable under consideration in Base Period}} \right) \times 100$$

Advantages/Uses of Index Number

1. **A Barometer of Economic Progress** With the help of index numbers, a comparison in the value of money in different years can be made easily. If the value of money rises, then it signifies that the country has progressed and vice-versa.

2. **Importance for the Government** The change in the value of money has a direct effect on the public, so government adopts suitable fiscal and monetary policy according to the results of index number.

3. **Throws Light on Economic Condition** Index numbers are very helpful in comparing the economic condition of a particular group of people in two different periods.

4. **Fixation of Wages or Policy-making** The money wages can be revised according to the proportionate change in the cost of living. The cost of living index number guides the government and the executives for the fixation and revision of wages.

5. **Importance for the Producer** Price index number helps the producer to decide whether he should expand the production or he should reduce the production. If price level is rising, it means profit margin is high and production can be increased.

6. **Measure to Remove Inequality of Income** Index number of wholesale price also indicates about the regional disparity.

   So, different measures can be taken for the proper distribution of wealth and ensuring that inequalities of income are checked.

Types of Index Number

Index number can be broadly classified into the following two categories

1. **Price Index Numbers** These index numbers measure the general changes in the prices. They can be further categorised as

(i) **Wholesale Price Index** The wholesale price index measures the changes in the wholesale prices.

(ii) **Retail/Consumer Price Index** This price index measures the changes in retail prices.

2. **Quantity Index Numbers** These index numbers measure the changes in the quantity of goods produced in the periods under review.

Methods of Constructing Index Number

Following are the main methods of constructing an index number

I. Simple Index Number

In simple index number, all items under consideration are given equal weightage, i.e., all goods and services are to be given equal importance. There are two methods of constructing simple index number

1. Simple Aggregative Method

In this method, the sum total of prices of base and current years are considered while computing the index number. Following steps should be followed while computing index number by this method

Step 1 Find the sum of prices of all the goods and services under consideration for the current year and denote it as Σp_1.

Step 2 Find the sum of prices of all the goods and services under consideration for the base year and denote it as Σp_0.

Step 3 Apply the given formula to compute the price index number, $P_{01} = \dfrac{\Sigma p_1}{\Sigma p_0} \times 100$, where symbols have their usual meaning.

Example 1. With the help of the following data, calculate index number for 2020 taking 2015 as base year

Commodity	Price in 2015 (in ₹)	Price in 2020 (in ₹)
A	100	145
B	90	130
C	145	200
D	180	275
E	85	150

Ans. **Calculation of Index Number by Simple Aggregative Method**

Commodity	Price in 2015 (p_0)	Price in 2020 (p_1)
A	100	145
B	90	130
C	145	200
D	180	275
E	85	150
	$\Sigma p_0 = 600$	$\Sigma p_1 = 900$

$$P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100 = \frac{900}{600} \times 100 = 150$$

It means that there is a net increase of 50% in the price of commodities in 2020 as compared to the price of 2015.

2. Simple Average of Price Relative Method

In this method, the average of price relatives is considered while computing the index number. Following steps should be followed while computing index number by this method

Step 1 Compute the price relatives of the given items with the help of the following formula,

Price Relative $(I) = \dfrac{p_1}{p_0} \times 100$

Step 2 Find the sum of the price relatives so computed and express it as ΣI.

Step 3 Apply the given formula to find index number as an average of price relatives, $P_{01} = \dfrac{\Sigma I}{n}$, where

ΣI = Sum of price relatives and n = Number of items

Example 2. Construct index number by simple average of price relative method for 2021 taking the price of 2016 as base from the data given below

Commodity	Price (in ₹)	
	2016	2021
A	30	45
B	40	50
C	60	72
D	80	88
E	10	13

Ans. **Construction of Index Number using Simple Average of Price Relative Method**

Commodity	Price (in ₹)		Price Relative = $\left(\dfrac{p_1}{p_0} \times 100 \right)$
	2016 (p_0)	2021 (p_1)	
A	30	45	$\dfrac{45}{30} \times 100 = 150$
B	40	50	$\dfrac{50}{40} \times 100 = 125$
C	60	72	$\dfrac{72}{60} \times 100 = 120$
D	80	88	$\dfrac{88}{80} \times 100 = 110$
E	10	13	$\dfrac{13}{10} \times 100 = 130$
$n = 5$			$\Sigma I = 635$

$$P_{01} = \frac{\Sigma I}{n} = \frac{635}{5} = 127$$

II. Weighted Index Number

They are the index number in which different items of the series are accorded different weightage, depending upon their relative importance. There are two methods of constructing weighted index number

1. Weighted Average of Price Relative Method

According to this method, weighted index number is simply the weighted arithmetic mean of price relatives. The steps to be followed while computing this index number are given below

Step 1 Compute the price relatives of the given items with the help of the following formula,

$$\text{Price Relative } (I) = \frac{p_1}{p_0} \times 100$$

Step 2 Multiply the price relative so computed with the given weights to find **IW**.

Step 3 Find the sum of **IW** to obtain $\Sigma I\mathbf{W}$.

Step 4 Find the sum of the weights to obtain $\Sigma\mathbf{W}$.

Step 5 Apply the given formula to compute index number by this method $\mathbf{P}_{01} = \dfrac{\Sigma I\mathbf{W}}{\Sigma\mathbf{W}}$, where symbols have the same meaning as defined above.

Example 3. From the following data, construct a weighted index number for 2020 with 2010 as base year.

Commodity	Weight	Price (in ₹)	
		2010	2020
Wheat	15	10	15
Rice	10	8	16
Pulses	5	5	10
Milk	4	2	4
Oil	6	4	6
Sugar	7	3	6
Salt	3	1	2

Ans. **Construction of Weighted Index Number**

Commodity	Weight (W)	Price (in ₹)		Price Relative (I) ($p_1 / p_0 \times 100$)	IW
		2010 (p_0)	2020 (p_1)		
Wheat	15	10	15	150	2,250
Rice	10	8	16	200	2,000
Pulses	5	5	10	200	1,000
Milk	4	2	4	200	800
Oil	6	4	6	150	900
Sugar	7	3	6	200	1,400
Salt	3	1	2	200	600
					$\Sigma I\mathbf{W} = 8{,}950$

$$\text{Weighted Index Number} = \frac{\Sigma IW}{\Sigma W}$$

$$= \frac{8{,}950}{50} = 179$$

2. Weighted Aggregative Method

Under this method, weights are assigned to various items and the weighted aggregate of the prices are obtained. There are many methods to construct weighted aggregative index number.

However, considering the scope of syllabus of class XI, we will discuss the following methods of constructing weighted aggregated index number

(i) **Laspeyre's Method** In this method, the quantity consumed in base year $(\mathbf{q}_0)$ is taken as weight. Following steps are to be remembered

Step 1 Multiply the current year price of various commodities with base year quantity and add the products to obtain $\Sigma\mathbf{p}_1\mathbf{q}_0$.

Step 2 Multiply base year price of various commodities with base year quantity and add the products to obtain $\Sigma\mathbf{p}_0\mathbf{q}_0$.

Step 3 Following formula is used to calculate Laspeyre's index number

$$\mathbf{P}_{01} = \frac{\Sigma\mathbf{p}_1\mathbf{q}_0}{\Sigma\mathbf{p}_0\mathbf{q}_0} \times 100$$

(ii) **Paasche's Method** In this method, the quantity consumed in current year $(\mathbf{q}_1)$ is taken as weight. Following steps are to be remembered

Step 1 Multiply current year price of various commodities with current year quantities and add the products to obtain $\Sigma\mathbf{p}_1\mathbf{q}_1$.

Step 2 Multiply the base year price of various commodities with the current year quantities and add the products to obtain $\Sigma\mathbf{p}_0\mathbf{q}_1$.

Step 3 Following formula is used to calculate Paasche's index number $\mathbf{P}_{01} = \dfrac{\Sigma\mathbf{p}_1\mathbf{q}_1}{\Sigma\mathbf{p}_0\mathbf{q}_1} \times 100$

(iii) **Fisher's Method** This method was introduced by Professor Irving Fisher. This method combines the techniques of Laspeyre's method and Paasche's method. Fisher used both base year as well as current year quantities $(\mathbf{q}_0, \mathbf{q}_1)$ as weight. The given steps should be followed to compute Fisher's index number

Step 1 Multiply base year quantity with prices of base year and current year and add the products to obtain $\Sigma\mathbf{p}_1\mathbf{q}_0$ and $\Sigma\mathbf{p}_0\mathbf{q}_0$.

Step 2 Multiply current year quantity with prices of base year and current year and add the products to obtain $\Sigma\mathbf{p}_1\mathbf{q}_1$ and $\Sigma\mathbf{p}_0\mathbf{q}_1$.

Step 3 Apply the given formula to compute Fisher's index number $P_{01} = \sqrt{\dfrac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times \dfrac{\Sigma p_1 q_1}{\Sigma p_0 q_1}} \times 100$

Example 4. Construct index number of price from the data given below by applying
    (i) Laspeyre's Method   (ii) Paasche's Method
    (iii) Fisher's Method

Commodity	Base Year		Current Year	
	Price (in ₹)	Quantity	Price (in ₹)	Quantity
A	2	40	3	20
B	1.5	30	2.5	40
C	1	50	1.5	30
D	2.5	20	2	80

Ans.   **Construction of Price Index Number**

Commodity	Base Year		Current Year		$p_1 q_0$	$p_0 q_0$	$p_1 q_1$	$p_0 q_1$
	Price (p_0)	Quantity (q_0)	Price (p_1)	Quantity (q_1)				
A	2	40	3	20	120	80	60	40
B	1.5	30	2.5	40	75	45	100	60
C	1	50	1.5	30	75	50	45	30
D	2.5	20	2	80	40	50	160	200
					$\Sigma p_1 q_0$ $=310$	$\Sigma p_0 q_0$ $=225$	$\Sigma p_1 q_1$ $=365$	$\Sigma p_0 q_1$ $=330$

  (i) **Laspeyre's Method**

$$P_{01} = \frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$$

$$= \frac{310}{225} \times 100 = 137.8$$

  (ii) **Paasche's Method**

$$P_{01} = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1} \times 100 = \frac{365}{330} \times 100 = 110.6$$

  (iii) **Fisher's Method**

$$P_{01} = \sqrt{\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1}} \times 100$$

$$= \sqrt{\frac{310}{225} \times \frac{365}{330}} \times 100$$

$$= \sqrt{1.378 \times 1.106} \times 100$$

$$= 1.23 \times 100 = 123$$

Consumer Price Index (CPI)

Consumer Price Index (CPI) measures the changes over time in the general price level of goods and services that households acquire for the purpose of consumption. CPI is considered to be an indicator of inflation in a country.

The Consumer Price Index number is also known as cost of living index number, retail price index number, price of living index number.

Different CPI for Different Consumers

The consumption patterns of consumers belonging to different strata of society are different.

So, there are different CPI based on the consumption patterns of different consumers. These are
- Consumer Price Index for Industrial Workers (CPI-IW) (constructed with 2001 as base year)
- Consumer Price Index for Agricultural Labour (CPI-AL) and Consumer Price Index for Rural Labour (CPI-RL) (constructed with 1986-87 as base year)
- Consumer Price Index for Rural, Urban and Combined Sectors (constructed with 2011-12 as base year)

Methods of Construction of Consumer Price Index Number

There are following two methods

1. Aggregative Expenditure Method

This method is the same as Laspeyre's method of constructing weighted index.

The following formula is applied for calculating index number by aggregative expenditure method

$$\text{CPI} = \frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$$

Here, $\Sigma p_1 q_0$ = Aggregate expenditure in current year
        $\Sigma p_0 q_0$ = Aggregate expenditure in base year.

Example 5. Find the consumer price index or cost of living index number for the current year from the following data by aggregative expenditure method.

Commodity	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	2	12	4	5
B	5	12	6	10
C	4	20	5	15
D	3	10	3	10

Ans. **Construction of Consumer Price Index Number**

Commodity	Base Year		Current Year		$p_1 q_0$	$p_0 q_0$
	Price (p_0)	Quantity (q_0)	Price (p_1)	Quantity (q_1)		
A	2	12	4	5	48	24
B	5	12	6	10	72	60
C	4	20	5	15	100	80
D	3	10	3	10	30	30
					$\Sigma p_1 q_0$ = 250	$\Sigma p_0 q_0$ = 194

$$\text{CPI} = \frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100 = \frac{250}{194} \times 100 = 128.87$$

2. Family Budget Method

In this method, the family budgets of a large number of people, for whom the index is meant, are carefully studied. Then, the aggregate expenditure of an average family on various commodities is estimated.

These values constitute the weights. CPI is computed in the same manner as weighted average of price relative method. The following formula is applied to compute CPI by family budget method $\text{CPI} = \dfrac{\Sigma IW}{\Sigma W}$

where, ΣIW = Sum of products of price relative with weights ΣW = Sum of weights

Example 6. Construct the consumer price index number for 2021 on the basis of the following data using family budget method.

Items	Price in 2010 (₹)	Price in 2021 (₹)	Weight
Food	200	280	30
Rent	100	200	20
Clothing	150	120	20
Fuel and lighting	50	100	10
Miscellaneous	100	200	20

Ans. **Construction of Consumer Price Index Number for 2021**
[Base year 2010 = 100 (Family Budget Method)]

Items	Weight (W)	Price in 2010 (p_0)	Price in 2021 (p_1)	$I = \dfrac{p_1}{p_0} \times 100$	IW
Food	30	200	280	140	4,200
Rent	20	100	200	200	4,000
Clothing	20	150	120	80	1,600
Fuel and lighting	10	50	100	200	2,000
Miscellaneous	20	100	200	200	4,000
	$\Sigma W = 100$				$\Sigma IW = 15,800$

Consumer Price Index Number for 2011

$$= \frac{\Sigma IW}{\Sigma W}$$
$$= \frac{15,800}{100}$$
$$= 158$$

Weights Assigned to Different Categories of Consumption Goods

As we have discussed that while computing CPI by family budget items, different weights are assigned to various consumption goods.

The government agencies while computing CPI refer to the standard weights which are tabulate below

The Group of Items in CPI for Industrial Workers and Their Weightage

Major Group	Weight in %
Food	45.86
Pan, supari, tobacco, etc	2.38
Fuel & light	6.84
Housing	10.07
Clothing, bedding & footwear	6.53
Misc. group	28.32
General	100.00

Source *Economic Survey, Government of India.*

Wholesale Price Index (WPI)

The Wholesale Price Index measures the changes in the general price level of the country. This price index is calculated mainly on the basis of those commodities which are traded on wholesale rates such as oil, sugar, wheat, rice, etc.

This price index totally ignores the service sector. There is only one composite Wholesale Price Index for the whole country and it is computed on a weekly basis.

The methods for computation of Wholesale Price Index are the same as discussed in Consumer Price Index.

Groups for the Construction of Wholesale Price Index

The current series of wholesale price index has a base year of 2011-12. Also, in India for the construction of wholesale price index, goods are mainly classified into the following three main groups

1. **Primary Articles** This group is further divided into three sub-groups, viz. food articles, non-food articles and minerals. Primary articles have a weightage of 22.62%.

2. **Fuel and Power** In this category, items like coal, petroleum products, electricity, etc are included with a total weightage of 13.15%.

3. **Manufactured Products** This group is further divided into many sub-groups such as food products, beverages, textiles, metal products, etc. This group has a weightage of 64.23%.

The above information can be tabulated as below

The Categories in WPI and Their Weightage

Category	Weight in %
Primary Articles	22.62%
Fuel and Power	13.15%
Manufactured Products	64.23%

Source *Ministry of Statistics and Programme Implementation, 2016-17*

Other Important Index Numbers

These index numbers are also important

1. **Sensex** Sensex is the short form for Bombay Stock Exchange (BSE) Sensitive Index with 1978-79 as base.

   It is the benchmark index for the Indian stock market. It consists of 30 stocks which represent a large, well-established companies of the economy.

   If the sensex rises, it indicates that market is doing well and investors expect better earnings from companies. It also indicates a growing confidence of investors in the basic health of the economy.

   Movement in sensex should be interpreted in the following way

   - If sensex goes up, it means that the prices of the stocks of most of the companies under BSE sensex have gone up.
   - If sensex goes down, it means that prices of stocks of most of the companies under BSE sensex have gone down.

2. **Human Development Index** It is another index number used to judge the level of development of different countries.

   This index is prepared by United Nation (UN) for its member countries using threee components

   - Per capita income (measured in $PPP).
   - Gross enrollment ratio and years of schooling.
   - Life expectancy at birth.

   Based upon the index, counties are given value out of 1 and ranked accordingly.

Issues in Construction of Index Number

There are many problems faced while constructing index number. Some of the problems are as follows

1. **Determination and Definition of the Purpose** Before constructing an index number, one must define the objective. It is necessary that the purpose and scope of the desired index number must be determined and clearly defined in specified terms.

2. **Selection of Sources of Data** Data can be taken either from primary sources or from secondary sources. The source of data for the construction of index number should be carefully selected depending on the extent of coverage desired, accuracy, nature and objective of constructing the index number, etc.

3. **Selection of Base Year** Base year should be too far in the past. It must be a representative year and a year in which there were no elections, war or natural calamities.

4. **Selection of Items/Commodities** Items used for the construction of index number must be representative. The number of commodities should be neither too large nor too small. Items selected should be relevant and standardised i.e., easy to be described, recognised and understood. e.g., rice, milk, ghee, cloth, etc.

5. **Selection of the Price** In the construction of price index, the problem is whether to adopt retail price or wholesale price, controlled or open market price.

6. **Selection of Weighing Methods** We should accord suitable weightage to different items. The method of providing weightage depends upon the purpose of index number. Weighing may be according to the value or quantity.

7. **Selection of the Formula** Index number can be constructed with the help of many formulae such as Laspeyre's method, Paasche's method, Dorbish and Bowley's method, Fisher's method, etc. One has to decide about the method to be used while constructing the index number.

Index Number in Economics

There are many uses of index number in economics. These are

- Consumer Price Index (CPI) are helpful in wage negotiation, formulation of income policy, price policy, rent control, taxation and general economic policy formulation.
- The Wholesale Price Index (WPI) is used to estimate the effect of changes in prices on aggregate such as, national income, capital formation, etc.
- CPI are used in calculating the purchasing power of money and real wage.

- Index of industrial production gives us a quantitative figure about the change in production in the industrial sector.
- Agricultural production index provides us a ready reckoner of the performance of agricultural sector.
- Sensex is a useful guide for investors in the stock market. If the sensex is rising, investors are optimistic of the future performance of the economy.
- The WPI is widely used to measure the rate of inflation as discussed below.
  Inflation is a general and continuing increase in prices. If inflation becomes sufficiently large, money may lose its traditional function as a medium of exchange and as a unit of account. Its primary impact lies in lowering the value of money.

Inflation and Index Number

Inflation is described as a situation characterised by a sustained increase in the general price level. A small rise in price or an irregular price rise cannot be called inflation. Wholesale Price Index (WPI) is the most commonly accepted measure of inflation, due to following attributes

- The Wholesale Price Index (WPI) is the most widely used price index as an indicator of the rate of inflation in the economy.
- It is only general index capturing price movements in a comprehensive way and indicates movement in price of commodities in all trade and transactions.
- WPI is available on a weekly basis with the shortest possible time lag of 2 weeks.

Chapter Practice

Objective Questions

• Multiple Choice Questions

1. An index number which accounts for the relative importance of the items is known as **(NCERT)**
(a) Weighted index
(b) Simple aggregative index
(c) Simple average of relatives
(d) None of the above

Ans. (a) Weighted index

2. In most of the weighted index numbers the weight pertains to **(NCERT)**
(a) base year
(b) current year
(c) both base and current year
(d) None of these

Ans. (a) base year

3. The impact of change in the price of a commodity with little weight in the index will be **(NCERT)**
(a) small
(b) large
(c) uncertain
(d) None of these

Ans. (a) small

4. The item having the highest weight in consumer price index for industrial workers is **(NCERT)**
(a) food
(b) housing
(c) clothing
(d) None of these

Ans. (a) food

5. In general, inflation is calculated by using **(NCERT)**
(a) Wholesale Price Index
(b) Consumer Price Index
(c) Producer's Price Index
(d) None of these

Ans. (a) Wholesale Price Index

6. Which of the following devices is used for measuring differences in the magnitude of a group of related variables?
(a) Arithmetic mean
(b) Index number
(c) Correlation
(d) Mode

Ans. (b) Index number

7. Index numbers are very helpful in comparing the economic conditions of a particular group of people for ......different periods.
(a) three
(b) two
(c) four
(d) None of these

Ans. (b) two

8. **Statement I** Construction of index numbers only needs choosing commodity basket.

Statement II Index numbers have universal acceptance.

Alternatives
(a) Statement I is correct and Statement II is incorrect
(b) Statement II is correct and Statement I is incorrect
(c) Both the statements are correct
(d) Both the statements are incorrect

Ans. (b) Statement II is correct and Statement I is incorrect

9. **Statement I** An appropriate method for working out consumer price index is family budget method.

Statement II Index numbers are devices for measuring differences in the magnitude of a group of related variables.

Alternatives
(a) Statement I is correct and Statement II is incorrect
(b) Statement II is correct and Statement I is incorrect
(c) Both the statements are correct
(d) Both the statements are incorrect

Ans. (c) Both the statements are correct

10. The ...... value of index number is a pure number.
(a) average
(b) commodity
(c) price relative
(d) All of these

Ans. (c) price relative

11. Which of the following index numbers is based on the assumption that all the commodities are of equal importance?
(a) Weighted index number
(b) Simple index number
(c) Both (a) and (b)
(d) None of these

Ans. (b) Simple index number

12. Choose the correct pair.

Column I	Column II
A. Economic Barometers	(i) Only weighted Index Numbers
B. Purchasing Power of Money	(ii) Inverse of CPI
C. Base year of Index Numbers	(iii) 1990

Codes
(a) A–(i)
(b) B–(ii)
(c) C–(iii)
(d) None of these

Ans. (b) B–(ii)

13. In Laspeyre's index number, the weight pertains to
(a) base year quantities
(b) current year
(c) Both (a) and (b)
(d) None of these

Ans. (a) base year quantities

14. If Laspeyre's index is 110 and Paasche's index is 108, fisher's index will be
(a) 100
(b) 108
(c) 109
(d) None of these

Ans. (c) Fisher's index $= \sqrt{110 \times 108} = 108.99$ or 109

15. Factor Reversal Test is expressed in terms of

(a) $\dfrac{\Sigma P_1 Q_1}{\Sigma P_0 Q_0}$

(b) $\dfrac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \times \dfrac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1}$

(c) $\dfrac{\Sigma P_1 Q_1}{\Sigma Q_0 P_1}$

(d) $\dfrac{\Sigma Q_1 P_0}{\Sigma Q_0 P_0} \times \dfrac{\Sigma P_1 Q_1}{\Sigma Q_0 P_1}$

Ans. (d) $\dfrac{\Sigma Q_1 P_0}{\Sigma Q_0 P_0} \times \dfrac{\Sigma P_1 Q_1}{\Sigma Q_0 P_1}$

• Assertion-Reasoning MCQs

Direction *(Q. Nos. 1 to 5) There are two statements marked as Assertion (A) and Reason (R). Read the statements and choose the appropriate option from the options given below*
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A)
(c) Assertion (A) is true, but Reason (R) is false
(d) Assertion (A) is false, but Reason (R) is true

1. **Assertion** (A) A better way to estimate GDP accurately is to deflate input and output prices through separate indices.

Reason (R) When output prices move relatively faster than the input prices, the single deflation method overestimates GDP.

Ans. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

2. **Assertion** (A) Index number serves as the barometer for measuring the value of money in an economy.

Reason (R) Index numbers have universal acceptance thus can be applied in any case.

Ans. (b) Index number is an important statistical tool that serves as the barometer for comparison of different variables.

3. **Assertion** (A) Wholesale price index is used to measure the changes in the prices of goods that impacts individual.

Reason (R) Positive value of index number indicates rise in general price levels.

Ans. (d) Consumer's price index is used to measure the changes in the retail prices of the commodities.

4. **Assertion** (A) Value index is based upon both price and quantity.

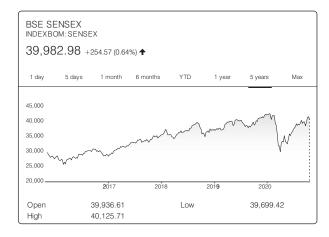**Reason** (R) Value is calculated by the product of price and quantity.

Ans. (b) Value refers to the product of price and quantity thus comprised of both base and current year's price and quantities.

5. **Assertion** (A) Fisher's method of index number is considered as ideal weighted method of index numbers.

Reason (R) Fisher's method passes all statistical tests of time and factor reversal.

Ans. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

• Case Based MCQs

1. **Direction** *Read the following case study graph and answer the question no. (i) to (vi) on the basis of the same.*

(i) Which year is considered as the base year for constructing Sensex in India?

(a) 1978-79   (b) 2000-01   (c) 2004-05   (d) 2011-12

Ans. (a) 1978-79

(ii) As per the given graph, rising Sensex indicates ………… .

(a) growth of economy
(b) growth of investors profit
(c) inflow of foreign currency
(d) All of the above

Ans. (b) As the graph is showing an upward trend, it indicates growth of profit for the investors.

(iii) Index number is always expressed in terms of …… .

(a) percentage   (b) proportionate
(c) Both (a) and (b)   (d) None of these

Ans. (a) percentage

(iv) ……… type of average is used to calculate the value of index number.

(a) Simple   (b) Weighted
(c) Proportionate   (d) Both (a) and (b)

Ans. (b) Weighted

(v) The given graph shows 0.64% increase, what does it indicate?

(a) Rise in number of stocks   (b) Rise in stock prices
(c) Fall in stock price   (d) None of these

Ans. (b) Rise in stock prices

(vi) Which year shows a decrease in stock price as per the given graph?

(a) 2017   (b) 2018   (c) 2019   (d) 2020

Ans. (d) 2020

2. Direction *Read the following case study and answer the question no. (i) to (vi) on the basis of the same.*

We frequently see index numbers, such as the Consumer Price Index (CPI), in our daily life. Economists often use the index numbers to compare values measured at different points in time. Using an index can make quick comparisons easy. The index numbers have become a widely accepted statistical device for measuring business activity changes. A typical use of the index number technique in business is to summarize complex situations with a single performance index so that a dashboard (or report) would have enough space to show all KPIs. An index number is used to measure changes in the magnitude of a variable or group of variables regarding time, geographical location, or other characteristics such as profession.

IT professionals who need to analyse economic and business activities, but have limited experience in statistics, want to learn how to construct and interpret performance indexes. Index numbers are also not free from criticism as its base year and commodity selection requires a lot of attention and expert attention.

(i) Choose the correct statement from given below

(a) Index numbers are cent percent accurate
(b) There is null possibility of biasness in case of index numbers
(c) Index number is based upon all the items given in the data
(d) All of the above

Ans. (c) Index number is based upon all the items given in the data

(ii) Index numbers can be used in which of the following fields?

(a) Geographical areas
(b) Change in magnitude of a variable
(c) Change in time periods
(d) All of the above

Ans. (d) All of the above

(iii) Which of the following problems comes in the construction of index numbers?

(a) Selection of base year   (b) Selection of commodities
(c) Selection of quantities   (d) All of these

Ans. (d) All of these

(iv) **Assertion** (A) Selection of incorrect base leads to mis-leading conclusion.

Reason (R) A year with high fluctuations in prices should not be considered as base year.

Alternatives

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A)
(c) Assertion (A) is true, but Reason (R) is false
(d) Both are false

Ans. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(v) Application of index numbers which is based on data related to different time period is known as ……… .

(a) Time series data   (b) Temporal data
(c) Inter-temporal data   (d) All of these

Ans. (d) All of these

(vi) Economists often use the index numbers to ……….. values measured at different points in time.

(a) measure   (b) change   (c) compare   (d) All of these

Ans. (a) measure

PART 2
Subjective Questions

• Short Answer (SA) Type Questions

1. Why do we need an index number? (**NCERT**)

Ans. Index numbers are needed because of the various advantages which pertain to the use of index numbers. These advantages

   (i) **Barometer of Economic Progress** Index numbers are a barometer for measuring the value of money and assessing the level of economic progress.

   (ii) **Importance for the Government** The government adopts suitable monetary and fiscal policies according to the changes in index numbers.

   (iii) **Throws Light on Economic Condition** Index numbers are very helpful in comparing the economic condition of a particular group of people across two time periods.

   (iv) **Fixation of Wages of Policy-making** Index numbers such as CPI and WPI help the government and executives for the fixation and revision of wages.

2. Is the change in any price reflected in a price index number? (**NCERT**)

Ans. No, the change in any price is not reflected in a price index number. Price index numbers measure and permit comparison of the prices of certain goods included in the basket being used to compare prices in the base period with prices in the current period. Moreover, an equal rise in the price of an item with large weight and that of an item with low weight will have different implications for the overall change in the price index.

3. What are the desirable properties of the base period? (**NCERT**)

Ans. Base period should have the following properties

   (i) The base year should be a normal year in which extraordinary events such as earthquake, flood, war, elections, etc should not have occurred.

   (ii) The period should not be too far in the past as comparison cannot be done with such a base year because policies, economic and social conditions change with time.

   (iii) Base period should be updated periodically.

Thus, we can conclude that while selecting base period, certain factors should be considered.

4. What is the difference between a price index and a quantity index? (**NCERT**)

Ans. The differences between a price index and a quantity index are as follows

   (i) Price index numbers measure and allow for comparison of the prices of certain goods while quantity index numbers measure the changes in the physical volume of production, construction or employment.

   (ii) Price index numbers are more widely used as compared to quantity index numbers.

   (iii) Quantity index does not indicate the real change in the purchasing power of money while price index does.

5. The Consumer Price Index for June, 2005 was 125. The food index was 120 and that of other items was 135. What is the percentage of the total weight given to food? (**NCERT**)

Ans. Let X denote the percentage of total weight given to food and $100 - X$ denote the percentage of total weight given to other items.

$$\text{CPI} = \frac{120(X) + 135(100 - X)}{100}, 125 = \frac{120X \times 13,500 - 135X}{100}$$

$$\Rightarrow \quad 12,500 = 120X + 13,500 - 135X$$

$$\Rightarrow \quad 1,000 = 15X \Rightarrow X = \frac{1,000}{15} = 66.67\%$$

Thus, the percentage of the total weight given to food = 66.67%

6. If the salary of a person in the base year is ₹ 4,000 per annum and the current year salary is ₹ 6,000, by how much should his salary rise to maintain the same standard of living, if the CPI is 400? (**NCERT**)

Ans. Base year salary = ₹ 4,000, Base year index = 100 (assumption), Current year index = **400**

Salary required in the current year to maintain the same standard of living of base year

$$= \text{Base Year Salary} \times \frac{\textbf{CPI of Current Year}}{\textbf{CPI of Base Year}}$$

$$= \textbf{4,000} \times \frac{\textbf{400}}{\textbf{100}} = ₹\textbf{16,000}$$

Current year salary = ₹ 6,000

The increase in current salary required

$$= \textbf{16,000} - \textbf{6,000} = ₹ \, 10,000$$

7. Which method is considered 'ideal' for constructing index number and why?

Ans. Fisher's method is considered ideal for constructing index number because

   (i) It satisfies factor reversal test.

   (ii) It satisfies time reversal test.

   (iii) It is based on different weights.

8. Give the limitations of simple aggregative method of computing index number.

Ans. Although computation of index number is quite simple while using this method, yet it is not ordinarily used because of the following limitations

   (i) All items are given equal weightage.

   (ii) This measure of index number is influenced by the items which are highly priced.

   (iii) This method is affected with the change in the unit of measurement.

For example, index number computed when price of wheat is expressed in per kg, will be different from the index number computed when the price of wheat is expressed in per quintal.

9. Mr Ashok was getting ₹ 400 in the base year and ₹ 800 in the current year. If Consumer Price Index is ₹ 350, then what extra amount is required for maintaining the earlier standard of living?

Ans. For former standard of living, Ashok should get

$$= \frac{\text{Salary in Base Year} \times \text{CPI}}{100} = \frac{400 \times 350}{100} = 1,400$$

∴ Amount required for maintaining the same standard of living $= 1,400 - 800 = ₹ 600$

10. The monthly per capita expenditure incurred by workers of 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 base. **(NCERT)**

Item	Price in 1980	Price in 2005
Food	100	200
Clothing	20	25
Fuel and lighting	15	20
House rent	30	40
Miscellaneous	35	65

Ans. **Construction of Consumer Price Index**

Item	W	Price in 1980 (₹) (p_0)	Price in 2005 (₹) (p_1)	$I\left(\dfrac{p_1}{p_0} \times 100\right)$	I W
Food	75	100	200	200	15,000
Clothing	10	20	25	125	1,250
Fuel and lighting	5	15	20	133.33	666.65
House rent	6	30	40	133.33	799.98
Miscellaneous	4	35	65	185.71	742.84
	$\Sigma W = 100$				$\Sigma IW = 18,459.47$

$$\text{CPI} = \frac{\Sigma IW}{\Sigma W} = \frac{18,459.47}{100} = 184.59 = 185 \text{ (approx)}$$

11. Explain briefly the process of data collection for Consumer Price Index (CPI).

Ans. Primary data is collected every month to compute rural and urban CPI in the following ways

(i) For CPI (Rural), two villages are selected from each district. Presently data is collected from 1,181 villages. Number of items for price data collection is identified through the market survey and it is around 225.

Price data is collected from selected shops in the villages every month by the Department of Posts.

(ii) For CPI (Urban), data is collected from all cities, having a population of more than 9 lakhs. Presently, total number of selected cities is 310. Number of items for price data collection is identified through the market survey and it is around 250. Each selected market is visited every month for price data collection from shops and outlets.

(iii) 4.75 lakh price data records collected from rural and urban areas are uploaded per month to the web portal of National Informatics Centre, which is the formal data collection arm of NSSO (National Sample Survey Organisation).

12. 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%	Miscellaneous 20%
Price in 2004 (₹)	1,500	250	750	300	400
Price in 1995 (₹)	1,400	200	500	200	250

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

Ans. **Construction of Consumer Price Index**

Item	W (%)	Price in 1995 (₹) (p_0)	Price in 2004 (₹) (p_1)	$I\left(\dfrac{p_1}{p_0} \times 100\right)$	I W
Food	35	1,400	1,500	107.14	3,750 (approx)
Fuel	10	200	250	125.00	1,250
Clothing	20	500	750	150.00	3,000
Rent	15	200	300	150.00	2,250
Miscellaneous	20	250	400	160.00	3,200
	$\Sigma W = 100$				$\Sigma IW = 13,450$

$$\text{CPI} = \frac{\Sigma IW}{\Sigma W}$$

$$= \frac{13,450}{100} = 134.5$$

This result indicates that the CPI in the year 2004 has increased by 34.5% as compared to the year 1995.

13. Construct index number of 2015 from the given data by the simple aggregative method and the simple average of relative method.

Commodity	A	B	C	D	E	F
Price in 2015 (₹)	10	18	16	14	12	17
Price in 2010 (₹)	8	15	12	10	8	12.5

Ans. **Construction of Index Number**

Commodity	Price in 2010 (₹) (p_0)	Price in 2015 (₹) (p_1)	$I\left(\dfrac{p_1}{p_0}\times 100\right)$
A	8	10	125
B	15	18	120
C	12	16	133.3
D	10	14	140
E	8	12	150
F	12.5	17	136
n = 6	$\Sigma p_0 = 65.5$	$\Sigma p_1 = 87$	$\Sigma I = 804.3$

(i) **Simple Aggregative Method**

$$P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100 = \frac{87}{65.5} \times 100 = 132.8$$

(ii) **Simple Average of Relative Method**

$$P_{01} = \frac{\Sigma I}{n} = \frac{804.3}{6} = 134.05$$

14. Construct the index number by simple average of price relative method and by simple aggregative method.

Commodity	A	B	C	D	E
Price in 2014 (₹)	16	40	35	5.25	2
Price in 2015 (₹)	20	60	50	6.25	1.5

Ans. **Construction of Index Number**

Commodity	Price in 2014 (₹) (p_0)	Price in 2015 (₹) (p_1)	$I\left(\dfrac{p_1}{p_0}\times 100\right)$
A	16	20	125
B	40	60	150
C	35	50	142.9
D	5.25	6.25	119.05
E	2	1.50	75
n = 5	$\Sigma p_0 = 98.25$	$\Sigma p_1 = 137.75$	$\Sigma I = 611.95$

(i) **Simple Average of Price Relative Method**

$$P_{01} = \frac{\Sigma I}{n} = \frac{611.95}{5} = 122.39$$

(ii) **Simple Aggregative Method**

$$P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100 = \frac{137.75}{98.25} \times 100$$
$$= 140.20$$

15. Using the simple aggregative method, calculate the index number for the given data.

	A	B	C	D
p_1	15	22	20	27
p_0	10	20	18	25

Ans. **Construction of Index Number**

Commodity	p_0 (Base Year)	p_1 (Current Year)
A	10	15
B	20	22
C	18	20
D	25	27
	$\Sigma p_0 = 73$	$\Sigma p_1 = 84$

$$P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100 \Rightarrow P_{01} = \frac{84}{73} \times 100 = 115.07$$

16. Calculate the weighted average of price relative index for 2016 on the basis of 2012 from the following data

Commodity	W	p_0 2012	p_1 2016
A	10	15	20
B	8	10	12
C	6	5	8
D	6	10	13
E	4	4	5

Ans. **Construction of Weighted Index Number**

Commodity	W	Price in 2012 (₹) (p_0)	Price in 2016 (₹) (p_1)	$I\left(\dfrac{p_1}{p_0}\times 100\right)$	IW
A	10	15	20	133.33	1,333
B	8	10	12	120.00	960
C	6	5	8	160.00	960
D	6	10	13	130.00	780
E	4	4	5	125.00	500
	$\Sigma W = 34$				$\Sigma IW = 4,533$

$$P_{01} = \frac{\Sigma IW}{\Sigma W} = \frac{4,533}{34} = 133.3$$

• Long Answer (LA) Type Questions

1. Explain briefly the various characteristics or features of index numbers.

Ans. The characteristics of index numbers are as follows

   (i) **Specialised Averages** Index numbers are specialised averages as they are helpful in computing combined averages of goods and services expressed in different units. Unlike the measures of central tendency, which can compute averages of variables expressed in one unit only, index numbers can measure the averages of variables with diverse units.

   (ii) **Measure the Relative Changes** Index numbers measure the relative change in the value of the variable under study. Because of this, index numbers are expressed in terms of percentage which are independent of the units of measurement.

   (iii) **Measure the Net Changes** Index numbers measure net changes in a variable or group of variables. They describe net change in a single number. This facilitates the comparisons of two or more index numbers.

   (iv) **Measure the Change not Capable of Direct Measurement** Index numbers are meant to study the changes in the effects of such factors which cannot be measured directly. For example, changes in business activity in a country are not capable of direct measurement but it is possible to study relative changes in business activity with the help of index number.

2. Discuss in brief, the methods of constructing weighted index numbers.

Ans. Weighted index numbers are the index number in which different items of the series are accorded different weightage, depending upon their relative importance.

There are two methods of constructing weighted index numbers

   (i) **Weighted Average of Price Relative Method** According to this method, weighted index number is simply the weighted arithmetic mean of price relative. In this method, weighted sum of the price relative is divided by the sum total of the weights.

Thus, $P_{01} = \dfrac{\Sigma IW}{\Sigma W}$

   (ii) **Weighted Aggregative Method** Under this method, weights are assigned to various items and instead of finding the simple aggregate of price, the weighted aggregate of the price are obtained. The different methods to compute weighted aggregative index numbers are

Laspeyre's Method This method uses the base year quantities as weights.
The following formula is used to calculate index number

$$P_{01} = \frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$$

Paasche's Method This method uses the current year quantities as weights The following formula is used to calculate index number

$$P_{01} = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1} \times 100$$

Fisher's Method This method combines the techniques of Laspeyre's method and Paasche's method and uses both base year as well as current year quantities (q_0, q_1) as weight. The formula to construct index number is

$$P_{01} = \sqrt{\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1}} \times 100$$

3. Construct index number of price for the year price of 2016 from the following data by
   (i) Laspeyre's Method   (ii) Paasche's Method   (iii) Fisher's Method

Commodity	2008		2016	
	Price	Quantity	Price	Quantity
A	10	30	12	35
B	9	10	11	15
C	8	15	10	20
D	6	20	7	25

Ans.

Construction of Price Index Number

Commodity	2008 (Base Year)		2016 (Current Year)		$p_0 q_0$	$p_0 q_1$	$p_1 q_0$	$p_1 q_1$
	p_0	q_0	p_1	q_1				
A	10	30	12	35	300	350	360	420
B	9	10	11	15	90	135	110	165
C	8	15	10	20	120	160	150	200
D	6	20	7	25	120	150	140	175
					$\Sigma p_0 q_0 = 630$	$\Sigma p_0 q_1 = 795$	$\Sigma p_1 q_0 = 760$	$\Sigma p_1 q_1 = 960$

(i) **Laspeyre's Method** $P_{01} = \dfrac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100 = \dfrac{760}{630} \times 100 = 120.63$

(ii) **Paasche's Method** $P_{01} = \dfrac{\Sigma p_1 q_1}{\Sigma p_0 q_1} \times 100 = \dfrac{960}{795} \times 100 = 120.75$

(iii) **Fisher's Method** $P_{01} = \sqrt{\dfrac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times \dfrac{\Sigma p_1 q_1}{\Sigma p_0 q_1}} \times 100 = \sqrt{\dfrac{760}{630} \times \dfrac{960}{795}} \times 100 = \sqrt{1.206 \times 1.207} \times 100 = \sqrt{1.455} \times 100$

$= 1.2065 \times 100 = 120.65$

4. Construct the following indices by taking 2014 as the base year

   (i) Simple Aggregative Price Index   (ii) Index of Average of Price Relative

Item	A	B	C	D	E
Price in 2014 (₹)	6	2	4	10	8
Price in 2015 (₹)	10	2	6	12	12
Price in 2016 (₹)	15	3	8	14	16

Ans.   **Construction of Price Index Number**

Item	Price in 2014 (₹) (p_0)	Price in 2015 (₹) (p_1)	Price in 2016 (₹) (p_2)	$I_1\left(\dfrac{p_1}{p_0} \times 100\right)$	$I_2\left(\dfrac{p_2}{p_0} \times 100\right)$
A	6	10	15	166.67	250
B	2	2	3	100.00	150
C	4	6	8	150.00	200
D	10	12	14	120.00	140
E	8	12	16	150.00	200
$n = 5$	$\Sigma p_0 = 30$	$\Sigma p_1 = 42$	$\Sigma p_2 = 56$	$\Sigma I_1 = 686.67$	$\Sigma I_2 = 940$

(i) **Simple Aggregative Price Index** $P_{01} = \dfrac{\Sigma p_1}{\Sigma p_0} \times 100 = \dfrac{42}{30} \times 100 = 140$ (for 2015),

$$P_{02} = \dfrac{\Sigma p_2}{\Sigma p_0} \times 100 = \dfrac{56}{30} \times 100 = 186.67 \text{ (for 2016)}$$

(ii) **Index of Average of Price Relative** $P_{01} = \dfrac{\Sigma I_1}{n} = \dfrac{686.67}{5} = 137.34$ (for 2015),

$$P_{02} = \dfrac{\Sigma I_2}{n} = \dfrac{940}{5} = 188 \text{ (for 2016)}$$

5. The price quotation of different commodities for 2014 and 2015 are given below. Calculate the index number for 2015 with 2014 as base year by using

   (i) Simple Average of Price Relative   (ii) Weighted Average of Price Relative

Commodity	Unit	Weight	Price (₹) 2014	Price (₹) 2015
A	kg	5	2.00	4.50
B	quintal	7	2.50	3.20
C	dozen	6	3.00	3.50
D	kg	2	1.00	1.80

Ans.

Construction of Weighted Index Number

Commodity	Weight (W)	p_0	Price in 2015 (p_1)	$I\left(\dfrac{p_1}{p_0} \times 100\right)$	IW
A	5	2.00	4.50	$\dfrac{4.50}{2.0} \times 100 = 225$	1,125
B	7	2.50	3.20	$\dfrac{3.20}{2.50} \times 100 = 128$	896
C	6	3.00	3.50	$\dfrac{3.50}{3.00} \times 100 = 116.67$	700.02
D	2	1.00	1.80	$\dfrac{1.80}{1.00} \times 100 = 180$	360
n = 4	$\Sigma W = 20$			$\Sigma I = 649.67$	$\Sigma IW = 3{,}081.02$

(i) **Simple Average of Price Relative Method** $P_{01} = \dfrac{\Sigma I}{n} = \dfrac{649.67}{4} = 162.42$

(ii) **Weighted Average of Price Relative Method** $P_{01} = \dfrac{\Sigma IW}{\Sigma W} = \dfrac{3{,}081.02}{20} = 154.051$

6. Calculate the cost of living index number using family budget method.

Commodity	Wheat	Rice	Pulses	Ghee	Sugar	Oil	Fuel	Clothes
Units Consumed in Base Year	200	50	56	20	40	50	60	40
Price in ₹ (Base Year)	1.0	3.0	4.0	20.0	2.5	10.0	2.0	15.0
Price in ₹ (Current Year)	1.2	3.5	5.0	30.0	5.0	15.5	2.5	18.0

Ans.

Construction of Cost of Living Index Number

Commodity	Unit Consumed in Base Year (q_0)	Price in Base Year (₹) (p_0)	Price in Current Year (₹) (p_1)	$I\left(\dfrac{p_1}{p_0} \times 100\right)$	$W(p_0 q_0)$	IW
Wheat	200	1.0	1.2	120.00	200	24,000
Rice	50	3.0	3.5	116.67	150	17,500.5
Pulses	56	4.0	5.0	125.00	224	28,000
Ghee	20	20.0	30.0	150.00	400	60,000
Sugar	40	2.5	5.0	200.00	100	20,000
Oil	50	10.0	15.5	155.00	500	77,500
Fuel	60	2.0	2.5	125.00	120	15,000
Clothes	40	15.0	18.0	120.00	600	72,000
					$\Sigma W = 2{,}294$	$\Sigma IW = 3{,}14{,}000.5$

$$\text{CPI} = \frac{\Sigma IW}{\Sigma W} = \frac{3{,}14{,}000.5}{2{,}294} = 136.88$$

This result indicates that CPI in the current year has increased by 36.88% as compared to the base period.

7. The price paid and quantities purchased by a household in base and current years are given below. Calculate the additional dearness allowance to be given to the household so as to fully compensate it for the price rise, using both the Laspeyre's and Paasche's index number.

Commodity	Base Year		Current Year	
	Price (₹)	Quantity	Price (₹)	Quantity
A	30	10	40	8
B	12	20	15	18

Ans.

Construction of Price Index Number

Commodity	Base Year		Current Year		p_0q_0	p_0q_1	p_1q_0	p_1q_1
	p_0	q_0	p_1	q_1				
A	30	10	40	8	300	240	400	320
B	12	20	15	18	240	216	300	270
					$\Sigma p_0q_0 = 540$	$\Sigma p_0q_1 = 456$	$\Sigma p_1q_0 = 700$	$\Sigma p_1q_1 = 590$

Laspeyre's Index Number $\dfrac{\Sigma p_1q_0}{\Sigma p_0q_0} \times 100 = \dfrac{700}{540} \times 100 = 129.63$

Paasche's Index Number $\dfrac{\Sigma p_1q_1}{\Sigma p_0q_1} \times 100 = \dfrac{590}{456} \times 100 = 129.39$

Additional dearness allowance to be paid as per Laspeyre's Index Number = **29.63%**

Additional dearness allowance to be paid as per Paasche's Index Number = **29.39%**

Chapter Test

Multiple Choice Questions

1. Fisher's index number is the
   (a) arithmetic mean of index numbers of Laspeyre and Passche. (b) harmonic mean of index number of Laspeyre and Paasche.
   (c) geometric mean of index numbers of Laspeyre and Passche. (d) None of the above

2. Which of the following measures changes in retail price of the commodities?
   (a) Wholesale Price Index   (b) Weighted Index   (c) Consumer Price Index   (d) None of these

3. Cost of living index numbers are also used to find real wage by the process of
   (a) base shifting   (b) splicing of index number   (c) deflating of index number   (d) None of the above

4. .... is the benchmark index for the Indian stock market.
   (a) Price index   (b) Agricultural index   (c) Sensex   (d) None of these

5. Consumer Price Index number for the year 1957 was 313 with 1940 as the base year, the average monthly wages in 1957 of the workers in a factory was ₹ 160. Their real wage is
   (a) 48.40   (b) 51.12   (c) 40.30   (d) None of these

Short Answer (SA) Type Questions

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

2. Write any three uses of index number especially in economics.

3. What methods are used for constructing Consumer Price Index number?

4. "Index numbers measures the changes in the variables under study." Name some of the variables in which the changes are studied.

5. Calculate weighted price relatives index

Commodity	Weight in%	Base Year Price in (₹)	Current Year (₹)	Price Relative
A	40	2	4	200
B	30	5	6	120
C	20	4	5	125
D	10	2	3	150

Long Answer (LA) Type Questions

1. Calculate weighted aggregative price index from the following data using Fisher's method.

Commodity	Base Year		Current Year	
	Price (₹)	Quantity	Price (₹)	Quantity
A	2	10	4	5
B	5	12	6	10
C	4	20	5	15
D	2	15	3	10

2. Given the following data

Item	Base Year		Current Year	
	Price (₹)	Quantity	Price (₹)	Quantity
A	1	10	2	5
B	1	5	X	2

Find X, if the ratio between Laspeyre's and Paasche's index number is 28 : 27.

Answers

Multiple Choice Questions

1. (c)   2. (c)   3. (c)   4. (c)   5. (b)