CLASS XI ECONOMICS NOTES

Introduction To Index Numbers

Key Notes and Important Questions with Answers

(iv) INTRODUCTION TO INDEX NUMBERS

Index numbers :- An index numbers is a statistical measure design to show changes in a variable or group of related variables with respect to time, geographical location or other characteristics.

- **Characteristics of Index Numbers :**

  1. Index numbers are not qualitative statements like prices are rising or falling. It is a precise measurement of quantitiative changes in the concerned variable.

  2. Index numbers show changes in terms of averages. For example when it is said that price level has been increased it does not mean that price of all goods and services have been increased. But it means that on and average prices have been increased.

  3. An Index number, indicating change in magnitude, as of price, wage, employment, or production shifts, relative to the magnitude at a standard or base value usually taken as 100.
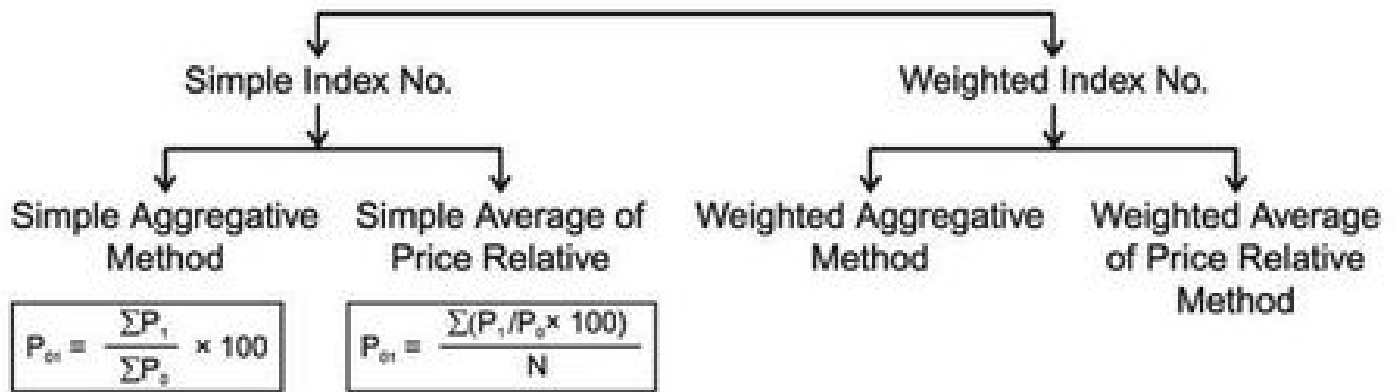
- **Types of Index Numbers**

  Index numbers are names after the activity they measure. Their types are as under :

  1. **Price Index :** Measure changes in price over a specified period of time. It is basically the ratio of the price of a certain number of commodities at the present year as against base year. Some price index numbers are **Wholesale price Index (WPI), Consumer Price Index (CPI) or Cost of Living Index (COLI).**

  2. **Quantity Index :** As the name suggest, these indices pertain to measuring change in volume of commodities like goods produced or goods consumed, etc. An important quantity index number is **Index of Industrial Production (IIP)**

3. **Value Index :** These pertain to compare changes in the monetary value of imports, exports, production or consumption of commodities.

- **Methods of Constructing Index Numbers**

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                            ┌─────────────────────────┴─────────────────────────┐
                      Simple Index No.                                   Weighted Index No.
              ┌──────────────┴──────────────┐                    ┌──────────────┴──────────────┐
       Simple Aggregative      Simple Average of        Weighted Aggregative      Weighted Average
           Method              Price Relative               Method               of Price Relative
                                                                                       Method
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$$P_{01} = \frac{\Sigma P_1}{\Sigma P_0} \times 100$$

$$P_{01} = \frac{\Sigma(P_1/P_0 \times 100)}{N}$$

- **Weighted Aggregative Method**

(i) **Laspeyre's Method** $P_{01} = \dfrac{\Sigma P_1 q_0}{\Sigma P_0 q_0} \times 100$

P_1 = Price of current year
P_0 = Base year price
q_0 = Base year quantity

(ii) **Paasche's Method** $P_{01} = \dfrac{\Sigma P_1 q_1}{\Sigma P_0 q_1} \times 100$

q_1 = Current year quantity

(iii) **Fisher's Method** $P_{01} = \sqrt{\dfrac{\Sigma P_1 q_0}{\Sigma P_0 q_0} \times \dfrac{\Sigma P_1 q_1}{\Sigma P_0 q_1}} \times 100$

- **Fisher's Index Number** is called ideal index number because :-
  (a) It considers both base year and current year quantity;
  (b) It is based on Geometric Mean which is considered as best average.
  (c) It satisfies time reversal & factor reversal test.

- **Weighted Average of Price Relative**

$$P_{01} = \frac{\Sigma RW}{\Sigma W}$$

where $R = \dfrac{P_1}{P_0} \times 100$

W = Weight

1. **Wholesales Price Index (WPI)**

   WPI is used to measure the relative changes in the prices of commodities traded in the wholesale markets. presently 2011-12 is used as the base year. It is also used to calculate the rate of inflation in a country.

2. **Consumer Price Index (CPI) OR Cost of Living Index (COLI)**

   CPI can be measured through two methods

   1. Aggregate expenditure method
   2. Family budget method

   Aggregate expenditure method :

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

   Family budget method :

   $$CPI = \frac{\Sigma RW}{\Sigma W}$$

   If W is not given $(W = p_0 q_0)$

   $$R = \frac{p_1}{p_0} \times 100$$

3. **Index of Industrial Production (IIP)**

   The index of industrial production is a composite indicator that measures the short-term changes in the quantity of production of industrial products during a given period with respect to that in a chosen base period.

   $$IIP = \frac{\Sigma \left(\frac{Q_1}{Q_0}\right) W}{\Sigma W} \times 100$$

   Where Q_1 = Production level in current year

   Q_0 = Production level in base year

   W = Weightage of different industrial output

4. Inflation and Index Number

Inflation is the percentage increases in price level i.e prices of a basket of goods and services over a specific period of time in respect of base year.

$$\text{Inflation Rate} = \frac{I_1 - I_0}{I_0} \times 100$$

$$\text{Where } I_1 = \text{Index of current period}$$
$$I_0 = \text{Index of base period.}$$

QUESTION BANK

ONE (1) MARK QUESTIONS :-

1) What do you mean by index numbers ?

2) Define base year.

3) State the three different index numbers.

4) Give the formula to calculate the rate of inflation.

THREE & FOUR (3 & 4) MARKS QUESTIONS :-

1) Mention three advantages of index number.

2) Construct the index no. for 2017 taking 2011 as base year by simple average of price-relatives.

Items	A	B	C	D	E	
2011 (prices)	15	22	38	25	50	Ans. P_{01} = 145.9
2017 (prices)	30	25	57	35	63	

3) Explains the limitations of index number.

SIX (6) MARK QUESTION :-

1) Explain the problems to construct an index number.

2) Explain the importance of index number.

3) Calculate Paasche's and Laspeyre's index number.

Commodities	Base Year Quantity	Base Year Price	Current Year Quantity	Current Year Price
A	10	10	20	15
B	3	25	5	30
C	4	20	10	15
D	15	5	18	7
E	2	30	4	30

Ans. Paaschey's = 115.10, Laspeyre = 136.67

4) Calculate consumer price Index No. Using Family Budget Method.

Items	Weight	Base year price	Current year price
Food	45	300	350
Rent	20	200	225
Fuel	8	100	110
Clothing	10	150	175
Others	17	250	300

Ans. 115.87

ANSWER OF ONE MARK QUESTIONS

1) An index number is a statistical device for measuring changes in the magnitude of a group of relative variables.

2) It refer to year of reference with which prices of current year are compared to measure the changes.

3) (a) consumer price index (b) wholesale price index (c) Index of industrial production

4) $\dfrac{I_1 - I_0}{I_0} \times 100$

Frequently Asked Questions
Index Numbers

1. What is the symbol of the price of the base year ?
   (Hint: P_0)

2. State the characteristics of index number.
   Hint :
   (i)   Expressed in numbers
   (ii) Relative measure
   (iii) Average of percentage
   (iv) Basis for comparison
   (v)   Universal utility

3. Write three uses of Wholesale Price Index.
   Hints :
   (i)   Forecasting of demand and supply.
   (ii) Determination of Real Change in Aggregate.
   (iii) Indicator of Rate of Inflation.

INDEX NUMBER

Multiple Choice Questions :- (1 Mark Questions)

1. An index number which accounts for the relative importance of the items is know as.
   (a)   Weighted index
   (b)   Simple aggregative index
   (c)   Simple average of relatives

2. In most of the weighted index numbers weight pertains to
   (a)   Base year
   (b)   Current year
   (c)   Both base and current year

3. The impact of change in price of a commodity with little weight in th index will be.
   (a)   Small
   (b)   Large
   (d)   Uncertain

4. A Consumer Price Index measures change in
   (a) Retail prices
   (b) Wholesale price
   (c) Producer prices

5. In general, inflation is calculated by using
   (a) Wholesale price index
   (b) Consumer price index
   (c) Producer's price index

6. The item having the highest weight in consumer price index for industrial worker is
   (a) Food
   (b) Housing
   (c) Clothing

ANSWERS OF ONE MARK MULTIPLE CHOICE QUESTIONS

1. (a)
2. (a)
3. (a)
4. (a)
5. (a)
6. (a

Exam Oriented Questions with Answers

Q.1. What are the difficulties or problems in the construction of index numbers?

Ans. The main difficulties or problems in the construction of index numbers are as follows :

1. **Purpose of Index Number** : Different index number serve different purposes. So before constructing an index number, one must define the objective.

2. **Selection of Base Year** : Base year is the year with which prices of the current year are compared. So it should be selected with due care. It should be a normal year without much ups and downs.

3. **Selection of the Price of the Goods and Services :** In the construction of price index, selection of prices is a major difficulty. The problem is that which prices should be taken into consideration. Wholesales prices or retail prices. Besides it, prices at different places are different. So, one should be careful in its selection.

4. **Selection of Goods and services :** Which goods and services should be included for measuring index number, is another major problem. So, one should keep the purpose of index number into consideration. While selecting it.

5. **Selection of Method :** There are various methods to measure index number. So, which method should be used, is another problem.

Q.2. What are the steps to construct consumer price index (CPI).

Ans. The steps to construct consumer price index are as follows :

1. **Selection of the Consumer Class :** First of all, it should be determined, for whom CPI is to calculate i.e., for industrial labour, farmers, govt employee etc.

2. **Information about the Family Budget :** After the selection of consumers class, information about their family budget should be collected i.e., what they consume, how much they consumers, prices of the concerned goods and services etc.

3. **Choice of Base Year :** After this, base year selection should be done. It should be a normal year without much ups and downs.

4. **Information about Prices :** The data regarding retail prices of selected goods and services should be collected from the concerned area, where the selected consumer group lines and makes the purchases.

5. **Weightage :** Selected items should be given weights according to their relative importance.

6. **Selection of Method :** At the end, it should be decided

Q.3. What is the importance of CPI or cost of living index.

Ans. Importance of CPI

1. It helps government in formulation of various policies regarding taxation, prices, rent control, general economic and fiscal policies etc.

2. It helps in determination of dearness allowance, on the basis of which govt employees salaries are hiked to compensate the rising prices level.

3. It is used to measure the real value of the rupee or its purchasing power and real income.

Q.4. What are the limitations of index numbers?

Ans. These are the following limitations of index numbers:

1. It provides only relative changes.
2. It considers only quantitative changes.
3. Index numbers does not reflect perfect accuracy.
4. Different methods of measuring index number give different results.

SOME MATHEMATICAL TOOLS USED IN ECONOMICS

Relationship between two variables can express in three ways -

    (1)   In the form of table

    (2)   In the form of diagram

    (3)   In the form of an algebraic equation.

Economics now prefers to describe relationship between different variables in terms of algebraic equations

Functional Relationship - It refers to the 'cause and effect' relationship between the variables.

(I)   SLOPE OF A LINE (LINEAR GRAPH)

Straight lines have the same slope. It means change in one variable in response to a unit change in other is same everywhere on the straight line. The slope of a straight line is calculated as :

$$\text{Slope} = \frac{\text{Change in variable on the Y - axis}}{\text{Change in variable on the X - axis}}$$
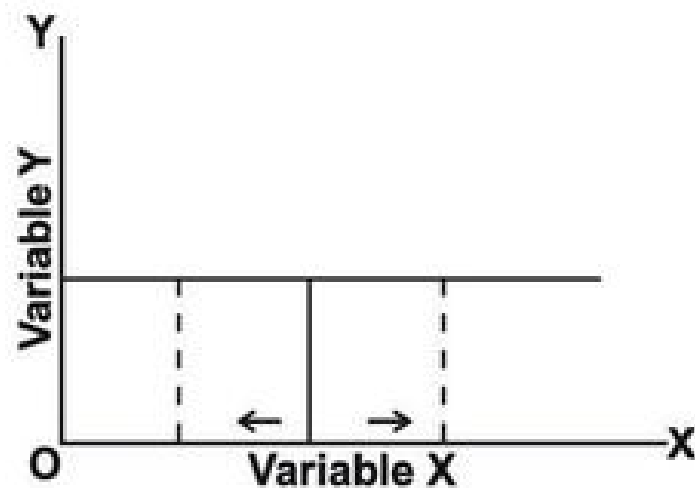
$$= \frac{\Delta Y}{\Delta X}$$
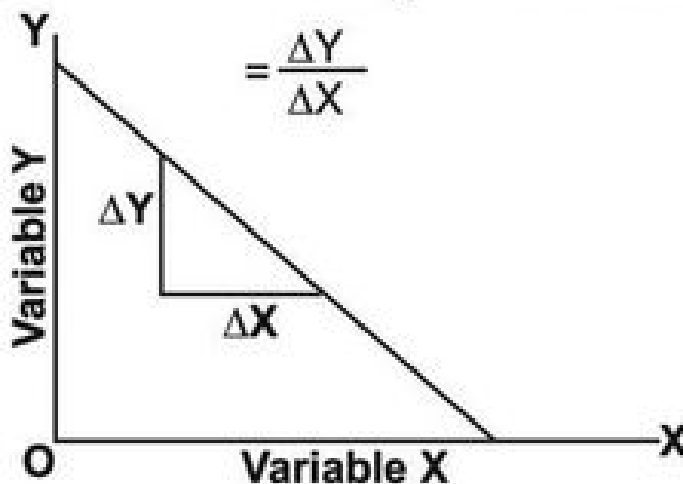
1)   Positive Slope - If the line is upward slopping then the two variable are directly related.
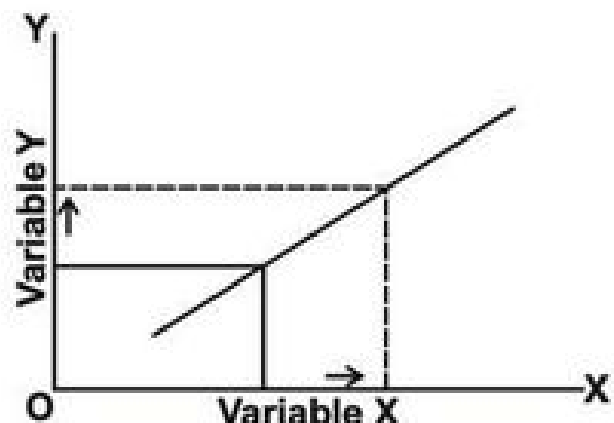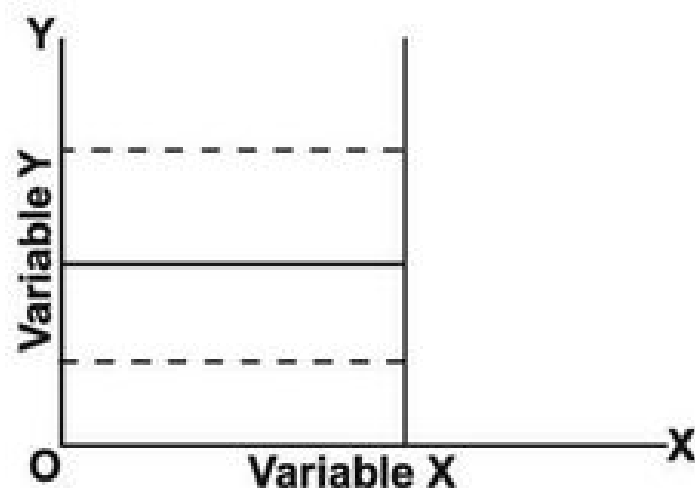
2)   Negative Slope - When the Line is downward Slopping, then the two variable are inversely related.
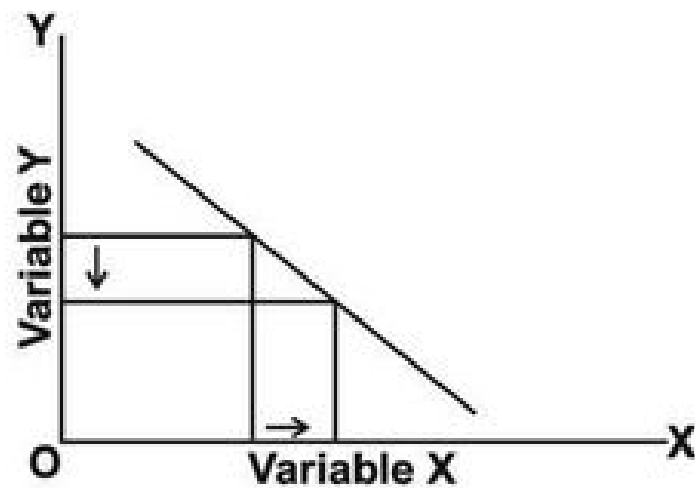
3)   Zero Slope – In case of a horizontal straight line, the slope is Zero as OY is zero.

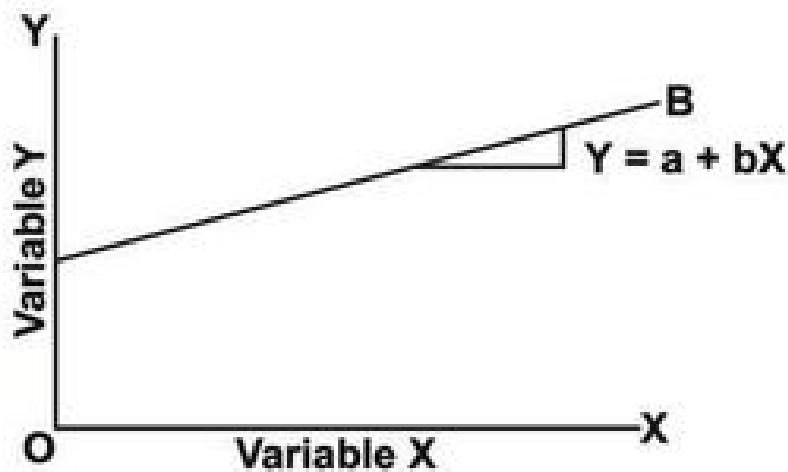4)   Infinite Slope – In case of a vertical straight line, the slope is infinite as OY is too big to be measured.

(II) Equation of Line

If the slope is constant throughout, the curve will be a straight line.

1) Equation of on upward slopping straight line curve:

$$Y = a + bX$$

where a = Value of the Y - axis intercept (OA) of the curve AB.

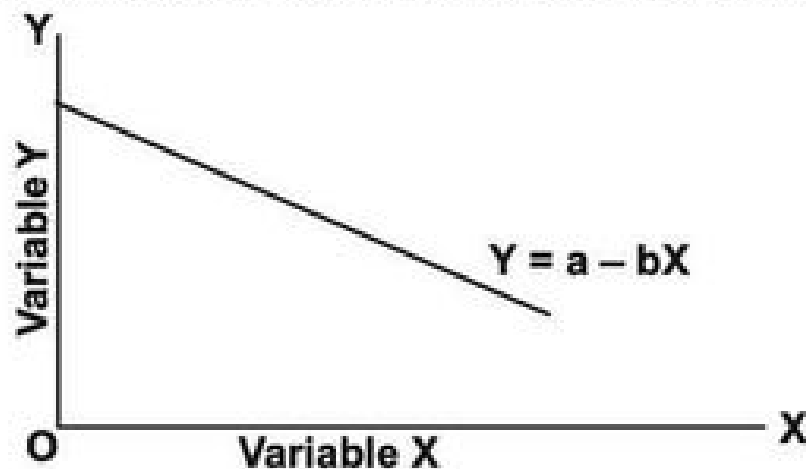$$b = \text{It is coefficient} = \frac{\Delta Y}{\Delta X}$$

X = Independent Variable

+ = Sign indicate direct relation between x and y

2) Equation of a downward slopping Straight Line curve –

$$Y = a - bx$$

(–) = Sign indicate inverse relation between x and y

III SLOPE OF A CURVE

A non–linear curve is the one, whose slope changes. Unlike the slope of a straight line, the slope of a curve is continuously changing.
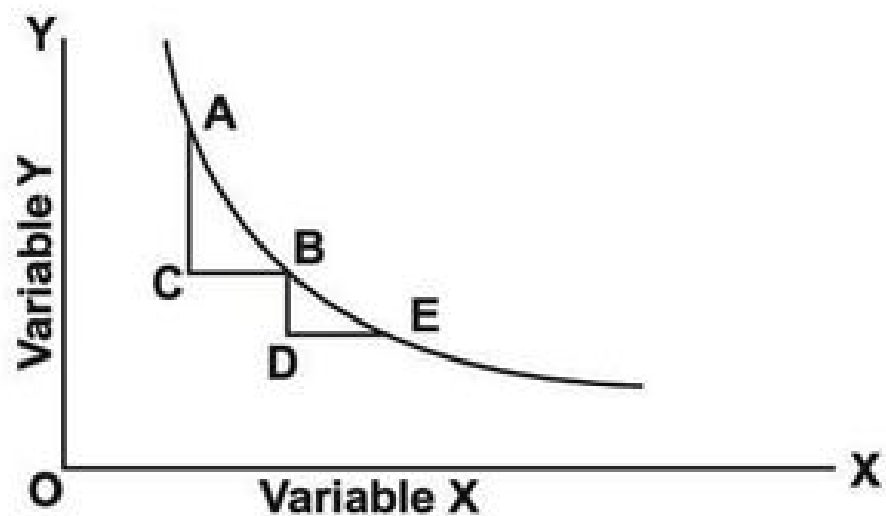
1) Downward slopping convex curve –

In case of movement from A to B

$$\text{Slope} = \frac{\Delta Y}{\Delta X} = \frac{AC}{CB}$$

In case of movement from B to E

$$\text{Slope} = \frac{\Delta Y}{\Delta X} = \frac{BD}{DE}$$

2) Downward slopping concave curve –

The slope of concave curve tends to rise.