

# Senior Secondary Course

## ECONOMICS (318)

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**NATIONAL INSTITUTE OF OPEN SCHOOLING**

(An Autonomous Institution under MHRD, Govt. of India)

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## *Chairman's Message*

*Dear learner,*

*As the needs of the society in general, and some groups in particular, keep on changing with time, the methods and techniques required for fulfilling those aspirations also have to be modified accordingly. Education is an instrument of change. The right type of education at right time can bring about positivity in the outlook of society, attitudinal changes to face the new/fresh challenges and the courage to face difficult situations.*

*This can be very effectively achieved by regular periodic curriculum renewal. A static curriculum does not serve any purpose, as it does not cater to the current needs and aspirations of the individual and society.*

*For this purpose only, educationists from all over the country come together at regular intervals to deliberate on the issues of changes needed and required. As an outcome of such deliberations, the National Curriculum Framework (NCF 2005) came out, which spells out in detail the type of education desirable/needed at various levels of education – primary, elementary, secondary or senior secondary.*

*Keeping this framework and other national and societal concerns in mind, we have currently revised the curriculum of Economics course at Senior Secondary level, as per the Common Core Curriculum provided by National Council of Educational Research and Training (NCERT) and the Council of Boards of School Education in India (COBSE) making it current and need based. Textual material production is an integral and essential part of all NIOS programmes offered through open and distance learning system. Therefore, we have taken special care to make the learning material user friendly, interesting and attractive for you.*

*I would like to thank all the eminent persons involved in making this material interesting and relevant to your needs. I hope you will find it appealing and absorbing.*

*On behalf of National Institute of Open Schooling, I wish you all a bright and successful future.*

**Prof. C.B. Sharma**  
Chairman, NIOS

## *A Note From the Director*

*Dear Learner,*

*The Academic Department at the National Institute of Open Schooling tries to bring you new programmes every now and then in accordance with your needs and requirements.*

*The Economics course at Senior Secondary level has now been revised as per the Common Core Curriculum developed by COBSE (Council of Boards of School Education) and NCERT (National Council for Educational Research and Training) making it current and need based.*

*The National Curriculum Framework developed by the National Council for Educational Research and Training was kept as a reference point. Leading experts in the subject of the country were involved and with their active involvement, study materials based on the new curriculum have been updated.*

*Old, outdated information has been removed and new, relevant things have been added.*

*I am happy to place this new revised study material in Senior Secondary Economics in your hand. I hope you will find the new material that is now in your hands interesting and exciting. Any suggestions for further improvement are welcome.*

*Let me wish you all a happy and successful future.*

*(Dr. Kuldeep Agarwal)*

*Director (Academic)*

*National Institute of Open Schooling*

## *A Letter to Learner*

*Dear Learner*

*I welcome you all to this Senior Secondary Course in Economics. It gives me immense pleasure that you have opted Economics as one of your subjects of study. The study of economics contributes to the development of systematic framework for analyzing, researching and writing about a wide array of financial and regional economic issues and also making sense of our complex environment.*

*An earnest attempt has been made to revise this book as per Common Core Curriculum developed by COBSE (Council of Boards of School Education) and NCERT (National Council for Educational Research and Training) making it current and need based.*

*The present curriculum in Economics has been distributed into two parts and eleven modules.*

*Part I Consists of three modules, namely: Indian Economic Development, Current challenges before the Indian Economy and Economic growth and Economic Development. Similarly Part-II consists of eight modules, namely: Statistical Tools, Introduction to Economics, Consumer's Behaviour, Producer's Behaviour, Market and Price Determination, National Income Accounting, Theory of Income and Employment and money, Banking and Government Budget. Each module has been divided further into different lessons.*

*All efforts have been made to give related illustrations and examples for your better understanding. You should go through all solved examples and try to solve all problems under "Check Your Progress" and "Terminal Exercise" independently given at the end of each lesson.*

*If you face any difficulty, please do not hesitate to write to me. Your suggestions and doubts are most welcome.*

*Wish you a bright future!*

*Yours,*

***Dr. Manish Chugh***

*Academic Officer (Economics), NIOS  
aoeco@nios.ac.in*

## How to use the Study Material

Your learning material has been developed by a team of economics experts in open and distance learning. A consistent format has been developed for self-study. The following points will give you an idea on how to make best use of the print material.

**Title** is an advance organiser and conveys an idea about the contents of the lesson. Reflect on it.

**Introduction** highlights the contents of the lesson and correlates it with your prior knowledge as well as the natural phenomena in operation in our immediate environment. Read it thoroughly.



**Objectives** relate the contents to your desired achievements after you have learnt the lesson. Remember these.

**Content** of the lesson has been divided into sections and sub-sections depending on thematic unity of concepts. Read the text carefully and make notes on the side margin of the page. After completing each section, answer intext questions and solve numerical problems yourself. This will give you an opportunity to check your understanding. You should continue reading a section till such time that you gain mastery over it.

At some places you will find some text in **italics and bold**. This indicates that it is important. You must learn them.



**Intext Questions** are based on the concepts discussed in every section. Answer these questions yourself in the space given below the question and then check your answers with the model answers given at the end of the lesson. This will help you to judge your progress. If you are not satisfied with the quality and authenticity of your answers, turn the pages back and study the section again.



**What have you learnt** is essentially summary of the learning points for quick recapitulation. You may like to add more points in this list.



**Terminal exercises** in the form of short, long and numerical question will help you to develop a perspective of the subject, if you answer these meticulously. Discuss your responses with your peers or counsellors.



**Answers to intext questions** : These will help you to know how correctly you have answered the intext questions.



**Audio**: For understanding difficult or abstract concepts, audio programmes are available on certain content areas. You may listen to these on FM Gyanvani or may buy the CDs from Priced Publication Unit, NIOS



**Video**: Video programmes on certain elements related to your subject have been made to clarify certain concepts. You may watch these at your study center or may purchase these CDs from Priced Publication Unit, NIOS.



These are few selected websites that you can access for extended learning.

Studying at a distance requires self-motivation, self-discipline and self-regulation. Therefore you must develop regular study habit. Drawing a daily schedule will help you in this endeavour. You should earmark a well-ventilated and well-lighted space in your home for your study.

## *Course Overview*

### **Part I: [For Tutor Marked Assignment]**

#### **Module-I: Indian Economic Development**

1. Overview of Indian Economy
2. Economic Planning in India

#### **Module-II: Current Challenges before the Indian Economy**

3. Economic Growth and Economic Development
4. The Problem of Unemployment, Poverty and Inequality

#### **Module-III: Introduction to Statistics**

5. Meaning, Scope and its Need in Economics
6. Collection and Classification of Data
7. Presentation of Data

**Important Note:** All contents of Part-I will be assessed/examined through Tutor Marked Assignment (TMA). TMA is compulsory and contains 20% marks as weightage. The marks/grades of TMA will be reflected in the mark sheet.



## **Part-II [For Public Examination]**

### **Module IV: Statistical Tools**

8. Measures of Central Tendency
9. Measures of Dispersion
10. Correlation Analysis
11. Index Numbers

### **Module V: Introduction to Economics**

12. Introduction to the study of Economics
13. Central Problems of an Economy

### **Module VI: Consumer's Behaviour**

14. Consumer's Equilibrium
15. Demand
16. Price Elasticity of Demand

### **Module VII: Producer's Behaviour**

17. Production Function
18. Cost of Production
19. Supply
20. Price Elasticity of Supply

### **Module VIII: Market and Price Determination**

21. Forms of Market
22. Price Determination Under Perfect Competition
23. Revenue and Profit Maximization of a Competitive Firm

### **Module-IX: National Income Accounting**

24. National Income and related Aggregates
25. National Income and its Measurement

### **Module X: Theory of Income and Employment**

26. Consumption, Saving and Investment
27. Theory of Income Determination

### **Module XI: Money, Banking and Government Budget**

28. Money and Banking
29. Government and the Budget

**Important Note:** All Contents of Part-2 will be assessed/examined through Public/Final Examination. Public Examination is compulsory and contains 80% marks as weightage.

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## ABOUT ECONOMY AND ECONOMICS

### ECONOMY AND ECONOMICS

Our very existence depends on various Economic Activities that involves production, distribution, exchange and consumption of goods and services. The primary aim of the economic activity is the production of goods and services with a view to make them available to masses. “Human activities which are performed in exchange for money or money’s worth are called economic activities”. The environment that facilitates these activities is known as Economy.

Living in society also means that we must know how to organize our lives in perfect manner. We must know to economise our precious time and scarce resources. You must also learn how to manage time also because in present scenario time is money. Similarly, when we make budget for our home; we make the best use of the resources which are available to us. We can avoid many problems in this way. This way of Management of Household is called Economics but it is much more than making a Budget. A study of economics can describe all aspects of a country’s economy, such as how a country uses its resources, how much time labourers devote to work and leisure, the outcome of investing in industries or financial products, the effect of taxes on a population, and why businesses succeed or fail and many more.

Thus, Economics is the branch of social science that deals in the study of making decisions in the presence of scarcity of resources in the economy particularly with regard to the human activities such as production, consumption, saving and investment. It is a complex social science subject that uses principles of mathematics, physics, statistics, politics, history, sociology, anthropology, psychology and philosophy etc. In the true sense, Economics is an inter-disciplinary subject which addresses both the positive (fact based) and normative (value based) issues. The term ‘Economics’ is derived from two Greek words OIKOS and NEMEIN, meaning the rule or law of the household. Economics therefore is concerned with not just how a nation allocates its resources to various uses but it deals with the process by which the productive capacity of these resources can be further increased and with the factors which in the past have led to sharp fluctuations in the rate of utilization of resources.

### HOW DO WE DEFINE ECONOMICS?

The Modern Science of Economics was born with the publication of **Adam Smith’s “An Enquiry into the Nature and Causes of Wealth of the Nation -1776”**. That is why, **Adam Smith is known as the Father of Modern Economics.**

Economics has been defined by various economists in different ways. This is because 'economics is an unfinished science'. With the passage of time there has been significant development in theories of Economics.

**The various definitions of economics may be classified as under:-**

- Economics as the Science of wealth.
- Economics as the Science of material well being.
- Economics as the Science of choice making.
- Economics as the Science of dynamic growth and development.

**Economics as the Science of Wealth.**

**Adam Smith** who is considered to be the father of economics wrote a book entitled 'An Enquiry into the Nature and Causes of the wealth of the Nations', in 1776.

**Economics as the Science of Material Well Being**

**Marshall** shifted the emphasis of economics from wealth to welfare. He formulated the definition of economics strictly in accordance with his ideas of human welfare. His definition is as follows:

**'Economics is the study of mankind in the ordinary business of life. It examines that part of individual and social action which is most closely connected with the attainment and with the use of material requisites of well being.'**

**Economics as the Science of Choice Making or Scarcity definition**

**Robbins** wrote a famous book "An Essay on the Nature and significance of Economic Science", in 1932. He introduced the 'Scarcity' definition of economics in his book.

**"Economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses."**

**Economics as the Science of Dynamic Growth and Development**

**Prof. Robbins** has excluded from the purview of economics the problem of economic growth and has taken a more static view of an essentially dynamic problem. This inherent defect in Prof. Robbins definition has been sought to be removed by Prof. Samuelson's definition. The definition is as follows:

**"Economics is the study of how men and society choose, with or without the use of money, to employ scarce productive resources which could have alternative uses, to produce various commodities over time and distribute them for consumption now and in the future amongst various people and groups of society."**

**‘Political economy’** was the earlier name for the subject, but economists in the late 19th century suggested “economics” as a shorter term for “economic science” to establish itself as a separate discipline outside of political science and other social sciences. Economics has two main streams – **Microeconomics and Macroeconomics**. Through these two major fields, economics analyses how economies work and affect - market, business, government, people, and other parts of the society. Economic theories are based on extensive studies and analysis.

## INDIAN ECONOMISTS AND THEIR CONTRIBUTION

The study of every discipline starts with the process of defining it and Economics is no exception to this. Economy is Economics at play in certain region. In Indian Economy, role of Indian Economists is known throughout the world for their contribution in the economic prosperity of the country. Indian Economists mainly deal with the various concepts of Economics.

Though Economics today studies a wide spectrum of issues and topics but if we take an overall view, its essence has been very simple i.e. the betterment of human life on this beautiful planet earth. In making the lives of masses, the Economists have been devising a number of theories and propositions as to how an Economy may maximise its worth and potential.

Since ancient times many masterpieces were produced by great Economists who were trying to improvise better ways of maximising the fruits of Economic activities. The study of Economics has a common goal to search for possible ways and alternatives for the betterment of human life. Apart from this, economists also contribute in formulating some broad rational theories to make a more balanced world.

Some of the renowned Indian Economists are:

- **Chanakya (Kautilya):** He was an Indian teacher, philosopher, and royal advisor. Originally, a professor of economics and political science at the ancient Takshashila University. Chanakya is traditionally identified as “Kautilya” or “Vishnu Gupta”, who authored the ancient political treatise called Arthashastra (Economics).
- **Mahavira:** Economics in Jainism is influenced by the Mahavira and his principles and philosophies. His philosophies have been used to explain the economics behind it. He was the last of the 24 Tirthankars, who spread Jainism.
- **Shri DadaBhai Naroji:** He is fondly called the Grand Old Man of India. He was a pioneer in the field of Economics. He prepared the first estimates of National Income in 1876.
- **Prof. V.K.R.V. Rao:** He was a prominent Indian Economist, Politician, Professor & Educator. He was the first person to adopt scientific procedure in estimating National Income in 1931.

- **Prasant Chandra Mahalanobis:** He was a renowned Indian Statistician and was instrumental in formulating India's strategy for Industrialization in Second Five Year Plan (1956-61).
- **Jagdish Natwarlal Bhagwati:** He is an India-born, naturalized American, economist. He is a professor of Economics and Law at Columbia University. Bhagwati is notable for his researches in International Trade and advocacy of Free Trade
- **Prof. Amartya Sen:** He is a renowned Economist and social worker. He was awarded Nobel Prize for the welfare Economics in Market oriented Economics in 1998.

## CAREER VISTAS IN ECONOMICS

Economics offers good number of career options in both public and private sector. Major opportunities exist in banking and finance sector. Economists also play important roles in international organisations like the World Bank, International Development Agency, Asian Development Bank, International Monetary Federation, United Nation's Development Programme (UNDP) and many other agencies.

Indian Institutions such as Planning Commission, Central Statistical Organisation (CSO), National Sample Survey Organisation (NSSO), National Council of Applied Economic Research (NCAER) and Institute of Applied Manpower Research (IAMR), Indian Statistical Institute (ISI), Institute of Economic Growth (IEG) and Central and State Universities offer good career opportunities in the field of research.

The Indian Economics Service (IES) and Indian Statistical Service (ISS) conducted by the Union Public Service Commission (UPSC) is a popular civil service.

Economic journalism is another career opportunity for students holding a degree in Economics and interest in journalism.

### Some of the specialisation areas under Economics

Banking Economics, Environmental Economics, Industrial Economics, Rural Economics, Econometrics, Game Theory, Development Economics etc.

**MODULE - I**  
**INDIAN ECONOMIC DEVELOPMENT**

1. Overview of Indian Economy
2. Economic Planning in India





## CURRICULUM OF SENIOR SECONDARY COURSE IN ECONOMICS (318)

### 1. RATIONALE

Economics has become a very sought after subject in the field of Social Science. The knowledge of Economics is very important in pursuing various activities in everyday life such as production, consumption and investment. In Consumption, every individual wants to utilize his/her income in the best possible manner so as to get maximum satisfaction from the goods and services purchased. Similarly, as producer, the individual/firm/industry uses the resources to minimize cost and get maximum output/profit. At the economy level, everybody wants that there should be economic growth and development through higher income and employment. Study of economics is very useful to achieve these goals.

At NIOS, students are introduced to the subject of Economics at Secondary stage. The level at this stage is elementary in nature. However, at the Sr. Secondary level, students will be exposed to more areas of economics. They are also expected to know the use of tables and graphs/statistical tools to understand and explain various concepts and theories of economics. Indian students can be trained in their field in the Indian context as well as in the context of globalization process going in today's world.

### 2. OBJECTIVES

The main objectives of learning Economics at Senior Secondary level are to enable the learners to:

- To help the learners understand the structure, problems, working and recent changes in the Indian economy.
- To help the learners understand principles, laws and concepts of Economics.
- To help the learners understand national income analysis and methods used in calculating national income.
- To develop positive attitudes for economic justice among the masses and socio-economic reconstruction of the country.
- To develop skills among the learners the use of statistical tools to analyse, interpret and explain data and information.

### 3. COURSE STRUCTURE

The present curriculum in Economics has been distributed into two parts and eleven modules. Part I Consists of three modules, namely: Indian Economic Development, Current challenges before the Indian Economy and Economic growth and Economic Development. Similarly Part-II consists of eight modules, namely: Statistical Tools, Introduction to Economics, Consumer's Behaviour, Producer's Behaviour, Market and Price Determination, National Income Accounting, Theory of Income and Employment and money, Banking and Government Budget. Each module has been divided further into different lessons.

The number of lessons and suggested study time are as follows:

## Part-1

Module/ Lesson	No. of Lessons	Study Time (in hours)
<b>Module-I: Indian Economic Development</b>	<b>02</b>	<b>35</b>
1. Overview of Indian Economy		
2. Economic Planning in India		
<b>Module-II: Current challenges before the Indian Economy</b>	<b>02</b>	<b>35</b>
3. Economic growth and Economic Development		
4. The Problem of Unemployment, Poverty and Inequality		
<b>Module III: Introduction to Statistics</b>	<b>03</b>	<b>50</b>
5. Meaning, Scope and its Need in Economics		
6. Collection and Classification of data		
7. Presentation of Data		
<b>Total</b>	<b>7</b>	<b>120</b>

## Part-2

Module/lesson	No. of lessons	Study time (in hours)
<b>Module-IV: Statistical tools</b>	<b>04</b>	<b>35</b>
8. Measures of Central tendencies 9. Measures of Dispersion 10. Correlation Analysis 11. Index Numbers		
<b>Module-V: Introduction to Economics</b>	<b>02</b>	<b>16</b>
12. Introduction to the Study of Economics 13. Central Problems of an Economy		
<b>Module-VI: Consumer's Behaviour</b>	<b>03</b>	<b>25</b>
14. Consumer's equilibrium 15. Demand 16. Price Elasticity of Demand		
<b>Module-VII: Producer's Behaviour</b>	<b>04</b>	<b>40</b>
17. Production Function 18. Cost of Production 19. Supply 20. Price Elasticity of Supply		
<b>Module-VIII: Market and Price Determination</b>	<b>03</b>	<b>16</b>
21. Forms of Market 22. Price Determination under Perfect Competition 23. Revenue and Profit Maximization of a Competitive Firm		
<b>Module-IX: National Income Accounting</b>	<b>02</b>	<b>16</b>
24. National Income and Related aggregates 25. National Income and its Measurement		
<b>Module-X: Theory of Income and Employment</b>	<b>02</b>	<b>16</b>
26. Consumption, Saving and Investment 27. Theory of Income Determination		
<b>Module-XI: Money, Banking and Government Budget</b>	<b>02</b>	<b>16</b>
28. Money and Banking 29. Government and the Budget		
<b>Total</b>	<b>19</b>	<b>180</b>

## 4. COURSE DESCRIPTION

### Part-1

#### Module 1: Indian Economic Development

**Approach:** This module deals with the parameters of development and gives brief account of India's economy on the eve of Independence. It also deals with the planning and economic development in India including its achievements and drawbacks.

##### Lesson-1: Overview of Indian Economy

Features of Indian Economy-National and Per capita Income, Status of the Social sector, State of agriculture, Industry and foreign trade.

##### Lesson-2: Economic Planning in India

Meaning of Economic Planning, need for planning, objectives of planning, strategies of economic planning, achievements and drawbacks of Five Year Plans in India, New Economic Policy 1991-Liberalization, Privatization & Globalization.

#### Module 2: Current Challenges before the Indian Economy

**Approach:** This module provides the knowledge about the current challenges before the India economy and focuses mainly on poverty, unemployment, population and human capital formation.

##### Lesson 3: Economic Growth and Economic Development

Meaning of Economic Growth and Economic Development. Difference between Economic Growth and Economic Development; Concept of Sustainable Economic Development; Concept of Human Development, Human Development Index, factors affecting economic growth, Common features of underdeveloped countries

##### Lesson 4: The Problem of Unemployment, Poverty and Inequality

Meaning, Types and measures of unemployment, Causes of unemployment in India, Concept of Poverty line and estimates of Poverty, Causes of Poverty in India, Poverty alleviation and employment generation programmes in India, Inequality in income and Regional Inequality.

#### Module 3: Introduction to Statistics

**Approach:** Statistical data are very useful in economics. This module will help learners to understand the meaning of data, methods of their collection, and their presentation.

##### Lesson-5: Meaning, Scope and its Need in Economics

Need and scope of statistics, Meaning, functions and importance of statistics in economics, limitations of statistics.

### **Lesson-6: Collection and Classification of Data**

Primary and secondary data, collection of primary data, sources of secondary data; organization of data into arrays and frequency distribution.

### **Lesson-7: Presentation of data**

Tabulation, Bar diagrams and pie diagrams, Graphs - Line graph, histogram, Polygon and Ogive.

## **Part-2**

### **Module 4: Statistical Tools**

**Approach:** After collection of data, it becomes necessary to draw conclusion from them. Different statistical tools are used to analyse the data and draw conclusions. This module will enable the learners to understand the use of certain tools to analyse the data.

#### **Lesson-8: Measures of Central Tendencies**

Meaning of central tendency, computation of arithmetic mean, combined mean, weighted arithmetic mean, median, quartiles and mode.

#### **Lesson-9: Measures of Dispersion**

Meaning of dispersion, Measures and methods of computing dispersion, Range, quartile deviation mean deviation, standard deviation (Absolute and Relative measures), Lorenz curve.

#### **Lesson-10 Correlation Analysis**

Meaning, Scatter diagram, Karl Pearson's coefficient of correlation, Spearman's Rank correlation

#### **Lesson-11: Index Numbers**

Meaning, types, Construction of simple and weighted index numbers, Laspeyer's, Paasche's and Fischer's wholesale price index, Consumer price index and index of industrial production, uses of index numbers.

### **Module 5: Introduction to Economics**

**Approach:** This module will enable the learners to understand the meaning of micro- economics and its relationship with macroeconomics. In addition to this, it will also discuss about the problems which all economics have to face.

#### **Lesson-12: Introduction to the Study of Economics**

Meaning of Economics, Meaning of Microeconomics and Macroeconomics, relationship and distinction between the two, positive and normative economics.

### **Lesson-13: Central Problems of an Economy**

Meaning of economic problem, why Economic Problem arises, Central Problems, What to produce, How to produce and for Whom to produce; Concept of production possibility frontier, Opportunity Cost and marginal opportunity cost.

## **Module 6: Consumer's Behaviour**

**Approach:** This module will enable the learners to understand the concept of utility and indifference curves and how consumers get maximum satisfaction from their purchases.

### **Lesson-14: Consumer's Equilibrium**

Meaning of Utility, Marginal and Total utility, Law of Diminishing Marginal Utility, Consumer's Equilibrium based on utility analysis. Meaning of Indifference curve and budget line, consumer's equilibrium using indifference curve and budget line.

### **Lesson-15: Demand**

Meaning, factors affecting demand, law of demand, Individual and market demand, demand schedule and demand curve movement along the demand curve and shift in demand curve.

### **Lesson-16: Price Elasticity of Demand**

Meaning, Factors affecting price elasticity of demand. Methods of Calculating price elasticity of demand

- (a) Percentage method
- (b) Total expenditure method
- (c) Geometric method

Simple numerical problems based on each method.

## **Module 7: Producer's Behaviour**

**Approach:** This module deals with the objectives of the producer, production function and different types of cost. Besides this, it will also deal with supply of a commodity and price elasticity of supply.

### **Lesson-17: Production Function**

Meaning of production function, Production function in the Short Run-Law of Variable Proportion.

### **Lesson-18: Cost of Production**

Meaning of Cost, Fixed and Variable cost, Explicit and Implicit cost, Monetary cost, Real cost, Private and Social costs, Short run costs.

### **Lesson-19: Supply**

Meaning, determinants of supply, law of supply, individual and market supply, supply schedule and supply curve, movement along the supply curve and shift in supply curve.

### **Lesson 20: Price Elasticity of Supply**

Meaning, measurement of price elasticity of supply by (a) Percentage method (b) Geometric method  
Factors affecting price elasticity of supply

## **Module 8: Market and Price Determination**

**Approach:** This module will enable the learners to understand the meaning of market, forms of market-Perfect competition, monopoly, monopolistic competition and oligopoly- their meaning and features. This module also helps the learners to understand the concept of revenue and profit maximization condition of a competitive firm. Beside this, this module also deal with the equilibrium price computation

### **Lesson-21: Forms of Market**

Meaning of market, Different forms of market - Perfect competition, monopoly, monopolistic competition and oligopoly- their meaning and features

### **Lesson-22. Price determination Under Perfect Competition**

Meaning of equilibrium price, Determination of equilibrium price, excess demand and excess supply; Effect of changes in demand and supply on equilibrium price and quantity; Simple applications of demand and supply analysis - ceiling price, floor price.

### **Lesson-23: Revenue and Profit maximization of a Competitive Firm**

Concept of revenue - Total Revenue, Average Revenue Marginal Revenue. Various concepts of profit; profit; Maximizaition of a competitive firm Total revenue and total cost approach, Marginal revenue and Marginal cost approach

## **INTRODUCTION TO MACROECONOMICS**

### **Module-9: National Income Accounting**

**Approach:** National income is a central concept in economics. It provides a quantitative view of a country's economic performance. This module will enable the learners to understand various concepts related to national income and different methods of its measurement.

### **Lesson-24: National Income and Related Aggregates**

Meaning of income, four factors of production, factor incomes and non-factor incomes, final goods and intermediate goods, basic economic activities, closed and open economy, stock and flow, circular flow of income, concept of domestic territory and normal residents, value of output and value added, market price vs factor cost, domestic income vs national income, real & nominal GDP concept of depreciation. Concepts of GDP, NDP GNP & NNP (at market price and factor cost)

### **Lesson-25: National Income and its Measurement**

Methods of calculating national income-value added or product method, income method and expenditure method, private income, personal income and personal disposable income, national disposable income (gross and net), GDP and economic welfare.

## **Module 10: Theory of Income and Employment**

**Approach:** This module will discuss about the determination of equilibrium level of income and employment. In addition to this it will also discuss about the problems of excess demand and deficient demand in the economy.

### **Lesson-26: Consumption, Saving and Investment**

Consumption function, saving function and investment function, propensity to consume and save

### **Lesson-27: Theory of Income Determination**

Concept of aggregate demand, Determination of Equilibrium level of Income, Increase in income through Multiplier Process; Excess demand and Deficiency in demand.

## **Module 11: Money, Banking and Government Budget**

**Approach:** This module explains about meaning and functions of money, functions of Central Bank. This also explains how the monetary and fiscal policy are used to correct the situations of excess demand and deficient demand in the economy.

### **Lesson-28: Money and Banking**

Barter system of exchange; Money- its meaning and functions, Supply of Money - currency held by the public and net demand deposits held by the commercial banks, Measures of Money Supply process of credit creation, Central bank-meaning, functions, Monetary Policy to control money supply.

### **Lesson-29: Government and the Budget**

Meaning, Objectives, components, Revenue Receipts and Capital Receipts, Revenue expenditure and Capital expenditure, Measures of deficit (Revenue Deficit, Fiscal Deficit and Primary Deficit - their meaning and implications); Fiscal policy and its role.

## **5. SCHEME OF STUDY**

The course in Economics provides you with package of learning opportunities which comprise of:

- Printed Self Learning Material (SLM) in two parts i.e. Part-1 and Part-2.
- Supplementary Materials in the form of Audio and Video Programmes.



- Video tutorials in Economics available on the NIOS website ([www.nios.ac.in](http://www.nios.ac.in)) as well as YouTube. The links of these tutorials have been mentioned within the SLM in the concerned lesson.
- 30 Personal Contact Programme (PCP) sessions at your study centre. Please contact your study centre for the PCP schedule
- Apart from Face-to-Face Personal Contact Programme (PCP) at your study centre, live Personal Contact Programmes (PCPs) through audio streaming are webcast on Mukta Vidya Vani, which can be accessed through NIOS website ([www.nios.ac.in](http://www.nios.ac.in)).

## **6. SCHEME OF EVALUATION**

The learner will be assessed through Continuous and Comprehensive Evaluation (CCE) in the form of Tutor Marked Assignment (TMA) as well as Public Examination. The following table shows the details:

<b>Mode of Evaluation</b>	<b>Syllabus/Contents</b>	<b>Duration</b>	<b>Weightage</b>
Tutor Marked Assignment (TMA)	All Contents under SLM Part-1	Self Paced	20%
Public/Final Examination	All Contents under SLM Part-2	3 Hours	80%



**1**

## OVERVIEW OF INDIAN ECONOMY

Every economy in the world has its own characteristics or features by which it is known or identified. Economies are compared with each other on the basis of these features. India as a distinct nation came into existence on 15th August 1947, called the independence day of India which marked the end of British rule over India. After that, Independent India has completed 66 years of self rule on 15th August 2013. This period is long enough to evaluate the position and performance of the country to enable comparison with other countries in the world as well as evaluate its own progress over the years. With this view in mind the current lesson provides the features of Indian economy.



### OBJECTIVES

After completing this lesson, you will be able to:

- describe the characteristics or features of Indian economy;
- explain the problems faced by Indian economy;
- explain the role of agriculture in India; and
- describe the growth of industry in India.

### 1.1 FEATURES OF INDIAN ECONOMY

Let us now list the features of Indian economy as follows:

- (i) Low per capita income
- (ii) Heavy population pressure
- (iii) Dependence of population on agriculture

## MODULE - 1

### Indian Economic Development



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## Overview of Indian Economy

- (iv) Poverty and Inequality income distribution
- (v) Higher level of capital formation which is a positive feature
- (vi) Planned economy

let us discuss these points one by one.

### (i) Low per capita income

India is known in the world as a country with low per capita income. Per capita income is defined as the ratio of national income over population. It gives the idea about the average earning of an Indian citizen in a year, even though this may not reflect the actual earning of each individual. India's per capita income for the year 2012-2013 is estimated at ₹ 39,168. This comes to about ₹ 3,264 per month. If we compare India's per capita income with other countries of the world then it can be seen that India is well behind many of them. For example, the per capita income of USA is 15 times more than that of India while China's per capita income is more than three times of India.

### (ii) Heavy population pressure

India is world's second largest populated country after China. As per 2011 census India's population stands at more than 121 crores. It increased at a rate of 1.03 percent during 1990-2001. The main cause of fast rise in India's population is the sharp decline in death rate while the birth rate has not decreased as fast. Death rate is defined as the number of people died per thousand of population while birth rate is defined as the number of people taking birth per thousand of population.

In 2010, the birth rate was 22.1 persons per one thousand population while the death rate was only 7.2 persons per one thousand population. Low death rate is not a problem. In fact it is a sign of development. Low death rate reflects better public health system. But high birth rate is a problem because it directly pushes the growth of population. After 1921, India's population increased very fast because birth rate declined very slowly while death rate declined very fast. From 49 in 1921 the birth rate declined to 22.1 in 2010 while during the same time period, death rate declined from 49 to 7.2. Hence the population growth was very rapid in India.

Heavy population pressure has become a major source of worry for India. It has put burden on the public exchequer to mobilize enough resources to provide public education, health care, infrastructure etc.

### (iii) Dependence on Agriculture

Majority of India's working population depend on agricultural activities to pursue their livelihood. In 2011 about 58 percent of India's working population was

engaged in agriculture. In spite of this, the contribution of agriculture to India's gross domestic product is a little over 17 percent. A major concern of agriculture in India is that productivity in this sector is very less. There are many reasons for this. There is heavy population pressure on land to sustain huge number. Due to population pressure on land the per capita availability of land area is very low and not viable for extracting higher output. Two, since per capita land availability is less, a majority of people are forced to become agricultural labour working at low wages. Three, Indian agriculture suffers from lack of better technology and irrigation facilities. Four, mostly people, who are not educated or not trained properly, are engaged in agriculture. So it adds to low productivity in agriculture.



Notes

**INTEXT QUESTIONS 1.1**

Fill in the blanks

- India's per capita income is ..... of that of China?
  - twice
  - one third
  - same as
  - none of the above
- USA's per capita income is ..... of that of India?
  - 15 times
  - 10 times
  - less than
  - none of the above
- As per 2011 census, India's population stands at
  - more than 100 crore
  - less than 100 crores
  - more than 121 crores
  - none of the above
- India's Birth rate in 2010 was:
  - 20.2
  - 21.2
  - 22.1
  - 23.2
- India's death rate in 2010 was
  - 7.2
  - 7.4
  - 7.8
  - 7.9
- India's population growth was rapid because
  - death rate is more than birth rate
  - birth rate is more than death rate
  - birth rate is same as death rate
  - none of the above

## MODULE - 1

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### Overview of Indian Economy

7. In 2011, ..... percent of India's working population was engaged in agriculture?
- (a) 70 (b) 80  
(c) 68 (d) 58
8. Contribution of agriculture to India's national income in 2011 was around
- (a) 10 percent (b) 20 percent  
(c) 17 percent (d) 25 percent

#### (iv) Poverty and inequality

Another very disheartening thing about India is that it has world's largest number of poor people. As per reports of government of India, in 2011-12 about 269.3 million people in India were poor. This was about 22 percent of India's population. A person is termed poor if he/she is not able to consume the required amount of food to get a minimum calorie value of 2400 in rural area and 2100 in urban area. For this the person must earn the required amount of money as well to buy the food items. The government has also estimated that the required amount of money is ₹ 816 in rural area and ₹ 1000 in urban area per head per month. This comes to about ₹ 28 in rural area and ₹ 33 in urban area per head per day. This is called poverty line. This implies that 269.9 million people of India were not able to earn such little amount in 2011-12.

Poverty goes with inequality in income and wealth distribution. Very few in India possess materials and wealth while majority have control over no or very little wealth in terms of land holding, house, fixed deposits, shares of companies, savings etc. Only top 5 percent of households control about 38 percent of total wealth in India while the bottom 60 percent of household has control over only 13 percent of the wealth. This indicates concentration of economic power in a very few hand.

Another issue linked to poverty is the problem of unemployment. One of the most important reasons of poverty in India is that there is lack of job opportunities for all the persons who are in the labour force of the country. Labour force comprises of the adult persons who are willing to work. If adequate number of jobs are not created every year, the problem of unemployment will grow. In India every year large number of people are added to the labour force due to increase in population, increase in number of educated people, lack of expansion of industrial and service sector at the required speed etc.

So far we discussed the negative features. There are certain positive features of Indian economy as well. They are discussed below.



Notes

**(v) Higher rate of capital formation or investment**

At the time of independence, one of the major problem of Indian economy was deficiency in capital stock in the form of land and building, machinery and equipment, saving etc. In order to continue the cycle of economic activities such as production and consumption, a certain ratio of production must go towards saving and investment. However, the required ratio was never generated in the first four to five decades after independence. The simple reason being higher consumption of necessary items by the population of whom most happened to be poor and lower middle income class. Collective household saving was very less due to this. Consumption of durable items was also very less. But in recent years things have changed. Economists have calculated that in order to support the growing population, India requires 14 percent of its GDP to be invested. It is encouraging to note that the saving rate of India for the year 2011 stands at 31.7 percent. The ratio of gross capital formation was 36.6 percent. This is possible because people are now able to save in banks, consume durable goods and there has been large scale investment taking place on public utilities and infrastructure.

**(vi) Planned economy**

India is a planned economy. Its development process has been continuing through five year plan since the first plan period during 1951-56. The advantage of planning is very well known. Through planning the country sets its priorities first and provides the financial estimates to achieve the same. Accordingly efforts are made to mobilise resources from various sources at least cost. India has already completed eleven five year plan periods and the twelfth plan is in progress. After every plan a review is made analysing the achievements and short falls. Accordingly, things are rectified in the next plan. Today India is a growing economy and recognised every where as a future economic power. The per capita income of India is growing at a higher rate than before. India is seen as a big market for various products. All these are possible due to planning in India.

**1.2 ROLE OF AGRICULTURE IN INDIA**

Agriculture is one of the most important sectors of Indian economy. It is the supplier of food and raw materials in the country. At the time of independence more than 70 per cent of India's population depended on agriculture to earn livelihood. Accordingly the share of agriculture in the national product/income was as high as 56.6 per cent in 1950-51. However with development of industries and service sector during the plan periods, the percentage of population depending on agriculture as well as the share of agriculture in the national product has come down. In 1960, the percentage of labour force engaged in agricultural activities was 74 which gradually came down over the years to 51 per cent in 2012. In 1960 the share of labour force in industry and service sectors stood at 11 and 15 percent

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respectively. But in 2012 these shares increased to 22.4 and 26.5 percent respectively. It has been observed in most of the economies that along with economic development shift in labour force from agriculture to industry and service sector takes place.

Agriculture is the source of food supply. The production of food grains has increased from nearly 55 million tonnes in 1950-51 to 259 million tones in 2012-13. Because of the growth in food grain production, India's dependence on import of food grains has declined and almost become nil. Keeping in view the rapid growth in India's population, increase in food grain was a necessity which the country achieved significantly. Except for pulses, increase in food grains has been made possible by increase in cereals and various cash crops.

Agriculture is also a major source of foreign exchange earning through export. The share of agriculture in India's export in the year 2011-12 was 12.3 percent. The major items of export include tea, sugar, tobacco, spices, cotton, rice, fruits and vegetables etc.

### 1.3 GROWTH OF INDUSTRY IN INDIA

Industry or the secondary sector of the economy is another important area of economic activity. After independence, the government of India emphasized the role of industrialization in the country's economic development in the long run. Accordingly, the blue print for industrial development was made through the Industrial Policy Resolution (IPR) in 1956. The 1956 policy emphasized on establishment of heavy industries with public sector taking the lead in this area. Adoption of heavy or basic industries strategy was justified on the ground that it will reduce the burden on agriculture, enable growth in the production of consumer goods industries as well as small industries that are helpful for employment generation and achieving self reliance. After the adoption of the IPR, 1956 there was tremendous growth in industrialization during the second and third plan periods i.e. 1956-61 and 1961-66. Public sector contributed maximum to this growth. But towards the end of 1960s, investment in industries was reduced which adversely affected its growth rate. In the 1980s, this trend was reversed and investment in industries was increased by making the infrastructure base such as power, coal, rail much stronger.

In early 1990s it was found that the public sector undertakings were not performing upto expectation. There has been reports of mismanagement in these under takings resulting in loss. So in 1991 the government of Indian decided to encourage the role of private sector in industrial development, remove the rigid licence system which is known as liberalization and allow international players to compete in the domestic country as well as domestic players to explore foreign territories. The aim of taking all these steps was to strengthen the process of



industrialization in the country. Such a model of industrial development is called Liberalization, Privatization and Globalization (LPG) model.

After the adoption of this new policy in 1991, there has been phases of growth followed by slowdown in the industrial development process. In the early years of 1990s there was significant growth in industrialization due to increase in investment in infrastructure, reduction in excise duty, availability of finance etc. But towards the end of 1990s the growth rate slowed down due to stiff competition from international companies, inadequate infrastructure support etc. However, in the beginning of the new millennium, between 2002-08 there was again some recovery due to increase in saving rate from 23.5 percent in 2001-2 to 37.4 percent in 2007-08. Even the competition from the foreign companies helped during this phase as the domestic companies could create enough internal strength in term of quality control, finance and customer care etc. to withstand the competition. However after 2008-09 there was some slow down in industrial growth due to rise in petroleum price, interest rate and borrowings from abroad which has created lot of liabilities for the domestic companies.

**Notes****INTEXT QUESTIONS 1.2**

1. What was share of agriculture in India's national income in 1950-51?
2. With economic development, labour force tend to shift from industry to agriculture. True or False
3. What was the share of agriculture in India's export in 2011-12?
4. Give the full form of LPG?
5. The industrial policy of 1956 emphasized on the strategy of
  - (a) Light industries
  - (b) small and medium industries
  - (c) Heavy industries
  - (d) none of the above

**WHAT HAVE YOU LEARNT**

In this lesson you have learnt that

- India is a developing economy with the promise to grow in future.
- India is currently among those countries whose per capita income is low.
- India is suffering from heavy population pressure
- A majority of india's populaiton is dependent on agriculture.
- There is high absolute poverty in India

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- The gap between rich and poor is substantial in India
- Some positive features of Indian economy are
  - India's saving rate is high
  - Five year planning in India is running successfully



### TERMINAL EXERCISE

#### Short Answer Type Questions

1. Give one positive and two negative features of Indian Economy.
2. Give two reasons for low productivity in agriculture in India.
3. What is main cause of increase in population in India?
4. Why is India called planned economy?
5. Define poverty line in rural area.

#### Long Answer Type Questions

1. India suffers from heavy population pressure. Explain.
2. Explain two positive features of Indian economy.
3. India's per capita income is low? Do you agree. Give reasons.
4. Describe India as agricultural country.
5. Briefly discuss the poverty and inequality situation in India.
6. Explain the role of agriculture in Indian economy.
7. Explain the growth of industrialization in India?



### ANSWERS TO INTEXT QUESTIONS

#### 1.1

1. (b)    2. (a)    3. (c)    4. (c)    5. (a)    6. (b)    7. (d)    8. (c)

#### 1.2

1. 56.5 percent
2. False
3. 12.3 percent
4. Liberalization, Privatization and Globalization
5. Heavy industries



## 2

## ECONOMIC PLANNING IN INDIA

India is a vast country with multiple problems faced by its population. The British ruled the country for nearly two centuries and exploited its resources for their benefit leaving the country reeling under absolute poverty. When the British left India in 1947 there was nothing to be proud of or be happy except for the 'freedom'. The problems were many before the Indian government. Besides mass poverty there was the problem of food shortage and inflation. Illiteracy, lack of health care, lack of infrastructure etc. were other serious problems facing the country. As a long term strategy, 'Planning' for economic development was the answer to solve these problems.



### OBJECTIVES

After completing this lesson, you will be able to:

- define "Planning";
- explain the need for planning;
- list out the objectives of planning;
- describe the strategy of planning in India;
- explain new economic policy;
- point out the targets set by our planners in terms of various objectives of planning;
- explain the achievements made with respect to the plan objectives; and
- realise the short comings or unfulfilled part of the objectives.

**Notes****2.1 MEANING OF ECONOMIC PLANNING**

Economic planning is a process which involves the following steps:

- (i) Preparing a list of the problems facing the economy .
- (ii) Rearranging the list on the basis of priority. The top priority issue which needs to be addressed immediately should be placed at number one and so on.
- (iii) The next step is to identify the problems which are to be solved in the immediate short run and the other problems which are to be addressed over the long period.
- (iv) Fixing a target to achieve the desired goal. The target could be a specified time period within which the problem must be solved. If the problem is to be addressed over long run, then it must be made clear that how much of the problem be solved in the first period (say a year or six months) and so on. Secondly the target could be a certain quantity to be achieved. Say in case of production, the government can fix some target in terms of quantity.
- (v) Estimating the amount of resources needed for achieving the target. Resources include financial resource, human resource, physical resource etc.
- (vi) Mobilizing the resources is another important task. This means that the planners must know the sources of arranging the required resources. For example, in case of financing the plan, the planners must make the budget and spell out the different sources of finding. When the government makes plan, one of its major source of getting funds in the tax revenue. For a business person, one of the sources of finance is the loan from bank. When various sources of funds are available then the planner must also decide as to how much fund to be collected from each of these sources.  
  
Use of the human resource is another important task to execute the plan proposal. The planner must estimate the type of man power and the number of persons required to carry out the task. A proper estimate on this requirement should be given at the outset. Similarly proper estimate of physical resources should also be provided. Physical resources include office buildings, vehicles, furniture, stationeries etc.
- (vii) Once the resources are arranged, implementation and execution process starts in an organize manner to achieve the desired goal. To make sure that everything is running smoothly and to rectify mistakes if any or to modify the style of working to accommodate any change, periodic review must be done till the final achievement is realised.

**2.2 ECONOMIC PLANNING IN INDIA**

India adopted a system of five yearly planning to address its various socio-economic problems. You have already been told about the problems of Indian

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economy at the time of its independence. To remind, these problems include mass poverty and inequality, low productivity in agriculture and storage of food grains, lack of industrial and infrastructural development etc. Since these are to be solved over the long period, Indian government adopted five year plan starting from first year plan in 1951 development. The idea was to make a list of important problems to be solved keeping in view the given resources and the capacity to arrange the resources. Then make a review after five years of what has been done and rectify the mistakes accordingly in the next five year plan period and so on.

Some of the great architects of Indian planning include Jawaharlal Nehru, P.C Mahalonobis, V.R Gadgil, V.K.R.V Rao. After becoming the first prime minister of independent India, Nehru established the Planning Commission in 1950. The major function of the Planning Commission was to formulate plans keeping in view the resources of the country and suggesting the best methods to utilize them effectively and in a balanced manner. Planning commission prepared the first five year plan (FYP) for the period 1951-1956. By 2014, India has already experienced more than sixty years of planning with eleventh five year plans being completed are twelfth FYP continuing.

### 2.3 OBJECTIVES OF PLANNING IN INDIA

The various objectives of economic planning in India are drawn keeping in view its socio-economic problems. Accordingly the objectives as follows:

1. Economic growth
2. Increase in employment
3. Reduction in inequality of income
4. Reduction in poverty
5. Modernization of the economy
6. Ensuring social justice and equality.

Let us discuss these objectives one by one .

- 1. Economic Growth :** The objective of achieving economic growth implies that the real national income and per capita income must grow every year at a targeted rate. Real national income is the measure of national income at a given years price or at a constant price. Real per capita income is the average income of individuals in the economy. It is argued that in order to achieve higher standard of living for each individual /household and the society as a whole , both per capita income and national income must grow in real terms. Since income represents purchasing power, increase in income will enhance the purchasing power of people and the country. When purchasing power will



increase then individuals can buy more goods and services to satisfy their wants. The country as a whole can pay for its purchases from abroad called import. Increase in real income also means that the output level or quantity of output is higher than before. Here output includes output in different sectors of the economy such as agricultural output, industrial output and services to satisfy the needs of India's growing population increase in output every year has to be achieved. To achieve higher rate of output the economy must increase its rate of investment to create infrastructure and capital stock. Infrastructure includes power projects, roads, railways, airports, ports, telecommunication network, buildings etc. Capital stock includes plant, machinery, banking and insurance etc. Investment in all these things is necessary to achieve economic growth in real income, hence the planners of the country set a target for growth in each five year plan keeping in view the growth of population and demand for goods and services etc.

2. **Increase in Employment:** Employment refers to engagement of the labour force in gainful economic activity such as production of goods and services. Income is generated through the production process where the production process involves employment of factors of production provided by the households. You know that factors of production include land, labour, capital and organization/entrepreneurship. These factors are owned by the households of the country. As factors are scarce resources and needed to produce goods and services, it is important for the government to create opportunities where in they can be properly used/utilized. The production capacity of an economy depends on the amount of the factor resources it possesses. The required amount of output can be generated if these factors of production get employment. The value of the output then can be distributed among the factors as their income in the form of wage for labour, rent to the owner of land and building, interest to the owner of capital and profit to the entrepreneur. If the country is not able to create employment opportunities to gainfully engage the factors of production, the required amount of output can not be produced and hence income can not be generated. Take the example of labour resources in the country. You know that the population of the country supplies labour force who are in the age group of 15 to 59 years. Every year due to increase in population the number of people in the labour force is also increasing. Most of them are also educated. If there is no enough scope to get employment then they will remain unemployed and unutilized. Infact the unemployment situation in India is very bad. Besides causing increase in consumption without corresponding increase in production, unemployment also is a cause of various social problems such as poverty and crime etc. So planners of the Indian economy put creation of employment as a major objective of five year plans.

**INTEXT QUESTIONS 2.1**

1. Economic growth means
  - (a) Increase in real national income
  - (b) Removal of inequality
  - (c) Increase in price level
  - (d) None of the above
2. National income can be increased by
  - (a) Increase in population
  - (b) Increase in the rate of investment
  - (c) Increase in unemployment
  - (d) Decrease in price level
3. Who are the owner of factors of production
  - (a) Government
  - (b) Rest of the world
  - (c) Households
  - (d) Firms and industries
4. Labour force comes from the population in the age group of
  - (a) 4 to 14
  - (b) 60 to 75
  - (c) 10 to 15
  - (d) 15 to 59

- 3. Reduction in Inequality of Income :** India is a country with diverse economic standard of its population. This means that in terms of income level, India lacks uniformity. A large section of India's population belong to lower income group and termed as poor where as a few are very rich with very high level of income. Income disparity is a major concern of the social angle, women are the worst affected in terms of income standard irrespective of their caste or religion. Similarly the scheduled caste and scheduled tribe population belong to the marginalized section of Indian society as they are at the bottom of the pyramid of development. One of the major reasons of inequality in income is the unequal distribution of asset holding such as per capita land holding, possession movable and immovable property from inheritance etc. A majority of India's population live in rural area and work in agriculture. But a few are big land lords and majority are marginal or small farmers and agricultural labourers. Agricultural labourers are so called because they do not have their own land

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### Economic Planning in India

to cultivate and move from one place to another in search of job on a daily or weekly wage basis. Their situation is worse because of their own illiteracy and lack of scope to organize themselves. One to their low income they do not have anything to begin to their next generation on the otherhand landlords enjoy higher returns to their property and due to existence of law of inheritance the property remains with their future generations. Hence, rich remains rich and poor remains poor in the country due to possession and lack of private property respectively. India is badly affected due to this inequality. The poor people are not able to support the market due to lack of purchasing power where too much purchasing power with the rich has caused wasteful consumption to increase. Most of the social evils are created due to inequality. Hence, our planners aimed at reducing the inequality in income distribution through planning.

4. **Reduction in Poverty :** Another major objective of planning in India is “reduction in poverty”. At the time of independence more than fifty percent of India’s population was poor. By the year 2014, nearly 27 to 28 percent of India’s population is under poverty as per governments estimates. You will come to know about the manner in which poverty is estimated in India in the lesson on poverty and employment. For the time being let us confine our notion of poverty to the situation where an individual is unable to satisfy his/her basic minimum needs of life. There are lot of people in the country who are not even getting a square meal a day. Lack of employment is a major cause of poverty. It is aggravated by unequal distribution of national wealth and income. Poverty is termed as a curse on human dignity and it has seriously tarnished the image of India in the world. Developed countries do not count India seriously due to its inability to remove poverty. It is proper planning to remove poverty completely from the country.
5. **Modernisation of the Economy :** India has been a country of continuous exploitation by foreign powers such as the Mughals who ruled for more than two hundred years and the British who also ruled the country for another two hundred years. The British in particular, left the country in dire poverty and underdevelopment when they handed over power to Indian government in 1947. Because of the historical reasons Indian economy could not rise from its traditional level of functioning. It remained an agrarian economy and industrially backward. There was no development in new technology and technological upgradation. Lack of modern technology is a major reason for Indian economy to suffer from low productivity in agriculture and lack of industrial development. At the time of independence and for many more years after that, the major contributor to India’s GDP because of underdeveloped industrial and service sector. Combined with his lack of better education and skill development of the population, the occupational structure has also remained biased towards agriculture. Hence, to reverse such trend it is necessary to change the structure



of GDP of India by improving the quality of human resources and developing industries and service sector. This can be done by modernization of the economy.

- 6. Ensuring Social Justice and Equility :** Indian planning also aimed at achieving a socialistic pattern of society. It can be achieved by ensuring its population social justice and equity. In fact all the objectives said above are necessary to achieve social justice. But the sufficient condition for sustaining social justice and equitable distribution of income is to introduce reforms in various sectors by changing the age old systems which have perpetuated poverty and inequality and obstructed development of industrial and service sector or caused low productivity in agriculture. So the planners thought to introduce reforms in agriculture and economic policy so that they facilitate growth and equitable distribution of the benefits of development.



### INTEXT QUESTIONS 2.2

- One of the reasons of inequality in income is
  - Existence of private property
  - Lack of equal distribution of wealth
  - Both of the above
  - None of the above
- Which of the following sector used to have larger share in India's GDP at the time of its independence
 

a. Industry	b. Agriculture
c. Service	d. None of the above

### 2.4 NEED FOR PLANNING

A major part of the question about need for planning has been answered in the meaning of planning itself described above. There we said that planning involves various steps for effective implementation and execution. Infact the number of problems facing Indian economy is very high. Each problem is complex in nature and cannot be solved in a short period. Take the example of the problem of poverty. There is no method by which this problems can be solved immediately. The government must collect data to know the number of people affected by poverty and its nature. Collection of data itself is a very huge task keeping in view India's vast geographical area and lack of accessibility to many areas. In a democracy , the government is duty bound to formulate policies after proper debate and discussions which takes time. Then mobilization of adequate resources and provision of



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resources to continue the programme over a long period are two most important things to solve the problem of poverty. Without proper planning it cannot be done. Planning is also necessary to avoid wasteful expenditure, minimize cost meet the target in time and optimal use of resource.

### 2.5 STRATEGY OF PLANNING

By strategy we mean the use of correct approach /method/formula for achieving the target under planning. In the first plan period of 1951-56, no specific strategy was adopted during this time the government of India gave more emphasis to agriculture keeping in view the fact that majority of India's population depend on agriculture and there was the immediate issue of adequate food grain supply to address food shortage. The first five year plan was a great success as the targeted growth rate was achieved so India was in a position to adopt a long term strategy for planning in future. The development strategy was accordingly spelt out explicitly in the second plan period of 1956-61. The strategy was to give emphasis on – 1. Industrialization, 2. Within industrialization more emphasis on heavy industries.

### 2.6 JUSTIFICATION OF THE STRATEGY OF INDUSTRIALIZATION

In order to address the problems related to poverty, unemployment, economic growth, self reliance etc. The Indian planners adopted the strategy of industrialization in the country in general and establishing heavy and basic industries in particular.

**The arguments offered in favour of industrialization and heavy industries strategy are as follows:**

1. India's population has been over depended on agriculture resulting in crowding of rural area, pressure on land, fragmentation of land holding, underemployment and unemployment with fixed amount of land available for cultivation, more population makes the amount of per capita availability of land very small or nil. This has resulted in inequality in distribution of land and ultimately affecting agricultural production badly. Industrialization is the only answer to shift the surplus labour engaged in agriculture to industries and release the pressure on land.
2. Industrial activities provide more job opportunities than agricultural activities. So industrialization will help getting employment for the jobless in the country.
3. Industrialization is necessary for the growth of agriculture itself. Industries use raw materials from agriculture and agriculture sector needs industrial equipment and machinery such as pump set, tractor, electricity etc.
4. Establishment of basic and heavy industries must be given priority. Examples

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of basic and heavy industries are iron and steel, aluminium, heavy chemicals, heavy electrical etc. These are capital goods industries. Every economy needs such type of industries because they produce machinery and equipment needed to establish other industries which can produce consumer goods for the satisfaction of wants. So the heavy industries are the backbone of the economy.

It should be noted that after the adoption of heavy industry strategy the government of India created public sector to establish and manage such industries. Some of the examples are steel authority of India limited (SAIL), Bharat aluminium company (BALCO), Bharat heavy electrical limited (BHEL), National aluminium company (NALCO), etc.

5. Besides heavy and basic industries, Indian government has also given emphasis on developing the micro, small and medium industries. These industries are defined on the basis of investment limit and can be established by private individuals. The advantage of these industries include: promotion of self employment as well as generating employment further, use of local resources, reducing inequality of income as they can be owned by individuals etc.

## 2.7 NEW ECONOMIC POLICY

As said above, the heavy industry strategy was implemented under the ownership and management of the public sector. The government made budgetary provisions for the public sector to create infrastructure and establish industries. The process went on for more than three decades. However, an evaluation of the performance of the public sector by the government itself found that barring a few, more than half of the public sector units have been running on losses. There was gross mismanagement and labour problems falling the public sector units. It was a major shock to the government to find all these shortcomings of public sector. The failure of the public sector on various fronts was seen as one of the major reasons for lack of all round development of the country in the area of industrialisation, removal of poverty and unemployment etc. Hence in 1991, the central government came out with a new economic policy resolution. The main feature of this policy are:

- (i) Liberalization
- (ii) Privatization
- (iii) Globalization

The policy is also popularly called LPG model of development.

### Meaning of and Need for Liberalization

Liberalization means withdrawal of controls and regulations by the government on establishment and running of industries in the country. Till 1991, all the public sector units were practically under the government even if they were called

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autonomous bodies. There were lot of interventions by the ministries of the government in functioning of the public sector. This resulted in politization and fall in professionalism and inefficiency. In order to overcome this problem the government decided to stop political intervention in the running of the public sector units by signing a memorandum of understanding. According to this the management of public sector units will be given autonomy to function but they will also be accountable.

Another important feature of liberalization is to do away with the licensing system. Earlier it was mandatory for any private individual or organization to seek permission from the government to start any industrial activity. There was heavy rush and long queue before the window of the concerned government department to get a license. This system slowly gave rise to delays in getting license. Government officials started taking bribes to clear files. Such corrupt practices brought bad name to the government. So in 1991 government decided to abandon the licensing system and allowed the interested individuals to start their industrial activity without any permission. However, permission is still required only in case of strategic industries such as medicine, defence equipments etc.

#### Meaning of and Need for Privatization

Privatization implies opening of the door of industrial activities to the private sector which was exclusively reserved for public sector only except nuclear energy and defence. Since basic and heavy industries were strictly under public sector there was no room for competition. The quality of product and services deteriorated due to lack of competition from other companies. As a result the consumers were the major loser because they did not get quality products and the delivery system and other services were also very poor. So the government decided to allow and encourage the entry of private sector in the areas earlier reserved for public sector only. As a result private sector entry was seen in tele communication, civil aviation etc. The government also decided to disinvest some of the public sector companies by selling part of their assets to public.

#### Meaning of and Need for Globalization

Globalization is a process in which attempts are made by the different countries in the world to allow free flow of goods and services, labour technology, investments etc. India is a member of world trade organization (WTO) which is the nodal agency to promote globalization. In 1991 industrial policy, India adopted soft attitude towards foreign companies to do their business in India in order to promote competition. It also committed itself to abolish or reduce tariff on import of commodities. On the otherhand, India also adopted policies to promote exports. The government also allowed foreign companies to hold 51 percent share or more

in case of their collaboration with Indian companies so that they can function freely and as the owner. This will also facilitate transfer of latest technology into Indian territory.

**INTEXT QUESTIONS 2.3**

1. Liberalization aims at retaining the licencing system. True or False
2. Privatization policy will help in enhancing competition in the market. True or False
3. Globalization aims at imposing tariff on imported goods. True or False

**2.8 ACHIEVEMENTS OF ECONOMIC PLANNING**

Economic planning in India was started in 1951. As said earlier, there were certain objective of economic planning which include: achieving economic growth in terms of increase in real national and per capita income, increase in the level of employment, removal of inequality in the distribution of income removal of poverty, ensuring social and economic justice etc. By 2014, India has completed 63 years of planning and has entered into twelfth plan period. It is high time to know the achievements of planning keeping in view its objectives. Let us discuss them.

**1. Achievements in Economic Growth**

Achieving economic growth was a major objectives of planning. To achieve growth it is necessary to achieve increase in national income and per capita income as well as increase in production of agricultural and industry sectors. A review of different plans shows that, the first five year plan was a success as it achieved a growth rate of 3.6 per cent against a target of 2.1 percent growth rate in national income. Then except for 5<sup>th</sup> and 6<sup>th</sup> plans, during the other plan periods i.e. from second to eleven five year plan the targeted growth rate in national income could not be achieved.

Similarly, The per capita income has attained growth but the rate of growth has been very slow. For example : During the first 30 years of planning the per capita income grew at a very slow rate of 1.2 per cent per year. Recently this growth rate has increased to some extent. Coming to agriculture, the food grain production has gone up from 51 million tones at the beginning of the first plan to 257.4 million tones in 2011-12. Particularly the production of rice, wheat has been spectacular, but production of pulses and oil seeds etc., has been below target.

In terms of industrial development, a major achievement has been the diversification of Indian industries. There has been expansion of transport and communications, growth in generation and distribution of electricity and considerable progress in steel, aluminium, engineering goods, chemicals, fertilizers and petroleum products.

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During the planning period, the per capita availability consumer goods and other essential items has increased considerably. The goods worth mentioning here include-cereals, sugar, milk, egg, edible oil, tea, cloth and electricity.

### 2. Creation of Infrastructure

India has achieved a great deal in the area of creation of infrastructure. There has been large expansion roads and railway networks. Domestic air travel has increased significantly. Expansion of irrigation and hydro-electric projects has given boost to agricultural production. There has been growth in establishment of towns and cities due to increase in urban infrastructure. Communication network in the form of mobile telephony, internet has expanded tremendously.

### 3. Development in Education

One of the brightest areas of achievements of planning has been the development in education in India. There has been a significant increase in the enrolment of children at school level. There are 378 universities and 18,064 colleges in India which is a good development for higher education. India has also 1.52 lakh higher secondary and 10.43 lakh primary and upper primary schools.

### 4. Development of Science and Technology

Another significant area of achievement has been the growth in science and technology including the increase in technical and skilled manpower. India's march in space research has been noticed by the developed countries. It has made impact in the field of nuclear energy as well. Today India's Dependence on foreign experts for consultation has reduced. On the contrary it is now able to send technical experts to many foreign countries in the middle east, Africa etc.

### 5. Expansion of Foreign Trade

Due to industrialization in the country, India's dependence on import of capital goods has delivered. Many items, which were imported earlier are being produced domestically. Due to industrial progress, India is also able to export manufacturing and engineering goods.



### INTEXT QUESTIONS 2.4

1. During which plan period, the actual growth rate of national income was more than the targeted growth rate.
  - (a) Second plan
  - (b) First plan



- (c) Eleventh plan                      (d) Ninth plan
2. The growth rate of per capita income was higher in the beginning of plan period as compared to the period in the beginning of 21<sup>st</sup> century.  
True or False.

## 2.9 DRAWBACKS OR FAILURES OF PLANNING

Besides the achievements as told above, there are many unfulfilled tasks which the planning in India is yet to achieve completely.

### 1. Failure to Remove Poverty and Inequality completely :

Even after more than sixty years of planning, India has not been able to remove poverty completely. More than 240 million people are still under absolute poverty according to official estimates. The situation is worse in rural area. The government has introduced many antipoverty measures. But they have not been very successful so far.

Similarly, there is no significant improvement in the distribution of income and asset holding resulting in existence of inequality. The number of landless agricultural labourers is very high as compared to the land holding population. The process of industrialization has helped some big industrial houses. This has resulted in concentration of economic wealth and power in few hands. This trend must be reversed if India wants to achieve equity and social justice.

### 2. Problem of Unemployment Persists :

In spite of growth in income and output, India's employment situation has not improved much. Due to faster growth of population and labour force the situation has worsened further. According to official estimates India's unemployment rate is 6.6%. There is also huge backlog of unemployment due to lack of creation of required amount of jobs every year.

### 3. Failure to Curtail Corruption and Black Money :

Existence of rampant corruption in various public offices is a matter of grave concern in India. Common person faces a lot of problem in getting things done without giving bribe. Infact corruption has become a major political issue in elections. Various forms of corruption include paying or accepting bribe, non-payment of tax to government, political influence to get contract, secret understanding among sellers to increase price etc. Corruption has given rise to black money which is not accounted anywhere but very much in circulation. A sizeable portion of India's GDP is unaccounted. Black money creates inflation and



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pressure in the society. It is also the root cause of inequality in distribution of income as people who possess black money grow richer at the cost of common citizen.



### WHAT YOU HAVE LEARNT

- To solve its various economic problems India adopted Five year plans starting from 1951.
- The objectives of planning include : economic growth, increase in employment, removal of inequality and poverty and achieving social justice and equity.
- India adopted the strategy of industrialization with emphasis on basic and heavy industries to achieve the desired objectives.
- Even if the national income and the per capita income of India have recorded growth rates during planning period, the growth rates are below the target.
- India's progress in infrastructure, education, science and technology and foreign trade has been note worthy.
- Significant drawbacks of planning in India include inability to eradicate poverty, inequality and unemployment completely.
- Corruption in public places and prevalence of black money are major threats to development in India.
- In 1991 the government adopted new economic policy in order to rectify the problems associated with public sector to promote industrialization and to achieve faster economic growth.
- The new economic policy is called LPG model i.e. Liberalization, Privatization and globalization.
- LPG policy aims at removing licensing policy, promoting competition in the market and encouraging free trade in the world.



### TERMINAL EXERCISE

#### Short answer type questions

1. Give the meaning of planning ?
2. Write two objectives of planning in India ?
3. Name two types of resources needed for planning with examples ?
4. Give one justification for adopting the strategy of industrialization ?



**Notes****Long answer type questions**

1. Explain the steps involved in the process of planning ?
2. Discuss the objectives of removal of inequality and poverty ?
3. Which strategy did India adopt to achieve the plan target and why ?
4. Explain the objectives of economic growth and increase in employment under planning in India ?
5. Explain 3 achievements of economic planning in India ?
6. Evaluate the performance of planning in removing poverty and inequality ?
7. Write a short note on achievement of planning with respect to economic growth?
8. Comment on the development of infrastructure in India?
9. Give reasons for adopting a new economic policy?
10. Explain the LPG model of the government to promote economic growth?

**ANSWERS TO INTEXT QUESTIONS****2.1**

1. (a)
2. (b)
3. (c)
4. (d)

**2.2**

- 1 (a)
2. (b)

**2.3**

1. False
2. True
3. False

**2.4**

1. (b)
2. False



**MODULE - II**  
**CURRENT CHALLENGES BEFORE**  
**THE INDIAN ECONOMY**

3. Economic Growth and Economic Development
4. The Problem of Unemployment, Poverty and Inequality





## 3

## ECONOMIC GROWTH AND ECONOMIC DEVELOPMENT

Economics is all about making smart choices to cope with scarcity. The most fundamental measurement used to evaluate the success in allocating the scarce resources is economic growth. Individuals monitor their **income** and the changing value of their **assets**. Businesses track their **profits** and their **market share**. Nations monitor a variety of statistics to measure economic growth such as **national income, productivity etc.** Moving beyond growth and productivity, some economists argue that any assessment of the nation's economy must also include measurements of distribution, equity, per-capita income etc. Further, the country should also focus on other needs of a society, like environmental justice or cultural preservation to sustain the economic growth process and allows an overall human development in the economy through creation of more opportunities in the sectors of education, healthcare, employment and the conservation of the environment.



### OBJECTIVES

After completing this lesson, you will be able to:

- define the meaning of Economic Growth and Economic Development, and their differences;
- explain the concept of Sustainable Development and Human Development;
- list out the factors affecting Economic Growth; and
- describe the broad Features of the Underdeveloped countries.

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### Economic Growth and Economic Development

#### 3.1 ECONOMIC GROWTH

The term economic growth is defined as the process whereby the country's real national and per capita income increases over a long period of time.

This definition of economic growth consists of the following features of economic growth:

- **Economic Growth implies a process of increase in National Income and Per-Capita Income.** The increase in Per-Capita income is the better measure of Economic Growth since it reflects increase in the improvement of living standards of masses.
- **Economic Growth is measured by increase in real National Income and not just the increase in money income or the nominal national income.** In other words the increase should be in terms of increase of output of goods and services, and not due to a mere increase in the market prices of existing goods.
- **Increase in Real Income should be Over a Long Period:** The increase of real national income and per-capita income should be sustained over a long period of time. The short-run seasonal or temporary increases in income should not be confused with economic growth.
- **Increase in income should be based on Increase in Productive Capacity:** Increase in Income can be sustained only when this increase results from some durable increase in productive capacity of the economy like modernization or use of new technology in production, strengthening of infrastructure like transport network, improved electricity generation etc.

#### 3.2 ECONOMIC DEVELOPMENT

Economic development is defined as a sustained improvement in material well being of society. Economic development is a wider concept than economic growth. Apart from growth of national income, it includes changes – social, cultural, political as well as economic which contribute to material progress. It contains changes in resource supplies, in the rate of capital formation, in size and composition of population, in technology, skills and efficiency, in institutional and organizational set-up. These changes fulfill the wider objectives of ensuring more equitable income distribution, greater employment and poverty alleviation. In short, economic development is a process consisting of a long chain of inter-related changes in fundamental factors of supply and in the structure of demand, leading to a rise in the net national product of a country in the long run.



The economic growth is a narrow term. It involves increase in output in quantitative terms but economic development includes changes in qualitative terms such as social attitudes and customs along with quantitative growth of output or national income.

Economic development without growth is almost inconceivable. The comparison between the two concepts is given in the following table:

### 3.3 COMPARISON CHART: ECONOMIC GROWTH VS. ECONOMIC DEVELOPMENT

	Economic Growth	Economic Development
<b>Meaning</b>	Economic growth refers to an increase in the real output of goods and services in the country.	Economic development implies changes in income, savings and investment along with progressive changes in socio-economic structure of country (institutional and technological changes).
<b>Factors:</b>	Growth relates to a gradual increase in one of the components of Gross Domestic Product: consumption, government spending, investment, net exports.	Development relates to growth of human capital, decrease in inequality figures, and structural changes that improve the quality of life of the population.
<b>Measurement:</b>	Economic Growth is measured by quantitative factors such as increase in real GDP or per capita income	The qualitative measures such as HDI (Human Development Index), gender- related index, Human poverty index (HPI), infant mortality, literacy rate etc. are used to measure economic development.
<b>Effect:</b>	Economic growth brings quantitative changes in the economy.	Economic Development leads to qualitative as well as quantitative changes in the economy.
<b>Relevance:</b>	Economic growth reflects the growth of national or per capita income.	Economic development reflects progress in the quality of life in a country.

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#### INTEXT QUESTION 3.1

1. “Economic Development is a wider concept than Economic Growth”. Do you agree with the statement?

### 3.4 SUSTAINABLE DEVELOPMENT

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development includes the protection of future economic growth and future development. In other words, it means a better quality of life for everyone, now and for generations to come. Sustainable development includes the protection of future economic growth and future development. Growth is essential, but sustainable development requires it to be different. It must become more concerned about the physical environment not only to present generation, but to the future generation also. It means that the current consumption cannot be financed for long by increasing economic debt and ecological imbalance which future generation will pay. Sustainable development constantly seeks to achieve social and economic progress in ways that will not exhaust the earth's finite natural resources. Sustainable development is a process of development in which economic and other policies are designed to bring about development which is economically, socially and ecologically sustainable. The concept thus is pro-people, pro-job and pro-nature. It gives highest priority to poverty reduction, productive employment, social integration and environmental regeneration.

#### The sustainable development thus requires

- Preservation of Ecological Resources and greater use of renewable resources.
- Encouragement to the use of environmentally-safe technologies for development purposes i.e. focus on reduction of all kinds of pollution involved in the economic activities.
- Formulation and implementation of policy framework for people-security and human justice, including ecological and economic security.

### 3.5 HUMAN DEVELOPMENT

According to the United Nation's Development Programme (UNDP), human development may be defined as “a process of enlarging people's choices.” At all levels of development, the three essential choices for people include to live a long and healthy life, to acquire better knowledge and to have access to resources needed for a decent standard of living. If these essential choices are not available, many other opportunities to improve the quality of life will remain inaccessible. Human development has two dimensions: acquiring human capabilities and the use



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of these acquired capabilities for productive, leisure and other purposes. The benefits of human development go far beyond the expansion of income and wealth accumulation because people constitute the very essence of human development. Human development is about much more than economic growth. The economic growth focuses on the improvement of one option i.e. income or product while human development focus on enlarging all human options including education, health, clean environment and material well being. Thus, the options available for improving people's lives are influenced by the quality of economic growth in its wider sense, and the impact is by no means confined to quantitative aspects of such growth. In other words, economic growth needs to be seen as a means, albeit an important one, and not the ultimate goal, of development. Income makes an important contribution to human well-being, broadly conceived, if its benefits are translated into more fulfilled human lives. But the growth of income is not an end in itself. It is the quality of growth, not its quantity alone, which is crucial for human well-being.

Thus, the concept of human development, is concerned mainly with enabling people to enjoy a better life as the ultimate goal of human endeavor. Highlights that this goal cannot be achieved solely through improvements in income or material well-being.

As the 1996 Human Development Report put it, growth can be jobless, rather than job creating; ruthless, rather than poverty-reducing; voiceless, rather than participatory; rootless, rather than culturally enshrined; and futureless, rather than environment-friendly. Economic growth which is jobless, ruthless, voiceless, rootless and futureless is not conducive to human development. The lack of income or income poverty is only one aspect of human impoverishment; deprivation can also occur in other areas— having a short and unhealthy life, being illiterate or not allowed to participate, feeling personal insecurity, etc. Human poverty is thus larger than income poverty.

### **3.6 MEASURING HUMAN DEVELOPMENT: HUMAN DEVELOPMENT INDEX (HDI)**

As stated earlier three dimensions of Human Development are capabilities of people to lead a long and healthy life, to acquire knowledge and to have access to resources needed for a decent standard of living. The combined effect of various components of human development is measured through Human Development Index (HDI). The HDI contains four variables: life expectancy at birth, to represent the dimension of a long, healthy life; adult literacy rate and combined enrolment rate at the primary, secondary and tertiary levels to represent the knowledge dimension; and real GDP per capita to serve as a proxy for the resources needed for a decent standard of living. HDI thus looks not only at GDP

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growth rate but takes into account education, health, gender inequality and income parameters to measure human development of a country.

As per the latest available Human Development Report (HDR) 2013 published by the United Nations Development Programme (UNDP) (which estimates the human development index [HDI] in terms of three basic capabilities: to live a long and healthy life, to be educated and knowledgeable, and to enjoy a decent economic standard of living), the HDI for India was 0.554 in 2012 with an overall global ranking of 136 (out of 186 countries) compared to 134 (out of 187 countries) as per HDR 2012. India's HDI has risen by 1.7% annually since 1980.



### INTEXT QUESTION 3.2

1. Human development is a better measure of economic development as it places human-beings at the centre stage of development. Discuss.

### 3.7 FACTORS AFFECTING ECONOMIC GROWTH

The process of economic growth is a highly complex phenomenon and is influenced by numerous and varied factors such as political, social and cultural factors. These factors are as follows:

#### A. Economic Factors

1. **Natural Resources:** The principal factor affecting the development of an economy is the natural resources. The natural resources include the land area and the quality of the soil, forest wealth, good river system, minerals and oil resources, good climate, etc. For economic growth, the existence of natural resources in abundance is essential. A country deficient in natural resources may not be in a position to develop rapidly. However, the availability of rich natural resources are a necessary condition for economic growth but not a sufficient one. In less developed countries, natural resources are unutilized, underutilized or misutilised. This is one of the reasons of their backwardness. On the otherhand countries such as Japan, Singapore etc. are not endowed with abundant natural resources but they are among the developed nations of the world. These countries have shown committment towards preserving the available resources, putting best efforts to manage the resources, minimizing waste of resources etc.
2. **Capital Formation:** Capital formation is another important factor for development of an economy. Capital formation is the process by which a community's savings are channelised into investments in capital goods such as plant, equipment and machinery that increases nation's productive capacity and worker's efficiency thus ensuring a larger flow of goods and services in a

country. The process of capital formation implies that a community does not spend whole of its income on goods for current consumption, but saves a part of it and uses it to produce or acquire capital goods that greatly add to productive capacity of the nation.

3. **Technological Progress:** Technological progress is a very important factor in determining the rate of economic growth. Technological progress mainly implies the research into the use of new and better methods of production or the improvement of the old methods. Sometimes technical progress results in the availability of natural resources. But generally technological progress results in increase in productivity. In other words, technological progress increases the ability to make a more effective and fruitful use of natural and other resources for increasing production. By the use of improved technology it is possible to have greater output from the use of given resources or a given output can be obtained by the use of a smaller quantity of resources. The technological progress improves an ability to make a fuller use of the natural resources e.g. with the aid of power - driven farm equipment a marked increase has been brought about in agricultural production. The USA, UK, France, Japan and other advanced industrial nations have all acquired the industrial strength from use of advanced technology. In fact economic development is facilitated with the adoption of new techniques of production.

### Entrepreneurship

Entrepreneurship implies an ability to find out new investment opportunities, willingness to take risks and make investment in the new and growing business units. Most of the underdeveloped countries in the world are poor not because there is shortage of capital, weak infrastructure, unskilled labor and deficiency of natural resources, but because of acute deficiency of entrepreneurship. It is, therefore, essential in the under-developed nations to create climate for promoting entrepreneurship by emphasizing education, new researches, and scientific and technological developments

4. **Human Resources Development:** A good quality of population is very important in determining the level of economic growth. So the investment in human capital in the form of educational and medical and such other social schemes is very much desirable. Human resource development increases the knowledge, the skills and the capabilities of the people that increase their productivity.
5. **Population Growth:** Labor supply comes from population growth and it provides expanding market for goods and services. Thus, more labor produces larger output which a wider market absorbs. In this process, output, income and employment keep on rising and economic growth improves. But the population growth should be normal. A galloping rise in population retards



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### Economic Growth and Economic Development

economic progress. Population growth is desirable only in a under-populated country. It is, however, unwarranted in an overpopulated country like India.

- 6. Social Overheads:** Another important determinant of economic growth is the provision of social overheads like schools, colleges, technical institutions, medical colleges, hospitals and public health facilities. Such facilities make the working population healthy, efficient and responsible. Such people can well take their country economically forward.

### Non-Economic Factors

Non-Economic factors that include socio-economic, cultural, psychological and political factors are also equally significant as are economic factors in economic development. We discuss here some of the essential non economic factors which determine the economic growth of an economy.

- 1. Political Factors:** Political stability and strong administration are essential and helpful in modern economic growth. The stable, strong and efficient government, honest administration, transparent policies and their efficient implementation develop confidence of investors and attracts domestic as well as foreign capital that leads to faster economic development.
- 2. Social and Psychological Factors:** Social factors include social attitudes, social values and social institutions which change with the expansion of education and transformation of culture from one society to the other. The modern ideology, values, and attitudes bring new discoveries and innovations and consequently to the rise of the new entrepreneurs. The outdated social customs restricts occupational and geographical mobility and thus pose an obstacle to the economic development.
- 3. Education:** It is now fairly recognized that education is the main vehicle of development. Greater progress has been achieved in those countries, where education is wide spread. Education plays an important role in human resource development, improves labor efficiency and removes mental block to new ideas and knowledge thus contributes to economic development.
- 4. Desire for Material Betterment:** The desire for material progress is a necessary precondition for economic development. The societies that focus on self-satisfaction, self-denial, faith in fate etc. limit risk and enterprise and thus keep the economy backward.



### INTEXT QUESTION 3.3

1. Non-economic factors are as much important in economic development as economic factors. Comment.

### 3.8 COMMON FEATURES OF UNDERDEVELOPED COUNTRIES

1. **Low per Capita Income:** The level of per capita income is very low in underdeveloped countries.
2. **Poor Level of Living:** The vast majority of people in underdeveloped nations lie under the conditions of poverty, malnutrition, disease, illiteracy, etc. Even basic necessities of life such as minimum food clothing and shelter are not easily accessible to the poor masses.
3. **High Rate of Growth of Population:** Population growth in underdeveloped countries neutralizes economic growth. High population implies greater consumption expenditure and lower investments in productive activities and slows down the economic development.
4. **Highly Unequal Income Distribution:** The income inequality between the rich and the poor people within the underdeveloped countries is also very high.
5. **Prevalence of Mass Poverty:** Low level of per capita income combined with high degree of inequalities in its distribution leads to widespread poverty in underdeveloped countries.
6. **Low Levels of Productivity:** The Productivity level (i.e. output produced per person) tends to be very low in an underdeveloped country which is mainly due to : (i) inefficient workforce which itself is a consequence of poverty, ill health and lack of education (ii) Low work culture (iii) Low use of capita in the form of machinery and equipment.
7. **Low Rate of Capital Formation:** The saving rate in an underdeveloped country is quite low and rate of capital formation is also is very slow.
8. **Technological Backwardness:** In most of the sectors, an underdeveloped economy the techniques of production employed are generally obsolete mainly due to low saving rate.
9. **High Level of Unemployment:** Unemployment levels are very high in the underdeveloped countries mainly due to lack of capital and low level of development in various economic sectors, these countries are not able to absorb the rising labor supply.
10. **Low Social Indicators of Development:** The under-developed countries have very low social indicators such as low literacy rate, high infant mortality rate, low expectancy of life, etc. as compared to the developed countries.



#### INTEXT QUESTIONS 3.4

1. Which of the following characteristics are most likely found in developing countries?



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### Economic Growth and Economic Development

- (a) high population growth rates.
  - (b) large number of people living in poverty.
  - (c) very traditional methods of agricultural production.
  - (d) all of the above
  - (e) none of the above
2. Economic development refers to
  - (a) economic growth.
  - (b) economic growth plus changes in output distribution and economic structure.
  - (c) sustainable increases in Gross National Product.
3. The common measure of economic development is
  - (a) The level of health and education of the population.
  - (b) The rate of population growth.
  - (c) Per Capita GDP
  - (d) All of the above
  - (e) None of the above.
4. developing nations have
  - (a) A lower infant mortality rate.
  - (b) A greater degree of equality in the income distribution.
  - (c) lower rate of illiteracy.
  - (d) None of above.
5. Sustainable development involves
  - (a) Reducing Consumption, increasing efficiency and using renewable energies.
  - (b) better transportation by building more roads
  - (c) Using Resources at maximum rates.
6. Sustainability is the use of a resource that doesnot cause long term depletion of resources or affect the diversity of the ecosystem.
  - (a) True.
  - (b) False.
7. Which three indicators are currently used in the Human Development Index (HDI):
  - (a) real GDP per capita
  - (b) Birth rates



- (c) Life expectancy at birth
- (d) Employment Rates
- (e) Educational attainment.



### WHAT YOU HAVE LEARNT

- Economic growth implies a process of increase in real national income and real per capita income.
- Economic development is defined as a sustained improvement in material well being of society.
- Sustainable development in development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- Human development may be defined as “a process of enlarging people's choices”.
- According to UNDP, human Development Index (HDI) includes three basic capabilities (indicators) to live a long and healthy life, to be educated and knowledgeable and to enjoy a decent economic standard of living.
- Economic factors affecting growth and development are: natural resources, capital formation, technological progress, entrepreneurship, human resource development, population growth and social overheads.
- Non-economic factors affecting growth and development are: political factors, social and psychological factors, education and desire for material betterment.
- Common features of developing countries are: (i) Low per capita income, (ii) Poor level of living, (iii) High rate of growth of population, (iv) Highly inequal income distribution, (v) Prevalence of mass poverty, (vi) Low levels of productivity, (vi) Low rate of capital formation, (viii) Technological backwardness, (ix) High level of unemployment, and (x) Low social indicators of development.



### TERMINAL EXERCISE

1. What is economic growth? Do you think that economic growth and economic development are two names for the same concept?  
**Hint:** Meaning of economic growth and difference between economic growth and economic development.
2. There is no automatic link between economic growth and human development. Discuss.

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### Economic Growth and Economic Development

**Hint:** Meaning of human development and difference between economic growth and human development.

3. What are the common features of Underdeveloped countries?

**Hint:** features of underdeveloped countries.

4. What are the important components of the Human Development Index (HDI)

**Hint:** meaning of HDI

5. Explain the meaning of Sustainable development.

**Hint:** Concept of sustainable development.



### ANSWERS TO INTEXT QUESTIONS

#### 3.1

1. Difference between economic growth and economic development.

#### 3.2

1. Meaning of human development.

#### 3.3

1. Economic and Non-economic factors of growth.

#### 3.4

1. (d)    2. (b)    3. (c)    4. (d)    5. (a)    6. (a)
7. (a), (c) and (e)





## 4

## THE PROBLEM OF UNEMPLOYMENT, POVERTY AND INEQUALITY

In India, the problems of unemployment and poverty have always been major obstacles to economic development. Regional disparity is also crucial in this context. Economic reforms, changes in the industrial policy and better utilization of available resources are expected to reduce the problem of unemployment and poverty. The governmental bodies are also required to initiate long term measures for poverty alleviation. Generation of employment opportunities and equality in income distribution are the two key factors that are of utmost important to deal with the dual problem of unemployment and poverty.



### OBJECTIVES

After completing this lesson, you will be able to:

- explain the meaning, types and important measures of unemployment;
- identify the causes of unemployment;
- know the Government policies and programmes implemented to alleviate poverty and generate employment; and
- evaluate the extent and causes of regional disparity in India.

### 4.1 MEASUREMENT AND MAGNITUDE OF UNEMPLOYMENT IN INDIA

#### 4.1.1 Meaning and Types of Unemployment

The population of any country consists of two components (i) **Labor Force** (ii) **Non-Labor Force**. Labor force means all persons who are working (i.e. being engaged in the economic activity) as well as those who are not working but are

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seeking or available for work at the current wage rate. It means the labor force consists of both employed and unemployed people.

The component of population which is not a part of the labor force is Non-Labor Force. It includes all those who are not working and are neither seeking nor available for work.

**Unemployment** can be defined as a state of worklessness for a person who is fit and willing to work at the current wage rate. It is a condition of involuntary and not voluntary idleness. Simply stated an unemployed person is the one who is an active member of the labor force and is seeking work, but is unable to find the same. In case of voluntary unemployment a person is out of job on his own accord or choice, doesn't work on the prevalent or prescribed wages. Either he wants higher wages or doesn't want to work at all. The involuntary unemployment on the other hand is the situation when a person is separated from remunerative work and devoid of wages although he is capable of earning his wages and is also anxious to earn them. It is the involuntary idleness that constitutes unemployment. Involuntary unemployment can be further divided into cyclical unemployment, seasonal unemployment, structural unemployment, frictional unemployment, natural rate of unemployment, disguised unemployment and under employment.

#### 4.1.1.1 Cyclical Unemployment

Cyclical or demand deficient unemployment occurs when the economy is in need of low workforce. When there is an economy-wide decline in aggregate demand for goods and services, employment declines and unemployment correspondingly increases. Cyclical unemployment mainly occurs during recession or depression. This form of unemployment is most commonly known as cyclical unemployment since unemployment moves with the trade cycle. For instance, during the recent global slowdown in late 2008, many workers around the globe lost their jobs.

#### 4.1.1.2 Seasonal Unemployment

This type of unemployment occurs in a particular time of the year or season and thus is known as seasonal unemployment. Seasonal unemployment is most common in industries like agriculture, tourism, hotel, catering etc.

#### 4.1.1.3 Structural Unemployment

Structural unemployment arises when the qualification of a person is not sufficient to meet his job responsibilities. It arises due to long term change in the pattern of demand that changes the basic structure of the economy. The person is not able to learn new technologies used in the new expanding economic sectors and they thus may be rendered permanently unemployed. For instance, when computers were



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introduced, many workers were dislodged because of a mismatch between the existing skills of the workers and the requirement of the job. Although jobs were available, there was a demand for a new kind of skill and qualification. So, persons with old skills did not get employment in the changed economic regime, and remain unemployed.

#### 4.1.1.4 Frictional Unemployment

Frictional unemployment occurs when a person is out of one job and is searching for another for different reasons such as seeking a better job, being fired from a current job, or having voluntarily quit a current job. It generally requires some time before a person can get the next job. During this time he is frictionally unemployed.

#### 4.1.1.5 Natural rate of unemployment

The sum total of frictional and structural unemployment is referred as the natural rate of unemployment.

#### 4.1.1.6 Disguised Unemployment

The unemployment which is not visible is said to be disguised unemployment. It occurs when a person doesn't contribute anything to the output even when visibly working. This happens amongst family labor especially in agriculture who are engaged on land but are not contributing to the given level of output. Thus their marginal productivity is zero.

#### 4.1.1.7 Underemployment

When a person is engaged in the economic activity but that fail to provide him fully in accordance to his qualification and efforts. Thus it is a situation in which a person is employed but not in the desired capacity whether in terms of compensation, hours, or level of skill and experience. While not technically unemployed the underemployed often compete for available jobs.

## 4.2 MEASUREMENT OF UNEMPLOYMENT

**Unemployment rate** is the percent of the labor force that is without work. It is calculated as below:

$$\text{Unemployment rate} = (\text{Unemployed Workers} / \text{Total labor force}) \times 100$$

Measurement of unemployment is a difficult task. In India, the most comprehensive and reliable data on employment and unemployment are compiled by the National Sample Survey Organization (NSSO). Based on different reference period (a year, a week, and each day of a week), NSSO provides four different measures of

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employment and unemployment. The following are some methods of measuring unemployment:

- (i) **Usual Principal Status Unemployment (UPS):** This is measured as the number of persons who remained unemployed for a major part of the year. The persons covered by the survey may be classified into those working and/or available for work in their principal activity, and those working and/or available for work in a subsidiary activity, that is, a sector other than their principal activity. Hence, within the usual status concept, the estimates are now derived on the usual principal status as well as the usual principal and subsidiary status basis. The usual status unemployment rate is a person rate and indicates chronic unemployment, because all those who are found usually unemployed in the reference year are counted as unemployed. This measure is more appropriate to those in search of regular employment, e.g., educated and skilled persons who may not accept casual work. This is also referred to as 'open unemployment'.
- (ii) **Usual Principal and Subsidiary Status Unemployment (UPSS):** Here person is considered unemployed, if besides UPS, those available but unable to find work on a subsidiary basis during a year.
- (iii) **Current Weekly Status Unemployment (CWS):** This refers to the number of persons who did not find even an hour of work during the survey week.
- (iv) **Current Daily Status Unemployment (CDS):** This refers to the number of persons who did not find work on a day, or on some days, during the survey week.

Rates of unemployment differ based on different concepts. The UPS and UPSS measure reflect only long term unemployment spells. The CWS measure captures shorter unemployment spells, but ignores unemployment for less than a week. The CDS measure is the most inclusive, capturing both open as well as partial unemployment. The unemployment rate based on different measures is given under the following table 4.1:

**Table 4.1: Unemployment Rate (%)**

Year	2004-05	2009-10	2010-11
UPSS	2.3	2.0	2.2
CWS	4.4	3.6	3.7
CDS	8.2	6.6	5.6

**Source:** NSSO Surveys, till 2014

It is clear from the above table that there is decline in the unemployment rate since 2004-05. UPSS has remained more or less same between 2004-05 to 2010-11 at marginally above 2 per cent. CWS declined from 4.4 per cent in 2004-05 to 3.6 in 2009-10 and almost remained same at 3.7 in 2010-11. CDS decreased continuously from 8.2 per cent in 2004-05 to 6.6 per cent in 2009-10 and 5.6 per cent in 2010-11

## 4.3 CAUSES OF UNEMPLOYMENT IN INDIA

### 4.3.1 Slow Economic Growth

During the planning period the trend rate of growth was considerably lower than the targeted rate. Therefore, jobs in adequate number were not created. Further, economic growth by itself does not solve the problem of unemployment. In the recent past there has been deceleration in the growth of employment in spite of the accelerated economic growth. This can be explained in terms of steady decline in the degree of response of employment to change in output in all the major sectors of economic activity except in construction. According to T.S. Papola, over a period of time, the output growth in agriculture and manufacturing sector has become more input and technology-intensive and less labor-intensive. Besides, the sectoral composition of growth is also an important determinant of unemployment. Excessive dependence on agriculture and slow growth of non-farm activities limit employment generation.

### 4.3.2 Increase in Labor force

There are two important factors that have caused an increase in the labor force which are as follows:

- (i) **Rapid Population Growth:** Rising population has led to the growth in the labor supply and without corresponding increase in the employment opportunities for the increasing labor force has aggravated the unemployment problem.
- (ii) **Social Factors:** Since Independence, education among women has changed their attitude toward employment. Many of them now compete with men for jobs in the labor market. The economy has however failed to respond to these challenges and the net result is a continuous increase in unemployment backlogs.

### 4.3.3 Rural-Urban Migration

The unemployment in urban area is mainly the result of substantial rural migration to urban areas. Rural areas have failed to provide subsistence living in agriculture

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and allied activities and so large scale migration is taking place to cities. However, economic development in cities has failed to create enough additional jobs for the new urban entrants to the labor market. Thus only some of the migrants are absorbed in productive activities and the rest join the reserve army of unemployed workers.

#### 4.3.4 Inappropriate Technology

In India, though capital is a scarce factor, labor is available in abundant quantity; yet producers are increasingly substituting capital for labor. This policy results in larger unemployment. Despite the abundance of labor, capital intensive technology is adopted in India mainly because of rigid labor laws. It is quite difficult to follow easy hire and fire policy and so right sizing of manpower is difficult for the enterprises. It is difficult to reduce the number of labor-Force. Further, the factors like labor-unrest and lack of work-culture leads to the increased inefficiency of labor and thus provide incentives to follow labor-saving technology by organizations.

#### 4.3.5 Defective Educational System

The present educational system has theoretical bias and has limited utility for productive purposes. It lacks the emphasis on the development of aptitude and technical qualifications required for various types of work among job seekers. This has created a mismatch between the need and availability of relevant skills and training, which results in unemployment, especially of youth and educated while shortage of technical and specialized personnel continues.

#### 4.3.6 Lack of Infrastructure Development

Lack of investment and infrastructure development limits the growth and productive capacity of different sectors which leads to inadequate generation of employment opportunities in the economy.

#### 4.3.7 Lack of employability

India faces poor health and nutrition situation among masses which reduces the capacity of person to be employable and it causes unemployment.



#### INTEXT QUESTION 4.1

1. What is unemployment rate? How is it measured in India?
2. What are the causes of increase in labor force in India?



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## 4.4 POVERTY IN INDIA

In general, poverty can be defined as a situation when people are unable to satisfy the basic needs of life. The definition and methods of measuring poverty differs from country to country. The extent of poverty in India is measured by the number of people living below the **Poverty Line**.

### 4.4.1. Poverty Line

The **Poverty Line** defines a threshold income. Households earning below this threshold are considered poor. Different countries have different methods of defining the threshold income depending on local socio-economic needs. The Planning Commission releases the poverty estimates in India.

Poverty is measured based on consumer expenditure surveys of the National Sample Survey Organisation (NSSO). A poor household is defined as the one with an expenditure level below a specific poverty line.

Earlier, India used to define the poverty line based on a method defined by a task force in 1979. It was based on expenditure for buying food worth 2,400 calories in rural areas and 2,100 calories in urban areas. In 2009, the Suresh Tendulkar Committee defined the poverty line on the basis of monthly spending on food, education, health, electricity and transport.

The Planning Commission has updated the poverty lines and poverty ratios for the year 2009-10 as per the recommendations of the Tendulkar Committee. It has estimated the poverty lines at all India level as an MPCE (monthly per capita consumption expenditure) of ₹ 673 for rural areas and ₹ 860 for urban areas in 2009-10. So a person who spends ₹ 673 in rural areas and ₹ 860 in urban area per month is defined as living below the poverty line.

Based on these cut-offs, the percentage of people living below the poverty line in the country has declined from 37.2 per cent in 2004-5 to 29.8 per cent in 2009-10. Even in absolute terms, the number of poor people has fallen by 52.4 million during this period. Of this, 48.1 million are rural poor and 4.3 million are urban poor. Thus poverty has declined on an average by 1.5 percentage points per year between 2004-5 and 2009-10. The annual average rate of decline during the period 2004-5 to 2009-10 is twice the rate of decline during the period 1993-4 to 2004-5 (Table).

**Table 4.2: Poverty Ratios** (figures are in %)

Year	Rural	Urban	Total
1993-94	50.1	31	45.3
2004-05	41.8	25.7	37.2
2009-10	33	20.9	29.8

**Source:** Economic Survey 2013



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## 4.5 CAUSES OF POVERTY IN INDIA

### 4.5.1 Vicious Circle of Poverty:

It is said that “a country is poor because it is poor.” This idea has come down from Ragnar Nurkse who pinpointed the problem of the vicious circle of poverty. Low level of saving reduces the scope for investment; low level of investment yields low income and thus the circle of poverty goes on indefinitely.

### 4.5.2 Low Resources Endowment

A household is poor if the sum total of income earning assets which it commands, including land, capital and labor of various levels of skills, cannot provide an income above the poverty line. The poor mainly consists of unskilled labor, which typically does not command a high enough level of wage income.

### 4.5.3 Inequality in the Distribution of Income and Assets:

The distribution of income and assets also determine the level of income. The economic inequalities are the major cause of poverty in India. It means the benefits of the growth have been concentrated and have not “trickled down” sufficiently to ensure improved consumption among the lower income groups.

### 4.5.4 Lack of Access to Social Services

The lack of access to social services such as health and education compound the problems arising from inequality in the ownership of physical and human assets. These services directly affect household welfare. The poor typically get much less than a fair share of such services. This is partly because governments do not invest enough to ensure an adequate supply of these services and the limited supply is mainly availed by non-poor households. Further, the poor may not have adequate access for a variety of other reasons like lack access to information about the existence of such services, lack of knowledge and corruption.

### 4.5.5 Lack of access to Institutional Credit

The banks and other financial institutions are biased in the provision of loans to the poor for the fear of default in the repayment of loans. Further, the rules regarding collateral security, documentary evidences etc. present constraints for the poor to avail loan facility from banks. The inaccessibility to institutional credit may force poor to take credit from the landlord or other informal sources at a very high interest rate and which in turn may weaken their position in other areas, leading, for example, to the payment of abnormally high rental shares for land, or acceptance of abnormally low wages in various types of “bonded labour”





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arrangements or selling their crop at a very low price. In some cases poor people cannot make themselves free from the clutches of moneylenders. Their poverty is further accentuated because of indebtedness. Such indebted families continue to remain under the poverty line for generations because of this debt-trap.

#### 4.5.6 Price Rise

The rising prices have reduced the purchasing power of money and thus have reduced the real value of money income. The people belonging to low income group are compelled to reduce their consumption and thus move below the poverty line.

#### 4.5.7 Lack of Productive Employment

The magnitude of poverty is directly linked to unemployment situation. The present employment conditions don't permit a reasonable level of living causing poverty. The lack of productive employment is mainly due to problems of infrastructure, inputs, credit, technology and marketing support. The gainful employment opportunities are lacking in the system.

#### 4.5.8 Rapid Population Growth:

The faster population growth obviously means a slower growth in per capita incomes for any given rate of growth of gross domestic product (GDP), and therefore a slower rate of improvement in average living standards. Further the increased population growth increase consumption and reduces national savings and adversely affects the capital formation thereby limiting the growth in the national income.

#### 4.5.9 Low Productivity in Agriculture

The level of productivity in agriculture is low due to subdivided and fragmented holdings, lack of capital, use of traditional methods of cultivation, illiteracy etc. This is the main cause of poverty in the rural India.

#### 4.5.10 Social Causes

- (i) **Education:** Education is an agent of social change. Poverty is also said to be closely related to the levels of schooling and these two have a circular relationship. The earning power is affected by investment in individual's education and training. However, poor people do not have the funds for human capital investment and thus it limits their income.
- (ii) **Caste system:** Caste system in India has always been responsible for rural poverty. The subordination of the low caste people by the high caste people

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caused the poverty of the former. Due to rigid caste system, the low caste people could not participate in various economic activities and so remain poor.

- (iv) **Social customs:** The rural people generally spend a large percentage of annual earnings on social ceremonies like marriage, death feast etc. and borrow largely to meet these requirements. As a result, they remain in debt and poverty.

### 4.6 POVERTY ALLEVIATION AND EMPLOYMENT GENERATION PROGRAMMES IN INDIA

The government is following a focused approach through various flagship schemes in the areas of poverty alleviation and employment generation to achieve inclusive development.

#### 4.6.1 Mahatma Gandhi National Rural Employment Guarantee Work (MGNREGA)

This flagship programme of the government aims at enhancing livelihood security of households in rural areas by providing at least one hundred days of guaranteed wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work with the stipulation of one-third participation of women. The MGNREGA provides wage employment while also focusing on strengthening natural resource management through works that address causes of chronic poverty like drought, deforestation, and soil erosion and thus encourage sustainable development.

#### 4.6.2 National Rural Livelihood Mission (NRLM)- Aajeevika

The Swarnjayanti Gram Swarozgar Yojana (SGSY)/ NRLM a self-employment programme implemented since April 1999 aims at lifting the assisted rural poor families (swarozgaris) above the poverty line by providing them income-generating assets through a mix of bank credit and government subsidy. The rural poor are organized into self-help groups (SHGs) and their capacities are built through training and skill development.

#### 4.6.3 Swarna Jayanti Shahari Rozgar Yojana (SJSRY)

The SJSRY launched on 1 December 1997 aims at providing gainful employment to the urban unemployed and underemployed, by encouraging them to set up self-employment ventures or creating wage employment opportunities.



## INTEXT QUESTIONS 4.2

1. Explain the concept of poverty line in India.
2. How does availability of institutional credit impact the level of poverty in India
3. What do you mean by vicious circle of poverty?

## 4.7 INEQUALITY IN INDIA

India is a vibrant country with quite an impressive economic growth profile and as expected, improvement in economic growth and per capita income has translated, at least partly, into reduction in the level of poverty in the country. It is a fact that there has been a secular decline in the share of poor in the population. However, there exists a wide spread disparities in the levels of social-economic development between the different regions of the country. The huge differences in living standards as measured by per capita incomes, across the States of India range from 12000 rupees per head in Bihar to nearly 100,000 rupees per head in Goa. They are the product of history and past growth experience. There are also other related disparities in the levels of education, literacy, health, infrastructure, population growth, investment expenditure and the structure of regions. The regional disparity in the last decade shows that India has a vast array of richer and poorer regions with Goa being the richest region and Bihar the poorest. In 2010/11, Chandigarh was the richest, but Bihar remained the poorest. There are also substantial variations in the average annual growth rate over the period, ranging from an impressive 8.39 per cent in Chandigarh to a sluggish 2.71 per cent in Jammu & Kashmir. Further, during this decade, the top four richest regions (viz, Goa, Chandigarh, Delhi and Puducherry) have high initial levels of GDSP (Gross Domestic State Product) per head and very fast growth over the period as compared to the other regions.

## 4.8 CAUSES OF GROWING REGIONAL DISPARITIES IN INDIA

### 4.8.1. Historical Factors

Historically regional imbalance in India started from its British regime. British industrialist mostly preferred to concentrate their activities in two states like west Bengal and Maharashtra and more particularly to their metropolitan cities like Kolkata, Mumbai and Chennai. They concentrated all their industries in and around these cities neglecting the rest of the country to remain backward.



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#### 4.8.2 Geographical factors

The difficult terrain surrounded by hills rivers and dense forest, leads to increase in the cost of administration, cost of development projects, besides making mobilization of resources partially difficult. Adverse climate and floods are also responsible factors for poor rate of economic development of different regions of the country as reflected by low agricultural productivity and lack of industrialization. These factors have resulted in uneven growth of different regions of India.

#### 4.8.3 Infrastructure

The states with well-developed basic infrastructure such as power, water, roads and airport attracts the big investment projects and so has witnessed a very high growth rate. The poorer states on other hand lacking the basic infrastructure fails to attract private investments. This has accentuated the problem of inequality in the distribution of income and concentration of economic power.

#### 4.8.4 Decline in Public Investment

In the new economic policy the Government has been continuously limiting its role with respect to participation in economic activity and has given more space to the private sector. There has been a steady decline in the public investment. This has adversely affected the poorer states. Since the public investment is a major contributor to growth of these States through bulk investments on irrigation, power and social sector projects decline in the same has adversely affected the process of development of many regions.



#### INTEXT QUESTIONS 4.3

1. The percentage of labour force that is unemployed is the:
  - (a) employment rate
  - (b) Unemployment Population Ratio.
  - (c) Unemployment rate.
  - (d) Labour force rate.
2. The labour force can be defined as:
  - (a) Those of workers who are seeking work and are available for work at current wage rate.
  - (b) Anyone who is working or actively seeking work.
  - (c) The population between school-leaving age and retirement age.
  - (d) Those who could claim benefit if they were to become unemployed.
3. Cyclical Unemployment is the:

- (a) Unemployment that results when people become discouraged about their chances of finding a job so that they stop looking for work
  - (b) Unemployment that occurs during recessions and depressions.
  - (c) portion of unemployment that is due to the normal working of the labour market.
  - (d) portion of unemployment that is due to changes in the structure of the economy that results in a significant loss of jobs in certain industries.
4. Which among the following is the method to estimate the poverty line in India?
- (a) Investment method
  - (b) Capital method
  - (c) Human method
  - (d) Income method.
5. Who conducts the periodical sample survey for estimating the poverty line in India?
- (a) National Survey Organisation
  - (b) National Sample Survey Organisation
  - (c) Sample Survey Organisation
  - (d) None of the above.
6. For how many days MNREGA provides employment?
- (a) 70
  - (b) 80
  - (c) 90
  - (d) 100



### WHAT YOU HAVE LEARNT

- An able bodied person who is willing to work but he is not getting any job is called an unemployed person.
- Cyclical unemployment occurs during the time of recession where there is fall in aggregate demand in the economy.
- Seasonal unemployment is mostly found in agriculture sector, tourism etc.
- Structural unemployment is caused due to lack of adjustment of the labour force with the change in demand.
- Frictional unemployment is created when a person searches for a better job or losses his current job.
- Disguised unemployment is a situation where marginal product of labour is zero.

## MODULE - 2

Current challenges before the Indian Economy



Notes

## MODULE - 2

Current challenges before  
the Indian Economy



Notes

### The Problem of Unemployment, Poverty and Inequality

- Underemployment is a situation where in a person does not receive the remuneration he/she deserves from his/her present occupation and also his/her capabilities are not fully used.
- Unemployment rate is defined as the percent of the labour force that is without work.
- There are following measures of unemployment in India- Usual Principal Status (UPS), Usual Principal and Subsidiary Status Unemployment (UPSS), Current Weekly Status (CWS) and Current Daily Status (CDS).
- UPS refers to a person who could not find a job for major part of the year.
- UPSS refers to a person who could not find a job for even on a subsidiary basis for a major part of the year.
- CWS refers to a person who could not get a job even for an hour in a week.
- CDS refers to a person who could not find a job in the reference day.
- Causes of unemployment in India include: Slow Economic Growth, Rapid Population Growth, Rural-Urban Migration, Backward Technology, Lack of Education and Lack of Infrastructure.
- Poverty line is defined as the level of income or expenditure below which a person cannot sustain himself/herself at the on going market price. Poverty Line has changed over time in India.
- Causes of Poverty in India include: Lack of Resources, Income Inequality, Lack of Access to Social Services, Lack of Access to Institutional Credit, Unemployment, Inflation etc.
- Some of the antipoverty programmes of the government include: MGNREGA, NRLM, SJSRY,
- Inequality in income distribution and regional inequality are major threat to Indian economic development.



### TERMINAL EXERCISE

1. What are the causes of unemployment in India?
2. Discuss the causes of poverty in India.
3. Briefly explain various poverty alleviation programmes implemented by Government of India in recent years.
4. Explain the dimension of regional inequality in India.
5. What are causes of regional inequality in India?



## ANSWER TO INTEXT QUESTIONS

### 4.1

1. See section 4.2
2. See section 4.3.2

### 4.2

1. Poverty line (see section 4.4.1)
2. See sec 4.5.4
3. See section 4.5.1

### 4.3

1. (c)
2. (a)
3. (b)
4. (d)
5. (b)
6. (d)

## MODULE - 2

Current challenges before  
the Indian Economy



Notes





**MODULE - III**  
**INTRODUCTION TO STATISTICS**

- 5. Meaning, Scope and its Need in Economics
- 6. Collection and Classification of Data
- 7. Presentation of Data



## 5



Notes

## MEANING, SCOPE AND ITS NEED IN ECONOMICS

All of us want to know about everyday life around us. We can know about the nature of things both quantitatively and qualitatively. Many times we can express things better in quantitative terms, that is, in numbers. For example, by comparing the per capita income of India and the United States, we can say that India is a developing economy while United States is a developed economy.

The word ‘Statistics’ is derived from the Latin word ‘statis’ or the Italian word ‘statisti’ or German word ‘statistic.’ All these words mean a political state. In the olden days statistics was necessary for the proper functioning of the affairs of a state. Thus, in those days Statistics was called as ‘science of state’ or ‘science of kings’ as it was mainly used by the state or kings. Today statistics is defined as a field of study relating to the collection analysis, interpretation and presentation of data. In this lesson you will learn about the meaning of statistics and its scope and its need in economics.



### OBJECTIVES

After completing this lesson, you will be able to:

- explain the need and scope of statistics in Economics;
- describe the importance of statistics in Economics;
- know the characteristics of statistical data;
- carry out statistical enquiry;
- identify sources of statistical data; and
- explain the functions and limitations of statistics.



Notes

## 5.1 NEED AND SCOPE OF STATISTICS

### (a) Need for Statistical Data

Statistics plays a very important role in the field of economics. There is need of statistical data in every walk of life. No field of study is complete without the supporting quantitative information about that field. Some of the ways in which statistics is widely used in economics are as follows:

- (i) **In Construction of Economic Theories:** An economic theory is first developed on the basis of what we observe in real life. It is then approved or disapproved by the analysis of statistical data relevant to the observation. For example, it is observed that consumers demand less at higher prices. This observation takes the shape of a theory when it is confirmed from actual statistical data that consumers really demand less at higher prices.
- (ii) **In Economic Planning:** Statistics is an important tool of economic planning. Planners use statistical data to formulate policies for economic development. For example, India is an over populated country. However, the extent of over population can be revealed by data on population and resources available to support the population. Effective policies to control population can be framed only after we know how much over-populated India is.
- (iii) **In evaluation of policies of the government:** It is not only enough to implement policies but also necessary to know whether the implementation has been proper or not. Statistical data helps us to evaluate the policies of the government. For example, how much revenue did the government get through higher taxes? It is through statistical investigations that the Finance Minister gets feedback on the taxes paid by the people and the revenue accrued to the government.
- (iv) **To reveal the structure of an economy:** We study the structure of an economy with the help of data on population, natural resources, employment, national income, production, exports, imports etc. The statistical knowledge about these helps us to know about the structure of the economy and the changes in the structure of the economy.

### (b) Scope of Statistics

In ancient times, statistics was used by the state for the purpose of administration. But now a days, it is widely used as a tool of all sciences. There is hardly any field whether it be biology, botany, astronomy, physics, chemistry, sociology, or psychology where statistical tools are not used. The word statistics is used in two senses: (a) the plural sense and (b) the singular sense. In a plural sense it refers to quantitative information or simply statistical data. In singular sense, it refers to

method or methods used in arriving at the quantitative information or dealing with it. We can explain the difference between the two with the help of following example:

**Table 5.1: Growth of Population in India**

Year	Population (in crores)
1951	36.1
1961	43.9
1971	54.8
1981	68.5
1991	84.6
2001	102.87
2011	121.01

**Source:** Census of 2011 Population.

The above table 5.1 records population of India in different years. Here we are referring only to the quantitative information about population. We are using the word statistics in the plural sense in this case.

When we say that population of India was estimated through the census method; that the figures are presented in the tabular form; that population of India is continuously rising and that it is rising on account of fall in death rate, we are referring to the methods of collection, presentation, interpretation of trend in data and analysis of data respectively. All these steps are statistical methods. Here we are using the word statistics in the singular sense.

### Importance of Statistics in Economics

There are number of economic laws which have evolved due to statistical analysis in the field of economics, e.g. Engel's law of family expenditure, Malthus theory of population etc. Let us understand the importance of statistics keeping in view the various parts of economics.

- (a) **Statistics and the study of consumption:** Every individual needs a certain number of things. He spends first on necessities, then on comforts and luxuries, which depend on his income. We discover how different groups spend their income on different items of consumption with the help of statistics.



Notes

## MODULE - 3

### Introduction to Statistics



Notes

### Meaning, Scope and Its Need in Economics

- (b) **Statistics and the study of production:** The progress of production every year can easily be measured by statistics. The comparative study of productivity of various elements of production (e.g. land, labour, capital and entrepreneurship) is also done with the help of statistics. The statistics of production are very helpful for adjustment of demand and supply.
- (c) **Statistics and the study of exchange:** Production is based on national and international demand. A producer needs statistics for deciding the cost of production and selling price so that he can study competition and demand of commodity in a market. The law of price determination and cost price which are based on the various market conditions and demand and supply can be studied with the help of statistics.
- (d) **Statistics and the study of distribution:** Statistics are helpful in calculation of national income in the field of distribution statistical methods are used in solving the problem of the distribution of national income. Various problems arise due to unequal distribution of wealth and national income and are solved with the help of statistical data.



### INTEXT QUESTIONS 5.1

- Fill in the blanks with appropriate word from the brackets;
  - What was 'statistics' called in the ancient times .....  
(science of knowledge, science of state).
  - Statistics is an important tool of .....  
(methods, economics planning).
  - The word statistics in singular sense refers to statistical .....  
(method, data).
- Which of the following refers to (quantitative/qualitative) information.
  - Sita's height is 5'6"., where as Meera is 5'-0".
  - Sita is taller than Meera.
  - Foodgrain production in India was estimated at 199.5 million tones in 2000-01.
  - Anju is the shortest girl in her class.

### 5.2 MEANING OF STATISTICS

#### 5.2.1 Statistics in plural sense

In plural sense statistics means statistical data "By statistics we mean aggregate of facts affected to a market extent by multiplicity of causes numerically expressed enumerate or estimated according to a reasonable standard of accuracy, collected

in a systematic manner for a predetermined purpose and plural in relations to each other”

In plural sense, facts expressed numerically are called statistics such as data relating to income, production, population, prices etc. In other words, statistics mean numerical statement of facts. How do the statistical data look like? Table 5.1 is an example of statistical data.

It gives information about population of India.

Here we are referring only to the quantitative information about population. We are using the word statistics in the plural sense in this case.

**Notes**

### 5.2.1.1 Characteristics of Statistical Data

- (i) **Statistical data are aggregates of facts:** A single observation is not statistics, it is a group of observations. For example, Ram scored 60 marks out of 100 is not statistics, but a series relating to the marks of a group of students will be termed as statistics. For example, when we say that Mohan, Ram, Mary and Karim scored 35, 60, 75 and 58 marks respectively, the group of figures become statistics. Now we can compare, analyse and draw some conclusions from these figures.

**For example:**

1. Highest marks obtained are 75.
2. Lowest marks obtained are 35.
3. Marks range between 35 and 75.
4. Average marks obtained =  $\frac{35 + 60 + 75 + 58}{4} = 57$  marks

- (ii) **Statistics are affected by multiplicity of causes :** Generally the facts and figures are affected by a number of factors working together. For example, the production of rice depends on rainfall, method of cultivation, seeds, manure, soil fertility etc. but it is very difficult to study separately the effect of each of these factors on the production of rice.
- (iii) **Statistical data are numerically expressed :** All statistics are numerically expressed. Qualitative statements such as ‘the population of India is increasing rapidly’ or ‘India’s per capita income is low’ are not statistics unless they are assigned numerical values.

## MODULE - 3

### Introduction to Statistics



Notes

### Meaning, Scope and Its Need in Economics

- (iv) **Collected in a systematic manner :** Statistics should be collected systematically in a planned way. Before collecting data, a suitable plan for their collection should be prepared. Data collected in an unsystematic manner would lead to misleading conclusions.
- (v) **Statistical data must be obtained with reasonable degree of accuracy :** Statistics are numerical statements which can be obtained with accuracy if the number of observations is small. Sometimes, when actual measurement of figures is not possible in a particular field of inquiry, then method of estimation or approximation is applied. For example, if we say that there are 30 students in XI class of XYZ public school, the figure is 100 percent accurate if we apply counting method. But, on the other hand, if we say that 20,000 people are watching the cricket match, this figure can be obtained only by estimation method i.e. as an approximation. But even this estimation must have a reasonable degree of accuracy to make sense.
- (iv) **Statistics are collected for a predetermined purpose :** The purpose of collecting data should be decided in advance. The purpose should be clearly defined. Otherwise, collected data will be of no use. Suppose, we want to compare the performance of students at secondary level of National Institute of Open Schooling in one subject or more. We must specify the subjects and the year for which comparison is being carried out before collecting data.



### INTEXT QUESTIONS 5.2

1. Tick (✓) the correct answers Statistical data are:
  - (i) Numerical statement of facts.
  - (ii) Qualitative information.
  - (iii) Both quantitative and qualitative information.
  - (iv) Single or isolated facts and figures
  - (v) Aggregates of facts
2. State whether the following statements are true or false.
  - (i) Statistics are numerical statements of facts.
  - (ii) Statistical data are not single or isolated figures.
  - (iii) Statistical data are qualitative data.
  - (iv) Statistics are collected for a predetermined purpose.



### 5.2.2 Statistics in Singular Sense

In the singular sense, statistics means science of statistics or statistical methods. It refers to techniques or methods relating to collection, classification, presentation, analysis and interpretation of quantitative data. These are the stages through which every statistical enquiry has to pass through. We shall discuss these stages one by one.



Notes

#### 5.2.2.1 Stages of Statistical Enquiry

Studying statistics in the singular sense implies the knowledge of various stages of statistical study.

- (i) **Collection of data:** Collection of data is the first step of a statistical enquiry. Statistical data are mainly classified into primary and secondary data. Primary data are data collected directly through survey, directly from first hand sources by means of surveys, observations or experimentations. These are data that has not been previously published.

Secondary data are data collected from other sources including published and online resources. For example, Reserve Bank of India Bulletin and National Accounts Statistics are published data i.e. Secondary data. You will read more about primary and secondary data in the next lesson.

- (ii) **Organisation of Data :** Organisation of the data refers to the arrangement of data in such a form that comparison of the mass of similar data may be facilitated and further analysis may be possible. An important method of organization of data is to distribute data into different classes or sub-classes on the basis of their characteristics. This process is called classification of data.
- (iii) **Presentation of data :** The presentation of data means exhibition of the data in such a clear and attractive manner that these are easily understood and analysed. There are many forms of presentation of data of which the following three are well known: textual or descriptive presentation, tabular presentation and diagrammatic presentation. You will study more about this in the next lesson.
- (iv) **Analysis of data :** After the data have been collected, organized and presented, they need to be analysed. Analysis of data is a technique through which significant facts from the numerical data are extracted. One of the most important objects of statistical analysis is to get one single value that describes the characteristic of the whole data. Analysis of an economic or other problems is not possible without the use of certain statistical tools such as measures of central tendency like mean, median or mode.



Notes

- (v) **Interpretation of data :** Interpretation of data is the last stage of a statistical enquiry. After making analysis with the help of statistical tools, we interpret the data to derive some conclusions in order to formulate certain policies. Interpretation must be done carefully, as wrong interpretation will lead to formulation of wrong policies and hence do more harm than good.

### 5.3 FUNCTIONS OF STATISTICS

Main functions of statistics are given below:

- (i) **Statistics simplifies complex data:** With the help of statistics a mass of data can be presented in such a manner that they become easy to understand e.g. the complex data may be presented in the form of totals, averages, percentages etc.
- (ii) **Statistics presents the facts in a definite form:** By stating conclusions in a numerical or quantitative form, we can achieve definiteness.
- (iii) **Statistics provides a technique of comparison:** By using statistical tools such as average ratios, percentages etc. data can be made comparable for drawing conclusion.
- (iv) **Statistics studies relationship:** Correlation analysis is used to discover functional relationship between different phenomena e.g. the relationship between demand and supply, the relationship between advertisement and sales can easily be explained with the help of correlation analysis.
- (v) **Statistics helps in formulating policies:** Many policies are framed on the basis of statistics like import, export, wage-policy etc.
- (vi) **Statistics helps in forecasting:** The future behaviour of phenomena such as market situation for the future is predicted on the basis of available statistics of past and present.
- (vii) **Statistics help to test and formulate theories:** Statistical data and techniques are useful while testing theories e.g. whether increase in demand affects the price can be tested by collecting and comparing the relevant data.

#### Limitation of statistics

- (i) **It does not study the qualitative aspect of a problem:** Statistics studies only the facts which can be measured quantitatively but qualitative phenomena like honesty, intelligence, poverty etc. cannot be studied in statistics unless these attributes are expressed in terms of numerals.
- (ii) **It does not study individuals:** Statistics studies aggregates of facts but individual values of the observation like income of a family has no specific importance.
- (iii) **Statistical laws are true only on an average:** Since the results are affected by a large number of causes, laws of statistics are not universally applicable.

- (iv) **Statistics can be misused:** The results obtained with the help of statistics can be manipulated according to one's own interest which can mislead the community.
- (v) **Statistical results lack mathematical accuracy:** The results drawn from statistical analysis are normally in approximations. So statistical studies are a failure in the fields where cent per cent accuracy is desired.



Notes



### INTEXT QUESTIONS 5.3

1. Complete the following statements:
  - (i) Statistics in plural sense means .....
  - (ii) Statistics in singular sense means .....
  - (iii) Statistical data are collected in a .....
  - (iv) The first step in statistical enquiry is .....
  - (v) The last step in statistical enquiry is .....
  - (vi) Analysis of data means drawing conclusions from data with the help of .....
  - (vii) Reserve Bank of India Bulletin and National Accounts Statistics are sources of ..... data.
2. Match the following:
 

(a) Collection of data	1. Mean, mode and median.
(b) Presentation of data	2. Primary or secondary sources.
(c) Analysis of data	3. Arriving at conclusions.
(d) Interpretation of data	4. Tables, diagrams and picture.



### WHAT YOU HAVE LEARNT

- Statistics plays a very important role in economics
- Statistics is used (i) in construction of economic theories (ii) in planning (iii) in evaluation of policies of the government and (iv) to reveal the structure of an economy.
- The word statistics is used in two senses. In a plural sense, statistics refers to quantitative information or statistical data. In a singular sense it is termed as statistical methods. It means the science of collection, organization, presentation, analysis and interpretation of statistical data.

## MODULE - 3

### Introduction to Statistics



#### Notes

#### Meaning, Scope and Its Need in Economics

- Statistical data are (i) aggregates of facts, (ii) affected by multiplicity of causes, (iii) numerically expressed, (iv) collected in a systematic manner (v) accurate to a reasonable degree or standard, and (vi) collected for a predetermined purpose.
- A statistical enquiry passes through the stages of collection, presentation, analysis and interpretation of data.
- Sources of statistical data are primary and secondary.
- Statistical data is presented in the form of tables, graphs, diagrams and pictures.
- Statistics:
  - (i) simplifies complex data,
  - (ii) presents the facts in definite form
  - (iii) provides a technique of comparison,
  - (iv) studies relationship,
  - (v) helps in formulating policies,
  - (vi) helps in forecasting,
  - (vii) helps to test and formulate theories.
- Limitations of statistics are:
  - (i) it does not study the qualitative aspect of a problem
  - (ii) it does not study individual
  - (iii) statistical laws are true only on an average
  - (iv) statistics can be misused
  - (v) statistical results lack mathematical accuracy.



#### TERMINAL EXERCISE

1. State the need of statistics in economics.
2. Describe in brief the scope of statistics.
3. Define statistics in plural and singular sense.
4. Define the term statistics in the plural sense and point out its main characteristics.
5. State briefly the various stages of a statistical enquiry.
6. What are the principal sources of data?
7. Describe any four limitations of statistics.

8. What are the limitation of statistics?
9. What is the importance of statistics in the field of business and economics?



### ANSWERS TO INTEXT QUESTIONS

#### 5.1

1. (i) Science of state  
(ii) Economic planning  
(iii) Methods
2. (i) Quantitative information  
(ii) Qualitative information  
(iii) Quantitative information  
(iv) Qualitative information

#### 5.2

1. (i) and (v)
2. (i) True      (ii) True      (iii) False      (iv) True

#### 5.3

1. (i) Statistical data      (ii) Statistical methods  
(iii) Systematic manner      (iv) Collection of data  
(v) Interpretation of data      (vi) Statistical tools  
(vii) Secondary
2. (a) 2      (b) 4      (c) 1      (d) 3

#### Terminal Exercise

1. Read Section 5.1 (a)
2. Read Section 5.1 (b)
3. Read Section 5.2 and 5.3
4. Read Section 5.2 (b)
5. Read Section 5.3 (b)
6. Read Section 5.3 (b) (i) 5.3 (b) (i)



Notes



Notes

# 6

## COLLECTION AND CLASSIFICATION OF DATA

In the previous lesson, you have learnt about the meaning and scope of statistics and its need in Economics. In this lesson you will learn about the techniques of collecting, organizing and condensing of data. These techniques are necessary for making the statistical data meaningful.



### OBJECTIVES

After completing this lesson, you will be able to:

- distinguish between primary and secondary data;
- list the methods of collecting primary data;
- give some examples of sources of secondary data;
- explain the concepts of an array, frequency array and frequency distribution;
- state different methods of constructing frequency distribution; and
- construct simple and cumulative frequency distributions from a given data.

### 6.1 COLLECTION OF DATA

#### (a) Primary vs. Secondary Data

Data can be collected in two different ways. One way is to collect data directly from the respondent. The person who answers the questions of the investigator is called respondent. Statistical information thus collected is called primary data and the source of such information is called primary source. This data are original because it is collected for the first time by the investigator himself. For example, if the investigator collects the information about the salaries of National Institute of

Open Schooling employees by approaching them, then it is primary data for him.

Another way is to adopt the data already collected by someone else. The investigator only adopts the data. Statistical information thus obtained is called secondary data. The source of such information is called secondary source. For example, if the investigator collects the information about the salaries of employees of National Institute of Open Schooling from the salary register maintained by its accounts branch, then it is secondary data for him.



Notes

### (b) Methods for collecting primary data

There are several methods for collecting primary data. Some of which are:

1. **Direct personal interview :** In this method investigator (also called interviewer) has to be face-to-face with the person from whom he wants information. The person from whom this information is collected to called respondent.
2. **Indirect oral investigation :** Under this method data are collected through indirect sources. Under this method questions relating to the inquiry are put to different persons and their answers are recorded. This method is most suitable when the person from whom the information is sought is either unavailable or unwilling.
3. **Questionnaire method :** In this method a list of questions called questionnaire is prepared and sent to respondents either through post or given personally to them. This method is suitable where the field of inquiry is wide.

There are some advantages of using primary data. The investigator can collect the data according to his requirement. It is reliable and sufficient for the purpose of investigation. However, it suffers from disadvantages also in that it involves a lot of cost in terms of money, time and energy. This make unsuitable when field of enquiry is very very large. Many a times with some modifications, same purpose may be served by using data collected by other persons or agencies.

### (c) Sources of secondary data

As already discussed secondary data are not collected by the investigator himself but they are obtained by him from other source. Broadly, there are two sources:

(a) Published data and (b) Unpublished data.

#### I. Published Sources

There are certain agencies which collect the data and publish them in the form of either regular journals or reports. These agencies/sources are known as published sources of data.

## MODULE - 3

### Introduction to Statistics



#### Notes

### Collection and Classification of Data

In India some of the published sources are:

- 1. Central Statistical Organisation (CSO) :** It publishes data on national income, savings, capital formation etc., in a publication called National Accounts Statistics.
- 2. National Sample Survey Organisation (NSSO) :** This organization which is under the Ministry of Finance provides data on all aspects of national economy, such as agriculture, industry, employment and poverty etc.
- 3. Reserve Bank of India (RBI) :** It publishes financial statistics. Its publications are Report on Currency and Finance, Reserve Bank of India Bulletin and Statistical Tables Relating to Banks in India etc.
- 4. Labour Bureau :** Its publications are Indian Labour Statistics, Indian Labour Year Book and Indian Labour Journal.
- 5. Population Census :** It is undertaken by the office of the Registrar General, Census of India, Ministry of Home Affairs. It provides us statistics on population, per capita income, literacy rate etc.
- 6. Papers and Magazines :** Journals like 'Capital', 'Commerce', Economic and Political Weekly', and newspapers likes 'The Economic Times' etc. also publish important statistical data.

### II. Unpublished Sources

Secondary data are also available from unpublished sources, because all statistical data is not always published. For example, information recorded in various government and private offices, studies made by research scholars etc. can be important sources of secondary data.



#### INTEXT QUESTION 6.1

- Fill in the blanks with suitable words given in brackets against each:
  - ..... data are original. (Primary, Secondary)
  - ..... Primary data are collected by the ..... himself. (respondent, investigator)
  - CSO publishes data on ..... (national income, population)
- State whether the following statements are true or false:
  - Secondary data are collected by the investigator himself.
  - Reserve Bank of India Bulletin represents an unpublished source of data.
  - A person from whom an investigator tries to get information is called respondent.



**6.2 ORGANISING AND CONDENSING DATA**

Suppose a statistical investigator wants to analyse the marks obtained by 40 students in a class. He collects data and finds that marks obtained by 40 students in the class are:

20	25	28	27	34	31	30	32	33	40
43	43	40	43	42	43	42	45	43	47
48	46	47	48	46	49	58	54	56	50
53	51	39	38	36	38	35	35	37	

Put yourself in the position of investigator. In which aspect of this data you will be interested? Perhaps you would be interested in knowing the highest marks obtained by any student. You may also be interested to know the lowest marks obtained by a student. Another point of interest can be the marks level around which most of the students have obtained.

The above data are unorganized. To refine this data for comparison and analysis it should be arranged in an orderly sequence or into groups on the basis of some similarity. This whole process of arranging and grouping the data into some meaningful arrangement is a first step towards analysis of data. Data can be arranged in two forms: (a) Arrays and (b) Frequency distributions.

**(a) Arrays**

A method of presenting an individual series is a simple array of data. An orderly arrangement of raw data is called 'Array'. Arrays are of two types: (i) Simple array, and (ii) Frequency array.

- (i) **Simple Array** : A simple array is an arrangement of data in ascending or descending order. Let us construct the simple arrays of the data about the marks of 40 students. The data in table 6.1 is arranged in ascending order and in table 6.2 in descending order.

**Table 6.1: Ascending Array of the Marks obtained by 40 students in class**

20	35	42	47
25	36	43	48
27	37	43	48
28	38	43	49
30	38	43	50



**Notes**

## MODULE - 3

### Introduction to Statistics



Notes

### Collection and Classification of Data

31	39	43	51
32	40	45	53
33	40	46	54
34	40	46	56
35	42	47	58

**Table 6.2: Descending Array of the Marks obtained by 40 students in class**

58	47	42	35
56	46	40	34
54	46	40	33
53	45	40	32
51	43	39	31
50	43	38	30
49	43	38	28
48	43	37	27
48	43	36	26
47	42	35	20

The above arrays reveal information on two points clearly. One, the highest marks obtained by any student are 58. Two, the lowest marks obtained by any student are 20.

Organising the data in the form of simple array is convenient if number of items is small. As the number of items increase the series becomes too long and unmanageable. As such there is need to condense data. Making a frequency array is one method of condensing data.

**(ii) Frequency Array :** Frequency array is a series formed on the basis of frequency with which each item is repeated in series. The main steps in constructing frequency array are:

1. Prepare a table with three columns-first for values of items, second for tally sheet and third for corresponding frequency. Frequency means the number of times a value appears in a series. For example in table 6.1 the marks 43 appears five times. So frequency of 43 is 5.

2. Put the items in first column in a ascending order in such a way that one item is reordered once only.
3. Prepare the tally sheet in second column marking one bar for one item. Make blocks of five tally bars to avoid mistake in counting. Note that every fifth bar is shown by crossing the previous four bars like e.g., ///.
4. Count the tally bars and record the total number in third column. This column will represent the frequencies of corresponding items.

Let us now explain construction of frequency array of the marks obtained by 40 students. In table 6.3 data about the marks is arranged in an ascending order in first column. It helps to find not only the maximum and minimum values but also makes it easy to draw bars.

Now for each mark level make one bar (/) in second column and cross the item from the data.

**Table 6.3 Frequency array of marks obtained by 40 students**

Marks(X)	Tally Sheet	Frequency
20	/	1
25	/	1
27	/	1
28	/	1
30	/	1
31	/	1
32	/	1
33	/	1
34	/	1
35	//	2
36	/	1
37	/	1
38	//	2
39	/	1
40	///	3
41	//	2
42	//	2
43	////	5
45	/	1



**Notes**

## MODULE - 3

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Notes

### Collection and Classification of Data

46	//	2
47	//	2
48	/	1
49	/	1
50	/	1
51	/	1
53	/	1
54	/	1
56	/	1
58	/	1
		Total Frequency = 40

The main limitations of frequency array is that it does not give the idea of the characteristics of a group. For example it does not tell us that how many students have obtained marks between 40 and 45. Therefore it is not possible to compare characteristics of different groups. This limitation is removed by frequency distribution.



### INTEXT QUESTIONS 6.2

Fill in the blanks with appropriate word from the brackets:

- A simple array is an arrangements of data in ..... (only ascending order, only descending order, either ascending or descending order).
- Organising data in simple array is convenient if number of items are ..... (large, small).
- Arranging the data in the form of ..... array is more convenient if number of items are large. (simple, frequency).
- Frequency array ..... the idea of characteristics of a group. (gives, does not give)

### 6.3 FREQUENCY DISTRIBUTION

Data in a frequency array is ungrouped data. To group the data we need to make a 'frequency distribution'. A frequency distribution classifies the data into groups. For example, it tells us how many students have secured marks between 40 and 45.

Before constructing frequency distribution, it is necessary to learn the following important concepts (see tables 6.4 and 6.5) :

1. **Class :** Class is a group of magnitudes having two ends called class limits. For example, 20-25, 25-30 etc. or 20-24, 25-29 etc. as the case may be, each represents a class.
2. **Class Limits :** Every class has two boundaries or limits called lower limit ( $L_1$ ) and upper limit ( $L_2$ ). For example in the class (20-30)  $L_1 = 20$  and  $L_2 = 30$ .
3. **Class Interval :** The difference between two limits of a class is called class interval. It is equal to upper limit minus lower limit. It is also called class width. Class interval =  $L_2 - L_1$ . For  $30 - 20 = 10$ .
4. **Class Frequency :** Total number of items falling in a class that is having the value within  $L_1$  and  $L_2$  is class frequency. For example in table 6.4 class frequency in class (40-45) is 10. Similarly in class (50-55) the frequency is 4.
5. **Mid-Point/Mid-Value(M.V.) :** The mid-value of the class interval of a class also called as mid-point is obtained by dividing the sum of lower limit and upper limit of the class by 2. It is the average value of two limits of a class. It falls just in the middle of a class is

$$\text{M.V.} = \frac{L_1 + L_2}{2}$$

For example, the mid-value of class (20-30) is  $\frac{20+30}{2} = 25$

### Construction of Frequency Distribution

Frequency distributions can be constructed in many ways. We will explain here the construction of the following types:

- (a) Exclusive series
- (b) Inclusive series
- (c) Open end classes
- (d) Cumulative frequency

While constructing a frequency distribution same steps are to be taken which we have followed in the frequency array. The only difference is that we record classes like (20-25), (25-30), (30-35)....(55-60) etc., in first column in place of absolute items like 20, 25,...56,58 etc.

**(a) Exclusive series:** In this type one of the class limits (generally upper limit  $L_2$ ) is excluded while making a tally sheet. Any item having the value equal to the upper limit of a class is counted in the next class. For example, in a class of (20-25) all items having the value of 20 and more but less than 25 will be counted in this class.



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Item having the value of 25 will be counted in next class of (25-30) as is clear from the following example, Using the same data as given in making a frequency array and taking class interval of 5, a frequency distribution of exclusive type will be as under:

**Table 6.4: Construction of Frequency Distribution – “Exclusive Type”**

Class	Tally Sheet (Tallies)	Frequency (f)
20-25	/	1
25-30	///	3
30-35		5
35-40	/	7
40-45	/	10
45-50	/	8
50-55		4
55-60	//	2
		Total Frequency = 40

(b) **Inclusive Series :** In this type the lower limit of next class is increased by one over the upper limit of previous class. Both the items having value equal to lower and upper limit of a class are counted or included in the same class. That is why such a frequency distribution is called inclusive type. For example in the class (20-24) both 20 and 24 will be included in the same class. Similarly in the class (40-44) both 40 and 44 will be included. The following table has been formed on the basis of same data as taken in the exclusive type.

**Table 6.5: Construction of Frequency Distribution – “Inclusive Type”**

Class	Tally Sheet (Tallies)	Frequency (f)
20-24	/	1
25-29	///	3
30-34		5
35-39	/	7
40-44	/	10
45-49	/	8
50-54		4
55-59	//	2
		Total Frequency = 40

- (c) **Open-end Classes :** Open-end frequency distribution is one which has at least one of its ends open. You will observe that either lower limit of first class or upper limit of last class or both are not given in such series. In table 6.6 the first class and the last class i.e. below 25 and 55 and above are open-end classes.

**Table 6.6: Open-end Classes Frequency Distribution**

Class	Tally Sheet	Frequency (f)
Below-25	/	1
25-30	///	3
30-35	///	5
35-40	/// //	7
40-45	/// ///	10
45-50	/// ///	8
50-55	////	4
55 and above	//	2
		Total Frequency = 40

- (d) **Unequal Classes :** In case of unequal classes frequency distribution, the width of different classes (i.e.  $L_2 - L_1$ ) need not be the same. In table 6.7, the class (30 – 40 has width 10 while the class (40-55) has width 15.

**Table 6.7: Unequal Classes Frequency Distribution**

Class	Tally Sheet	Frequency (f)
20-25	/	1
25-30	///	3
30-40	/// /// //	12
40-55	/// /// /// /// //	22
55-60	//	2
		Total Frequency = 40

- (e) **Cumulative Frequency :** A 'Cumulative Frequency Distribution' is formed by taking successive totals of given frequencies. This can be done in two ways:
- (i) From above, such as 1,4 (i.e.  $1+3$ ), 9(i.e.  $4+5$ ), 16 (i.e.  $9+7$ ), and so on.



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Such a distribution is called 'Less-than' cumulative frequency distribution. It shows the total numbers of observations (frequencies) having less than a particular value of the variable (here marks). For example, there are 4 (i.e.  $1+3$ ) students who got marks less than 30; 9 (i.e.  $4+5$ ) students who got marks less than 35 and so on. Table 6.8 gives the less-than cumulative frequency distribution.

**Table 6.8: 'Less-than' Cumulative Frequency Distribution**

Marks	Cumulative Frequency (cf)
Less than 25	1
Less than 30	4 ( $1+3$ )
Less than 35	9 ( $4+5$ )
Less than 40	16 ( $9+7$ )
Less than 45	26 ( $16+10$ )
Less than 50	34 ( $26+8$ )
Less than 55	38 ( $34+4$ )
Less than 60	40 ( $38+2$ )

- (ii) From below, such as 2,6 (i.e.  $2+4$ ), 14 (i.e.  $6+8$ ), 24 (i.e.  $14+10$ ) and so on. Such a distribution is called 'More-than' cumulative frequency distribution. It shows the total number of observations (frequencies) having more than a particular value of the variable (here marks). For example there are 6 (i.e.  $2+4$ ) students who got marks more than 50, 14 (i.e.  $2+4+8$ ) students who got marks more than 45 etc. See table 6.9.

**Table 6.9: 'More-than' Cumulative Frequency Distribution**

Marks	Cumulative Frequency (cf)
More than 20	40
More than 25	39 ( $40-1$ )
More than 30	36 ( $39-3$ )
More than 35	31 ( $36-5$ )
More than 40	24 ( $31-7$ )
More than 45	14 ( $24-10$ )
More than 50	6 ( $14-8$ )
More than 55	2 ( $6-4$ )



**INTEXT QUESTIONS 6.3**

Fill in the blanks with appropriate word from the brackets.

- (a) Frequency distribution ..... data into groups.  
(classifies, does not classify)
- (b) The difference between two limits of a class is called .....  
(Class limit, class interval).
- (c) In the exclusive type frequency distribution an item having value equal to the upper limit is counted in the ..... class. (same, next)
- (d) In the inclusive type frequency distribution an item having value equal to the upper limit is counted in the ..... class.
- (e) Preparing a frequency distribution by taking 'successive totals' of frequencies is called ..... frequency distribution. (open-ended, cumulative)

**Notes****ACTIVITY**

1. Visit children in your neighbourhood and record the age of at least 30 of them and then construct a frequency distribution of both exclusive as well as inclusive types.
2. From daily newspapers, record maximum temperature of your city for 30 days. Prepare a frequency distribution of both exclusive as well as inclusive types with a class interval of 1.5 degrees Celsius and with at least 5 classes.

**WHAT YOU HAVE LEARNT**

- For any statistical enquiry, data can be collected in two ways:
  - (a) either by the investigator himself. This is called primary data.
  - (b) or he can obtain it from other sources i.e. data already collected by others. This is called secondary data.
- In India there are several sources of getting secondary data. Some of these are: Central Statistical Organisation (CSO), National Sample Survey Organisation, (NSSO), Reserve Bank of India (RBI), etc.
- Collected data are normally in a disorderly form. Therefore, they have to be arranged in some orderly form or sequence. This is called arrangement of data.
- The various ways of arrangement of data are: a simple array, a frequency array

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and frequency distribution. Arrays can be (i) simple array or (ii) frequency array.

- When simple frequencies are successively totaled, we get what is called cumulative frequency distribution.
- To get frequency distribution we have to make use of tally sheet.
- Formation of frequency distribution requires important decisions regarding number of classes, class limits and class width etc.
- A class is a group of magnitudes having two ends called class limits ( $L_1$  and  $L_2$ ),  $L_1$  being lower limit and  $L_2$  the upper limit.
- Total number of cases falling in a particular class is called class frequency.
- We can form the following types of frequency distributions:
  - (a) exclusive type where the upper limit of the class is excluded and put in the next class.
  - (b) inclusive type where the upper limit of the class is included in the same class.
  - (c) Open-end like (below 25) and (55 and above).
  - (d) Unequal classes where class width or class interval of different classes is different like (20 – 25), (25-30), (30-40)....
  - (e) Cumulative 'Less-than' and 'More-than' where simple frequencies are successively totaled from above and from below respectively.

**Cumulative:** means successive totaling. That is, something increasing in quantity by one addition after another.

**Condensation:** putting huge quantity of data in some useful, short or brief form without losing its utility.

**Respondent:** is a person who responds or answers to some questions raised. When an investigator approaches a person with a questionnaire, the person who answers these questions is called respondent.

**Sequence:** in ordinary language means connected line of events or ideas. In statistics it means a series formed on some such principle e.g. sequence of numbers from, say 2, with a difference of say, 5 That is 2, 7, 12, 17, 22 etc. These numbers are in ascending order of sequences. If we put them in the form (reverse sequence) ..... 22, 17, 12, 7, 2, these are called in descending order of sequence.

**Tally Sheet:** is a statement where occurrence of each value of a series is recorded by making one bar. (/)

**Data:** means statistical information on population, employment, prices, exports, imports etc. that has been collected, analysed and published by government departments, commercial and industrial associations, and other research agencies.

**TERMINAL EXERCISE**

1. Distinguish between primary and secondary data. Describe the methods for collecting primary data.
2. What is secondary data? Name some of its sources in India.
3. Distinguish between simple array and frequency array with examples.
4. On the basis of the following data about the wages of 20 workers in a factory, prepare a frequency array; 450, 580, 600, 480, 540, 620, 400, 475, 500, 480, 620, 480, 570, 600, 650, 410, 550, 600, 650, 450.
5. Explain the concept of 'frequency distribution'. How is it different from 'frequency array'?
6. On the basis of data in question 4, prepare a frequency distribution by exclusive method.
7. Distinguish between 'exclusive method' and 'inclusive method' of frequency distribution with examples.
8. Write short notes on:
  - (a) Open-end frequency distribution.
  - (b) Frequency distribution with unequal classes.
  - (c) Cumulative frequency distribution.

**Notes****ANSWERS TO INTEXT QUESTIONS****6.1**

1. (a) Primary (b) Investigator (c) National income
2. (a) False (b) False (c) True

**6.2**

- (a) either ascending or descending order (b) small
- (c) frequency (d) does not give

**6.3**

- (a) classifies (b) class interval
- (c) next (d) same
- (e) cumulative.

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#### Terminal Exercise

1. Read section 6.1(a) and (b)
  2. Read section 6.1 (a) and (c)
  3. Read section 6.2(a)
- (i) Arrange the data in ascending order:

400	480	550	600
410	480	570	620
450	480	580	620
450	500	600	650
475	540	600	650

- (ii) Prepare a tally sheet.

Income (₹.)	Tallies	Frequency (f)
400	/	1
410	/	1
450	//	2
475	/	1
480	///	3
500	/	1
540	/	1
550	/	1
570	/	1
580	/	1
600	///	3
620	//	2
650	//	2
		Total Frequency = 20

5. Read section 6.2 and 6.3

6. First two steps have already been explained in answer to question 4. The third step is as follows.

Income groups (Rs.)	Frequency (f)
400-450	2
450-500	6
500-550	2
550-600	3
600-650	5
650-700	2
Total Frequency = 20	

7. Read section 6.3 (a) and (b)
8. (a) Read section 6.3 (c)
- (b) Read section 6.3 (d)
- (c) Read section 6.3 (e)



Notes



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7

# PRESENTATION OF DATA

In the previous lesson, you have learnt about the methods of organizing and condensing data in the form of arrays and frequency distributions. It is the first step towards analysis of data. Another step in this direction is presentation of data to highlight and compare significant statistical facts. Statistical data can be systematically organized and presented in the form of tables, graphs and charts. There are various types of graphs. In this lesson, you will learn about table, bar charts, pie diagram (or chart) and time series line graph.



## OBJECTIVES

After completing this lesson, you will be able to:

- explain the meaning and purpose of a table;
- distinguish between reference table and special purpose table;
- draw the format of a table;
- explain the meaning and construction of simple and multiple bar charts;
- explain the need and construction of component bar charts;
- explain the meaning of pie chart and steps in its construction;
- explain the meaning of a time series graph and steps in its construction; and
- construct histogram, frequency polygon and cummutative frequency curve (OGIVE).

**7.1 TABLE****(a) Meaning**

A table is a systematic arrangement of related statistical data in columns and rows with some predetermined aim or purpose. Can you arrange the following information in tabular form?

“There are 50 Science, 50 Commerce and 50 Arts students in a college. The number of students from poor families is same for each course and their total is 30. Whereas science and commerce courses are equally popular in rich families, yet the number of rich arts students is twice as much. In all 40 students are from the rich families studying in the college. The majority of students are from middle class families and their number is 80.”

Let us arrange this information in tabular form. There are 150 students in all. A table leaves a more lasting impression on human mind than statements saying the same thing. As they say, a picture is worth 1000 words.

**Table 7.1: Distribution of students according to course and economic status**

	Science	Arts	Commerce	Total
Rich	10	20	10	40
Middle Class	30	20	30	80
Poor	10	10	10	30
Total	50	50	50	150

**(b) Purpose**

The purpose of a table is to simplify presentation of related data and make comparisons easy. The reader can easily locate the desired information. For example, the purpose of table 7.2 might be to show the imports and exports of country ‘A’ vis-à-vis other countries B, C, D and E.

**Table 7.2: Imports and Exports of Country ‘A’ during 2002-05  
(₹. Crores)**

	Country	Imports	Exports
1	B	70	73
2	C	72	80
3	D	74	85
4	E	85	80



**Notes**

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### Presentation of Data

From the table 7.2 on exports and imports, we can easily locate the country which has highest exports. The data given in rows is read from left to right. For example, row 1 shows that country A imports 70 from B and exports 73 to B. The data given in column B read from above to downwards. For example, column 2 shows that country A imports 70, 72, 74, 85 respectively from countries B,C,D and E.

#### (c) Types of Tables

Basically we have two types of tables (i) Reference or general purpose tables or (ii) special purpose or text tables. Let us discuss them one by one.

- (i) **Reference or general purpose tables:** These tables are in a way a store of information with an aim of presenting detailed statistical data. From these tables we can derive smaller tables. Generally, statistical tables presented by Government of India and its various statistical agencies and departments are reference or general purpose tables.
- (ii) **Special purpose or test tables:** These tables are smaller and can be obtained from reference tables. They aim to analyse a particular aspect so that we are able to bring out a specific point or answer a specific question.

#### (d) Parts of Table

Parts (or elements) of a table vary from table to table depending upon the nature of data and purpose of a table. However, some points are common to all (see format of table 7.3). They are:

**Table 7.3: (..... Title .....) (in ₹. Crores)**

Stub Head	Column Head 1		Column Head 2	
	Sub Column head	Sub column head	Sub column head	Sub column head
Stub Entries	Main Body of the Table (field)			

Footnote (.....)

Source of data (.....)

1. **Table Numbers:** If more than one table has been used or presented at one place, it is always better to give them numbers. It makes further reference to them easy. This number is always indicated in the top for example Table 7-1, Table 7-2 etc.
2. **Title:** Title is to the table what heading is to an essay. It appears at the top of a table and gives idea about what is contained in the main body of the table. The title should be brief and to the point. It is better if the title is presented in bold letters or capital letters. What is the title of Table 7-2?





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3. **Head note (or prefatory note):** It is written below the title. It clarifies the contents of the table and unit of measurements like “in rupees crores” or “in lakh tons” or “in thousand bales of cotton” etc. It must be written in brackets on right side (top) of the table immediately below the title. For example, in table 7.2 the unit of measurement is rupees crores.
4. **Stub:** The stub consists of stub head and stub entries. Whereas stub describes the stub entries down below it, each stub entry labels a given data placed in its row. Both stub head and stub entries appear on the left hand column of the table. Further, stub entries describe the column heads.
5. **Main Body or Field:** It is the most important part of the table and contains the numerical information about which a hint is given in title. For example, if the title is “Exports and Imports of Country A during 1995-96, it clearly shows that the body of the table contains statistical/numerical information on value of exports and imports of country A with different countries.
6. **Footnote:** It is a qualifying statement placed at the bottom of a table. Its purpose is to explain omission or limitations of the data presented in main body of the table. For example, if the data for a year is not available then it is mentioned at the bottom of the table.
7. **Source of Data:** Last but not the least, it is essential to mention the source of data presented in the table. It helps the reader to check the original source of data himself and get more of it on the subject. This also makes the data presented in the table more reliable. It should mention information like title, edition, page number and source of publication etc.

**INTEXT QUESTION 7.1**

1. State whether the following statements are true or false:
  - (a) Satisfactory collection of data must be followed by its good presentation.
  - (b) Tabulation is the only way of presenting data.
  - (c) Tables help in intelligent use of statistical data.
  - (d) The title of a table should be brief and to the point.
2. Fill in the blanks using suitable word given in the bracket.
  - (a) A ..... is a systematic arrangement of statistical data in columns and rows. (table, graph)
  - (b) Head note is written below the ..... of the table. (title, footnote)
  - (c) The ..... consists of stub head and stub entries. (stub, note)
  - (d) A foot-note is placed at the ..... of a table. (top, main body, bottom)



## Notes

## 7.2 BAR CHARTS OR DIAGRAMS

## Meaning

A bar can be defined as a thick 'line', often made thicker to draw attention of the reader. The height of this bar shows the quantity of the variable we want to present. It is also called one dimensional diagram because only height of the bar is important and its base or width is not taken into account. To make them look more beautiful, bars are either coloured or shaded in different ways.

## Types of bar charts:

There are two types of bar charts (a) simple and (b) components.

## (a) Simple bar charts

Simple bar charts can be (i) Single bar charts, and (ii) Multiple bar charts.

- (i) **Single bar charts:** We can either have vertical bars (figure 7.1) or horizontal bars (figure 7.2). Normally vertical bars are often used. Let us now explain how a bar diagram can be prepared from given data in table 7.4.

Table 7.4: Number of cars registered in three States

States	No. of Cars
A	8,000
B	10,000
C	4,000

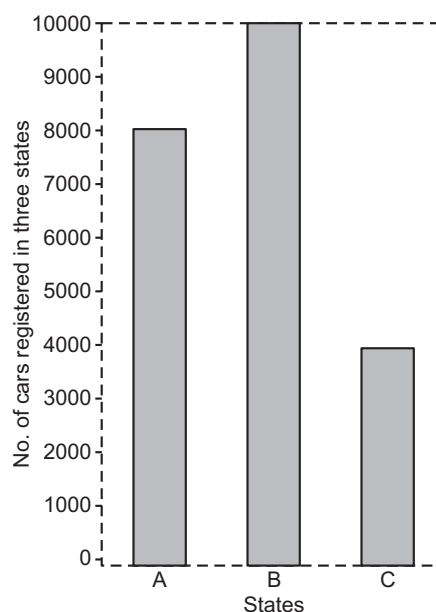


Fig. 7.1: Cars registered in states

In the case of vertical bars, States are represented on X axis and number of cars on the Y axis. As per the data given in table 7.4 each bar (rectangle with same base) is raised accordingly to the value of the variable (here the number of cars registered). For example, rectangle representing State A is raised upto 8,000, for State B upto 10,000 and for State C upto 4,000 (see Fig. 7.1).

In case we prefer to use horizontal bars, we represent States on Y-axis. Here the bars (rectangles) are drawn horizontally upto 8,000, 10,000 and 4,000 cars respectively for the three States A, B and C. (see figure 7.2).

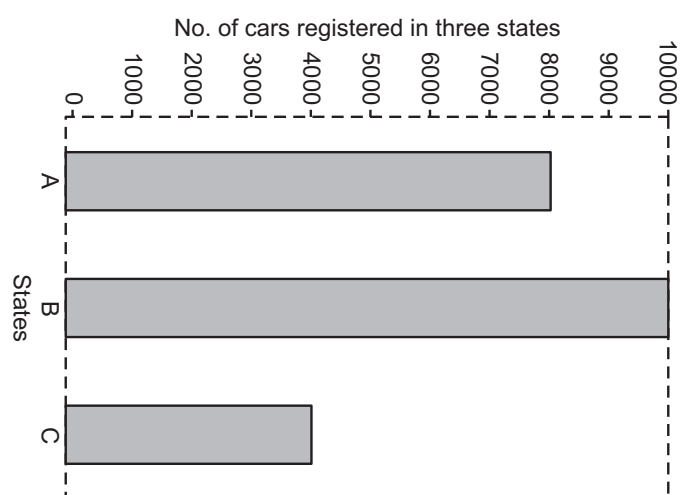


Fig. 7.2: Cars registered in states

- (ii) **Multiple bar charts:** Sometimes it is desired to represent more than one interrelated series of data on a bar diagram. In such cases a simple bar diagram is not suitable. We have to use what is known as multiple bar diagram. Here the number of bars for each year of region or zone is equal to the number of variables (data) to be represented. For example, imports and exports will be represented by two bars; selling price, cost price and profits by three bars and so on. Normally we do not take more than three bars because it becomes complicated. The method of drawing bars is same as explained for simple bar diagrams. Two examples of multiple bar diagrams are presented below (figure-7.3 based on table 7.5 and figure 7.4 based on Table 7.6).

**Table 7.5: Imports and Exports of Country 'X' during 2009 to 2013**  
(₹. Crores)

Year	Imports	Exports
2009-10	2955	2523
2010-11	4519	3329
2011-12	5265	4049
2012-13	5265	5143



Notes

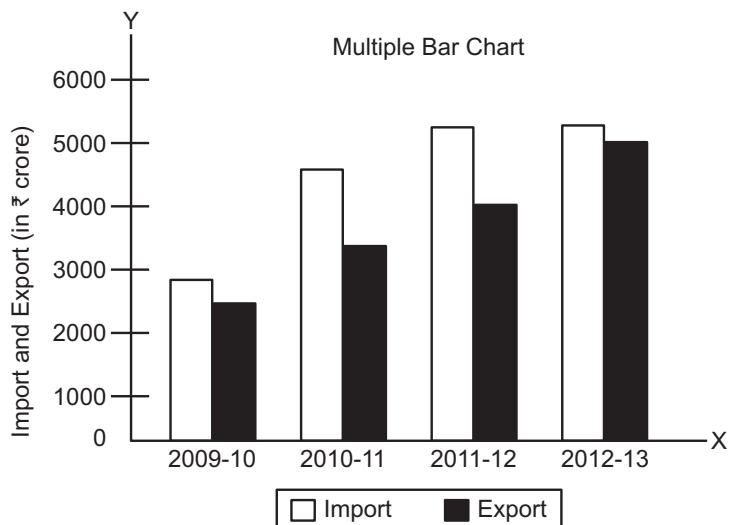
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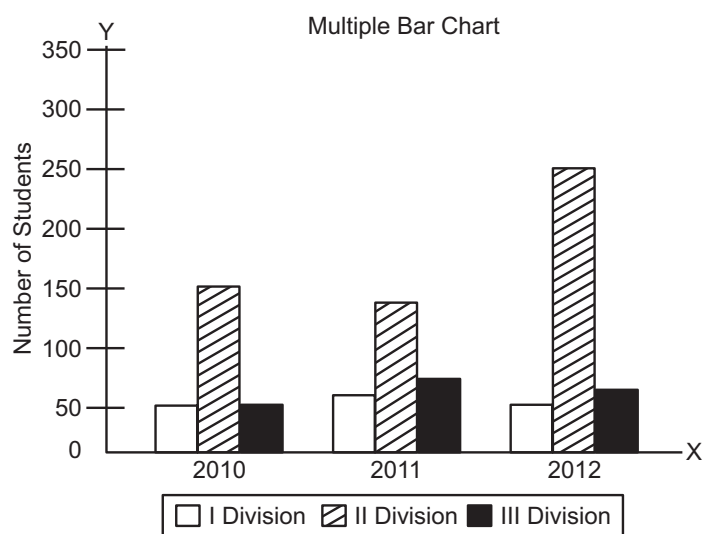
### Presentation of Data



**Fig. 7.3:** Imports and Exports of country A during 2009-13 (in rupees Crores)

**Table 7.6: Result of Class XII during 2010-2012**

Year	First Division	Second Division	Third Division
2010	50	150	50
2011	60	140	70
2012	50	250	60



**Fig. 7.4:** Result of class XII during 2010-2012

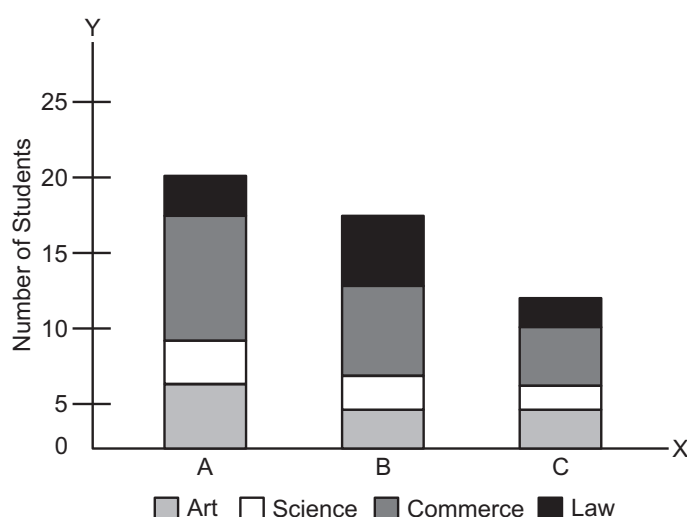
**(b) Component Bar Chart**

A simple bar diagram explained above is used to present only one variable. But when a breakdown of total or a series of totals is to be represented, we have to use what is called sub-divided or component bar diagrams. Here we use sub-divided or component bar diagram as shown in Fig. 7.5. It is based on imaginary (or hypothetical) data shown in table 7.7.

**Table 7.7: No. of students appearing in examination**

Stream	University A	University B	University C
Art	8,000	6,000	3,000
Science	4,000	2,000	1,000
Commerce	7,000	5,000	4,000
Law	1,000	2,000	2,000
Total	20,000	15,000	10,000

Number of Students appearing in Examinations in Various Universities

**Fig. 7.5: Steps in the construction of a component bar diagram**

- Step 1.** The order of various components in different bars should be same so as to facilitate comparison.
- Step 2.** The number of components in a bar, in no case should exceed 10.
- Step 3.** Index or key showing various components must be shown through different shades or colours



Notes



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### 7.3 PIE DIAGRAM

#### Meaning

It is also known as angular diagram. Pie diagrams are more popularly used for presenting percentage breakdown of data. For example, students of a particular college may be put in three categories-Science students, Commerce students and Arts students. Or exports of India may be classified as to USA, Europe, Middle-East countries, Africa etc. The pie diagram can be effectively used to show these categories or breakdowns. A pie diagram therefore, is a circle subdivided into component sectors to present the proportion of different constituent parts to the total. As such a pie diagram is shown in percentage terms.

#### Steps in the construction of pie diagram

- Step 1.** Find the value of each category or component or group as percentage of total of all categories or components or groups.
- Step 2.** Calculate degree of the angle formed by each category or component or group by the formula given below.

Degree for a particular category/component/group

$$= \frac{\text{Value of the group}}{\text{Total of all groups}} \times 360^\circ$$

- Step 3.** Take a circle of a suitable size and draw radius.
- Step 4.** Now draw angles calculated in step 2 with the help of a protractor.
- Step 5.** Shade or colour different segments suitably or make the distinctions between different categories or components or groups.
- Step 6.** For each category or component or group put the percentage in the pie diagram as shown in figure 7.6.

Let us now take an imaginary example to illustrate the construction of a pie-diagram.

**Example:** From the monthly budget of an industrial worker of Mumbai Industrial Area, it was found that the family spent ₹. 360 on food, ₹. 108 on clothing, ₹. 90 on housing, ₹. 24 on comforts, ₹. 12 on education and entertainment and ₹. 6 on miscellaneous items. Construct a pie-diagram.

**Solution:** We arrange the data in tabular form given below and complete all the steps mentioned above.

Table 7.8: Monthly Family Budget of an Industrial Worker of Bombay

Items	Expenditure	Percentage	Degree = $\frac{\text{Value of item}}{\text{Total value}} \times 360^\circ$
Food	360	$\frac{360}{600} \times 100 = 60$	$\frac{60}{100} \times 360^\circ = 216.0^\circ$
Clothing	108	$\frac{108}{600} \times 100 = 18$	$\frac{108}{100} \times 360^\circ = 64.8^\circ$
Housing	60	$\frac{90}{600} \times 100 = 15$	$\frac{15}{100} \times 360^\circ = 54.0^\circ$
Comforts	24	$\frac{24}{600} \times 100 = 4$	$\frac{4}{100} \times 360^\circ = 14.4^\circ$
Education and Entertainment	12	$\frac{12}{600} \times 100 = 2$	$\frac{2}{100} \times 360^\circ = 7.2^\circ$
Misc.	6	$\frac{6}{600} \times 100 = 1$	$\frac{1}{100} \times 360^\circ = 3.6^\circ$
<b>Total</b>	<b>600</b>	<b>100</b>	<b>360°</b>



Notes

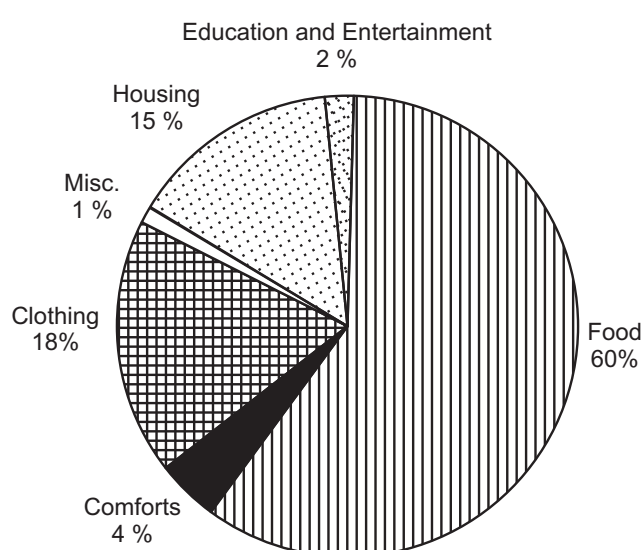


Fig. 7.6: Monthly Budget of Industrial Worker in Mumbai



Notes



## INTEXT QUESTIONS 7.2

1. State whether the following statements are true or false:
  - (a) The width of a one-dimensional bar diagram is important.
  - (b) In bar diagram, height of bars shows the value of the variable.
  - (c) We can have vertical as well as horizontal bars to present some data having one variable.
  - (d) When a break down of data is to be represented we use multiple bar diagram.
2. Fill in the blanks with suitable word out of those given in the brackets:
  - (a) A pie chart is also called ..... diagram.  
(a bar, an angular, a multiple bar)
  - (b)  $\frac{\text{Value of the group}}{\text{Total of all groups}} \times 360^\circ = \dots\dots\dots$   
(area, radius, degree for a groups).

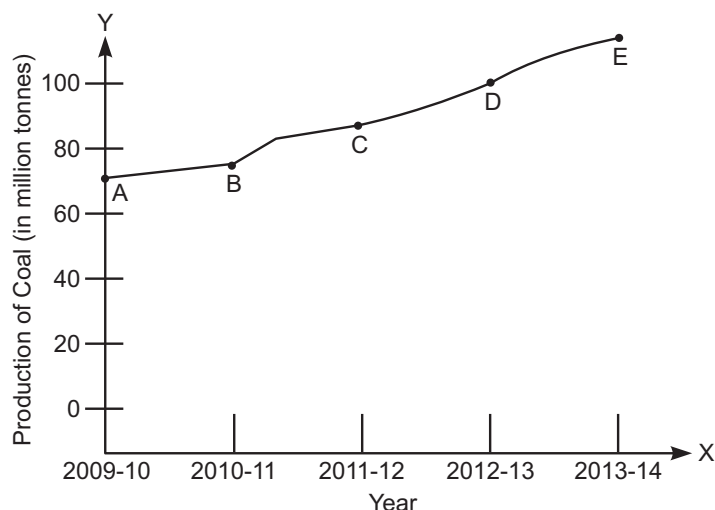
## 7.4 TIME SERIES LINE GRAPH

Statistical data can also be presented in the form of line graphs. A line graph records the relationship between two variables. If one of the two variables is time in days, weeks, months or years we get a time series line graph. For example, let us draw a line graph on the basis of the following data on production of coal in country 'X' from 2009-10 to 2013-14.

**Table 7.9: Production of Coal (Million Tons)**

Year	Production (Million Tons)
2009-10	77.22
2010-11	78.17
2011-12	88.42
2012-13	99.80
2013-14	103.50





**Fig. 7.7:** Production of coal in country X 2009-14 (in Million Tons)

The above graph is a time series line graph. Time is represented on the X axis and production on the Y axis. Time and production are two variables in this graph. It is production which changes with time. In other words as time passes production is affected and it increases or decreases or may remain constant. Since production changes with time, it is said to be dependent on time. Production is, therefore, treated as a dependent variable. Time is not influenced by production and therefore taken as an independent variable.

Point A on the line graph (also called curve) shows that production of crude oil in country 'X' in the year 2009-10 was 77.22 million tones. Similarly points B, C and D show production levels in the subsequent years. The upward rising curve from left to right indicates that production of coal oil in Country 'X' is constantly rising since 2009-10.

It is possible to show two or more comparable dependent variables on a time series line graph. In that case each dependent variable will be recorded on a separate curve. For example, take the following data on exports and import of country 'X'.

**Table 7.10: Exports and Imports of Country 'X'**

Year	Imports (in ₹ 100 crores)	Exports (in ₹ 100 crores)
2009-10	15	35
2010-11	85	100
2011-12	90	70
2012-13	130	120
2013-14	170	180



**Notes**

## MODULE - 3

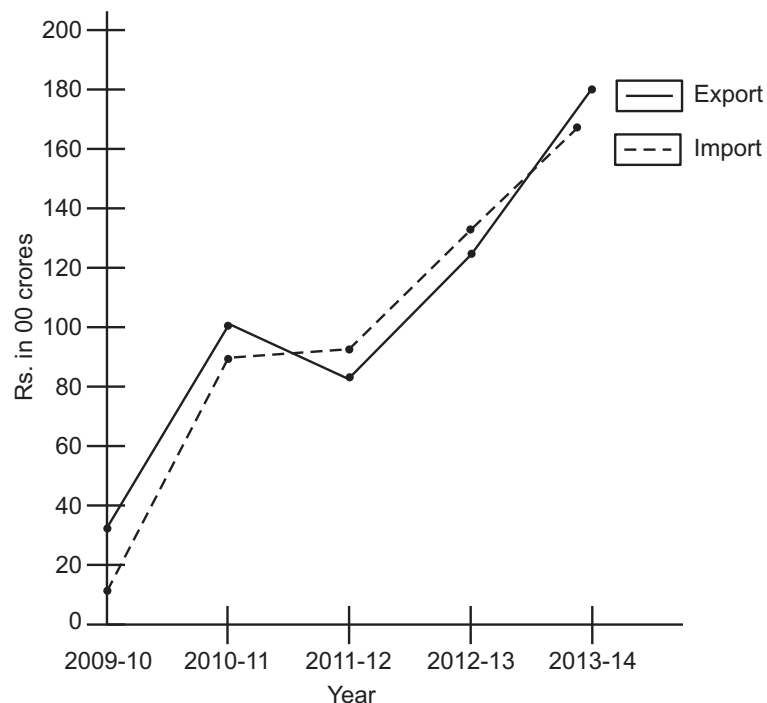
### Introduction to Statistics



Notes

### Presentation of Data

The time series line graph prepared on the basis of above data is given below (see figure 7.8)



**Fig. 7.8:** Exports and Imports of Country X in 2009-14 (in rupees' 00 crores)

In the above graph imports are shown in broken line and exports otherwise. Such a presentation is very useful to make comparison between two dependent variables.



### INTEXT QUESTIONS 7.3

Fill in the blanks:

- A ..... graph shows the relationship between two variables.
- If one of the variable on line graph is ..... it is called time series line graph.
- In a time series line graph ..... is an independent variable.
- In a time series line graph ..... variable is represented on the Y-axis.

### 7.5 HISTOGRAM

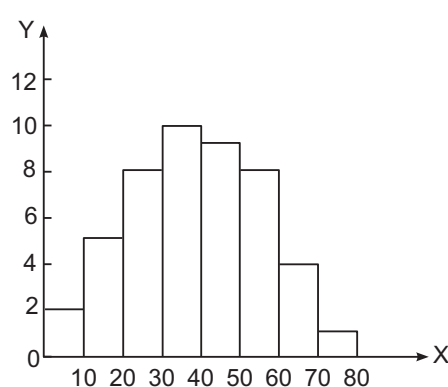
Histogram is a joining rectangular diagram of a continuous series in which each rectangle represents the class interval with frequency. It is a two dimensional diagram and also called a frequency histogram.

**(i) Histogram of equal class intervals:****Example:** Presents the following data in a histogram:

Marks	Frequency
0-10	2
10-20	5
20-30	8
30-40	11
40-50	10
50-60	9
60-70	4
70-80	1

**Notes****Method of Construction of Histogram**

- Take marks on x-axis.
- Take frequencies on y-axis.
- Get rectangle joining each other representing each class with frequency.
- Label both the axis.

**Fig. 7.9:** Histogram of equal class intervals.**(ii) Histogram of unequal class intervals****Example:** Represent the following data by mean of histogram:

## MODULE - 3

### Introduction to Statistics



Notes

### Presentation of Data

Marks	No. of students(F)
10-15	6
15-20	19
20-25	28
25-30	15
30-40	12
40-60	12
60-80	8

### Method of Construction of Histogram

- Since the last intervals are unequal, frequencies must be adjusted.
- Take the class which has the lowest class interval.
- Do not adjust the frequencies of the lowest class.
- Frequencies of other classes are adjusted with this lowest class intervals.
- Adjusted frequencies will decide the heights of each rectangle of histogram but widths will be according to class limits.
- The frequencies of minimum class intervals on which the frequencies of other classes are adjusted will not be changed.
- Both axis should be clearly labelled.

The adjusted frequencies are:-

Marks	Frequency	Adjusted	Adjusted Frequency
10-15	6	—	6
15-20	19	—	19
20-25	28	—	28
25-30	15	—	15
30-40	12	$\frac{5 \times 12}{10}$	6
40-60	12	$\frac{5 \times 12}{20}$	3
60-80	8	$\frac{5 \times 8}{20}$	2

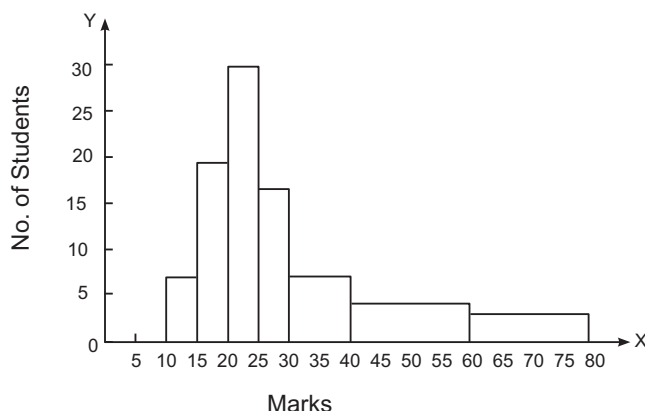


Fig. 7.10: Histogram of unequal class intervals

## 7.6 FREQUENCY POLYGON

Polygon is a diagrammatic presentation of data which is constructed by joining the midpoints of the tops of rectangles in a diagram. However, a polygon can be drawn even without constructing a histogram.

**Example:** Construct a frequency polygon from the data given below

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Students	5	10	15	20	12	8	5

### Method:

- Draw a suitable histogram keeping in view all the basic principles.
- Get the mid-points of the upper horizontal side of each rectangle.
- join these mid-points of the adjacent rectangle of the histogram by straight lines.
- Both axes should be clearly labelled.



Notes



Notes

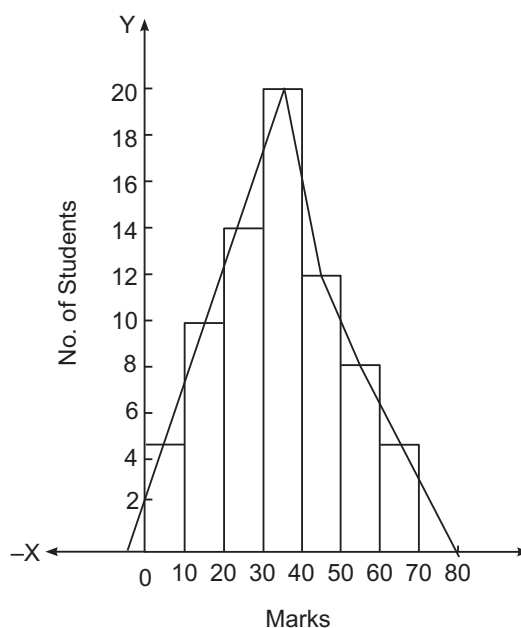


Fig. 7.11: Frequency polygon

### 7.7 CUMULATIVE FREQUENCY CURVE (OGIVE)

Cumulative frequency curve or ogive is the curve which is constructed by plotting cumulative frequency data on the graph paper in the form of a smooth curve.

A cumulative frequency curve or ogive may be constructed in two ways

- (a) Less than, method
- (b) More than method

**Example:** Present the following data in the form of less than ogive and more than ogive

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
No. of students	4	6	10	25	22	18	5	

#### Method

- (i) Get the cumulative frequencies of the given frequencies either by 'less than' method or by 'more than' method;
- (ii) Take 'marks' (variable under study on x-axis.
- (iii) Take calculated cumulative frequencies on y-axis.

(iv) Plot the various points and join them to get a curve i.e. ogive.

(v) Both the axes should be clearly labelled.

### Cumulative frequency Distributive

Marks	Cumulative Frequencies	Marks	Cumulative Frequencies
less than 5	4	More than 0	100
less than 10	$4 + 6 = 10$	More than 5	$100 - 4 = 96$
less than 15	$10 + 10 = 20$	More than 10	$96 - 6 = 90$
less than 20	$20 + 10 = 30$	More than 15	$90 - 10 = 80$
less than 25	$30 + 25 = 55$	More than 20	$80 - 10 = 70$
less than 30	$55 + 22 = 77$	More than 25	$70 - 25 = 45$
less than 35	$77 + 18 = 95$	More than 30	$45 - 22 = 23$
less than 40	$95 + 5 = 100$	More than 35	$23 - 18 = 5$
		More than 40	$5 - 5 = 0$

Notes

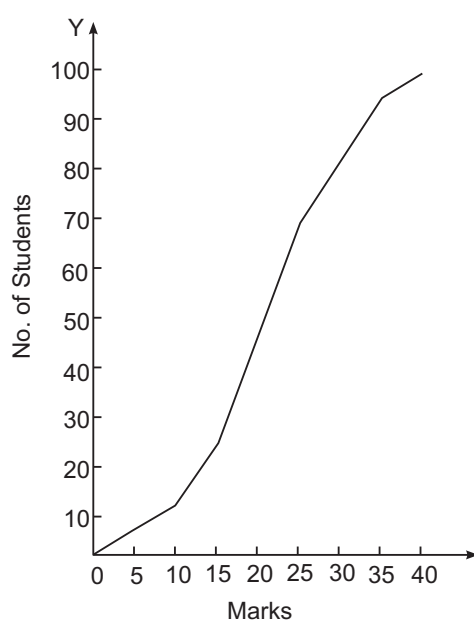


Fig. 7.12: 'Less than' ogive

## MODULE - 3

### Introduction to Statistics



Notes

### Presentation of Data

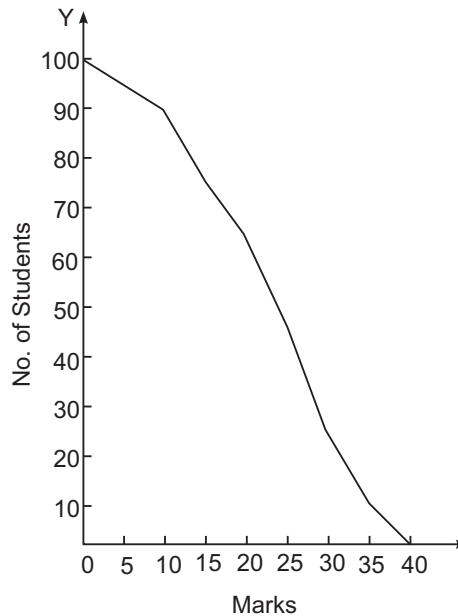


Fig. 7.13: 'More than' ogive



### WHAT YOU HAVE LEARNT

- After data have been collected, they must now be arranged and presented in some useful form.
- A good presentation highlights the data and brings out important points for necessary comparison.
- Tables, frequency arrays, frequency distribution, time series line graphs etc., are some important ways in which data are presented.
- A table is a systematic presentation of data in rows and columns
- Each table has some essential constituent parts like table number, title, head note, caption, stubs, main body, foot note and source of information.
- A graph is also an important way of presenting data-such as time series line graphs, bar charts, pie diagram etc.
- A bar diagram is defined as a thick line made thicker to draw attention of the viewer.
- Its height is important as it shows the value of the variable.
  - A bar diagram can be drawn either vertically or horizontally.
  - When a breakdown of a total or a series of totals is to be shown, we use what is known as sub-divided or component bar diagram.
  - A pie diagram is also an important and effective way of presenting data. It is a circle sub-divided into components to present the proportion of different constituent parts of the total.



- When an economic variable is presented along with time, it is called a time series line graph.

**TERMINAL EXERCISE**

- What is a statistical table? List its various parts.
- What is the purpose of preparing a table? In this context distinguish between reference table and text table.
- What is a bar chart? Explain briefly its various types.
- What is the difference between simple bar diagram, sub-divided or component bar diagram and multiple bar diagram?
- Explain the meaning and uses of a pie diagram. Prepare a pie diagram of family expenditure from the following data:

S.No.	Items	Expenditure (₹.)
1.	Food	480
2.	Clothing	300
3.	Education and Entertainment	330
4.	Rent	450
5.	Miscellaneous	240
	Total Expenditure	1800

- Explain the meaning of time series line graph with the help of an example.
- Draw a time series line graph on the basis of following data:

**Annual Profits of A Firm**

Year	Profit (₹. In thousand)
2009	60
2010	72
2011	75
2012	65
2013	80
2014	95

**Notes**

## MODULE - 3

### Introduction to Statistics



#### Notes

### Presentation of Data

8. Make a blank table (format) showing the distribution of students of 12<sup>th</sup> class according to:

- (a) Subject group i.e. Science, Arts and Commerce
- (b) Sex i.e. boys and girls.

9. The following table gives selling price and cost price of a good 'X' for five years.

Year	2009	2010	2011	2012	2013
Selling Prices 'X'	105	110	120	90	160
Cost Price 'X'	100	80	120	120	140

Plot the above information on a graph paper in the form of line graph. What type of graph do you get?

10. Draw histogram, frequencies polygon, 'less than' ogive and 'more than' ogive from the data given below:

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	3	10	14	10	3



### ANSWERS TO INTEXT QUESTIONS

#### 7.1

1. (a) True (b) False (c) True (d) True  
(a) table (b) title (c) stub (d) bottom

#### 7.2

1. (a) False (b) True (c) True (d) False  
2. (a) an angular (b) degree for a component

#### 7.3

- (a) line (b) time (c) time (d) dependent

**Guidelines to Activities**1. **Hint:**

Subject group	Number of Students		Total
	Boys	Girls	
Science			
Arts			
Commerce			
Total			

- (a) Fill up yourself, the title, footnote, etc. i.e. parts of a table.
  - (b) Fill up the main body of the table with imaginary figures.
2. (a) Measure year of X axis and selling price (S.P.) as well as cost price (C.P.) on Y axis to get a time series line graph.

**Notes**



## **MODULE - IV**

### **STATISTICAL TOOLS**

- 8. Measures of Central Tendency
- 9. Measures of Dispersion
- 10. Correlation Analysis
- 11. Index Numbers





Notes

## 8

## MEASURES OF CENTRAL TENDENCY

In the previous lesson, we have studied how to collect the raw data, its classification and tabulation in a useful form. Yet, this is not sufficient, for practical purposes; there is a need for further condensation of the data, particularly when we want to compare two or more different distributions data set. We may reduce the entire distribution to one number which represents the distribution using the measures of central tendency.



### OBJECTIVES

After completing this lesson, you will be able to:

- explain the concept of measures of central tendency or averages;
- calculate arithmetic mean, combined arithmetic mean and weighted arithmetic mean;
- calculate median and quartiles;
- calculate mode;
- compare the various measures of central tendency; and
- apply these measures for solving various business problems.

### 8.1 MEANING OF CENTRAL TENDENCY

The measure of central tendency is defined as the statistical measure that identifies a single value as the representative of an entire distribution. It aims to provide an accurate description of the entire data. It is the single value that is most typical/representative of the data. Since such typical values tend to lie centrally within a set of observations when arranged according to magnitudes, averages are called measures of central tendency. In other words, the measure of central tendency



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summarizes the data in a single value in such a way that this single value can represent the entire data. The word average is commonly used in day-to-day conversations. For example, we may talk of average income of an Indian, average rainfall, average production, average price etc.

### 8.2 TYPES OF AVERAGES (OR) MEASURES OF CENTRAL TENDENCY

The following are the important types of averages:

- Arithmetic mean.
  - Simple arithmetic mean.
  - Weighted arithmetic mean.
- Median
- Quartiles.
- Mode.

The first one is called '**mathematical average**' where as other three are called '**measures of location**' or '**measures of position**' or '**positional averages**'.

#### 8.2.1 Arithmetic Mean:

**Arithmetic mean** is the most commonly used measure of central tendency. Arithmetic mean is computed by adding all the values in the data set divided by the number of observations in it.

##### 8.2.1.1 Computation of Arithmetic Mean in case of Individual Series

The arithmetic mean in case of individual series can be computed using following methods:

- **Direct Method**
- **Assumed Mean Method**
- **Direct Method:**

If there are N observations as  $X_1, X_2, X_3, \dots, X_N$  then the Arithmetic Mean (usually denoted by  $\bar{X}$ , which is read as X bar) in case of individual series using direct method is given by:

$$\bar{X} = \frac{X_1 + X_2 + X_3 + \dots + X_N}{N}$$

$$\bar{X} = \frac{\sum X}{N}$$



Where,  $\Sigma X$  = sum of all N number of observations and N = total number of observations.

**Example 1:** Calculate Arithmetic Mean from the data showing the marks obtained by 7 students of class XI<sup>th</sup> in certain examination 5,11,16,17,19,24,30.

The Arithmetic Mean of marks is given by:

$$\begin{aligned}\bar{X} &= \frac{\Sigma X}{N} \\ &= \frac{5+11+16+17+19+24+30}{7} \\ &= \frac{122}{7} = 17.43 \text{ marks}\end{aligned}$$

The average marks are 17.43.

• **Assumed Mean Method:**

Assumed mean method also called shortcut method is useful if the number of observations in the data is large and/or figures are in fraction. It helps to simplify the calculations. In this method a particular value is assumed as arithmetic mean on the basis of some logic or experience. The deviation from the said assumed mean from each of the observation is computed. The summation of these deviations is taken and then it is divided by the number of observations in the data. The actual arithmetic mean is calculated using the following formula:

$$\bar{X} = A + \frac{\Sigma d}{N}$$

Where  $\bar{X}$  = Arithmetic mean, A = Assumed mean,  $\Sigma d = \Sigma(X - A)$

$\Sigma d$  = sum of deviations, N = Number of Individual observations

**Note:** Any value whether existing in the data or not can be taken as the assumed mean but the final answer would be the same.

**Example 2:** Data of exports of a certain firms for the year 2013-2014 are mentioned in the following table:

Firms	1	2	3	4	5	6	7	8	9
Value of Exports (₹ Cr)	10	20	30	40	50	60	70	80	90



Notes

## MODULE - 4

### Statistical Tools



Notes

### Measures of Central Tendency

Compute average value of exports for these firms using Assumed Mean Method.

**Solution:**

**Table 8.1: Computation of Arithmetic Mean by Assumed Mean Method**

Firms	Exports(X) (in ₹Cr)	Deviation from assumed mean (A=60); d=(X-60)
1	10	-50
2	20	-40
3	30	-30
4	40	-20
5	50	-10
6	60	0
7	70	10
8	80	20
9	90	30
N = 9	ΣX = 450	Σd = -90

$$\bar{X} = A + \frac{\Sigma d}{N} = 60 + \frac{(-90)}{9} = \text{Rupees 50 crores}$$



### INTEXT QUESTIONS 8.1

1. A researcher has collected the following sample individual data.

5    12    6    8    5    6    7    5    12    4

The mean of the data is

- (a) 5                      (b) 6                      (c) 7                      (d) 8

2. Find the mean of the set of numbers below:

3, 4, -1, 22, 14, 0, 9, 18, 7, 0, 1

#### 8.2.1.2 Computation of Arithmetic Mean for Grouped data

##### • Discrete Series:

In case of discrete series where the variable X takes the values  $X_1, X_2 \dots X_N$  with respective frequencies  $f_1, f_2 \dots f_N$  the arithmetic mean can be calculated by applying:

- (i) Direct Method
- (ii) Assumed Mean Method.
- (iii) Step Deviation Method

(i) **Direct Method:** According to this method the arithmetic mean is given by:

$$\bar{X} = \frac{f_1X_1 + f_2X_2 + \dots + f_NX_N}{f_1 + f_2 + \dots + f_N} = \frac{\sum fX}{\sum f}$$

where  $\sum f$  = total frequency

**Example 3:** The following data gives the weekly wages (in ₹) of 20 workers in a factory:

Weekly Earnings (in ₹)	100	140	170	200	250
No. of workers	5	2	6	4	3

Calculate the average weekly earnings of the workers.

**Solution:**

**Table 8.2: Computation of Arithmetic Mean**

Weekly Wages(X)	No. of workers(f)	fX	(A=170); d=X-170	fd
100	5	500	-70	-350
140	2	280	-30	-60
170	6	1020	0	0
200	4	800	30	120
250	3	750	80	240
	<b><math>\Sigma f=20</math></b>	<b><math>\Sigma fX=3350</math></b>		<b><math>\Sigma fd=-50</math></b>

Arithmetic mean using direct method, the average weekly wages are:

$$\frac{\sum fX}{\sum f} = \frac{3350}{20} = \text{Rs } 167.50$$

(ii) **Assumed Mean Method:** Since in the discrete series frequency (f) of each item is given, we multiply each deviation (d) from the assumed mean (A) with the respective frequency (f) to get fd. According to this method, arithmetic mean is given by:

$$\bar{X} = A + \frac{\sum fd}{N}$$



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### Statistical Tools



#### Notes

### Measures of Central Tendency

where  $A$  = assumed mean,  $d = X - A$  and  $N = \sum f$

Arithmetic mean using Assumed Mean Method, the average weekly earnings are:

$$\bar{X} = A + \frac{\sum fd}{N} = 170 + \frac{-50}{20} = \text{Rs. } 167.50$$

(iii) **Step Deviation Method:** In this case the deviations taken from assumed mean are divided by the common factor 'c' which simplifies the calculation.

Here we estimate  $d' = \frac{d}{c} = \frac{X - A}{c}$  in order to reduce the size of numerical figures for easier calculation. The arithmetic mean is given by:

$$\bar{X} = A + \frac{\sum fd'}{\sum f} \times c$$

**Example 4:** From the following data of the marks obtained by 60 students of a class.

Marks	20	30	40	50	60	70
No of students	8	12	20	10	6	4

Calculate the arithmetic mean by

- Direct Method
- Assumed Mean Method
- Step-Deviation Method

**Solution:**

**Table 8.3: Calculation of Arithmetic mean**

Marks (X)	No. of students(f)	fX	d = (X - 40)	d' = d/10	fd	fd'
20	8	160	-20	-2	-160	-16
30	12	360	-10	-1	-120	-12
40	20	800	0	0	0	0
50	10	500	10	1	100	10
60	6	360	20	2	120	12
70	4	280	30	3	120	12
	<b><math>\sum f = 60</math></b>	<b><math>\sum fX = 2,460</math></b>			<b><math>\sum fd = 60</math></b>	<b><math>\sum fd' = 6</math></b>

**(i) Direct method:**

$$\bar{X} = \frac{\Sigma fX}{\Sigma f} = \frac{2460}{60} = 41$$

Hence the average marks = 41.

**(ii) Assumed Mean Method:**

$$\bar{X} = A + \frac{\Sigma fd}{N} = 40 + \frac{60}{60} = 40 + 1 = 41$$

Hence the average marks = 41.

**(iii) Step-Deviation Method**

$$\bar{X} = A + \frac{\Sigma fd'}{\Sigma f} \times c = 40 + \frac{6}{60} \times 10 = 41$$

Hence the average marks = 41.

**Example 5:** From the following data, find the missing item if the Mean wage is ₹ 115.86

<b>Wages in (₹):</b>	110	112	113	117	?	125	128	130
<b>No. of workers :</b>	25	17	13	15	14	8	6	2

**Solution:** Let x be the missing item.

**Table 8.4: Calculation of missing Item**

Wages in ₹ ( $X_i$ )	Number of workers $f_i$	$f_i X_i$
110	25	2750
112	17	1904
113	13	1469
117	15	1755
x	14	14x
125	8	1000
128	6	768
130	2	260
<b>Total</b>	$\Sigma f_i = 100$	$\Sigma f_i X_i = 9906 + 14x$



**Notes**



Notes

Now the arithmetic mean  $(\bar{X}) = \frac{\sum f_i X_i}{\sum f_i}$

Therefore,  $115.86 = \frac{9906 + 14x}{100}$

or  $115.86 \times 100 = 9906 + 14x$

$$11586 = 9906 + 14x$$

$$11586 - 9906 = 14x$$

$$1680 = 14x$$

or  $x = \frac{1680}{14}$

$$x = 120$$

Therefore the missing item is ₹ 120



### INTEXT QUESTIONS 8.2

1. Find the mean of the set of ages in the table below:

Age (years)	Frequency
10	0
11	8
12	3
13	2
14	7

2. Find the mean average weekly earnings for the data given in example 3, by using step deviation method.

#### 8.2.1.3 Computation of Arithmetic Mean in case of Continuous series

In case of continuous series, class intervals and frequencies are given. In this case the mid-points of various class intervals are taken for calculating arithmetic mean. It may be noted that class intervals may be exclusive or inclusive or of unequal size. In case of continuous series also the computation of arithmetic mean is done by applying:



Notes

- (i) Direct Method;
- (ii) Assumed Mean Method;
- (iii) Step Deviation Method.

**(i) Direct Method:** The steps involved in the calculation of arithmetic mean are as follows:

1. Calculate the mid-point of each class and denote these mid-points as  $m$  as follows:

$$\text{Mid - point (m)} = \frac{\text{Lower Limit} + \text{Upper Limit}}{2}$$

2. Multiply the mid-point with respective frequency and denote these product as  $fm$
3. The arithmetic mean is obtained as follows:

$$\bar{X} = \frac{\sum fm}{\sum f}$$

**(ii) Assumed Mean Method:** Under this method the formula for calculating mean is

$$\bar{X} = A + \frac{\sum fd}{\sum f}$$

Where  $A$  = assumed mean  $d = m - A$

$f$  = frequency of  $n$  number of observation.

**(iii) Step Deviation Method:** To make the calculations simpler, we first find a common figure by which all the values of  $d$  can be divided. It will reduce the values of  $d$  and make further calculations easier. This common factor by which values of

$d$  are divided is termed as  $c$  i.e.  $\left(\frac{d}{c} = d'\right)$ . At a later stage the value of  $d'$  is again multiplied by this common factor so that the final result of arithmetic mean is not affected. The steps involved are as follows:

**Step 1:** Obtain

$$d' = \frac{m - A}{c}$$

where  $m$  = mid-point,  $A$  = Assumed mean

$c$  = common factor which is the difference between upper limit and lower limit of a class

## MODULE - 4

### Statistical Tools



Notes

### Measures of Central Tendency

**Step 2:** Apply the following formula to calculate arithmetic mean:

$$\bar{X} = A + \frac{\Sigma fd'}{\Sigma f} \times c$$

**Example 6:** Calculate average Land- size of the farmers of a village from the following data using (a) Direct method (b) Step deviation method.

Size of Land (in hectares)	0-10	10-20	20-30	30-40	40-50	50-60
No. of Farmers	42	44	58	35	26	15

**Solution:**

**Table 8.5: Computation of Land Size for Exclusive Class Interval**

Land Size (in hectares)	No. of Farmers(f)	Mid Points (m)	fm	$d' = \frac{m-35}{10}$	fd'
0-10	42	5	210	-3	-126
10-20	44	15	660	-2	-88
20-30	58	25	1450	-1	-58
30-40	35	35	1225	0	0
40-50	26	45	1170	1	26
50-60	15	55	825	2	30
	<b><math>\Sigma f = 220</math></b>		<b><math>\Sigma fm = 5540</math></b>		<b><math>\Sigma fd' = -216</math></b>

Applying Direct Method:

$$\bar{X} = \frac{\Sigma fm}{\Sigma f} = \frac{5540}{220} = 25.2 \text{ hectares}$$

Applying the Step Deviation Method:

$$\bar{X} = A + \frac{\Sigma fd'}{\Sigma f} \times c = 35 + \left( \frac{-216}{220} \right) \times 10 = 25.2 \text{ hectares}$$



### INTEXT QUESTIONS 8.3

- The following distribution gives the pattern of overtime work per month done by 180 employees of a company. Calculate the arithmetic mean.



<b>Overtime (in hrs)</b>	0-10	10-30	30-40	40-50	50-60
<b>No. of Employees</b>	10	60	50	40	20

**Solution:** Since the class intervals are unequal, the frequencies have to be adjusted to make the class interval equal on the assumption that these are equally distributed throughout the class.

$$\bar{X} = A + \frac{\Sigma fd'}{\Sigma f} \times c = 45 + \left( \frac{-220}{180} \right) \times 10 = 32.778 \text{ hours}$$

2. A company is planning to improve plant safety. For this accident data for the last 180 weeks were compiled. These data are grouped into the frequency distribution as shown below:

<b>No. of accidents</b>	1-10	11-20	21-30	31-40	41-50	51-60
<b>No. of Weeks</b>	10	20	30	50	40	30

Calculate the arithmetic mean of the number of accident per day.

**Solution:** In this case the inclusive series are converted into exclusive series by deducting half the difference between upper limit of a class and lower limit of next class from the lower limit of class and adding the same to upper limit of class.

$$\bar{X} = A + \frac{\Sigma fd'}{\Sigma f} \times c = 45.5 + \left( \frac{-180}{180} \right) \times 10 = 35.5 \text{ accident per week}$$

### 8.2.3 Properties of Arithmetic Mean

1. The sum of the deviations, of all the values of X, from their arithmetic mean, is zero.
2. The product of the arithmetic mean and the number of items gives the total of all items.
3. The sum of the squares of the deviations of the items taken from arithmetic mean is minimum.
4. If a constant is added or subtracted to all the variables, mean increases or decreases by that constant.
5. If all the variables are multiplied or divided by a constant, mean also gets multiplied or divided by the constant.



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## INTEXT QUESTIONS 8.4

Choose the correct answer:

- The sum of deviations of the individual data elements from their mean is:
  - always greater than zero
  - always less than zero
  - sometimes greater than and sometimes less than zero, depending on the data elements
  - always equal to zero
- In a group of 12 scores, the largest score is increased by 36 points. What effect will this have on the mean of the scores?
  - It will be increased by 12 points
  - It will remain unchanged
  - It will be increased by 3 points
  - It will increase by 36 points
  - There is no way of knowing exactly how many points the mean will be increased.

## 8.2.4 Combined Mean

If a series of  $N$  observations consists of two components having  $N_1$  and  $N_2$  observations ( $N_1 + N_2 = N$ ), and means  $\bar{X}_1$  and  $\bar{X}_2$  respectively then the Combined mean  $\bar{X}$  of  $N$  observations is given by

$$\text{Combined mean } \bar{X} = \frac{N_1\bar{X}_1 + N_2\bar{X}_2}{N_1 + N_2}$$

**Example 7:** The average marks of three batches of students having 70, 50 and 30 students respectively are 50, 55 and 45. Find the average marks of all the 150 students, taken together.

**Solution:** Let  $\bar{X}$  be the average marks of all 150 students taken together.

Average. marks	$\bar{X}_1 = 50;$	$\bar{X}_2 = 55;$	$\bar{X}_3 = 45$
No. of students	$N_1 = 70;$	$N_2 = 50;$	$N_3 = 30$

$$\bar{X}_{123} = \frac{N_1\bar{X}_1 + N_2\bar{X}_2 + N_3\bar{X}_3}{N_1 + N_2 + N_3}$$

$$= \frac{70 \times 50 + 50 \times 55 + 30 \times 45}{70 + 50 + 30} = \frac{7600}{150}$$

$$\bar{X}_{123} = 50.67 \text{ marks}$$



### INTEXT QUESTIONS 8.5

1. The mean of a certain number of observations is 40. If two or more items with values 50 and 64 are added to this data, the mean rises to 42. Find the number of items in the original data.
2. Eight coins were tossed together and the number of times they fell on the side of heads was observed. The activity was performed 256 times and the frequency obtained for different values of  $x$ , (the number of times it fell on heads) is shown in the following table. Calculate then mean by: i) Direct method ii) Short-cut method

<b>X:</b>	0	1	2	3	4	5	6	7	8
<b>f:</b>	1	9	26	59	72	52	29	7	1

3. Calculate the average age of employees working in a company from the following data:

<b>Age (years) below:</b>	25	30	35	40	45	50	55	60
<b>No. of employees:</b>	8	23	51	81	103	113	117	120

#### 8.2.5 Weighted Arithmetic Mean:

In calculating simple arithmetic mean, it is assumed that all the items in the series carry equal importance. But in practice, there are many cases where relative importance should be given to different items. When the mean is computed by giving each data value a weight that reflects its importance, it is referred to as a weighted mean. When data values vary in importance, the analyst must choose the weight that best reflects the importance of each value. If  $w_1, w_2, w_3, \dots, w_N$  are weights of  $N$  observations in a series  $X_1, X_2, X_3, \dots, X_N$  then the weighted mean is calculated as

$$\bar{X}_w = \frac{\sum wX}{\sum w}$$

**Note:** If the weights of all the observations are equal i.e.  $w_1 = w_2 = w_3, \dots, w_N = w$  Then the weighted A.M is equal to simple A.M i.e.  $\bar{X}_w = \bar{X}$ .

**Example 8:** An examination was held to decide the award of scholarship. The weights of various subjects were different. The marks obtained by 3 candidates (out of 100) in each subject are given below:



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Subject	Weight	Students		
		A	B	C
Mathematics	40	60	57	62
History	30	62	61	67
Chemistry	20	55	53	60
English	10	67	77	49

Calculate the weighted A.M. to award the scholarship.

**Solution:**

**Table 8.6: Calculation of the weighted arithmetic mean**

Subject	Weight	Students					
		A		B		C	
		Marks ( $X_A$ )	$X_A w_i$	Marks ( $X_B$ )	$X_B w_i$	Marks ( $X_C$ )	$X_C w_i$
Mathematics	40	60	2400	57	2280	62	2480
History	30	62	1860	61	1830	67	2010
Chemistry	20	55	1100	53	1060	60	1200
English	10	67	670	77	770	49	490
Total	<b>100</b>	<b>244</b>	<b>6030</b>	<b>248</b>	<b>5940</b>	<b>238</b>	<b>6180</b>

Applying the formula for weighted mean, we get

$$\bar{X}_{wA} = \frac{6030}{100} = 60.3 \text{ marks; } \bar{X}_A = \frac{244}{4} = 61 \text{ marks.}$$

$$\bar{X}_{wB} = \frac{5940}{100} = 59.4 \text{ marks; } \bar{X}_B = \frac{248}{4} = 62 \text{ marks.}$$

$$\bar{X}_{wC} = \frac{6180}{100} = 61.8 \text{ marks; } \bar{X}_C = \frac{238}{4} = 59.5 \text{ marks.}$$

From the above calculation, it may be noted that student B should get the scholarship as per simple A.M. values, but according to weighted A.M., student C should get the scholarship because all the subjects of examination are not of equal importance.



### INTEXT QUESTIONS 8.6

1. A big mall wants to know the weighted mean of the sales price of 2,000 units of one product that had its final price adjusted according to the first ten days of sales. The table below summarizes the relation between final price and number of sold units.

Price per unit	No. of sold units	Price per unit	No. of sold units
₹ 24.20	354	₹ 24.14	288
₹ 24.10	258	₹ 24.06	240
₹ 24.00	209	₹ 23.95	186
₹ 23.90	133	₹ 23.84	121
₹ 23.82	110	₹ 23.75	101

Compute both the average price and the weighted average sales price of this product

### An Evaluation of Arithmetic Mean

Arithmetic mean is easy to calculate. All values in the series are used in the calculation of mean, so it can be regarded as more representative of the entire data set. However, mean is affected by extreme items i.e. very high or a very low value in the data set. Thus the mean may be rather lower or higher than most of the values in the data set and so become unrepresentative of the entire data. Mean cannot be calculated in the open-ended frequency distribution.

## 8.3 MEDIAN

Median is the positional value that divides the series into two equal parts in such a way that half of the items lie above this value and the remaining half lie below this value. In Connor's words - "The median is that value of the variable which divides the group into two equal parts, one part comprising all values greater and the other all values lesser than the median." Median is called a positional average because it is based on the position of a given observation in a series arranged in an ascending or descending order and position of the median is such that equal number of items lie on either side of it. Median is denoted by Med. or  $M_d$ .

### 8.3.1 Computation of Median in case of Individual Series

The steps involved in the calculation of median are as follows:

**Step 1:** Arrange the data in ascending or descending order.



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**Step 2:** Ascertain  $\frac{N+1}{2}$ th item. This will give the position of the median i.e. item/items at which the median lies.

It may be noted that the formula  $\frac{N+1}{2}$ th item gives the position of the median in an ordered series, not the median itself. Median is the size of  $\frac{N+1}{2}$ th item.

**Example 9:** The following data relates to the no. of patients examined per hour in the hospital:

No. of Patients Examined	10	12	15	20	13	24	17	18
--------------------------	----	----	----	----	----	----	----	----

Calculate the median.

**Solution:**

Arranging the size of item in ascending order:

No. of Patients Examined	10	12	13	15	17	18	20	24
--------------------------	----	----	----	----	----	----	----	----

$$\begin{aligned}\text{Median} &= \text{size of } \left(\frac{N+1}{2}\right)\text{th item} = \left(\frac{8+1}{2}\right)\text{th item} \\ &= \text{size of 4.5th item}\end{aligned}$$

$$\text{We get Median} = \frac{15+17}{2} = 16$$

Thus the median no. of patients examined per hour is 16.

**Example 10:** The following figures represent the number of books in Statistics issued at the counter of a library on 11 different days. 96, 180, 98, 75, 270, 80, 102, 100, 94, 75 and 200. Calculate the median.

**Solution:** Arrange the data in the ascending order as 75, 75, 80, 94, 96, 98, 100, 102, 180, 200, 270.

Now the total number of items 'N' = 11

$$\text{Therefore, the median} = \text{size of } \left(\frac{N+1}{2}\right)\text{th item}$$

$$\begin{aligned}
 &= \text{size of } \left( \frac{11+1}{2} \right) \text{th item} \\
 &= \text{size of } 6^{\text{th}} \text{ item} \\
 &= 98 \text{ books per day}
 \end{aligned}$$

**INTEXT QUESTION S 8.7**

1. If a data set has an even number of observations, the median
  - (a) cannot be determined
  - (b) is the average value of the two middle items
  - (c) must be equal to the mean
  - (d) is the average value of the two middle items when all items are arranged in ascending order
2. A distribution of 6 scores has a median of 21. If the highest score increases 3 points, the median will become:
  - (a) 21
  - (b) 21.5
  - (c) 24
  - (d) Cannot be determined without additional information.
  - (e) none of these

**8.3.2 Computation of Median in case of Discrete Series:**

In case of discrete series the position of median i.e.  $\frac{N+1}{2}$ th item can be located through cumulative frequency. The steps involved in the calculation of median are as follows:

**Step 1:** Arrange the data in ascending or descending order of magnitude.

**Step 2:** find out the cumulative frequency (c.f.)

**Step 3:** Median = size of  $\frac{N+1}{2}$ th item

**Step 4:** Now look at the cumulative frequency column and find that total which is either equal to  $\frac{N+1}{2}$  or next higher to that and determine the value of the variable corresponding to it. That gives the value of median.

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**Example 11:** Calculate Median from the following data:

Marks	45	55	25	35	5	15
No of Students	40	30	30	50	10	20

**Solution:**

**Table 8.7: Calculation of Median Marks**

Marks in an Ascending order	No. of students	Cumulative frequencies
5	10	10
15	20	30
25	30	60
35	50	110
45	40	150
55	30	180

$$\text{Median} = \text{size of } \frac{N+1}{2} \text{th item} = \frac{180+1}{2} \text{ item} = 90.5 \text{th item}$$

Cumulative frequency which includes 90.5<sup>th</sup> item = 110

Median = size of item corresponding to 110 = 35marks.

### 8.3.3 Computation of Median in case of Continuous Series

The steps involved in the calculation of median are as follows:

**Step 1:** Calculate Cumulative Frequencies.

**Step 2:** Ascertain  $\left[ \frac{N}{2} \right]$  th item.

**Step 3:** Find out the cumulative frequency which includes  $\left[ \frac{N}{2} \right]$  th item and corresponding class frequency. The corresponding class of this cumulative frequency is called the median class.



**Step 4: Calculate Median as Follows:**

$$\text{median} = l_1 + \frac{\frac{N}{2} - \text{c.f.}}{f} \times i$$

where  $l_1$  = Lower limit of the median class

c.f. = cumulative frequency of the preceeding class

$f$  = frequency of the median class

$i$  = class interval of median class

**Example 12:** Calculate the median of weekly expenditure from the following data:

Weekly Expenditure (in ₹)	0-10	10-20	20-30	30-40	40-50
No. of families	14	23	27	21	15

**Solution:**

**Table 8.8: Calculation of Median Weekly Expenditure (in ₹)**

Weekly Expenditure (in ₹)	No. of families (f)	Cumulative frequency (c.f)
0-10	14	14
10-20	23	37
20-30	27	64
30-40	21	85
40-50	15	100

Ascertain  $\left[ \frac{N}{2} \right]$  th item =  $\left[ \frac{100}{2} \right]$  th item = 50th item lies in class interval as 20-30.

Thus the Median Class is 20-30.

Now applying formula of median

$$\text{Median} = l_1 + \frac{\frac{N}{2} - \text{c.f.}}{f} \times i$$

here  $l_1 = 20$ , c.f. = 37,  $f = 27$ ,  $i = 10$



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$$\text{Median} = 20 + \frac{50 - 37}{27} \times 10$$

$$= ₹ 24.815$$

Note that while calculating the median of a series, it must be put in the 'exclusive class-interval' form. If the original series is in inclusive type, first convert it into the exclusive type and then find its median.



## INTEXT QUESTIONS 8.8

1. Calculate the median age of the persons from the following data.

Age (years) :	20-25	25-30	30-35	35-40	40-45
No. of person :	70	80	180	150	20

2. Calculate the median marks of the students:

Marks :	40-50	30-40	20-30	10-20	0-10
No. of students :	10	12	40	30	8

## 8.3.4 Important Mathematical property of median

The sum of the deviations of the items from median, ignoring signs is the least.

$$\Sigma |X - Md| \text{ is least.}$$

## An Evaluation of Median

Since Median is the middle term it is not affected by extreme values and can also be calculated in the open ended frequency distribution. It is not based on all the values of the data set.

## 8.4 QUARTILES

Quartile is that value which divides the total distribution into four equal parts. So there are three quartiles, *i.e.*  $Q_1$ ,  $Q_2$  and  $Q_3$  which are termed as first quartile, second quartile and third quartile or lower quartile, middle quartile and upper quartile respectively.  $Q_1$  (quartile one) covers the first 25% items of the series.  $Q_1$  divides the series in such a way that 25% of the observations have the value less than  $Q_1$  and 75% have the value more than  $Q_1$ .  $Q_2$  (quartile two) is the median or middle value of the series and  $Q_3$  (quartile three) covers 75% items of the series.  $Q_3$  divides the series in such a way that 75% of the observations have the value less than  $Q_3$  and 25% have the value more than  $Q_3$ .

- **Calculation of Quartiles:**

The calculation of quartiles is done exactly in the same manner as it is in case of the calculation of median.

**8.4.1 In case of Individual and Discrete Series**

$$Q_k = \text{Size of } \frac{k(N+1)}{4} \text{th item of the series}$$

**8.4.2 In case of Continuous Series**

$$Q_k = \text{Size of } k\left(\frac{N}{4}\right) \text{th item of the series,}$$

$Q_k$  is calculated as follows:

$$Q_k = l_1 + \frac{k\left(\frac{N}{4}\right) - cf}{f} \times i$$

Where,  $l_1$  = Lower limit of quartile class

$l_2$  = upper limit of quartile class

$c$  = Cumulative frequency preceding the quartile class

$f$  = Frequency of  $k$ th quartile class.

**Example 13:** Find the  $Q_1$  and  $Q_3$  of the following:

- (a) 4, 5, 6, 7, 8, 9, 12, 13, 15, 10, 20  
 (b) 100, 500, 1000, 800, 600, 400, 7000 and 1200

**Solution:**

- (a) Values of the variable are in ascending order:

i.e. 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 20, So  $N = 11$  (No. of Values)

$$\begin{aligned} Q_1 &= \text{Size of } \frac{(N+1)}{4} \text{th item of the series} \\ &= \left(\frac{11+1}{4}\right) = \text{size of } 3^{\text{rd}} \text{ item.} = \text{size of 3rd item} = 6 \end{aligned}$$



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$$Q_3 = \text{Size of } \frac{3(N+1)}{4} \text{th item of the series}$$

$$= 3 \left( \frac{11+1}{4} \right) = \text{size of } 9^{\text{th}} \text{ item.} = \text{size of 9th item} = 13$$

∴ Required  $Q_1$  and  $Q_3$  are 6 and 13 respectively,

(b) The values of the variable in ascending order are:

100, 400, 500, 600, 700, 800, 1000, 1200,  $N = 8$

$$Q_1 = \text{Size of } \frac{(N+1)}{4} \text{th item of the series}$$

$$= \text{Size of } \frac{(8+1)}{4} \text{th item of the series}$$

$$= \text{size of 2.25th item}$$

$$= \text{size of } \{ \text{Second item} + 0.25(\text{Third item} - \text{Second item}) \}$$

$$= 400 + 0.25 (500 - 400) = 400 + 25 = 425$$

$$Q_3 = \text{Size of } \frac{3(N+1)}{4} \text{th item of the series}$$

$$= \text{Size of } \frac{3(8+1)}{4} \text{th item of the series}$$

$$= \text{size of 6.75th item}$$

$$= \text{size of } [6\text{th item} + 0.75(7\text{th item} - 6\text{th item})]$$

$$= 800 + 0.75 (1000 - 800)$$

$$= 800 + 150 = 950$$

Required  $Q_1$  and  $Q_3$  are 425 and 950 respectively.

**Example 14:** Find the median and  $Q_1$  from the following data.

Marks :	0-10	10-30	30-50	50-80	80-90	90-100
No of Students :	4	12	20	8	4	2

**Solution:** To locate median class firstly we have to calculate cumulative frequencies.

**Table 8.9: Calculation of Median and Quartile Marks**

Marks	0-10	10-30	30-50	50-80	80-90	90-100
No of Students	4	12	20	8	4	2
Cumulative frequency	4	16	36	44	48	50

Calculation of Median is shown as under:

Here  $N = 50$ , so  $N/2 = 25$ , hence median class is 30-50

$$\text{Median} = l_1 + \frac{\frac{N}{2} - c.f}{f} \times i$$

$$\text{Median} = 30 + \frac{25 - 16}{20} \times 20 = 39 \text{ marks}$$

#### Calculation of $Q_1$ :

Here  $N = 50$  so  $N/4 = 12.5$ , hence Quartile class ( $Q_1$ ) is 10-30

$$Q_1 = l_1 + \frac{N/4 - cf}{f} \times i$$

$$Q_1 = 10 + \frac{12.5 - 4}{12} \times 20 = 24.16 \text{ marks}$$

## 8.5 MODE

Mode ( $M_0$ ) is the value around which maximum concentration of items occurs. For example, a manufacturer would like to know the size of shoes that has maximum demand or style of the shirt that is more frequently demanded. Here, *Mode* is the most appropriate measure. Mode is the value which is repeated the highest number of times in the series. It is the size of that item which possesses the maximum frequency.

### 8.5.1 Computation of Mode in case of Ungrouped Data/ Individual series

The mode of this series can be obtained by mere inspection. The number which occurs most often is the mode.

Note that if in any series, two or more numbers have the maximum frequency, then the mode will be difficult to calculate. Such series are called as Bi-modal, Tri-modal or Multi-modal series.



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**Example 15:** Find the mode of 15, 21, 26, 25, 21, 23, 28, 21

**Solution:** The mode is 21 since it occurs three times and the other values occur only once.



### INTEXT QUESTIONS 8.9

- The most frequently occurring value of a data set is called:  
(a) range      (b) mode      (c) mean      (d) median
- Find the mode of 12, 15, 18, 26, 15, 9, 12, 27
- The measure of location which is the most likely to be influenced by extreme values in the data set is the:  
(a) median      (b) mode      (c) mean      (d) Quartile
- A researcher has collected the following sample individual data

5	12	6	8	5	6	7	5	12	4
---	----	---	---	---	---	---	---	----	---

The Median is:

- (a) 5              (b) 6              (c) 7              (d) 8

And the Mode is:

- (a) 5              (b) 6              (c) 7              (d) 8

- Which of the following can have more than one value?  
(a) Median;      (b) Quartile;      (c) mode and      (d) mean

### 8.5.2 Computation of mode in case of discrete series

The mode in case of discrete series is calculated by applying the following methods:

#### (a) Simple inspection method:

By simple inspection, the modal value is the value of the variable against which the frequency is the largest.

**Example 16:** Find the modal age of boys studying in XII class from the following data.

Age : (in yrs)	5	7	10	12	15	18
No. of Boys :	4	6	9	7	5	3

**Solution:**

From the above data we can clearly see that modal age is 10 yrs because 10 has occurred maximum number of times i.e. 9.

**b) Grouping and Analysis Table method:** This method is generally used when the difference between the maximum frequency and the frequency preceding it or succeeding it is very small.

### Process of Computation:

In order to find mode, a grouping table and an analysis table are to be prepared in the following manner:

### Grouping Table:

A grouping table consists of 6 columns.

1. Arrange the values in ascending order and write down their corresponding frequencies in the column-1.
2. In column-2 the frequencies are grouped into two's and added.
3. In column-3 the frequencies are grouped into two's, leaving the first frequency and added.
4. In column-4 the frequencies are grouped into three's, and added.
5. In column-5 the frequencies are grouped into three's, leaving the first frequency and added.
6. In column-6 the frequencies are grouped into three's, leaving the first and second frequencies and added.
7. Now in each these columns mark the highest total with a circle.

### Analysis Table:

After preparing a grouping table, prepare an analysis table. While preparing this table take the column numbers as rows and the values of the variable as columns. Now for each column number see the highest total in the grouping table (Which is marked with a circle) and mark the corresponding values of the variable to which the frequencies are related by using bars in the relevant boxes. Now the value of the variable (class) which gets highest number of bars is the modal value (modal class).

Applying grouping and Analysis Table Method to the given example for calculating the value of mode for discrete series.

**Table 8.10: Grouping Table**

Age	Frequency					
	Col I	Col II	Col III	Col IV	Col V	Col VI
5	4	10		19		
7	6		15		22	
10	9	16				21
12	7		12	15		
15	5	8				
18	3					



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Analysis Table

Column	5	7	10	12	15	18
Col I			1			
Col II			1	1		
Col III		1	1			
Col IV	1	1	1			
Col V		1	1	1		
Col VI			1	1	1	
Total	1	3	6	3	1	0

Thus the Modal age of Boys is 10 years.

### 8.5.3 Computation of Mode in case of Continuous series

In case of continuous series, for calculating mode, first of all ensure that the given continuous series is the exclusive series with equal class intervals. In order to find out the mode we need one step more than those used for discrete series. As explained in the discrete series, modal class is determined by inspection or by preparing grouping and analysis tables. The steps involved are:

1. Determine the modal class which has the maximum frequency.
2. Value of the mode can be calculated by the formula :

$$\text{Mode} = l_1 + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

$l_1$  = lower limit of the modal class

$f_1$  = frequency of the modal class

$f_0$  = frequency of the preceeding the modal class

$f_2$  = frequency of the succeeding the modal class

$i$  = class interval of the modal class

**Note:** 1. It may be noted that in case of continuous series, class intervals should be equal and series should be exclusive to calculate the mode. If the given series is inclusive and has unequal class interval then the same has to be converted into exclusive series and series with equal class interval.

2. If mid points are given, class intervals are to be obtained.

**Example 17:** From the following data calculate mode:

Age (in years) :	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
No. of Persons :	50	70	80	150	180	120	70	50



**Solution:****Table 8.11: Computation of mode**  
**Grouping Table:**

Age	Frequency					
	(1)	(2)	(3)	(4)	(5)	(6)
20-25	50	120		200		
25-30	70		150		300	
30-35	80	230				<b>410</b>
35-40	150		<b>330</b>	<b>450</b>		
40-45	<b>180</b>	<b>300</b>			<b>370</b>	
45-50	120		190			240
50-55	70	120				
55-60	50					

**Analysis Table**

Column	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
<b>1</b>					1			
<b>2</b>					1	1		
<b>3</b>				1	1			
<b>4</b>				1	1	1		
<b>5</b>					1	1	1	
<b>6</b>			1	1	1			
Total	0	0	1	3	6	3	1	0

The modal class is 40-45. Mode is given by:

$$\text{Mode} = l_1 + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

Here  $L = 40$ ,  $f_1 = 180$ ,  $f_0 = 150$ ,  $f_2 = 120$ ,  $i = 5$ 

$$\text{Mode} = 40 + \frac{180 - 150}{(2 \times 180) - 150 - 120} \times 5 = 40 + \left[ \frac{30}{90} \right] \times 5 = 41.67 \text{ years.}$$

**Example 18:** Calculate the modal wages from the following data:

Daily wages (in ₹):	20-25	25-30	30-35	35-40	40-45	45-50
No. of workers:	1	3	8	12	7	5

**Notes**

## MODULE - 4

### Statistical Tools



#### Notes

### Measures of Central Tendency

**Solution:** Here the maximum frequency is 12 by inspection method, corresponding to the class interval (35 - 40) which is the modal class.

$$\text{Mode} = l_1 + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

Here  $L = 35$ ,  $f_1 = 12$ ,  $f_0 = 8$ ,  $f_2 = 7$ ,  $i = 5$

$$\text{Mode} = 35 + \frac{12 - 8}{(2 \times 12) - 8 - 7} \times 5 = 35 + \left[ \frac{4}{9} \right] \times 5 = 37.22 \text{ (in rupee)}$$

Modal wages is ₹ 37.22

#### An Evaluation of Mode

Mode is not affected by extreme values and can be calculated in the open ended frequency distribution.

**Example 19:** The following table shows the daily wages of a random sample of construction workers. Calculate its mean, median and mode.

Daily Wages (₹)	Number of Workers
200 - 399	5
400 - 599	15
600 - 799	25
800 - 999	30
1000 - 1199	18
1200 - 1399	7
Total	100

**Solution:**

**Table 8.12: Calculation of Mean**

Daily Wages (₹)	Number of Workers (f)	Class Mark m	fm
200 - 399	5	299.5	1,497.5
400 - 599	15	499.5	7,492.5
600 - 799	25	699.5	17,489.5
800 - 999	30	899.5	26,985.0
1000 - 1199	18	1,099.5	19,791.0
1200 - 1399	7	1,299.5	9,096.5
Total	100		82,352.0

$$\text{Mean } (\bar{X}) = \frac{\Sigma fm}{\Sigma f} = \frac{82,352.0}{100} = 823.52 \text{ (in rupees)}$$

Thus Mean Wages are ₹ 823.52

In order to calculate the mode and median the given series has to be converted from inclusive series into exclusive series.

**Table 8.13: Calculation of Median**

Daily Wages (₹)	Number of Workers(f)	Cumulative Frequency
199.5 – 399.5	5	5
399.5 – 599.5	15	20
599.5 – 799.5	25	45
799.5 – 999.5	30	75
999.5 – 1199.5	18	93
1199.5 – 1399.5	7	100
<b>Total</b>	<b>100</b>	

$$\text{Median} = l_1 + \frac{\frac{N}{2} - c.f}{f} \times i$$

Here N = 100 so N/2 = 50, hence median class is 799.5 – 999.5

$$\text{Median} = 799.5 + \frac{50 - 45}{30} \times 200 = 832.83 \text{ (in Rupees)}$$

So the median daily wage is ₹ 832.8

**Table 8.14: Computation of Mode**

**Grouping Table**

Daily Wages (₹)	Frequency					
	(1)	(2)	(3)	(4)	(5)	(6)
199.5-399.5	5	20		45		
399.5-599.5	15		40		<b>70</b>	
599.5-799.5	25	<b>55</b>				<b>73</b>
799.5-999.5	<b>30</b>		<b>48</b>	<b>55</b>		
999.5-1199.5	18	25				
1199.5-1399.5	7					



Notes

## MODULE - 4

Statistical Tools



Notes

### Measures of Central Tendency

Analysis Table

Col.	199.5- 399.5	399.5- 599.5	599.5-799.5	799.5-999.5	999.5-1199.5	1199.5-1399.5
1				1		
2			1	1		
3				1	1	
4				1	1	1
5		1	1	1		
6			1	1	1	
Total	0	1	3	6	3	1

The modal class is 799.5 – 999.5. Mode is given by:

$$\text{Mode} = l_1 + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

Here  $l_1 = 799.5$ ,  $f_1 = 30$ ,  $f_0 = 25$ ,  $f_2 = 18$ ,  $i = 200$

$$\text{Mode} = 799.5 + \frac{30 - 25}{(2 \times 30) - 25 - 18} \times 200$$

$$= 799.5 + \left[ \frac{5}{17} \right] \times 200 = 858.32 \text{ (in Rupees).}$$

Thus the modal wage is ₹858.32



### WHAT YOU HAVE LEARNT

- The measure of central tendency identifies the single value that is most typical/ representative of the entire data-set.
- The following are the important measures of central tendency:
  - Arithmetic mean.
    - Simple arithmetic mean.
    - Weighted arithmetic mean.
  - Median
  - Quartiles.
  - Mode.



Notes

- The arithmetic mean in case of individual series can be computed using

- Direct Method**

$$\bar{X} = \frac{\sum X}{N}$$

- Assumed Mean Method**

$$\bar{X} = A + \frac{\sum d}{N}$$

where  $\bar{X}$  = Arithmetic mean, A = Assumed mean

$\sum d$  = sum of deviations, N = Number of Individual observations

- Arithmetic Mean in case of discrete series is given by:

- Direct Method**

$$\bar{X} = \frac{\sum fX}{\sum f}$$

where  $\sum f$  = total frequency

- Assumed Mean Method**

$$\bar{X} = A + \frac{\sum fd}{N}$$

where A = assumed mean, d = X – A and N =  $\sum f$

- Step Deviation Method**

$$\bar{X} = A + \frac{\sum fd'}{\sum f} \times c$$

- Arithmetic Mean in case of continuous series is given by:

- Direct Method**

$$\bar{X} = \frac{\sum fm}{\sum f}$$

where Mid-point (m) =  $\frac{\text{Lower Limit} + \text{Upper Limit}}{2}$

- Assumed Mean Method**

$$\bar{X} = A + \frac{\sum fd}{\sum f}$$

where A = assumed mean d = m – A

f = frequency of n number of observation.



Notes

- **Step Deviation Method**

$$\bar{X} = A + \frac{\Sigma fd'}{\Sigma f} \times c$$

where  $d' = \frac{m - A}{c}$

$m$  = mid-point,  $A$  = Assumed mean

$c$  = common factor which is the difference between upper limit and lower limit of a class

- The combined mean of two series is given by

$$\text{Combined mean } \bar{X} = \frac{N_1 \bar{X}_1 + N_2 \bar{X}_2}{N_1 + N_2}$$

where  $N_1$  and  $N_2$  are no. of items in the two series and  $\bar{X}_1$  and  $\bar{X}_2$  are the means of two series.

- The weighted arithmetic mean is given by:

$$\frac{\Sigma wX}{\Sigma w}$$

where  $w_1 = w_1, w_2, w_3, \dots w_N$  are weights of  $N$  observations in a series and  $x_i = x_1, x_2, x_3, \dots x_N$  are  $N$  observations in the series.

- Median is the positional value that divides the series into two equal parts in such a way that half of the items lie above this value and the remaining half lie below this value.
- In individual and discrete series, the formula to calculate median is :

$$\text{Median} = \text{size of } \frac{N+1}{2} \text{th item}$$

- If the number of observations is even then median is given by

$$\text{Median} = \left[ \frac{\text{size of } \left( \frac{N}{2} \right)^{\text{th}} + \text{size of } \left( \frac{N}{2} + 1 \right)^{\text{th}}}{2} \right]$$

- Median in case of cumulative series is given by:

Median = size of  $\left(\frac{N}{2}\right)$ th item

$$\text{Median} = l_1 + \frac{\frac{N}{2} - \text{c.f.}}{f} \times i$$

where  $l_1$  = Lower limit of the median class

c.f. = cumulative frequency of the preceding class

$f$  = frequency of the median class

$i$  = class interval of median class

- Quartile is the value which divides the total distribution into four equal parts. There are three quartiles, i.e.  $Q_1$ ,  $Q_2$  and  $Q_3$  which are termed as first quartile, second quartile and third quartile or lower quartile, middle quartile and upper quartile respectively.

- In case of Individual and Discrete Series, the quartiles are computed by:

$$Q_k = \text{Size of } \frac{k(N+1)}{4} \text{th item of the series}$$

- In case of Continuous Series the quartiles are computed by:

$$Q = l_1 + \frac{k\left(\frac{N}{4}\right) - \text{cf}}{f} \times i$$

where  $l_1$  = Lower limit of  $i$ th quartile class

$l_2$  = upper limit of  $i$ th quartile class

$c$  = Cumulative frequency preceding the  $i$ th quartile class

$f$  = Frequency of  $k$ th quartile class.

- Mode is the value around which maximum concentration of items occurs.
- Mode in case of ungrouped or Individual series is the number which occurs most often in data.
- The mode in case of grouped data (discrete series and continuous series) is the value of the variable against which the frequency is the largest.



Notes



Notes



## TERMINAL EXERCISE

## Mean

1. An average daily wages of all 90 workers in a factory is ₹. 60. An average daily wages of non-technical workers is ₹. 45. Calculate an average daily wages of technical workers if one-third workers are technical.
2. For the two frequency distribution given below, the mean calculated from the first was 25.4 and that from the second was 32.5. Find the values of x and y.

Class Interval	Distribution I	Distribution II
10-20	20	4
20-30	15	8
30-40	10	4
40-50	x	2x
50-60	y	y

3. The mean of 99 items is 55. The value of 100<sup>th</sup> item is 99 more than the mean of 100 items. What is the value of 100<sup>th</sup> item

## Median

4. The length of time taken by each of 18 workers to complete a specific job was observed to be the following:

Time(in min)	5-9	10-14	15-19	20-24	25-29
No. of workers	3	8	4	2	1

Calculate the median time and  $Q_1$  and  $Q_3$

5. Calculate the median from the following data:

Mid values	115	125	135	145	155	165	175	185	195
frequency	6	25	48	72	116	60	38	22	3

6. If the quartiles for the following distribution are  $Q_1 = 23.125$  and  $Q_3 = 43.5$ , find the median:

Daily Wages	0-10	10-20	20-30	30-40	40-50	50-60
No. of workers	5	-	20	30	-	10





Notes

7. The mean and median of a group of 25 observations are 143, 144, and 147 respectively. A set of 6 observations is added to this data with values 132, 125, 130, 160, 165 and 157. Find mean and median for the combined group of 31 observations.

**Mode**

8. Locate mode in the data:

7, 12, 8, 5, 9, 6, 10, 9, 4, 9, 9

9. Determine the modal value in the following series:

Value	10	12	14	16	18	20	22	24	26	28	30	32
frequency	7	15	21	38	34	34	11	19	10	38	5	2

10. The median and mode of the following wage distribution are known to be ₹. 33.5 and ₹. 34 respectively. Three frequency values from the table are however missing. Find the missing values.

Wages in ₹	Frequencies
0-10	10
10-20	10
20-30	?
30-40	?
40-50	?
50-60	6
60-70	4
	230

11. The details of monthly salary of various categories of employees working in a university are given below. From these details, calculate mode of monthly salary.

Category	Monthly Salary (₹)	No. of employees
Principal	10,00,000	1
Vice Principal	2,50,000	1
Senior	75,000	5
Professor	30,000	8
Associate Professor	20,000	13
Assistant Professor	18,000	9

## MODULE - 4

### Statistical Tools



Notes

### Measures of Central Tendency

12. The distribution of age of patients turned out in a hospital on a particular day was as under:

Age (in years)	No. of patients
More than 10	148
More than 20	124
More than 30	109
More than 40	71
More than 50	30
More than 60	16
More than 70 and upto 80	1

Find the median age and modal age of the patients.



### ANSWERS TO INTEXT QUESTIONS

#### 8.1

1. (c)                      2. 7

#### 8.2

1. 12.4 years              2. 41

#### 8.4

1. (d)                      2. (c)

#### 8.5

1. 15                      2. 3.97                      3. 36.83 years

#### 8.6

1. Average price ₹23.98

Weighted mean for sales in the first ten days ₹24.03

#### 8.7

1. (d)  
2. (a) Median will remain the same

**8.8**

1. 32.78 years
2. 23 marks

**8.9**

1. (b)
2. The modes are 12 and 15 since both occur twice
3. (c)
4. (b)
5. (c)



**Notes**



# MEASURES OF DISPERSION

The previous lesson provides the measure of central tendency that sum up or describe the data into a single representative value. The measures of central tendency may not be adequate to describe data unless we know the manner in which the individual items scatter around it. In other words, a further description of a series on the scatter or variability known as **dispersion** is necessary, if we are to gauge how representative the average is.

Let us take the following three sets.

Students	Group X	Group Y	Group Z
1	50	45	05
2	50	50	45
3	50	55	100
mean $\bar{X}$	50	50	50

Thus, the three groups have same mean i.e. 50. In fact the median of group X and Y are also equal. Now if one would say that the students from the three groups are of equal capabilities, it is totally a wrong conclusion. Close examination reveals that in group X students have equal marks as the mean, students from group Y are very close to the mean but in the third group Z, the marks are widely scattered. It is thus clear that the measures of the central tendency is alone not sufficient to describe the data. The measure of dispersion helps us to know the degree of variability in the data and provide a better understanding of the data.



## OBJECTIVES

After completing this lesson, you will be able to:

- know the meaning and need of measures of dispersion;

- distinguish between absolute and the relative measures of dispersion;
- apply the various measures of dispersion; and
- calculate and compare the different measures of dispersion.

## 9.1 MEANING OF DISPERSION

Dispersion is the extent to which values in a distribution differ from the average of the distribution.

In measuring dispersion, it is imperative to know the amount of variation (absolute measure) and the degree of variation (relative measure). In the former case we consider the range, Quartile Deviation, standard deviation etc. In the latter case we consider the coefficient of range, coefficient quartile deviation, the coefficient of variation etc.

### 9.1.1 Absolute and Relative Measures of Dispersion

The dispersion of a series may be measured either absolutely or relatively. If the dispersion is expressed in terms of the original units of the series, it is called absolute measure of dispersion. The disadvantage of absolute measure of dispersion is that it is not suitable for comparative study of the characteristics of two or more series.

For example if the data is expressed in kilograms then the absolute variation will also be expressed in kilograms but if the same data is expressed in grams then the variation will appear 1000 times more. So for comparison point of view it is necessary to calculate the relative measures of dispersion which are expressed as percentage form (i.e. unitless number). These types of expressions are called coefficients of dispersion. Each absolute measure of dispersion has a relative measure of dispersion.

## 9.2 MEASURES AND METHODS OF COMPUTING DISPERSION

The following are the important measures of dispersion:

1. Range
2. Quartile deviation or Semi-Inter quartile range.
3. Mean deviation
4. Standard deviation
5. Lorenz Curve

**Notes**



## Notes

Range and Quartile Deviation measure the dispersion by calculating the spread within which the values lie. Mean Deviation and Standard Deviation calculate the extent to which the values differ from the average.

### 9.2.1 Range

Range (R) is the difference between the largest (L) and the smallest value (S) in a distribution. Thus

$$\text{Range (R)} = L - S$$

**Coefficient of Range:** It is a relative measure of the range. It is used in the comparative study of the dispersion

$$\text{co-efficient of Range} = \frac{L - S}{L + S}$$

In case of continuous series Range is just the difference between the upper limit of the highest class and the lower limit of the lowest class.

### Range: Evaluation

Range is very simple to understand and easy to calculate. However, it is not based on all the observations of the distribution and is unduly affected by the extreme values. Any change in the data not related to minimum and maximum values will not affect range. It cannot be calculated for open-ended frequency distribution.

**Example 1:** The amount spent (in ₹) by the group of 10 students in the school canteen is as follows:

110, 117, 129, 197, 190, 100, 100, 178, 255, 790.

Find the range and the co-efficient of the range.

**Solution:**  $R = L - S = 790 - 100 = ₹ 690$

$$\text{Co-efficient of Range} = \frac{L - S}{L + S} = \frac{790 - 100}{790 + 100} = \frac{690}{890} = 0.78$$

**Example 2:** Find the range and it's co-efficient from the following data.

Size	10-20	20-30	30-40	40-50	50-100
Frequency	2	3	5	4	2

**Solution:**  $R = L - S = 100 - 10 = 90$

$$\text{Co-efficient of range} = \frac{L-S}{L+S} = \frac{100-10}{100+10} = \frac{90}{110} = 0.82$$



### INTEXT QUESTIONS 9.1

- The difference between the largest and the smallest data values is the
  - variance
  - inter-quartile range
  - range
  - coefficient of variation
- A researcher has collected the following sample data. The mean of the sample is 5.

3          5          12          3          2

The range is

- (a) 1                  (b) 2                  (c) 10                  (d) 12

### 9.2.2 Quartile Deviation

It is based on the lower quartile  $Q_1$  and the upper quartile  $Q_3$ . The difference  $Q_3 - Q_1$  is called the inter-quartile range. The difference  $Q_3 - Q_1$  divided by 2 is called semi-inter-quartile range or the quartile deviation.

$$\text{Thus Quartile Deviation (Q.D)} = \frac{Q_3 - Q_1}{2}$$

#### 9.2.2.1 Coefficient of Quartile Deviation

A relative measure of dispersion based on the quartile deviation is called the coefficient of quartile deviation. It is defined as

$$\text{Coefficient of Quartile Deviation} = \frac{\frac{Q_3 - Q_1}{2}}{\frac{Q_3 + Q_1}{2}} = \frac{Q_3 - Q_1}{Q_3 + Q_1}$$

It is pure number free of any units of measurement. It can be used for comparing the dispersion in two or more than two sets of data.

#### 9.2.2.2 Computation of Quartile Deviation of Ungrouped Data

**Example 3:** Find out the quartile deviation of daily wages (in ₹) of 7 persons is given below: 120, 70, 150, 100, 190, 170, 250



Notes



Notes

### Solution:

Arranging the data in an ascending order we get

70, 100, 120, 150, 170, 190, 250

Here  $n = 7$ ,

$$Q_1 = \text{Size of } \frac{(N+1)}{4} \text{th item}$$

$$= \text{Size of } \frac{(7+1)}{4} \text{th item} = 2^{\text{nd}} \text{ item} = 100 \text{ rupees}$$

$$Q_3 = \text{Size of } \frac{3(N+1)}{4} \text{th item}$$

$$= \text{Size of } \frac{3(7+1)}{4} \text{th item} = 6^{\text{th}} \text{ item} = 190 \text{ rupees}$$

$$\text{Q.D.} = \frac{Q_3 - Q_1}{2} = \frac{190 - 100}{2} = 45 \text{ rupees}$$



### INTEXT QUESTION 9.2

1. If the first quartile is 104 and quartile deviation is 18. Find the third quartile.

**Example 4:** The wheat production (in Kg) of 20 acres is given as: 1120, 1240, 1320, 1040, 1080, 1200, 1440, 1360, 1680, 1730, 1785, 1342, 1960, 1880, 1755, 1720, 1600, 1470, 1750, and 1885. Find the quartile deviation and coefficient of quartile deviation.

### Solution:

After arranging the observations in ascending order, we get 1040, 1080, 1120, 1200, 1240, 1320, 1342, 1360, 1440, 1470, 1600, 1680, 1720, 1730, 1750, 1755, 1785, 1880, 1885, 1960.

$$Q_1 = \text{value of } \left( \frac{N+1}{4} \right) \text{th item}$$

$$= \text{Value of } \left( \frac{20+1}{4} \right) \text{th item}$$





Notes

= Value of (5.25)th item

= 5th item + 0.25(6th item – 5th item)

= 1240 + 0.25(1320 – 1240)

$$Q_1 = 1240 + 20 = 1260$$

$$Q_1 = 1240 + 20 = 1260 \text{ kg}$$

$$Q_3 = \text{Value of } \frac{3(N+1)}{4} \text{th item}$$

$$= \text{Value of } \frac{3(20+1)}{4} \text{th item}$$

= Value of (15.75)th item

= 15th item + 0.75(16th item – 15th item)

= 1750 + 0.75 (1755 – 1750)

$$Q_3 = 1750 + 3.75 = 1753.75 \text{ kg}$$

Quartile Deviation (Q.D)

$$= \frac{Q_3 - Q_1}{2} = \frac{1753.75 - 1260}{2} = \frac{492.75}{2} = 246.875$$

$$Q.D. = \frac{Q_3 - Q_1}{2} = \frac{1753.75 - 1260}{2}$$

$$= \frac{492.75}{2} = 246.875 \text{ kg.}$$

Coefficient of Quartile Deviation

$$= \frac{Q_3 - Q_1}{Q_3 + Q_1} = \frac{1753.75 - 1260}{1753.75 + 1260} = 0.164$$

### Computation of Q.D. for a frequency distribution

#### 9.2.2.2 Computation in case of Discrete Series:

**Example 5:** The Tax authority collected the following amount of tax from different firms in a particular market.

## MODULE - 4

Statistical Tools



Notes

### Measures of Dispersion

Amount of Taxes (in 000 ₹)	10	11	12	13	14
No. of Firms	3	12	18	12	3

Calculate the quartile deviation and the coefficient of quartile deviation.

**Solution:**

**Table 9.1: Calculation of Quartile deviation**

Amount of Taxes (in '000 ₹)	No. of Firms (f)	Cummulative Frequency (C.F.)
10	3	3
11	12	15
12	18	33
13	12	45
14	3	48
	<b>Σf = 48</b>	

Here N = 48,

$$Q_1 = \text{Size of } \frac{(N+1)}{4} \text{th item}$$

$$= \text{Size of } \frac{(48+1)}{4} \text{th item}$$

$$= \text{Size of } 12.25^{\text{th}} \text{ item} = 11 \text{ (in '000 rupees)}$$

$$Q_3 = \text{Size of } \frac{3(N+1)}{4} \text{th item}$$

$$= \text{Size of } \frac{3(48+1)}{4} \text{th item}$$

$$= \text{Size of } 36.75^{\text{th}} \text{ item} = 13 \text{ (in '000 rupees)}$$

$$Q.D. = \frac{Q_3 - Q_1}{2} = \frac{13 - 11}{2} = 1 \text{ (in '000 rupees)}$$

$$\text{Coeff of Q.D.} = \frac{Q_3 - Q_1}{Q_3 + Q_1} = \frac{13 - 11}{13 + 11} = 0.083$$

### 9.2.2.3 Computation of Q.D. for a Continuous Series

Example 6: Calculate quartile deviation and coefficient of quartile deviation from the following distribution:

Weekly Wages(in '000 ₹)	5-7	8-10	11-13	14-16	17-19
No. of Workers	14	24	38	20	04

**Solution:**

**Table 9.2: Calculation of Quartile deviation and coefficient of quartile deviation**

Weekly Wages (in '000 ₹)	No. of Workers (f)	Cummulative Frequency (C.F.)
4.5-7.5	14	14
7.5-10.5	24	38
10.5-13.5	38	76
13.5-16.5	20	96
16.5-19.5	4	100
	$\Sigma f = 100$	

$$Q_1 = l_1 + \frac{l_2 - l_1}{f} \left( \frac{N}{4} - cf \right)$$

$\frac{N}{4} = 25$ .  $Q_1$  lies in the class of 7.5-10.5

$$Q_1 = l_1 + \frac{l_2 - l_1}{f} \left( \frac{N}{4} - cf \right) = 7.5 + \frac{25 - 14}{24} \times 3 = 8.875 \text{ (in ₹000)}$$

$$Q_3 = l_1 + \frac{l_2 - l_1}{f} \left( \frac{3N}{4} - cf \right) = 10.5 + \frac{75 - 38}{38} \times 3 = 13.42 \text{ (in ₹000)}$$

$$\text{Q.D.} = \frac{Q_3 - Q_1}{2} = \frac{13.42 - 8.875}{2} = 2.273 \text{ (in ₹000)}$$



**Notes**



Notes

$$\text{Coeff. of Q.D.} = \frac{Q_3 - Q_1}{Q_3 + Q_1} = \frac{13.42 - 8.875}{13.42 + 8.875} = 0.21$$

### Quartile Deviation: An Evaluation

Since Quartile deviation is based only on  $Q_1$  and  $Q_3$ , it means this measure is based on middle 50% of the data of the series. Thus unlike range, Quartile deviation is not affected by extreme items as it ignores 25% of the data from the beginning of the dataset and 25% of the data from the end (data arranged in ascending order). It can be calculated in case of open-ended distribution. However, it is not based on all the observations in the data.



### INTEXT QUESTIONS 9.3

- Which of the following is a measure of dispersion?
  - percentiles
  - quartiles
  - inter-quartile range
  - all of the above are measures of dispersion
- The inter-quartile range is
  - the 50th percentile
  - another name for the standard deviation
  - the difference between the largest and smallest values
  - the difference between the third quartile and the first quartile
- Which of the following limitation of the range is overcome by the inter-quartile range?
  - the sum of the range variances is zero
  - the range is difficult to compute
  - the range is influenced too much by extreme values
  - the range is negative
- A researcher has collected the following sample data. The mean of the sample is 5.  
 3    5    12    3    2  
 The inter-quartile range is:
  - 1
  - 2
  - 10
  - 12

**9.2.3 Mean Deviation**

Mean deviation (MD) of a series is the arithmetic average of the deviation of various items from a measure of central tendency (mean, median and mode)

Mean deviation is based on the items of the distribution and is calculated as an average, on the basis of deviation obtained from either mean, median or mode but generally from the median.

First we compute deviations of all the items from either mean or median ignoring plus (+) and (–) signs. They are called absolute values of deviations where the two parallel bars (ii) indicate that the absolute value is taken. This is also called modulus value. Then the aggregate of these deviations are divided by the number of observations this is called mean deviation.

**9.2.3.1 Calculation of mean deviation**

- (i) Arrange the data in ascending order (for calculating of median)
- (ii) Calculate median/mean/mode
- (iii) Take deviations of items from median/mean ignoring  $\pm$  signs and denote the column as  $|D|$
- (iv) Calculate the sum of these deviation in case of discrete and continuous series  $|D|$  is multiplied by respective frequency of the item to get  $\Sigma f |D|$
- (v) Divide the total obtained by number of items to get mean deviation

$$\text{M.D.} = \frac{\Sigma f |D|}{N}$$

- (vi) apply the formula to get coefficient of mean deviation

$$\text{Coefficient of M.D.} = \frac{\text{M.D.}}{\text{Median / Mean / Mode}}$$

**Example 6:** Calculate mean deviation and coefficient of mean deviation from both mean and median for the following data on the monthly income (in ₹) of households

Income (₹)      8520    6350    7920    8360    7500



**Notes**

## MODULE - 4

Statistical Tools



Notes

### Measures of Dispersion

**Table 9.3: Calculation of mean deviation from median**

Monthly Income (₹)	Deviation from mean (7730) ignoring ± signs  D	Deviations from median (7920) ignoring ± signs  D
6350	1380	1570
7500	230	420
7920	190	0
8360	630	440
8520	790	600
$\Sigma X = 38650$	$\Sigma  D  = 3220$	$\Sigma  D  = 3030$

$$\begin{aligned}\text{Mean} &= \frac{\Sigma X}{N} \\ &= \frac{38650}{5} = 7730\end{aligned}$$

$$\begin{aligned}\text{M.D.} &= \frac{\Sigma |D|}{N} \\ &= \frac{3220}{5} = \text{Rs } 644\end{aligned}$$

$$\begin{aligned}\text{Coefficient of M.D.} &= \frac{\text{M.D.}}{\text{Mean}} \\ &= \frac{644}{7730} = 0.083\end{aligned}$$

$$\text{and Median} = \text{Size of } \left( \frac{N+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{Size of } \left( \frac{5+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{Size of 3rd item}$$

$$= ₹ 7920$$

$$\text{Mean Deviation} = \frac{\Sigma |D|}{N}$$

$$= \frac{3030}{5} = \text{Rs } 606$$

$$\text{Coefficient of M.D.} = \frac{\text{M.D.}}{\text{Median}}$$

$$= \frac{606}{7920} = 0.076$$

### 9.2.3.2 Calculation of mean deviation in discrete series

**Example 7:** Calculate (a) median (b) mean deviation and (c) Coefficient of mean deviation

Size of item (X)	6	12	18	24	30	36	42
Frequency (f)	4	7	9	18	15	10	5

**Solution.****Table 9.4: Calculation of mean deviation from Median**

X	f	cf	D	f D
6	4	4	18	72
12	7	11	12	84
18	9	20	6	54
24	18	38	0	0
30	15	53	6	90
36	10	63	12	120
42	5	68	18	90
	$\Sigma f = 68$		$\Sigma  D  = 72$	$\Sigma f D  = 510$

**Notes**

$$\text{Median} = \text{Size of } \left( \frac{N+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{Size of } \left( \frac{68+1}{2} \right)^{\text{th}} \text{ item}$$

$$= 34.5^{\text{th}} \text{ item}$$

$$\text{M.D.} = \frac{\Sigma f|D|}{N} = \frac{510}{68} = 7.5$$

$$\text{Coefficient of M.D.} = \frac{\text{M.D.}}{\text{Median}} = \frac{7.5}{24} = 0.312$$

**Calculation of mean deviation in continuous series**

**Example 8:** Calculate (i) mean, (ii) mean deviation from mean and (iii) co-efficient of mean deviation.

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	5	8	15	16	6

**Solution:** Calculation of mean deviation from mean



Notes

Table 9.5: Calculation of mean deviation from Mean

Marks X	No of students f	Mid-point m	$\frac{m - 25}{10}$	fd'	D  = m - 27	f D
0-10	5	5	-2	-10	22	110
10-20	8	15	-1	-8	12	96
20-30	15	25	0	0	2	30
30-40	16	35	+1	+16	8	128
40-50	6	45	+2	+12	18	108
	$\Sigma f = 50$			$\Sigma fd' = 10$		$\Sigma f D  = 472$

$$\bar{X} = A + \frac{\Sigma fd'}{N} \times c$$

$$= 25 + \frac{10}{50} \times 10 = 27 \text{ Marks}$$

$$\text{M.D.} = \frac{\Sigma f|D|}{N} = \frac{472}{50} = 9.44 \text{ Marks}$$

$$\text{Coefficient of M.D.} = \frac{\text{M.D.}}{\text{Mean}} = \frac{9.44}{27} = 0.349$$

### Mean deviation: An evaluation

Mean deviation ignores the  $\pm$  signs of the deviation which is mathematically unsound and illogical. Therefore, this method is non-algebraic. Moreover, it can not be computed for distribution for open end classes.



### INTEXT QUESTIONS 9.4

- (i) Calculated mean deviation and co-efficient of mean deviation from median

No of tomatoes per plant	0	1	2	3	4	5	6	7	8	9	10
No of plants	2	5	7	11	18	24	12	8	6	4	3

- (ii) Calculate mean deviation from mean

Class:	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Frequency	3	7	22	60	85	32	8





Notes

### 9.2.4 Standard Deviation (S. D.)

Standard deviation is the most important and commonly used measure of dispersion. It measures the absolute dispersion or variability of a distribution. Standard deviation is the positive square root of the mean of the squared deviations of observations from their mean. It is denoted by S.D. or  $\sigma_x$ .

#### 9.2.4.1 Computation of Standard deviation in case of Individual Series

The following four methods are used to calculate the standard deviation:

##### 1. Actual Mean Method

Let X variable takes on N values i.e.  $X_1, X_2, \dots, X_N$ . The standard deviation of these N observations using actual mean method can be computed as follows:

1. Obtain the arithmetic mean ( $\bar{X}$ ) of the given data.
2. Obtain the deviation of each  $i^{\text{th}}$  observation from  $\bar{X}$  i.e.  $(X_i - \bar{X})$ . (Note that  $\Sigma(X_i - \bar{X}) = 0$ )
3. Square each deviation i.e.  $(X_i - \bar{X})^2$
4. Obtain the sum in step 3 i.e.  $\sum_{i=1}^N (X_i - \bar{X})^2$
5. Obtain the square root of the mean of these squared deviations as follows:

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\Sigma (X - \bar{X})^2}{N}}$$

N = Total No. of observation

##### 2. Assumed Mean Method

This method is applied to calculate the standard deviation when the mean of the data is in fraction. In that case it is difficult and tedious to find the deviation of all observations from the actual mean by the above method. Thus the deviations (d) are taken from the Assumed mean (A) and standard deviation is estimated by using the following formula:

$$\text{Standard Deviation } (\sigma_x) = \sqrt{\frac{\Sigma d^2}{N} - \left(\frac{\Sigma d}{N}\right)^2}$$

where  $d = (X - A)$  i.e. deviation taken from the assumed mean (A)



Notes

### 3. Direct Method

The relevance of this method is particularly useful when the items are very small. To obtain standard deviations, we apply the following formula:

$$\text{Standard Deviation } (\sigma_x) = \sqrt{\frac{\sum X^2}{N} - (\bar{X})^2}$$

where  $\bar{X}$  = arithmetic mean

**(Note:** The direct method basically implies taking deviations from zero)

### 4. Step Deviation Method

In this method we divide the deviations by a common class interval (c) and use the following formula for computing standard deviation:

$$\text{Standard Deviation } (\sigma_x) = \sqrt{\frac{\sum d'^2}{N} - \left(\frac{\sum d'}{N}\right)^2} \times c$$

where  $d' = \left(\frac{X - A}{c}\right)$  i.e. deviation taken from the assumed mean and divide by class interval (c)

**Example 9:** The wholesale price of a commodity for 6 days in a month of February 2014 is as follows:

Days	1	2	3	4	5	6
Commodity Price(₹ Per Quintal)	5	15	25	35	45	55

Compute the standard deviation using:

- Actual Mean Method
- Assumed Mean Method
- Direct Method and
- Step-Deviation Method

**Solution:****Table 9.6: Calculation of standard deviation**

Days	Price (₹ Per Quintal)	$(X - \bar{X})$ $= (X - 30)$	$(X - \bar{X})^2$ $= (X - 30)^2$	$d =$ $(X - 40)$	$d^2 =$ $= (X - 40)^2$	$X^2$	$d' =$ $\frac{X - 40}{5}$	$d'^2$
1	5	-25	625	-35	1225	25	-7	49
2	15	-15	225	-25	625	225	-5	25
3	25	-5	25	-15	225	625	-3	9
4	35	5	25	-5	25	1225	-1	1
5	45	15	225	5	25	2025	1	1
6	55	25	625	15	225	3025	3	9
		$\Sigma(X - \bar{X})$ $= 0$	$\Sigma(X - \bar{X})^2$ $= 1750$	$\Sigma d$ $= -60$	$\Sigma d^2$ $= 2350$	$\Sigma X^2$ $= 7150$	$\Sigma d'$ $= -12$	$\Sigma d'^2$ $= 94$

**Notes****Applying Actual Mean Method**

$$\bar{X} = \frac{\Sigma X}{N} = \frac{180}{6} = 30 \text{ (in Rupees)}$$

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\Sigma(X - \bar{X})^2}{N}} = \sqrt{\frac{1750}{6}} = 17.078 \text{ (in rupees)}$$

**Applying Assumed Mean Method:**

$$\text{Here } \bar{X} = A + \frac{\Sigma d}{N} = 40 + \frac{-60}{6} = 30$$

$$\text{Standard Deviation } (\sigma_x) = \sqrt{\frac{\Sigma d^2}{N} - \left(\frac{\Sigma d}{N}\right)^2}$$

$$\Sigma d^2 = 2350, \Sigma d = -60, N = 6$$

$$\therefore (\sigma_x) = \sqrt{\frac{2350}{6} - \left(\frac{-60}{6}\right)^2} = \text{Rs. } 17.078$$



Notes

**Applying Direct Method**

$$\text{Standard Deviation } (\sigma_x) = \sqrt{\frac{\sum X^2}{N} - (\bar{X})^2}$$

where  $\bar{X} = 30$ ,  $\sum X^2 = 7150$ ,  $N = 6$

$$\therefore (\sigma_x) = \sqrt{\frac{7150}{6} - (30)^2} = \text{Rs. } 17.078$$

**Applying Step Deviation Method**

$$\text{Standard Deviation } (\sigma_x) = \sqrt{\frac{\sum d'^2}{N} - \left(\frac{\sum d'}{N}\right)^2} \times c$$

where  $c = 5$ ,  $\sum d'^2 = 94$ ,  $N = 6$ ,  $\sum d' = -12$

$$\therefore (\sigma_x) = \sqrt{\frac{94}{6} - \left(\frac{-12}{6}\right)^2} \times 5 = \text{Rs. } 17.078$$

**Note:** The sum of deviations taken from mean is Zero. But the sum of deviations from a value other than actual mean is not equal to zero

**9.2.4.2 Computation of Standard Deviation in case of Continuous Series**

In continuous series, the class-interval and frequencies are given. The following methods are used to compute standard deviation in this case:

**1. Actual Mean Method**

In this method the following steps are involved:

- Calculate the mean of the distribution.
- Estimate deviations of mid-values from the actual mean i.e.  $x = m - \bar{X}$ .
- Multiply the deviations with their corresponding frequencies to get 'fx'. [Note that  $\sum fx = 0$ ].
- Calculate  $fx^2$  values by multiplying 'fx' values with 'x' values and sum up these to get  $\sum fx^2$ .
- Apply the following formula to obtain standard deviation:

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum fx^2}{\sum f}}$$

where  $x = (m - \bar{X})$  i.e. deviation taken from the arithmetic mean ( $\bar{X}$ )

## 2. Assumed Mean Method

The steps involved in the calculation of standard deviation are as follows:

- Calculate mid-points (i.e.  $m$ ) of classes.
- Estimate the deviations of mid-points from the assumed mean ( $A$ ) i.e.  $d = m - A$ .
- Multiply values of ' $d$ ' with corresponding frequencies to get ' $fd$ ' values (note that the total of this column is not zero since deviations have been taken from assumed mean).
- Apply the following formula to calculate standard deviation:

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum fd^2}{\sum f} - \left(\frac{\sum fd}{\sum f}\right)^2}$$

where  $d = (m - A)$  i.e. deviation taken from the assumed mean (i.e.  $A$ )

## 3. Step Deviation Method

The steps involved in the calculation of standard deviation are as follows:

- Calculate class mid-points ( $m$ ) and deviations ( $d$ ) from an arbitrarily chosen value just like in the assumed mean method. i.e.  $d = m - A$ .
- Divide the deviations by a common factor ' $C$ ' denoted by  $d' = \left(\frac{m - A}{c}\right)$ .
- Multiply  $d'$  values with corresponding  $f$  values to obtain  $fd'$  values.
- Multiply  $fd'$  values with  $d'$  values to get  $fd'^2$  values.
- Obtain  $\sum fd'$  and  $\sum fd'^2$  values.
- Apply the following formula.

$$\text{Standard Deviation } (\sigma_x) = \sqrt{\frac{\sum fd'^2}{\sum f} - \left(\frac{\sum fd'}{\sum f}\right)^2} \times c$$



Notes



## Notes

where  $d' = \left( \frac{m - A}{c} \right)$  i.e. deviation taken from the assumed mean and divide by class interval (c) (or the common factor in case the class intervals are unequal), m is the mid value of the interval.

### Standard Deviation: Interesting Properties

1. The value of Standard Deviation remains same if each observation in a series is increased or decreased by a constant value i.e. Standard deviation is independent of change of origin.
2. The value of Standard Deviation changes if each of observation in a series is multiplied or divided by a constant value i.e. Standard deviation is not independent of change of scale.

**Example 10:** A study of 1000 companies gives the following information

Profit (in ₹ crores)	0-10	10-20	20-30	30-40	40-50	50-60
No. of Companies	10	20	30	50	40	30

Calculate the standard deviation of the profit earned.

- (i) Actual Mean Method
- (ii) Assumed Mean Method
- (iii) Step-Deviation Method

**Solution:**

**Table 9.7: Calculation of standard deviation**

Profit (in ₹ crores)	No. of Companies	m	fm	d = (m - 40)	d' = $\frac{m - 45}{10}$	fd	fd <sup>2</sup>	fd'	fd' <sup>2</sup>
0-10	10	5	50	-35	-4	-350	12250	-40	160
10-20	20	15	300	-25	-3	-500	12500	-60	180
20-30	30	25	750	-15	-2	-450	6750	-60	120
30-40	50	35	1750	-5	-1	-250	1250	-50	50
40-50	40	45	1800	5	0	200	1000	0	0
50-60	30	55	1650	15	1	450	6750	30	30
			6300	Σd = -60	Σd' = -9	-900	40500	-180	540

**Applying Actual Mean Method**

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum fx^2}{\sum f}}$$

$$\sum fx^2 = 36000, \sum f = 180$$

$$\therefore (\sigma_x) = \sqrt{\frac{36000}{180}} = 14.142 (\text{in rupees crores})$$

**Applying Assumed Mean Method:**

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum fd^2}{\sum f} - \left(\frac{\sum fd}{\sum f}\right)^2}$$

$$\sum fd^2 = 40500, \sum fd = -900, \sum f = 180, d = X - 40$$

$$\therefore (\sigma_x) = \sqrt{\frac{40500}{180} - \left(\frac{-900}{180}\right)^2} = 14.142 (\text{in rupees crores})$$

**Applying Step Deviation Method:**

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum fd'^2}{\sum f} - \left(\frac{\sum fd'}{\sum f}\right)^2} \times c$$

$$d' = \frac{m-45}{10}, \sum fd'^2 = 540, \sum fd' = -180, \sum f = 180, c = 10$$

$$\therefore (\sigma_x) = \sqrt{\frac{540}{180} - \left(\frac{-180}{180}\right)^2} \times 10 = 14.142 (\text{in rupees crores})$$

**Example 11:** The following table shows the daily wages of a random sample of construction workers. Calculate its mean deviation and standard deviation.



Notes

## MODULE - 4

Statistical Tools



Notes

### Measures of Dispersion

Daily Wages (₹)	Number of Workers
200 - 399	5
400 - 599	15
600 - 799	25
800 - 999	30
1000 - 1199	18
1200 - 1399	7
Total	100

**Solution:**

**Table 9.8: Computation of mean deviation**

Daily Wages (₹) X	Number of Workers (f)	Class Mark (m)	fm	$f_i  m - \bar{X} $ $= f_i  m - 823.5 $
200 – 399	5	299.5	1497.50	2,620
400 – 599	15	499.5	7492.50	4,860
600 – 799	25	699.5	17487.50	3,100
800 – 999	30	899.5	26985.00	2,280
1000 – 1199	18	1,099.5	19791.00	4,968
1200 – 1399	7	1,299.5	9096.50	3,332
<b>Total</b>	100		82350.00	21,160

$$\text{Mean deviation} = \frac{\sum f_i |m - \bar{X}|}{\sum f_i} = \frac{21,160}{100} = 211.60 \text{ (₹)}$$

**Table 9.9: Computation of Standard deviation**

Daily Wages (₹)	Number of Workers	Class Mark (M.V.)	$f_i (m - \bar{X})^2$
200 – 399	5	299.5	1,372,880
400 – 599	15	499.5	1,574,640
600 – 799	25	699.5	384,400
800 – 999	30	899.5	173,280
1000 – 1199	18	1,099.5	1,371,168
1200 – 1399	7	1,299.5	1,586,032
Total	100		6,462,400

$$\text{Standard deviation} = \sqrt{\frac{6462400}{100}} = 254.21 \text{ (Rupees)}$$



**INTEXT QUESTION 9.5**

1. Sona, Karina, Omar, Mustafa and Amie obtained marks of 6, 7, 3, 7, 2 on a standardized test respectively. Find the standard deviation of their scores.

**9.2.4.3 Comparison of the variation of two series using standard deviation**

The values of the standard deviations cannot be used as the basis of the comparison mainly because units of measurements of the two distributions may be different. The correct measure that should be used for comparison purposes is the **Coefficient of Variation (C.V.)** given by **Karl Pearson**:

$$\text{C.V.} = \frac{\sigma_X}{\bar{X}} \times 100$$

$\sigma_X$  = S.D. of variable X,  $\bar{X}$  = mean of variable X

**Example 12:** The following table shows the summary statistics for the daily wages of two types of workers.

Worker's Type	Daily Wages	
	Mean	Standard deviation
I	₹ 100	₹ 20
II	₹ 150	₹ 24

Compare these two daily wages distributions.

**Solution:**

**Table 9.10: Calculation of coefficient of variations**

In comparison	Distribution	Reason
Average magnitude	II > I	$\bar{X}_{II} = 150 > \bar{X}_I = 100$
Variation	I > II	$CV_I = \frac{20}{100} \times 100 = 20\% > CV_{II}$ $= \frac{24}{150} \times 100 = 16\%$



**Notes**



Notes



### INTEXT QUESTIONS 9.6

- The hourly wages of a sample of 130 system analysts are given below:

mean = 60                      range = 20  
mode = 73                      variance = 324  
median = 74

The coefficient of variation equals

- (a) 0.30%      (b). 30%              (c) 5.4%              (d) 54%

- The measure of dispersion that is influenced most by extreme values is:

- (a) the standard deviation  
(b) the range  
(c) the inter-quartile range

- The descriptive measure of dispersion that is based on the concept of a deviation about the mean is

- (a) the range                                      (b) the inter-quartile range  
(c) the absolute value of the range      (d) the standard deviation

- The numerical value of the standard deviation can never be

- (a) zero                      (b) negative              (c) one

- A researcher has collected the following sample data. The mean of the sample is 5.

3              5              12              3              2

The Standard deviation is

- a. 8.944              b. 4.062              c. 13.2              d. 16.5

Answer: b

And

The Coefficient of Variation is

- a. 72.66%              b. 81.24%              c. 264%              d. 330%

Answer: b

### 9.2.5 Lorenz Curve

Lorenz curve is the graphical method of studying dispersion. Lorenz curve is the cumulative frequency curve showing the distribution of a variable such as population against any independent variable such as income or area settled. If the

distribution of the dependent variable is equal, the plot will show as a straight,  $45^\circ$  line. Unequal distributions will yield a curve. The gap between this curve and the  $45^\circ$  line is the inequality gap. The farther the curve from this  $45^\circ$  line, the greater is the variability present in the distribution. Lorenz curve is used to see the degree of concentration of income or health. For example, it may show top 25% of population accounts for 70% of income or bottom 25% of population has only 5% of income (see figure 9.1).

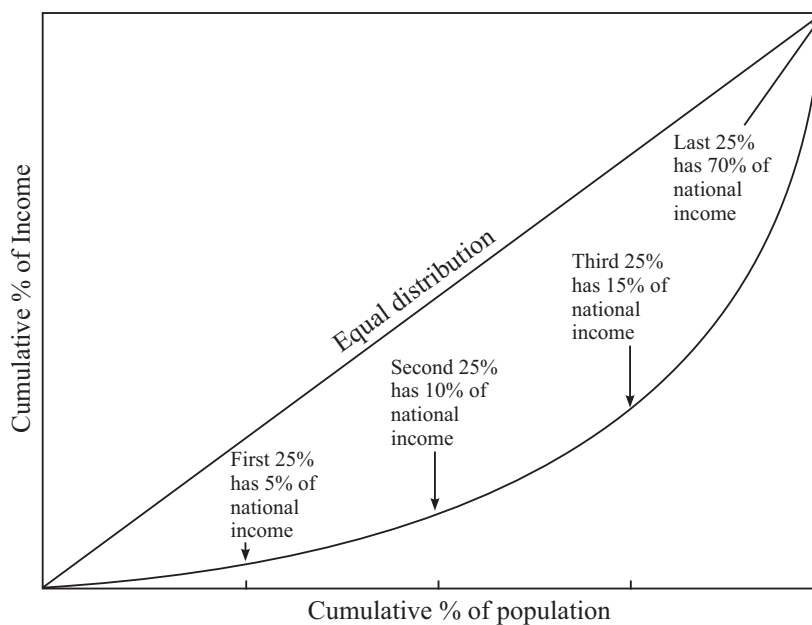


Fig. 9.1

### Steps involved in drawing Lorenz Curve:

The drawing of Lorenz curve requires following steps:

1. Find cumulative totals of variables. In case of continuous variable calculate the cumulative totals of mid-points.
2. Estimate cumulative frequencies.
3. Express the cumulative mid-points and frequencies into percentages by taking each of the sum total as 100.
4. Take the cumulative percentages of the variable on Y axis and cumulative percentages of frequencies on X-axis. Each axis will have values from '0' to '100'.
5. Draw a line joining Co-ordinate (0, 0) with (100,100). This is called the line of equal distribution.
6. Plot the cumulative percentages of the variable with corresponding cumulative percentages of frequency. Join these points to get the Lorenz Curve.



Notes



Notes



## WHAT YOU HAVE LEARNT

- The important measures of dispersion are:
  - i) Range
  - ii) Quartile deviation or Semi-Inter quartile range.
  - iii) Standard deviation
  - iv) Lorenz Curve
- Range (R) is the difference between the largest (L) and the smallest value (S) in a distribution i.e.  $\text{Range (R)} = L - S$
- The Coefficient of Range is the relative measure of the range and is given by:
 
$$\frac{L - S}{L + S}$$
- Quartile Deviation (Q.D) is given by  $\text{Q.D.} = \frac{Q_3 - Q_1}{2}$
- The Coefficient of quartile deviation is given by  $\text{Coeff of Q.D.} = \frac{Q_3 - Q_1}{Q_3 + Q_1}$
- Standard deviation is the most important and commonly used measure of dispersion It is denoted by S.D. or  $\sigma_x$ .
- Standard deviation in case of Individual Series is given by four methods:

### (i) Actual Mean Method

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum (X - \bar{X})^2}{N}}$$

N = Total No. of observation

### (ii) Assumed Mean Method

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum d^2}{N} - \left(\frac{\sum d}{N}\right)^2}$$

where  $d = (X - A)$  i.e. deviation taken from the assumed mean (A)



Notes

**(iii) Direct Method**

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum X^2}{N} - (\bar{X})^2}$$

where  $\bar{X}$  = arithmetic mean

**(iv) Step Deviation Method**

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum d'^2}{N} - \left(\frac{\sum d'}{N}\right)^2} \times c$$

where  $d' = \left(\frac{X - A}{c}\right)$  i.e. deviation taken from the assumed mean and divide by class interval (c)

- Standard Deviation in case of Continuous Series is given by

**(i) Actual Mean Method**

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum fx^2}{\sum f}}$$

where  $x = (m - \bar{X})$  i.e. deviation taken from the arithmetic mean ( $\bar{X}$ )

**(ii) Assumed Mean Method**

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum fd^2}{\sum f} - \left(\frac{\sum fd}{\sum f}\right)^2}$$

where  $d = (m - A)$  i.e. deviation taken from the assumed mean (i.e. A)

**(iii) Step Deviation Method**

$$\text{Standard deviation } (\sigma_x) = \sqrt{\frac{\sum fd'^2}{\sum f} - \left(\frac{\sum fd'}{\sum f}\right)^2} \times c$$

where  $d' = \left(\frac{m - A}{c}\right)$  i.e. deviation taken from the assumed mean and divide by class interval (c) (or the common factor in case the class intervals are unequal, m is the mid value of the interval).

## MODULE - 4

Statistical Tools



Notes

### Measures of Dispersion

- Standard deviation is independent of change of origin but not independent of change of scale.
- The coefficient of variation (C.V.) is the relative measure of dispersion which is used for the comparison of variability of two or more distributions. It is given by:

$$C.V. = \frac{\sigma_X}{\bar{X}} \times 100$$

$\sigma_X$  = S.D. of variable X,  $\bar{X}$  = mean of variable X

- Lorenz curve is the graphical method of estimating dispersion.



### TERMINAL EXERCISES

#### Range

- The following are the prices of shares of A B Co. Ltd. from Monday to Saturday:

Days	Price (in ₹)	Days	Price (in ₹)
Monday	200	Thursday	160
Tuesday	210	Friday	220
Wednesday	208	Saturday	250

Calculate range and its coefficient

- Find the range of given data  
108, 107, 105, 106, 107, 104, 103, 101, 104
- Find the value of range of frequency distribution

Age in years:	14	15	16	17	18	19	20
No. of students :	1	2	2	2	6	4	0

- Calculate the range for the distribution given below

Height in cms	150	151	152	154	159	160	165	166
No. of Boys	2	2	9	15	18	10	4	1

- Find the range of the following data

Profit (in '000 ₹):	0-10	10-20	20-30	30-40	40-50
No. of firms	0	6	0	7	15

6. Find the range of the following distribution

Class Interval	10-20	20-30	30-40	40-50	50-60
Frequency	8	10	15	18	19

### Quartile Deviation

7. Calculate the QD for a group of data,

241, 521, 421, 250, 300, 365, 840, 958

8. From the following figures find the quartile deviation and its coefficient:

Height (cms.):	150	151	152	153	154	155	156	157	158
No. of Students:	15	20	32	35	33	22	20	12	10

9. Using quartile deviation, state which of the two variables – A and B is more variable:

A		B	
Mid-Point	Frequency	Mid-Point	Frequency
15	15	100	340
20	33	150	492
25	56	200	890
30	103	250	1420
35	40	300	620
40	32	350	360
45	10	400	187
		450	140

10. Find the quartile deviation from the following table:

Size:	4-8	8-12	12-16	16-20	20-24	24-28	28-32	32-36	36-40
Frequency:	6	10	18	30	15	12	10	6	2

11. Calculate the coefficient of quartile deviation from the following data:

Class Interval	Frequency
10-15	4
15-20	12
20-25	16
25-30	22
30-40	10
40-50	8
50-60	6
60-70	4
	8



Notes



## Notes

### Standard deviation

12. Determine the standard deviation of the following student test results percentages.

92% 66% 99% 75% 69% 51% 89% 75% 54% 45% 69%

13. Calculate the coefficient of variation for the following data set.

The price (in ₹), of a stock over five trading days was 52, 58, 55, 57, 59.

14. The frequency table of the monthly salaries of 20 people is shown below.

Salary (in ₹)	Frequency
3500	5
4000	8
4200	5
4300	2

- (a) Calculate the mean of the salaries of the 20 people.
- (b) Calculate the standard deviation of the salaries of the 20 people.

15. The following table shows the grouped data, in classes, for the heights of 50 people.

Height (in cm) – classes	Frequency
$120 \leq 130$	2
$130 \leq 140$	5
$140 \leq 150$	25
$150 \leq 160$	10
$160 \leq 170$	8

- a) Calculate the mean of the salaries of the 50 people.
- b) Calculate the standard deviation of the salaries of the 50 people.



16. The following is the frequency distribution for the speeds of a sample of automobiles traveling on an interstate highway.

Speed Miles per Hour	Frequency
50 – 54	2
55 – 59	4
60 – 64	5
65 – 69	10
70 – 74	9
75 – 79	5
	35

Calculate the mean, and the standard deviation of speed.

17. In 2012, the average age of workers in a company was 22 with a standard deviation of 3.96. In 2013, the average age was 24 with a standard deviation of 4.08. In which year do the ages show a more dispersed distribution? Show your complete work and support your answer.

Therefore the year 2012 shows a more dispersed distribution.

18. The following is a frequency distribution for the ages of a sample of employees at a local company.

Age (in years)	Frequency
30 – 39	2
40 – 49	3
50 – 59	7
60 – 69	5
70 – 79	1

- Determine the average age for the sample.
  - Compute the standard deviation.
  - Compute the coefficient of variation.
19. The population change between 1990 and 2000 for several small cities are shown below.



Notes

## MODULE - 4

Statistical Tools



Notes

### Measures of Dispersion

City	Population Change (number of residents)
A	3083
B	1466
C	-461
D	1113
E	-11
F	395
G	3290
H	437

For the above **sample**, determine the following measures.

- (a) The mean
- (c) The standard deviation
- (d) The median



### ANSWERS TO INTEXT QUESTIONS

#### 9.1

- 1. (c)
- 2. (c)

#### 9.2

- 1. 140

#### 9.3

- 1. (c)
- 2. (d)
- 3. (c)
- 4. (b)

9.4

1. Median = 5, M.D. = 1.68
2. M.D. 0.915, Coefficient of M.D. = 0.336

9.5

1. 2.1 marks

9.6

1. (b)
2. (b)
3. (d)
4. (b)
5. Standard deviation (b) C.V



Notes

**Notes****10**

## CORRELATION ANALYSIS

In previous lessons you have learnt how to summarize the mass of data and variations in the similar variable. Many a time, we come across situations which involve the study of association among two or more variables. For example we may find that there is some relationship between the two variables such as amount of rain fall and production of wheat; figures of accidents and number of motor cars in a city; money spent on advertising and sales. On the other hand, if we compare the figures of rainfall in India and the production of cars in Japan, we may find that there is no relationship between the two variables. If there is any relation between two variables i.e. when one variable changes the other also changes in the same or in the opposite direction, we say that the two variables are correlated.



### OBJECTIVES

After completing this lesson, you will be able to:

- explain the meaning of the term correlation;
- explain the relationship between two variables;
- calculate the different measures of correlation; and
- analyze the degree and direction of the relationships.

### 10.1 MEANING OF CORRELATION

Correlation refers to the associations between variables. When an association exists between two variables, it means that the average value of one variable changes as there is a change in the value of the other variable. A correlation is the simplest type of association. When a correlation is weak, it means that the average value of one variable changes only slightly (only occasionally) in response to changes in the other variable. If there is no association, it means that there is no

change in the value of one variable in response to the changes in the other variable. In some cases, the correlation may be positive or it may be negative. A positive correlation means that as one variable increases the other variable increases, e.g. Height of a child and age of the child. Negative correlation implies as one variable increases the other variable decrease, e.g. value of a car and age of the car.

## 10.2 CORRELATION AND CAUSATION

The correlation between two variables measures the strength of the relationship between them but it doesn't indicate the cause and effect relationship between the variables. Correlation measures co-variation, not causation. Causation means changes in one variable affects/ causes the changes in other variable. In other words, just because two events or things occur together does not imply that one is the cause of the other. A positive "linear" correlation between two variables say X and Y implies that high values of X are associated with high values of Y, and that low values of X are associated with low values of Y. It does not imply that X causes Y. for example, a high degree of positive correlation may be obtained between the size of arms of children and their reasoning ability i.e. children with longer arms reason better than those with shorter arms, but there is no causal connection here. Children with longer arms reason better because they're older! In this example the common third factor 'age' is responsible for the high correlation between size of arms and reasoning ability. This refers to spurious correlation. Similarly a Researcher found a high degree of positive correlation between the number of temple goers and the number of burglaries committed in different towns. An explanation that more temple goers means more empty houses or attending temple makes people want to rob would be a logical fallacy. Instead the third factor population is causing this relationship. The highly populated area tends to have more temple goers and also case of burglaries. The following table 11.1 provides some interesting examples of influence of third variable on correlation between variables.

**Table 10.1: Spurious Correlation and Influence of Third Variable.**

Observed Spurious Correlation	Influence of Third Variable.
Positive Correlation between Amount of ice cream sold and deaths by drowning at the beach during summer.	<b>Summer Season:</b> Ice cream sales and drowning tend to be high during the warm months of the year.
Shoe size and reading performance for elementary school children.	<b>Age:</b> Older children have larger shoe sizes and read better.
Number of doctors in region and number of people dying from disease.	<b>Population density:</b> In highly dense areas, there are more doctors and more people die.



Notes

MODULE - 4

Statistical Tools



Notes

Correlation Analysis

Number of police officers and number of crimes.	<b>Population density:</b> In highly dense areas, there are more police officers and more crimes.
Teachers’ salaries and the price of vegetables.	<b>Time:</b> Both tend to increase over time.

Further, It is found that there is a positive and a high degree of correlation between the amount of oranges imported and road accidents i.e. as the amount of imported oranges increases, so do the traffic fatalities. However, it is fairly obvious just from logical thought that there is likely to be no causal relationship between the two. That is, the importing of oranges does not cause traffic fatalities. Conversely, if we stopped importing oranges, we would not expect the number of traffic fatalities to decline. It may be a sheer coincidence that a high degree of correlation is obtained between them.

10.3 TYPES OF CORRELATION

Correlation may be:

- 1. Positive and negative correlation
- 2. Linear and non-linear correlation

**A) If two variables change in the same direction** (i.e. if one increases the other also increases, or if one decreases, the other also decreases), then this is called a **positive correlation**. For example: Advertising and sales.

Some other examples of series of positive correlation are:

- (i) Heights and weights;
- (ii) Household income and expenditure;
- (iii) Price and supply of commodities;
- (iv) Amount of rainfall and yield of crops.



INTEXT QUESTIONS 10.1

- 1. It has been noted that there is a positive correlation between the I.Q. level and the size of women’s shoes. With smaller size of shoes of women corresponds to lower intelligence level and higher size of shoes of women corresponds to higher intelligence level of women. Comment on the conclusion that economic factors cause hemlines to rise and fall.

2. A researcher has a large number of data pairs (age, height) of humans beings from birth to 70 years. He computes a correlation coefficient. Would you expect it to be positive or negative? Why?

B) **If two variables change in the opposite direction** (i.e. if one increases, the other decreases and vice versa), then the correlation is called a **negative correlation**. For example: T.V. registrations and cinema attendance.

**Some other examples of series of negative correlation are:**

- (i) Volume and pressure of perfect gas;
- (ii) Current and resistance [keeping the voltage constant]
- (iii) Price and demand for goods.



### INTEXT QUESTIONS 10.2

1. What sort of correlation would be expected between a company's expenditure on health and safety and the number of work related accidents.
  - (a) positive
  - (b) negative
  - (c) none
  - (d) infinite
2. When "r" is negative, one variable increases in value, .....
  - (a) the other increases
  - (b) the other increases at a greater rate
  - (c) the other variable decreases in value
  - (d) there is no change in the other variable
  - (e) all of the above

### 10.4 LINEAR AND NON-LINEAR CORRELATION

The nature of the graph gives us the idea of the linear type of correlation between two variables. If the graph is in a straight line, the correlation is called a **"linear correlation"** and if the graph is not in a straight line, the correlation is **non-linear** or **curvi-linear**.

For example, if variable x changes by a constant quantity, say 20 then y also changes by a constant quantity, say 4. The ratio between the two always remains the same (1/5 in this case). In case of a curvi-linear correlation this ratio does not remain constant.



Notes



## Notes

In general two variables  $x$  and  $y$  are said to be linearly related, if there exists a relationship of the form

$$y = a + bx$$

where 'a' and 'b' are real numbers. This is nothing but a straight line when plotted on a graph sheet with different values of  $x$  and  $y$  and for constant values of  $a$  and  $b$ . Such relations generally occur in physical sciences but are rarely encountered in economic and social sciences.

The relationship between two variables is said to be non – linear if corresponding to a unit change in one variable, the other variable does not change at a constant rate but changes at a fluctuating rate. In such cases, if the data is plotted on a graph sheet we will not get a straight line curve. For example, one may have a relation of the form

$$y = a + bx + cx^2$$

### 10.5 DEGREES OF CORRELATION

Through the coefficient of correlation, we can measure the degree or extent of the correlation between two variables. On the basis of the coefficient of correlation we can also determine whether the correlation is positive or negative and also its degree or extent.

1. **Perfect correlation:** If two variables change in the same direction and in the same proportion, the correlation between the two is perfect positive. According to Karl Pearson the coefficient of correlation in this case is +1. On the other hand, if the variables change in the opposite direction and in the same proportion, the correlation is perfect negative. Its coefficient of correlation is -1. In practice we rarely come across these types of correlations.
2. **Absence of correlation:** If two series of two variables exhibit no relations between them or change in one variable does not lead to a change in the other variable, then we can firmly say that there is no correlation or absurd correlation between the two variables. In such a case the coefficient of correlation is 0.
3. **Limited degrees of correlation:** If two variables are not perfectly correlated or there is a perfect absence of correlation, then we term the correlation as Limited correlation.

Thus Correlation may be positive, negative or zero but lies with the limits  $\pm 1$ . i.e. the value of  $r$  is such that  $-1 \leq r \leq +1$ . The + and – signs are used for positive linear correlations and negative linear correlations, respectively.



- If  $x$  and  $y$  have a strong positive linear correlation,  $r$  is close to  $+1$ . An  $r$  value of exactly  $+1$  indicates a perfect positive correlation.
- If  $x$  and  $y$  have a strong negative linear correlation,  $r$  is close to  $-1$ . An  $r$  value of exactly  $-1$  indicates a perfect negative correlation.
- If there is no linear correlation or a weak linear correlation,  $r$  is close to  $0$ .

The following Table reveals the effect (or degree) of coefficient of correlation.

**Table 10.2: Degree and Type of Correlation**

Degrees	Positive	Negative
Absence of correlation →	Zero	Zero
Perfect correlation →	$+1$	$-1$
High degree →	$+0.75$ to $+1$	$-0.75$ to $-1$
Moderate degree →	$+0.25$ to $+0.75$	$-0.25$ to $-0.75$
Low degree →	$0$ to $0.25$	$0$ to $-0.25$

Note that  $r$  is a dimensionless quantity; that is, it does not depend on the units employed



### INTEXT QUESTIONS 10.3

- The coefficient of correlation ranges between
  - $0$  and  $1$
  - $-1$  and  $+1$
  - minus infinity and plus infinity
  - $1$  and  $100$
- If two variables are absolutely independent of each other the correlation between them must be,
  - $-1$
  - $0$
  - $+1$
  - $+0.1$
- The coefficient of correlation:
  - can be larger than  $1$
  - cannot be larger than  $1$
  - cannot be negative



Notes

## MODULE - 4

### Statistical Tools



#### Notes

### Correlation Analysis

4. If height is independent of average yearly income, what is the predicted correlation between these two variables?
  - (a) 1
  - (b) -1
  - (c) 0
  - (d) Impossible to say for sure
5. A student produces a correlation of +1.3. This is
  - (a) a high positive correlation
  - (b) a significant correlation
  - (c) an impossible correlation
  - (d) only possible if N is large
6. If A scored the top mark in the apprentices test on computing and the correlation between that test and the test on English language was +1.0 what position did A get in the test on English language.
  - (a) middle
  - (b) bottom
  - (c) top
  - (d) cannot say from the information given
7. Which correlation is the strongest +0.65 or -0.70
  - (a) -0.70
  - (b) +0.65
  - (c) depends on N
  - (d) cannot say from the information given
7. The symbol for the Karl Pearson Correlation Co-efficient is
  - (a)  $\Sigma$
  - (b)  $\sigma$
  - (c)  $\alpha$
  - (d)  $r$
8. For a normal good, if price increases then the quantity demanded decreases. What type of correlation co-efficient would you expect in this situation?
  - (a) 0
  - (b) positive
  - (c) 0.9
  - (d) negative
  - (e) unknowable

**10.6 PROPERTIES OF CORRELATION COEFFICIENT**

1. The correlation coefficient 'r' lies between -1 to +1.
2. The correlation coefficient 'r' is the pure number and is independent of the units of measurement of the variables.
3. The correlation coefficient 'r' is independent of change of origin i.e. the value of r is not affected even if each of the individual value of two variables is increased or decreased by some non-zero constant.
4. The correlation coefficient 'r' is independent of change of scale i.e. the value of r is not affected even if each of the individual value of two variables is multiplied or divided by some non-zero constant.

**INTEXT QUESTIONS 10.4**

1. Given a set of paired data (X, Y)
  - (a) If Y is independent of X, then what value of a correlation coefficient would you expect?
  - (b) If Y is linearly dependent on X, then what value of a correlation coefficient would you expect?
2. State whether the following statement is true or false: "If a positive correlation exists between height and weight, a person with above average height is expected to have above average weight".

**10.7 METHODS OF DETERMINING CORRELATION**

We shall consider the following most commonly used methods.

1. Scatter Plot
2. Karl Pearson's coefficient of correlation
3. Spearman's Rank-correlation coefficient.

**10.7.1 Scatter Plot (Scatter diagram or dot diagram)**

Scatter Plots (also called scatter diagrams) are used to graphically investigate the possible relationship between two variables without calculating any numerical value. In this method, the values of the two variables are plotted on a graph paper. One is taken along the horizontal (X-axis) and the other along the vertical (Y-axis). By plotting the data, we get points (dots) on the graph which are generally scattered and hence the name 'Scatter Plot'.

The manner in which these points are scattered, suggest the degree and the direction of correlation. The degree of correlation is denoted by 'r' and its direction is given by the signs positive and negative.



Notes

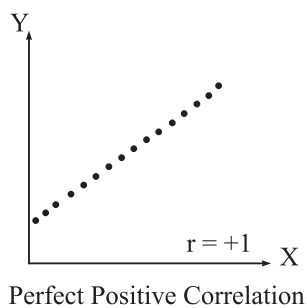
## MODULE - 4

### Statistical Tools

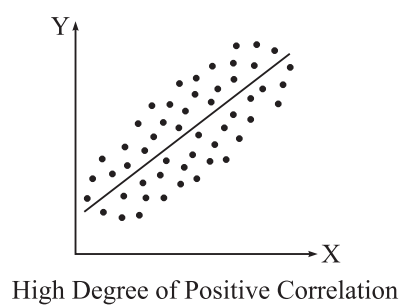


Notes

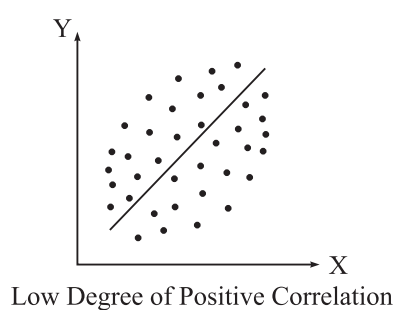
## Correlation Analysis



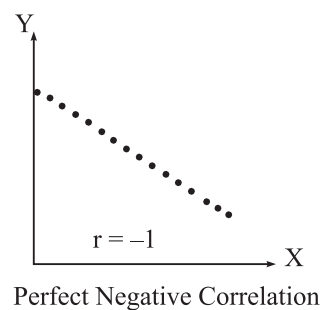
(a)



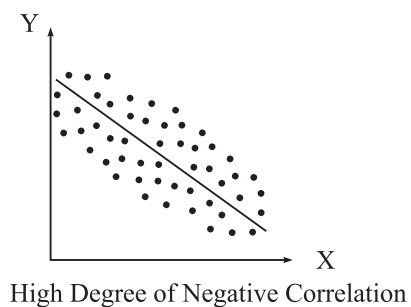
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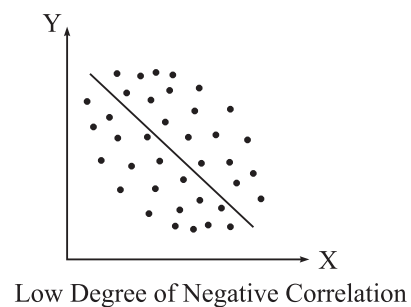
(c)



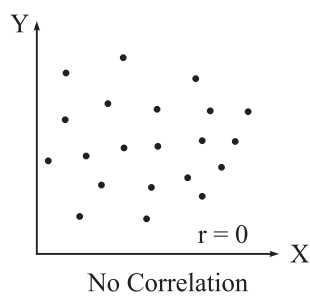
(d)



(e)



(f)



(g)

- (i) If all points lie on a rising straight line, the correlation is perfectly positive and  $r = +1$  (see fig. a)
- (ii) If all points lie on a falling straight line the correlation is perfectly negative and  $r = -1$  (see fig. d)
- (iii) If the points lie in narrow strip, rising upwards, the correlation is high degree of positive (see fig. b)
- (iv) If the points lie in a narrow strip, falling downwards, the correlation is high degree of negative (see fig. e)
- (v) If the points are spread widely over a broad strip, rising upwards, the correlation is low degree positive (see fig. c)
- (vi) If the points are spread widely over a broad strip, falling downward, the correlation is low degree negative (see fig. f)
- (vii) If the points are spread (scattered) without any specific pattern, the correlation is absent. i.e.  $r = 0$ . (see fig. g)

Though this method is simple and is a rough idea about the existence and the degree of correlation, it is not reliable. As it is not a mathematical method, it cannot measure the degree of correlation.

### 10.7.2 Karl Pearson's coefficient of correlation

It gives the precise numerical expression for the measure of correlation. It is denoted by 'r'. The value of 'r' gives the magnitude of correlation and its sign denotes its direction. The mathematical formula for computing r is:

$$r = \frac{\sum xy}{N\sigma_X\sigma_Y} \quad \dots(1)$$

where  $x = (X - \bar{X})$ ,  $y = (Y - \bar{Y})$ ,  $\sigma_X = \text{s.d. of } X$

$\sigma_Y = \text{s.d. of } Y$

and  $N = \text{number of pairs of observations}$

Since  $\sigma_X = \sqrt{\frac{\sum x^2}{N}}$  and  $\sigma_Y = \sqrt{\frac{\sum y^2}{N}}$

So equation 1 can be rewritten as:

$$r = \frac{\sum xy}{\sqrt{\sum x^2} \times \sqrt{\sum y^2}}$$



Notes



Notes

**By using actual mean**

$$r = \frac{\sum (X - \bar{X}) \times (Y - \bar{Y})}{\sqrt{\sum (X - \bar{X})^2} \times \sqrt{\sum (Y - \bar{Y})^2}} \quad \dots(2)$$

**By assumed mean method**

$$r = \frac{\sum dx dy - \frac{\sum dx \cdot \sum dy}{N}}{\sqrt{\sum dx^2 - \frac{(\sum dx)^2}{N}} \times \sqrt{\sum dy^2 - \frac{(\sum dy)^2}{N}}} \quad \dots(3)$$

**By direct method**

$$r = \frac{N \sum XY - [\sum X][\sum Y]}{\sqrt{N \sum X^2 - (\sum X)^2} \times \sqrt{N \sum Y^2 - (\sum Y)^2}} \quad \dots(4)$$

Now covariance of X and Y is defined as

$$\text{cov}(X, Y) = \frac{\sum (X_i - \bar{X})(Y_i - \bar{Y})}{N}$$

$$\therefore r = \frac{\text{cov}(X, Y)}{\sigma_X \sigma_Y}$$

Where N is the number of pairs of data.

$$d_x = X - A_X$$

$$d_y = Y - A_Y$$



### INTEXT QUESTIONS 10.5

1. Positive values of covariance indicate
  - (a) a positive variance of the X values
  - (b) a positive variance of the Y values
  - (c) the standard deviation is positive
  - (d) positive relation between two variables

**Example 1:** Calculate the coefficient of correlation between the expenditure on advertising and sales of the company from the following data.

<b>Advertising Expenditure (in 000 ₹):</b>	165	166	167	168	167	169	170	172
<b>Sales (in Lakh ₹)</b>	167	168	165	172	168	172	169	171

**Solution:** N = 8 (pairs of observations)

Table 10.3: Calculation of coefficient of correlation

Advertising Expenditure (in 000 ₹) : $X_i$	Sales (in Lakh ₹) $Y_i$	$x = X_i - \bar{X}$	$y = Y_i - \bar{Y}$	$xy$	$x^2$	$y^2$
165	167	-3	-2	6	9	4
166	168	-2	-1	2	4	1
167	165	-1	-4	4	1	16
167	168	-1	-1	1	1	1
168	172	0	3	0	0	9
169	172	1	3	3	1	9
170	169	2	0	0	4	0
172	171	4	2	8	16	4
$\Sigma X_i = 1344$	$\Sigma Y_i = 1352$	0	0	$\Sigma xy = 24$	$\Sigma x^2 = 36$	$\Sigma y^2 = 44$



Notes

**Calculation:**

$$\bar{X} = \frac{\Sigma X_i}{N} = \frac{1344}{8}$$

$$= 168 \text{ cm and } \sigma_x = \sqrt{\frac{\Sigma x^2}{N}} = \sqrt{\frac{36}{8}}$$

$$\bar{Y} = \frac{\Sigma Y_i}{N} = \frac{1352}{8}$$

$$= 169 \text{ cm and } \sigma_y = \sqrt{\frac{\Sigma y^2}{N}} = \sqrt{\frac{44}{8}}$$

Now,

$$r = \frac{\Sigma xy}{N\sigma_x\sigma_y} = \frac{24}{8\sqrt{\frac{36}{8}} \times \sqrt{\frac{44}{8}}} = \frac{24}{\sqrt{36 \times 44}} = +0.6029$$

Since  $r$  is positive and 0.6. This shows that the correlation is positive and moderate (i.e. direct and reasonably good).

**Example 2:** From the following data compute the coefficient of correlation between  $X$  and  $Y$ .

## MODULE - 4

### Statistical Tools



#### Notes

### Correlation Analysis

		X	Y
No. of items	→	15	15
Arithmetic mean	→	25	18
$\Sigma(X_i - \bar{X})^2$ and $\Sigma(Y_i - \bar{Y})^2$	→	136	138
$\Sigma(X_i - \bar{X}) \cdot \Sigma(Y_i - \bar{Y})$	→	122	

**Solution:** Given,  $N = 15$ ,  $\bar{X} = 25$ ,  $\bar{Y} = 18$

$$\Sigma(X_i - \bar{X})^2 \quad \text{i.e.} \quad \Sigma x^2 = 136$$

$$\Sigma(Y_i - \bar{Y})^2 \quad \text{i.e.} \quad \Sigma y^2 = 138$$

and  $\Sigma(X_i - \bar{X}) \cdot \Sigma(Y_i - \bar{Y}) = \Sigma xy = 122$

Using 
$$r = \frac{\Sigma xy}{\sqrt{\Sigma x^2} \times \sqrt{\Sigma y^2}}$$

we get 
$$r = \frac{122}{\sqrt{136} \times \sqrt{138}} = \frac{122}{136.9} = 0.891$$

**Example 3:** If covariance between X and Y is 12.3 and the variance of x and y are 16.4 and 13.8 respectively. Find the coefficient of correlation between them.

**Solution:** Given: Covariance =  $\text{cov}(X, Y) = 12.3$

Variance of X ( $\sigma_x^2$ ) = 16.4

Variance of Y ( $\sigma_y^2$ ) = 13.8

Now,

$$\begin{aligned} r &= \frac{\text{cov}(X, Y)}{\sigma_x \sigma_y} = \frac{12.3}{\sqrt{16.4} \times \sqrt{13.8}} \\ &= \frac{12.3}{4.05 \times 3.71} = 0.82 \end{aligned}$$



**Example 4:** Find the number of pair of observations from the following data.

$$r = 0.25, \Sigma(X_i - \bar{X})(Y_i - \bar{Y}) = 60, \sigma_y = 4, \Sigma(X_i - \bar{X})^2 = 90.$$

**Solution:** Given:  $r = 0.25$

$$\Sigma(X_i - \bar{X})(Y_i - \bar{Y}) = \Sigma xy = 60$$

$$\sigma_x = \sqrt{\frac{\Sigma x^2}{N}} = \sqrt{\frac{\Sigma(X_i - \bar{X})^2}{N}} = \sqrt{\frac{90}{N}}$$

$$\sigma_y = 4 = \sqrt{\frac{\Sigma y^2}{N}}$$

Now,

$$r = \frac{\Sigma xy}{n\sigma_x \cdot \sigma_y} = \frac{60}{N\sqrt{\frac{90}{N}} \times 4} = \frac{15}{\sqrt{90N}}$$

$$\therefore 0.25 = \frac{15}{\sqrt{90N}}$$

$$\therefore 0.25 \times \sqrt{90N} = 15$$

on squaring

$$\therefore 0.0625 \times 90N = 225$$

$$\therefore 90N = \frac{225}{0.0625}$$

$$\therefore 90N = 3600$$

$$\therefore N = 40$$

Therefore, the number of pairs of observations = 40

#### 10.7.2.1 Assumed Mean Method (Step Deviation)

If the values of X and Y are very big, the calculation becomes very tedious and if

we change the variable X to  $u = \frac{X_1 - A}{h}$  and Y to  $v = \frac{Y_1 - B}{k}$  where A and B are the assumed means for variable X and Y respectively and h and k are common



Notes

## MODULE - 4

### Statistical Tools



#### Notes

### Correlation Analysis

factor of variable X and Y, As stated earlier the one of the property of correlation coefficient is that it is independent of change of origin and change of scale so

$$r_{xy} = r_{uv}$$

The formula for r can be simplified as

$$r_{xy} = r_{uv} = \frac{\Sigma uv - \left( \frac{(\Sigma u)(\Sigma v)}{N} \right)}{\sqrt{\Sigma u^2 - \frac{(\Sigma u)^2}{N}} \times \sqrt{\Sigma v^2 - \frac{(\Sigma v)^2}{N}}}$$

**Example 5:** The following data relates to the Cost and Sales of a Company for the past 10 months

<b>Cost (in 000 ₹):</b>	44	80	76	48	52	72	68	56	60	64
<b>Sales(in 000 ₹):</b>	48	75	54	60	63	69	72	51	57	66

Find the coefficient of correlation between the two.

**Solution:** Here A = 60, h = 4, B = 60 and k = 3

**Table 10.4: Correlation coefficient between cost and sales**

Cost (in 000 ₹)	Sales (in 000 ₹)	u = $\frac{X_1 - A}{h}$	v = $\frac{Y_1 - B}{d}$	uv	u <sup>2</sup>	v <sup>2</sup>
44	48	-4	-4	16	16	16
80	75	5	5	25	25	25
76	54	4	-2	-8	16	4
48	60	-3	0	0	9	0
52	63	-2	1	-2	4	1
72	69	3	3	9	9	9
68	72	2	4	8	4	16
56	51	-1	-3	3	1	9
60	57	0	-1	0	0	1
64	66	1	2	2	4	4
		$\Sigma u = 5$	$\Sigma v = 5$	$\Sigma uv = 53$	$\Sigma u^2 = 85$	$\Sigma v^2 = 85$

**Calculation:**

$$\begin{aligned}
 r_{xy} = r_{uv} &= \frac{\Sigma uv - \left( \frac{(\Sigma u)(\Sigma v)}{N} \right)}{\sqrt{\Sigma u^2 - \frac{(\Sigma u)^2}{N}} \times \sqrt{\Sigma v^2 - \frac{(\Sigma v)^2}{N}}} \\
 &= \frac{53 - \left( \frac{(5)(5)}{10} \right)}{\sqrt{85 - \frac{(5)^2}{10}} \times \sqrt{85 - \frac{(5)^2}{10}}} \\
 &= \frac{53 - \left( \frac{(5)(5)}{10} \right)}{\sqrt{85 - \frac{(5)^2}{10}} \times \sqrt{85 - \frac{(5)^2}{10}}} \\
 &= \frac{53 - 2.5}{\sqrt{82.5} \times \sqrt{82.5}} \\
 &= \frac{50.5}{82.5} = 0.61
 \end{aligned}$$

**Notes****10.6.3 Spearman's Rank Correlation Coefficient**

This method is based on the ranks of the items rather than on their actual values. The advantage of this method over the others is that it can be used even when the actual values of items are unknown. For example if you want to know the correlation between honesty and wisdom of the boys of your class, you can use this method by giving ranks to the boys. It can also be used to find the degree of agreements between the judgments of two examiners or two judges. The formula is:

$$R = 1 - \frac{6\Sigma D^2}{N(N^2 - 1)}$$

where R = Rank correlation coefficient

D = Difference between the ranks of two items

N = the number of observations.



## Notes

**Note:**  $-1 \leq R \leq 1$ .

- (i) When  $R = +1 \Rightarrow$  Perfect positive correlation or complete agreement in the same direction
- (ii) When  $R = -1 \Rightarrow$  Perfect negative correlation or complete agreement in the opposite direction.
- (iii) When  $R = 0 \Rightarrow$  No Correlation.

## Computation:

- (i) Give ranks to the values of items. Generally the item with the highest value is ranked 1 and then the others are given ranks 2, 3, 4 ... according to their values in the decreasing order.
- (ii) Find the difference  $D = R_1 - R_2$   
where  $R_1 = \text{Rank of X}$  and  $R_2 = \text{Rank of Y}$   
Note that  $\Sigma D = 0$  (always)
- (iii) Calculate  $D^2$  and then find  $\Sigma D^2$
- (iv) Apply the formula.

## Note :

In some cases, there is a tie between two or more items. For example if each item have rank say 4th then they are given  $\frac{4+5}{2} = 4.5$ th rank. If three items are of equal rank say 4th then they are given  $\frac{4+5+6}{3} = 5$ th rank each. If  $m$  be the number of items of equal ranks, the factor  $\frac{1}{12} (m^3 - m)$  is added to  $SD^2$ . If there is more than one of such cases then this factor added as many times as the number of such cases, then

$$R = 1 - \frac{6 \left\{ \Sigma D^2 + \frac{1}{12} (m_1^3 - m_1) + \frac{1}{12} (m_2^3 - m_2) + \dots \right\}}{N(N^2 - 1)}$$

**Example 6 :** Calculate 'R' from the following data.

Student No. :	1	2	3	4	5	6	7	8	9	10
Rank in Maths :	1	3	7	5	4	6	2	10	9	8
Rank in Stats :	3	1	4	5	6	9	7	8	10	2

**Solution:****Table 10.5: Calculation of rank correlation**

Student No.	Rank in Maths (R <sub>1</sub> )	Rank in Stats (R <sub>2</sub> )	D = (R <sub>1</sub> – R <sub>2</sub> )	D <sup>2</sup>
1	1	3	–2	4
2	3	1	2	4
3	7	4	3	9
4	5	5	0	0
5	4	6	–2	4
6	6	9	–3	9
7	2	7	–5	25
8	10	8	2	4
9	9	10	–1	1
10	8	2	6	36
N = 10			ΣD = 0	ΣD <sup>2</sup> = 96

**Notes****Calculation of R :**

$$R = 1 - \frac{6\Sigma D^2}{N(N^2 - 1)} = 1 - \frac{6(96)}{10(100 - 1)} = 1 - \frac{6 \times 96}{10 \times 99} = 0.4181$$

**Example 7:** Calculate 'R' of 6 students from the following data.

Marks in Stats :	40	42	45	35	36	39
Marks in English :	46	43	44	39	40	43

**Solution:****Table 10.6: Calculation of rank correlation**

Marks in Stats	R <sub>1</sub>	Marks in English	R <sub>2</sub>	D	D <sup>2</sup>
40	3	46	1	2	4
42	2	43	3.5	–1.5	2.25
45	1	44	2	–1	1
35	6	39	6	0	0
36	5	40	5	0	0
39	4	43	3.5	0.5	0.25
N = 6				ΣD = 0	ΣD <sup>2</sup> = 7.50



Notes

Here  $m = 2$  since in series of marks in English of items of values 43 repeated twice.

$$R = 1 - \frac{6 \left\{ \sum D^2 + \frac{1}{12} (2^3 - 2) \right\}}{N(N^2 - 1)} = 1 - \frac{6 \left\{ 7.5 + \frac{1}{12} (8 - 2) \right\}}{6(36 - 6)}$$

$$R = 1 - \frac{6(7.5 + 0.5)}{210} = 0.771$$

**Example 8:** The value of Spearman's rank correlation coefficient for a certain number of pairs of observations was found to be  $2/3$ . The sum of the squares of difference between the corresponding marks was 55. Find the number of pairs.

**Solution:** We have

$$1 - \frac{6\sum D^2}{N(N^2 - 1)} \text{ but } R = \frac{2}{3} \text{ and } \sum D^2 = 55$$

$$\therefore \frac{2}{3} = 1 - \frac{6 \times 55}{N(N^2 - 1)}$$

$$\therefore -\frac{1}{3} = -\frac{6 \times 55}{N(N^2 - 1)}$$

$$\therefore N(N^2 - 1) = 6 \times 55$$

$$\text{Now } N(N^2 - 1) = 990$$

$$\therefore N(N^2 - 1) = 10 \times 99 = 10(100 - 1)$$

$$\therefore N(N^2 - 1) = 10(102 - 1) \Rightarrow N = 10$$

Therefore, there were 10 students.



## INTEXT QUESTIONS 10.6

1. The marks awarded by two judges in a certain beauty contest are given below:

<b>Judge I</b>	56	75	45	71	61	64	58	80	76	61
<b>Judge II</b>	66	70	40	60	65	56	59	77	67	63

By Using Rank correlation method, Determine whether the two judges have common taste in the judgement of beauty?



## WHAT YOU HAVE LEARNT

- Correlation measures the associations between variables. Correlation can be positive or negative and linear or non-linear. It is denoted by  $r$ .
- The value of  $r$  lies between -1 and +1 i.e.  $-1 \leq r \leq +1$ .
- The correlation coefficient ' $r$ ' is independent of change of origin and change of scale.
- The important methods of measuring correlation are (i) Scatter Plot (ii) Karl Pearson's coefficient of correlation; and (iii) Spearman's Rank-correlation coefficient;
- Scatter Plots are used to graphically investigate the possible relationship between two variables without calculating of any numerical value.
- The mathematical formula for computing  $r$  using Karl Pearson method is given:

$$r = \frac{\sum xy}{N\sigma_X\sigma_Y} \quad \dots(1)$$

where  $x = (X - \bar{X})$ ,  $y = (Y - \bar{Y})$ ,  $\sigma_X = \text{s.d. of } X$

$\sigma_Y = \text{s.d. of } Y$  and  $N = \text{number of pairs of observation}$

- Correlation ( $r$ ) can also be calculated using actual figure of two variables  $X$  and  $Y$  as follows:

$$r = \frac{N\sum XY - [\sum X][\sum Y]}{\sqrt{N\sum X^2 - (\sum X)^2} \times \sqrt{N\sum Y^2 - (\sum Y)^2}}$$

- The covariance 'of two variables say  $X$  and  $Y$  is defined as:

$$\text{cov}(X, Y) = \frac{\sum (X - \bar{X})(Y - \bar{Y})}{N}$$



Notes



### Notes

where  $N$  is the number of pairs of data.

If covariance is given, then  $r = \frac{\text{cov}(X, Y)}{\sigma_X \sigma_Y}$

- The correlation ( $r$ ) using Assumed Mean Method is given by:

$$r_{xy} = r_{uv} = \frac{\Sigma uv - \left( \frac{(\Sigma u)(\Sigma v)}{N} \right)}{\sqrt{\Sigma u^2 - \frac{(\Sigma u)^2}{N}} \times \sqrt{\Sigma v^2 - \frac{(\Sigma v)^2}{N}}}$$

where  $u = \frac{X - A}{h}$  and  $v = \frac{Y - B}{k}$

$A$  and  $B$  are the assumed means for variable  $X$  and  $Y$  respectively and  $h$  and  $k$  are common factor of variable  $X$  and  $Y$ .

- The Spearman rank correlation ( $R$ ) is given by:

$$R = 1 - \frac{6 \Sigma D^2}{N(N^2 - 1)}$$

where  $R$  = Rank correlation coefficient

$D$  = Difference between the ranks of two items

$N$  = the number of observations.



### TERMINAL EXERCISES

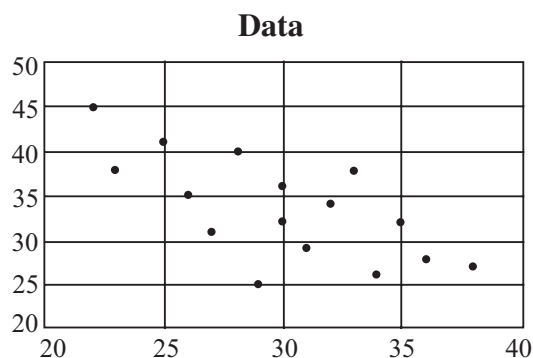
- The data relating to variable  $X$  and  $Y$  is given below:

<b>X</b>	72	73	75	76	77	78	79	80	80	81	82	83	84	85	86	88
<b>Y</b>	45	38	41	35	31	40	25	32	36	29	34	38	26	32	28	27

- Sketch a scatter plot.
- Compute the correlation coefficient,  $r$ .



Answer 1: a.



Notes

2. Calculate and analyze the correlation coefficient between the number of study hours and the number of sleeping hours of different students.

Number of Study hours	2	4	6	8	10
Number of sleeping hours	10	9	8	7	6

3. Find the value of the correlation coefficient from the following table:

Subject	Age X	Glucose Level Y
1	43	99
2	21	65
3	25	79
4	42	75
5	57	87
6	59	81

4. The values of the same 15 students in two subjects A and B are given below; the two numbers within the brackets denoting the ranks of the same student in A and B respectively.

(1,10) (2,7) (3,2) (4,6) (5,4) (6,8) (7,3) (8,1).  
 (9,11) (10,15) (11,9) (12,5) (13,14) (14,12) (15,13)

Use Spearman's formula to find the rank Correlation Coefficient.

5. Calculate Karl Pearson's coefficient of correlation from the advertisement cost and sales as per the data given below:

Advertisement Cost (in '000 \$)	39	65	62	90	82	75	25	98	36	78
Sales (in lakh \$)	47	53	58	86	62	68	60	91	51	84



Notes

6. The following observations are given for two variables.

Y	X
5	2
8	12
18	3
20	6
22	11
30	19
10	18
7	9

- Compute and interpret the sample covariance for the above data.
  - Compute and interpret the sample correlation coefficient.
7. A trainee manager wondered whether the length of time his trainees revised for an examination had any effect on the marks they scored in the examination. Before the exam, he asked a random sample of them to honestly estimate how long, to the nearest hour, they had spent revising. After the examination he investigated the relationship between the two variables.

Trainee	A	B	C	D	E	F	G	H	I	J
Revision time	4	9	10	14	4	7	12	22	1	17
Exam mark	31	58	65	73	37	44	60	91	21	84

- Plot the scatter diagram in order to inspect the data.
  - Calculate the correlation coefficient.
8. Positive values of covariance indicate
- a positive variance of the x values
  - a positive variance of the y values
  - the standard deviation is positive
  - positive relation between two variables
9. A numerical measure of linear association between two variables is the
- variance
  - coefficient of variation
  - correlation coefficient
  - standard deviation



Notes

10. The coefficient of correlation ranges between
- (a) 0 and 1
  - (b) -1 and +1
  - (c) minus infinity and plus infinity
  - (d) 1 and 100
11. The coefficient of correlation:
- (a) can be larger than 1
  - (b) cannot be larger than 1
  - (c) cannot be negative
12. If height is independent of average yearly income, what is the predicted correlation between these two variables?
- (a) 1
  - (b) -1
  - (c) 0
  - (d) Impossible to say for sure
13. A student produces a correlation of +1.3. This is
- (a) a high positive correlation
  - (b) a significant correlation
  - (c) an impossible correlation
  - (d) only possible if N is large
14. What sort of correlation would be expected between a company's expenditure on health and safety and the number of work related accidents..
- (a) positive
  - (b) negative
  - (c) none
15. If A scored the top mark in the apprentices test on computing and the correlation between that test and the test on English language was +1.0 what position did A get in the test on English language.
- (a) middle
  - (b) bottom
  - (c) top
  - (d) cannot say from the information given

## MODULE - 4

### Statistical Tools



Notes

### Correlation Analysis

16. Which correlation is the strongest +0.65 or -0.70
- (a) -0.70
  - (b) +0.65
  - (c) depends on N
  - (d) cannot say from the information given
17. The symbol for the Karl Pearson Correlation Co-efficient is –
- (a)  $\Sigma$
  - (b)  $\sigma$
  - (c)  $\alpha$
  - (d)  $r$
18. When “r” is negative, one variable increases in value, .....
- (a) the other increases
  - (b) the other increases at a greater rate
  - (c) the other variable decreases in value
  - (d) there is no change in the other variable
  - (e) all of the above
19. If two variables are absolutely independent of each other the correlation between them must be,
- (a) -1
  - (b) 0
  - (c) +1
  - (d) +0.1
20. For a normal good, if price increases then the quantity demanded decreases. What type of correlation co-efficient would you expect in this situation?
- (a) 0
  - (b) positive
  - (c) 0.9
  - (d) negative
  - (e) unknowable



## ANSWERS TO INTEXT QUESTIONS

### 10.1

1. A positive correlation does exist; however correlation does not imply causation
2. Positive, since in general, people grow in height increasing with age

### 10.2

1. (b)
2. (c)

### 10.3

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (b) | 2. (b) | 3. (b) | 4. (c) | 5. (c) |
| 6. (c) | 7. (a) | 8. (d) | 9. (d) |        |

### 10.4

1. (a)  $r = 0$
2. (b)  $r = 1$  or  $r = -1$  these two are same as  $|r| = 1$

### 10.5

1. (d)

### 10.6

1. +0.67 this indicates a strong positive relationship between the ranks given by two judges i.e. the judges have high degree of common approach towards judgement of beauty.



Notes

**Notes****11**

## INDEX NUMBERS

Of the important statistical devices and techniques, Index Numbers have today become one of the most widely used for judging the pulse of economy, although in the beginning they were originally constructed to gauge the effect of changes in prices. Today we use index numbers for cost of living, industrial production, agricultural production, imports and exports, etc. Index numbers are the indicators which measure percentage changes in a variable (or a group of variables) over a specified time.



### OBJECTIVES

After completing this lesson, you will be able to:

- describe the term index and appreciate its uses;
- differentiate between a weighted and unweighted index;
- construct and interpret a Laspeyres's price index;
- construct and interpret a Paasche's price index;
- construct and interpret a value index;
- explain how the Consumer Price Index is constructed and interpreted;
- explain how industrial production index is constructed; and
- understand its limitations.

### 11.1 MEANING OF INDEX NUMBER

“An index number is a statistical measure, designed to measure changes in a variable, or a group of related variables”.

“Index number is a single ratio (or a percentage) which measures the combined change of several variables between two different times, places or situations”.

**INDEX NUMBER** expresses the relative change in price, quantity, or value compared to a base period. An index number is used to measure changes in prices paid for raw materials; numbers of employees and customers, annual income and profits, etc.

If the index number is used to measure the relative change in just one variable, such as hourly wages in manufacturing, it is referred to as a simple index. An index number can also be used to measure changes in the value of the group of variables such as prices of specified list of commodities, volume of production in different sectors of an industry, production of various agricultural crops, cost of living etc, it is referred to as composite index. Index number measures average change in a group of related variables over two different situations such as prices of specified list of commodities, volume of production in different sectors of an industry, production of various agricultural crops, cost of living etc. Index number does not indicate that the change is uniform for all commodities or group of related variables used to calculate it. It may be noted that in case of, say, Price Index, price of some of the items may be rising, while it is falling in other items. Price index will only indicate the average change in the price of group of related commodities.

Conventionally, index numbers are expressed in terms of percentage. Of the two periods, the period with which the comparison is to be made, is known as the base period. The value in the base period is given the index number 100. Suppose the change in price in the year 2013 is measured in comparison to the year 2000, then 2000 become the base year and 2013 becomes the current year. For Example By saying that the price index for the year 2013 is 125, taking base year as 2000, it means that there is an increase of 25% in the general price as compared to the corresponding figure for the year 2000. Price index numbers measure and permit comparison of the prices of certain goods. Quantity index numbers measure the changes in the physical volume of production, construction or employment.



Notes

## 11.2 CHARACTERISTICS OF INDEX NUMBERS

Following are some of the important characteristics of index numbers:

- Index numbers are a special type of average that provides a measurement of relative changes in the level of a certain phenomenon from time to time. It is a special type of average because it can be used to compare two or more series which are composed of different types of items or even expressed in different types of units.
- Index numbers are expressed in terms of percentages to show the extent of relative change.
- Index numbers measure relative changes. They measure the relative change in the value of a variable or a group of related variables over a period of time or between places.



- Index numbers can also measure changes which are not directly measurable. For Example the cost of living, the price level or the business activity in a country are not directly measurable but it is possible to study relative changes in these activities by measuring the changes in the values of variables/factors which affect these activities.

### 11.3 USES OF INDEX NUMBERS

Index numbers are indispensable tools of economics and business analysis. Following are the main uses of index numbers.

- (i) Index numbers are economic barometers. Index numbers measure the level of business and economic activities and are therefore helpful in gauging the economic status of the country. Index number is a special type of averages which helps to measure the economic fluctuations on price level, money market, economic cycle like inflation, deflation etc.
- (ii) Index numbers helps in formulating suitable economic policies and planning etc. Many of the economic and business policies are guided by index numbers. For example, while deciding the increase of DA of the employees; the employers have to depend primarily on the cost of living index. If salaries or wages are not increased according to the cost of living it leads to strikes, lock outs etc. The index numbers provide some guide lines that one can use in making decisions.
- (iii) Index numbers are used in studying trends and tendencies. Since index numbers are most widely used for measuring changes over a period of time, the time series so formed enable us to study the general trend of the phenomenon under study.
- (iv) Index numbers are useful in forecasting future economic activity. Index numbers are used not only in studying the past and present workings of our economy but also important in forecasting future economic activity.
- (v) Index numbers measure the purchasing power of money. The cost of living index numbers determine whether the real wages are rising or falling or remain constant. The real wages can be obtained by dividing the money wages by the corresponding price index and multiplied by 100. Real wages helps us in determining the purchasing power of money.

### 11.4 CONSTRUCTION OF AN INDEX NUMBER:

The various methods of construction of Index numbers are explained through price index numbers. The methods of construction of price index numbers can be classified into broad categories as shown below:



Table 11.1: Price Indices

Un-weighted Index		Weighted Index	
Simple Aggregative Method	Simple Average of Price Relatives Method	Weighted Aggregative Method	Weighted Average of Price Relatives Method



Notes

### 11.4.1 Un-weighted Index

In the un-weighted index number the weights are not assigned to the various items used for the calculation of index number. Two unweighted price index number are given below:

#### (i) Simple Aggregate Method

This method is based on the assumption that various items and their prices are quoted in same units. Equal importance is given to all the items. The formula for a simple aggregative price index is given as follows:

$$P_{01} = \frac{\sum P_1}{\sum P_0} \times 100$$

where  $\sum P_1$  is the total of current year's prices for the various items.

$\sum P_0$  is the total of base year's prices for the various items.

**Example 1:** From the following data compute price index number for the year 2014 taking 2013 as the base year using simple aggregative method:

Commodity	Prices in the year 2013	Prices in the year 2014
A	1	5
B	2	4
C	3	3
D	4	2



Notes

**Solution:****Table 11.2: Computation of price Indian number using Aggregative Method**

Commodity	Prices in the year 2013 $P_0$	Prices in the year 2014 $P_1$
A	1	5
B	2	4
C	3	3
D	4	2
	$\Sigma P_0 = 10$	$\Sigma P_1 = 14$

The price index number is given by:

$$P_{01} = \frac{\Sigma P_1}{\Sigma P_0} \times 100 = \frac{14}{10} \times 100 = 140$$

From this price index of 140, it can be concluded that the aggregate of the prices of the given group of commodities has increased by 40% over the period from 2013 to 2014.

This price index number calculated by using simple aggregative method has limited use. The reasons are as follows:

- This method doesn't take into account the relative importance of various commodities used in the calculation of index number since equal importance is given to all the items.
- The different items are required to be expressed in the same unit. In practice, however, the different items may be expressed in different units.
- The index number obtained by this method is not reliable as it is affected by the unit in which prices of several commodities are quoted.

### (ii) Simple Average of Price Relatives Method

This method is an improvement over the previous method as it is not affected by the unit in which the prices of various commodities are quoted. The price relatives are pure number and therefore are independent of original units in which these are quoted. The price index number using price relatives is defined as follows:

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

where  $P_1$  and  $P_0$  indicate the price of the  $i$ th commodity in the current period and base period respectively. The ratio  $(P_1/P_0) \times 100$  is also referred to as price relative of the commodity and  $n$  stands for the number of commodities.

Using the data of Example 1 the index number using price relative method can be calculated as follows:

**Table 11.3: Calculation of Index number using Simple Price Relative Method**

Commodity	Prices in the year 2013 $P_0$	Prices in the year 2014 $P_1$	Price Relatives $\frac{P_1}{P_0} \times 100$
A	1	5	500
B	2	4	200
C	3	3	100
D	4	2	50
	$\Sigma P_0 = 10$	$\Sigma P_1 = 14$	$\Sigma \frac{P_1}{P_0} \times 100 = 850$

$$P_{01} = \frac{\sum \frac{P_1}{P_0} \times 100}{N} = \frac{850}{4} = 212.5$$

Thus the price in the year 2014 are 112.5% higher in 2013.

The index number based on simple average of price relatives is not influenced by the units in which the prices of the commodities are quoted.

However, this method like simple aggregative method gives equal importance to all the items and thus neglects their relative importance in the group.

#### 11.4.2 Weighted Index Number

In weighted index number rational weights are assigned to all the items or commodities. Such weights indicate the relative importance of the items included in the calculation of the index. In most cases quantity of usage is the best measure of importance.

##### (i) Weighted Aggregative Price Indices

In weighted aggregative price indices, the weights are assigned to each item in the basket in various ways and the weighted aggregates are also used in different ways



Notes

## MODULE - 4

### Statistical Tools



#### Notes

### Index Numbers

to calculate an index. In most cases quantity of usage is used to calculate price index number. Laspeyre's price index and Paasche's price index are the two most important methods of calculating weighted price indices. Laspeyre's price index number is the weighted aggregative price index number which uses base year's quantity as the weights. It is given by:

$$P_{01} = \frac{\sum P_1 q_0}{\sum P_0 q_0} \times 100$$

In general, Laspeyre's index number answers the question, it provides an explanation to the question that if the expenditure on base period basket of commodities was ₹100, how much should be the expenditure in the current period on the same basket of commodities?

**Example 2:** From the following data compute Laspeyre's index number for the current year:

Items	Base Year		Current Year	
	Prices (in ₹)	Quantity (in kg.)	Prices (in ₹)	Quantity (in kg.)
A	1	6	5	8
B	2	7	4	7
C	3	8	3	6
D	4	9	2	5

**Solution:**

**Table 11.4: Computation of Laspeyre's Index Number**

Items	Base Year		Current Year			
	Price ( $P_0$ )	Quantity ( $q_0$ )	Price ( $P_1$ )	Quantity ( $q_1$ )	$P_1 q_0$	$P_0 q_0$
A	1	6	5	8	30	6
B	2	7	4	7	28	14
C	3	8	3	6	24	24
D	4	9	2	5	18	36
					$\sum P_1 q_0 = 100$	$\sum P_0 q_0 = 80$

Laspeyre's Price index number is given by:

$$P_{01} = \frac{\sum P_1 q_0}{\sum P_0 q_0} \times 100 = \frac{100}{80} \times 100 = 125$$

As can be seen here that the value of base period quantities has risen by 25 per cent due to price rise. It means that the price is said to have risen by 25 percent.

Paasche's price index number is the weighted aggregative price index number which uses current year's quantity as the weights. It is given by:

$$P_{01} = \frac{\sum P_1 q_1}{\sum P_0 q_1} \times 100$$

In general, Paasche's index number answers the question, if the current period basket of commodities was consumed in the base period and if we were spending ₹100 on it, how much should be the expenditure in the current period on the same basket of commodities.

In the above example 2 Paasche's price index number can be calculated as follows:

**Table 11.5: Computation of Paasche's Price Index Number**

Items	Base Year		Current Year			
	Price (P <sub>0</sub> )	Quantity (q <sub>0</sub> )	Price (P <sub>1</sub> )	Quantity (q <sub>1</sub> )	P <sub>1</sub> q <sub>1</sub>	P <sub>0</sub> q <sub>1</sub>
A	1	6	5	8	40	8
B	2	7	4	7	28	14
C	3	8	3	6	18	18
D	4	9	2	5	10	20
					ΣP <sub>1</sub> q <sub>1</sub> = 96	ΣP <sub>0</sub> q <sub>1</sub> = 60

paasche's price index number is given by:

$$P_{01} = \frac{\sum P_1 q_1}{\sum P_0 q_1} \times 100 = \frac{96}{60} \times 100 = 160$$

Paasche's price index of 160 means the price rise of 60 percent using current year quantities as weights.



**Notes**



Notes

**INTEXT QUESTION 11.1**

- The paasche index number is based on:
  - Base Year Quantity
  - Current Year Quantity
  - Average of Base and Current Year Quantity
  - none of the above
- What is an index number?
- Write one use of index numbers.
- State any two characteristics of index numbers.

**(ii) Weighted Price Relative Method**

Under this method price index is constructed on the basis of price relatives and not on the basis of absolute prices. The price index is obtained by taking the average of all weighted price relatives. It is given by

$$P_{01}(\text{weighted arithmetic mean}) = \frac{\sum W \left( \frac{P_1}{P_0} \times 100 \right)}{\sum W}$$

Where W = weights

In a weighted price relative index, weights may be determined by the proportion or percentage of expenditure on them in total expenditure during the base or current period. In general, the base period weight is preferred to the current period weight. It is because calculating the weight every year is inconvenient.

**Example 3:** From the following data compute an index number by using weighted average of price relative method:

Items	Base Year		Current
	Price ( $P_0$ )	Quantity ( $q_0$ )	Year Price ( $P_1$ )
A	1	6	5
B	2	7	4
C	3	8	3
D	4	9	2

**Solution:**

Calculation of price index number by weighted average of price relatives method using arithmetic mean:

**Table 11.6: Calculation of price Index Number**

Items	Base Year		Current Year		W = $P_0 q_0$	$W \left( \frac{P_1}{P_0} \times 100 \right)$
	Price ( $P_0$ )	Quantity ( $q_0$ )	Price ( $P_1$ )	Relatives $= \frac{P_1}{P_0} \times 100$		
A	1	6	5	500	6	3000
B	2	7	4	200	14	2800
C	3	8	3	100	24	2400
D	4	9	2	50	36	1800
					$\Sigma W = 80$	$\Sigma W \left( \frac{P_1}{P_0} \times 100 \right)$ $= 10000$

$$P_{01}(\text{weighted arithmetic mean}) = \frac{\Sigma W \left( \frac{P_1}{P_0} \times 100 \right)}{\Sigma W} = \frac{10000}{80} = 125$$

The weighted price index is 125. The price index has risen by 25 percent.

It may be noted that the values of the unweighted price index and the weighted price index differ.

**INTEXT QUESTIONS 11.2**

- From the following data compute an index number by using weighted average of price relative method:

Commodities	Base Year Prices (in ₹)	Current Year Prices (in ₹)	Weights (W)
A	100	90	30
B	20	20	15
C	7	60	20
D	20	15	10
E	40	55	25

**Notes**

**11.5 SOME OTHER IMPORTANT INDEX NUMBERS****11.5.1 Consumer price index**

A consumer price index (CPI) measures changes in the price level of a basket of consumer goods and services purchased by households. CPI measures changes in the price level for the specified consumers in the particular region. CPI can be calculated for industrial workers, urban labours, Agricultural workers etc. Suppose the CPI for agricultural workers with base year of 2000 is 560 in the April 2012. It means that if the agricultural worker was spending 100 in 2000 for a typical basket of commodities, he needs ₹ 560 in April 2012 to be able to buy an identical basket of commodities. It is not necessary that he/she buys the

basket. CPI only indicates the capability to buy it. It may be noted that there cannot be one CPI for any class or group of the whole country as the retail prices in different places differ. Similarly, we cannot have a cost of living index number for the whole population of a particular town because there exists different group of persons in the town purchasing different baskets of commodities.

CPI is given by :

$$\text{Cost of Living Index} = \frac{\sum WP}{\sum W}$$

where  $P = \frac{P_1}{P_0} \times 100$  and W are the weights

**Example 4:** Construct the consumer price index number for the year 2012 on the basis of 2010 from the following data:

Commodities	Rice	Wheat	Pulses	Butter	Oil
Weights	40	20	15	20	5
Price (per unit in ₹) 2010	16	40	0.50	5.12	2
Price (per unit in ₹) 2012	20	60	0.5	6.25	1.5



**Solution:****Table 11.7: Constructing Consumer Price Index Number**

Commo- dities	Weights (W)	Price (per unit in ₹) 2010	Price (per unit in ₹) 2012	$P = \frac{P_1}{P_0} \times 100$	WP
Rice	40	16	20	125	5000
Wheat	20	40	60	150	3000
Pulses	15	0.50	0.5	100	1500
Butter	20	5.12	6.25	122	2440
Oil	5	2	1.5	75	375
	$\Sigma W = 100$				$\Sigma WP = 12315$

$$\text{Cost of Living Index for 2012} = \frac{\Sigma WP}{\Sigma W} = \frac{12315}{100} = 123.15$$

**INTEXT QUESTIONS 11.3**

1. Suppose a person was earning 1500 per month in 2005, what should be his salary in 2010, if the cost of living index number in 2010 with base year 2005 is 170.30?

**11.5.2 Wholesale Price Index Number**

The Wholesale Price Index or WPI is the price of a representative basket of wholesale goods. The wholesale price index number indicates the change in the general price level. Unlike the CPI, it does not have any reference consumer category. WPI with 2011 as base is 156 in March, 2014 means that the general price level has risen by 56 percent during this period.

**11.5.3 Industrial production index**

The industrial production index indicates the change in the level of industrial production in the given period comprising many industries. It is a weighted average of quantity relatives. The formula for the index is given by:

$$\text{Industrial Production Index (IIP}_{01}) = \frac{\Sigma q_1 \times W}{\Sigma W}$$

**Notes**

**Notes**

## **11.6 ISSUES IN THE CONSTRUCTION OF INDEX NUMBERS**

There are certain issues that should be kept in mind for the construction of index number which are explained as follows:

### **Purpose of Index Numbers**

An index number, which is designed keeping, specific objective in mind, is a very powerful tool. For example, an index whose purpose is to measure consumer price index, should not include wholesale rates of items and the index number meant for slum-colonies should not consider luxury items like A.C., Cars refrigerators, etc.

### **Selection of Items**

After the objective of construction of index numbers is defined, only those items which are related to and are relevant with the purpose should be included.

### **Choice of Average**

As index numbers are themselves specialized averages, it has to be decided first as to which average should be used for their construction. The arithmetic mean, being easy to use and calculate, is preferred over other averages (median, mode or geometric mean). In this lesson, we will be using only arithmetic mean for construction of index numbers.

### **Assignment of weights**

Proper importance has to be given to the items used for construction of index numbers. It is universally agreed that wheat is the most important cereal as against other cereals, and hence should be given due importance.

### **Choice of Base year**

The index number for a particular future year is compared against a year in the near past, which is called base year. It may be kept in mind that the base year should be a normal year and economically stable year.

## **11.7 CONCLUSION**

An index number is a statistical measure, designed to measure relative changes in a variable(s) with time/geographical location/other criteria. Index Numbers can be calculated for price, quantity, volume etc. The index numbers need to be interpreted carefully as there are several methods of calculating the index number. The items

to be included and the choice of the base period are important for the calculations. The index numbers are indispensable in economic policy making.



### WHAT YOU HAVE LEARNT

- An index number is a statistical measure, designed to measure changes in a variable or a group of related variables.
- Conventionally, index numbers are expressed in terms percentage.
- Main characteristics of index numbers are :
  - (i) Index numbers are a special type of average that provide a measurement of relative changes in the level of certain phenomenon from time to time
  - (ii) Index numbers are expressed in terms of percentages to show the extent of relative change
  - (iii) They measure relative changes.
  - (iv) They can also measure changes which are not directly measurable.
- Index numbers are economic barometers. They help in formulating economic policies and planning etc. They are used in studying trends and tendencies. Index numbers are useful in forecasting future economic activity. They measure the purchasing power of money.
- The formula to obtain index number by simple average of price relatives method is:

$$P_{01} = \frac{\sum P_1}{\sum P_0} \times 100$$

- The formula to obtain index number by simple average of price relatives method is:

$$P_{01} = \frac{\sum \frac{P_1}{P_0} \times 100}{N}$$

- The formula to get Laspeyres's price index is  $P_{01} = \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$
- Formula to get Paasche's index number is:

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



### Notes



Notes

- Formula to get index number by weighted price relative method is:

$$P_{01} = \frac{\sum W \left( \frac{P_1}{P_0} \times 100 \right)}{\sum W}$$

- Consumer price index (cost of living index) =  $\frac{\sum WP}{\sum W}$



### TERMINAL EXERCISES

- Use the following to answer questions a-d:

A company buys four products with the following characteristics:

Items	Number of units bought		Price paid per unit (£)	
	Year 1	Year 2	Year 1	Year 2
A	20	24	10	11
B	55	51	23	25
C	63	84	17	17
D	28	34	19	20

- Find the simple price indexes for the products for year 2 using year 1 as the base year:
  - Find the simple aggregate index for year 2 using year 1 as the base year:
  - Find the base-weighted aggregate index, the Laspeyres index, for year 2 using year 1 as the base year.
  - Find the current period-weighted aggregate index, the Paasche index, for year 2 using year 1 as the base year.
- During a certain year, Cost of Living Index Number goes up from 110 to 200 and the salary of worker is also raised from 3250 to 5000. Does the worker really gain?
  - The price relatives and weights of the set of commodities are given in the following table:

Commodities	A	B	C	D
Price Relatives	125	120	127	119
Weights	W1	2 W1	W2	W2+3

If the sum of weights is 40 and the index number for the set is 122, find the numerical value of  $W_1$  and  $W_2$ .

**ANSWERS TO INTEXT QUESTIONS****11.1**

1. (b)
2. Read section 11.2
3. Read section 11.3
4. Read section 11.2

**11.2**

1. 101.017

**11.3**

1. ₹ 2554.5

**Notes**



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**Feed back on Questions**

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## 1



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# WHAT IS ECONOMICS

Economics as a subject has assumed great importance in the field of social science. In our day to day life we use a lot of economic concepts such as goods, market, demand, supply, price, inflation, banking, tax, lending, borrowing, rate of interest etc. Similarly, we take economic decisions related to the distribution of our income to purchase various goods, making a budget to do some work, taking up a job to earn, withdrawing money from bank etc. We also observe and get information on the economic situation of our society or country foreign country and the world.



## OBJECTIVES

After completing this lesson, you will be able to:

- *know the meaning of economics;*
- *explain the important branches of economics;*
- *distinguish between positive and normative economics;*

## 1.1 MEANING OF ECONOMICS

Economics is a vast subject. So it is not easy to give a precise definition or meaning of economics as its scope and the area it covers are very large. Ever since, it emerged as a separate branch of study in social science, various scholars and authors have tried to give its meaning and objectives. It should be noted that with development of time and civilization the definition of economics has undergone modification and change. Let us focus the major ideas involving the meaning of economics below:

- (i) Many scholars and authors in the late eighteenth and early nineteenth century believed that economics is the **science of wealth**. These scholars are called the classical thinkers. They viewed that economics deals with the phenomenon of



## Notes

wealth which includes nature and causes of wealth, creation of wealth by individuals and nations etc.

- (ii) The problem with wealth definition was that it did not talk about people who had no wealth. Having wealth and not having wealth divided the society into rich and “not rich” or poor. So many scholars in the early nineteenth century thought that economics should address the issue of “welfare of the society” and not just wealth. Accordingly economics was seen as **science of welfare**. Welfare is both quantitative and qualitative in nature. Consumption of goods and services, increase in per capita income etc are quantitative aspects of welfare. Living in peace, enjoying leisure, acquiring knowledge etc are qualitative aspects of welfare. As science of welfare, economics was said to be concerned with the quantitative welfare only because it can be measured in terms of money.
- (iii) The welfare definition of economics explained only the material aspects of welfare. But people want both material goods and non-material services. Since resources available with every individual or society are scarce, people try to achieve their goals by alternative use of these resources which they do by making appropriate choice. So economics was treated as **science of scarcity and choice**. As science of scarcity and choice, economics studies human behavior as relationship between ends and means which are scarce and have alternative uses.

Here “ends” imply “wants”. “Scarce Means” imply “limited resources”. According to the scarcity definition, limited resources can be used alternatively. Take the example of production of two goods – Cloth and Wheat. We cannot produce unlimited amount of cloth and wheat with limited amount of resources. The resources have to be divided to produce these goods. Let demand for one of the goods say wheat increases so it has to be produced in larger quantity for which we need more resources. But given that, resources are limited, we can produce more wheat only by withdrawing some resources from the production of cloth and putting them in production of wheat. As a result, cloth production will fall and wheat production will increase. In this example, we have two alternatives –

- (i) Keep producing the same amount of cloth and wheat.
- (ii) Produce more wheat due to increase in its demand thereby decreasing some amount of cloth.

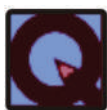
Since the economy wants more wheat, the study of economics tells us how this problem can be solved with limited resources.

- (iv) In the twentieth century the objective of achieving growth and development of the entire economy gained momentum. Role of the government in economic growth and development became increasingly important. So economics, no longer,

remained limited to individual decision making and use of resources only. Its scope has been expanded to include production and consumption of commodities overtime so that the economy achieves growth and development.

So economics is treated as the **science of growth and development**. In fact, it is true that now a days people talk about well being of individual and the whole nation. It is understood that for an individual to be able to satisfy his/her wants, it is necessary that the whole economy must grow and find proper mechanism to distribute the benefits of growth among the individual citizens. So performance of the economy is very important in terms of use of its resources and production and distribution of goods and services. The economy must allocate its resources among various alternative activities, ensure the efficient use and find ways as to how they would grow for future development of the economy. On this basis, many economies in the world have performed well. For example the USA, European countries, Japan, etc. are called developed economies because they have achieved higher level of income for their citizens. Our Indian economy is a developing economy because many of its citizens are still poor. A study of economics tells us the state of our economy and guides us to achieve higher level of growth and development.

- (v) Economists of late twentieth century have also started talking about welfare of future generation and protection of natural environment. Hence economics is also treated as **science of Sustainable Development**. To achieve higher level of growth and development, economies around the world have been exploiting natural resources and polluting the environment. Consumption of goods and services have even resulted in lots of wastages. Note that some resources like minerals, mineral oil, forests are depleting fast because of their rising consumption by present generation. So future generation may be left with little or no resources. It is our moral duty to use the available scarce resources judiciously, efficiently and ensure welfare of our future generation.



### INTEXT QUESTIONS 1.1

1. “Economics is a science of wealth”. What does this imply?
2. Which aspect of welfare does economics deal as the science of welfare?

## 1.2 BRANCHES OF ECONOMICS

The study of Economics is divided into two distinct branches. They are

- (i) Micro Economics
- (ii) Macro Economics



Notes

**Notes****1.2.1 Micro Economics**

The word “micro” means very small. So micro economics implies study of economics at a very small level. What does this exactly mean? In a society comprising of many individuals collectively every single individual makes just a small part. So the economic decisions taken by a single individual become the subject matter of micro economics. What are the economic decisions an individual takes? We can cite some examples in this regard.

- (a) In order to satisfy various wants an individual buys good and services. To buy goods and services the individual has to pay some price from his limited amount of income. So the individual has to make a decision with regard to quantity of the good to be purchased at given price. He/she has to also decide the combination of different goods to buy given his/her income so that he/she can get maximum satisfaction as a buyer.
- (b) An individual also sells goods and services as a seller. Here he has to take decision regarding the quantity of good to be supplied at a given price so that he/she can earn some profit.
- (c) All of us pay price to buy a good? How does this price get determined in the market? Micro economics provides answer to this question.
- (d) In order to produce a good an individual producer has to take decision as to how to combine the various factors of production so that maximum output can be produced at minimum cost.

All these are some important areas of study under micro economics.

**1.2.2 Macro Economics**

The word macro means very large. In comparison to an individual, the society or the country or economy as a whole is very large. So the economic decisions taken at the level of the economy as whole are subject matter of macro economics. Take the example of the economic decisions taken by the government. We all know that the government represents the whole country, not just any individual. So the decisions taken by the government are meant for solving the problems of the whole society. For example government makes policies with respect to collection of taxes, expenditure on public goods and welfare activities etc. which affect the whole economy. “How do such policies work” is the subject matter of macro economics.

In microeconomics we study the behavior of an individual as a buyer and seller. As buyer the individual spends money on goods and services which is called his/her consumption expenditure. If we add consumption expenditure of all individuals then we get idea of aggregate consumption expenditure of the whole society. Similarly aggregating incomes of individuals becomes total income of the country or national income. So study of these

aggregates such as national income, total consumption expenditure of the country etc. comes under macro economics.

Another example of macroeconomic issue is the study of inflation or price rise.

Inflation or price rise does not affect an individual only, but it affects the whole economy. So knowing its causes and effects as well as controlling it, come under the study of macro economics.

Similarly, problem of unemployment, economic growth and development etc. concern with the whole population of the nation and hence are covered under the study of macro economics.

**Notes****INTEXT QUESTION 1.2**

Write whether the following statements are True or False

- (i) Inflation is studied under micro economics.
- (ii) Determination of price of a good is a problem under macro economics.
- (iii) Macro economics deals with the issue of employment and unemployment.
- (iv) Micro economic deals with individual decision making with respect to buying a good.

**1.3 POSITIVE VS NORMATIVE ECONOMICS**

The study of economics involves both positive and normative aspects in terms of understanding the events taking place around us, taking decisions, prescribing rules and regulations and implementing policies to solve economic problems. Positive economics talks about “What is” where as normative economics talks about “What ought to be” or “what should be”. Positive economics talks about the things happening or might happen in the economic world. Normative economics gives value judgments about things and tells us to “What should have happened”. Consider the following statements.

- (i) India’s population have crossed 100 crore mark. India is the second largest populated country in the world.
- (ii) India should not allow its population to grow so fast. It must control its population.

Statement (i) describes a phenomenon which is happening. This is a positive statement. Statement (ii) gives a value judgment on India’s population. This is a normative statement.

Now consider another set of statements given below.



### Notes

- (iii) Workers will work hard if they are given more wages.
- (iv) Factories should increase the wage rate of workers to provide justice for hard work.

Statement (iii) is a positive statement. It tells about a certain fact. Statement (iv) is normative in nature because it tells about the right thing which if takes place will do good to society.

Economic decision making by individuals or government or business firms involves both positive and normative aspects of the things.

For example as given by statements (i) and (ii) because India's population is growing fast and posing problems, the government is doing its best to control the population growth through effective family planning and other measures. Similarly, based on statement (iii) and (iv), government has implemented minimum wage laws so that workers get justice.



### INTEXT QUESTIONS 1.3

1. Identify the following statements as positive or normative.
  - (i) India has a large number of poor people.
  - (ii) The government should spend more on education.
  - (iii) Poor people are suffering due to price rise of essential commodities.
  - (iv) Bank has increased its interest rate.
  - (v) People should be encouraged to save in post offices and commercial banks.



### WHAT YOU HAVE LEARNT

- Economics as a subject matter of social science has been treated as a science of –
  - (a) Wealth, (b) Welfare, (c) Scarcity and Choice (d) Growth and Development and (e) Sustainable Development.
- Micro Economics and Macro Economics are two important branches of Economics.
- Micro economics deals with the economic decision making by individuals and institutions.
- Macro Economics deals with economic aggregates at the level of the whole economy.

- Economic facts and figures are called Positive Economics.
- Normative Economics deals with “What ought to be”.



### TERMINAL EXERCISE

1. Economics is science of scarcity and choice. Explain.
2. How does wealth definition of economics differ from welfare definition of economics?
3. Differentiate between micro and macro economics?
4. Distinguish between Positive and Normative economics by giving examples?



### ANSWERS TO INTEXT QUESTIONS

#### Intext Questions 1.1

1. As science of wealth economics explains the nature and causes of wealth, creation of wealth by individuals and nations etc.
2. Quantitative aspect of welfare.

#### Intext Questions 1.2

- (i) False,                      (ii) False,                      (iii) True,                      (iv) True.

#### Intext Questions 1.3

- (i) Positive,                      (ii) Normative,                      (iii) Positive,  
(iv) Positive,                      (v) Normative.



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## HUMAN WANTS

In our daily life we see that different people are engaged in different types of activities. For example, some people are engaged in farming, some work in offices, some are selling vegetables, some are having different types of shops, some are running factories etc. These people are engaged in different types of activities to earn income. They have to earn income because they have to satisfy so many wants.

To earn income people use resources man made or natural. Wants are unlimited but the resources are limited/Scarce.



### OBJECTIVES

After completing this lesson, you will be able to:

- *explain the meaning of wants;*
- *explain how wants arise and grow;*
- *understand that all wants can not be satisfied;*
- *state the characteristics of wants;*
- *know how resources satisfy wants;*
- *differentiate between economic and non economic wants;*
- *explain that with development wants expand and change;*
- *understand the Indian philosophy of limiting wants.*

### 2.1 MEANING OF WANTS

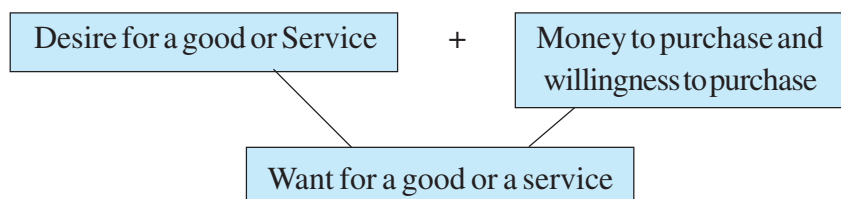
It is human nature to have many goods in life. There would be an endless list of such wishes. Let us call these wishes as 'desires'. One may desire a good house, a car, a computer, good food, decent clothes and so on. How can one get all of these? One may





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have these things if he/she has money. If one does not have enough money, then only one or two of these or none of these could be purchased. Which of our desires are to be fulfilled depends upon our capacity to pay or purchasing power. That is why not all desires can be met as we need money to satisfy them. The desires which are backed by money and willingness to purchase may be called wants. A beggar may desire to have a car but this desire can not be called a want as it is not backed by adequate money. However, if a rich man desires to have a car and is willing to purchase it, the desire can be turned into a want.



## 2.2 HOW DO WANTS ARISE AND GROW

Wants are a part of our living. They arise with the birth of man. Man in ancient times was satisfied while living in forests, drinking water from the streams, plucking fruits from trees or eating animal flesh to satisfy hunger. He had limited wants which were related to food, Shelter and clothing. Over a period of time, these wants have grown. How did it happen?

With the discovery of fire man started cooking food. This led to the discovery of new food items. Man's taste grew and expanded. A large variety of food stuffs came into existence. Today you can find different varieties of tastes, colours and shapes in food items.

As regards clothing, man has moved from unstitched animal skins and tree leaves to a variety of clothes. In order to live better, man discovered and invented new items of clothing. As knowledge, taste and fashion are increasing, new and better products in clothing are emerging.

In a similar fashion, need for housing has also undergone a tremendous change. Man has moved from caves to huts made of straw and pucca houses made of bricks. Now a days, houses made of wood, pucca houses, bungalows and palaces with fancy doors, windows and all sorts of decorative paints and fixtures are in use.

However, some wants may be necessary for the existence of life. For example, food, clothing and shelter. These are called basic wants or necessities. There are some other wants which make our life easy and comfortable. These are called comforts. Examples of comforts may be coolers, scooter etc. Some goods give us pleasure but they are very costly. For example, luxurious cars, diamond jewellery etc. such good are called luxuries.



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## 2.3 SATISFACTION OF WANTS

Do all our wants get satisfied? No, As soon as one want is satisfied another takes its place; our wants increase because we desire to live a better and comfortable life. As new goods and service are developed, we want them. Wants can be satisfied by goods and services. Goods and services can be produced with the help of resources. Land, labour, capital and entrepreneurship are called resources which help in the production of goods and services. Wants are unlimited but the resources to satisfy them are scarce. As soon as one want is satisfied, another takes its place. Some of these wants can be satisfied by man with his limited income while for others he may not be able to do so. *It is, therefore, not possible to fulfill all our wants though a single want is satiable.*

## 2.4 CHARACTERISTICS OF WANTS

The following are the most important characteristics of wants.

### (i) Wants are unlimited:

Famous economist Marshall has rightly said that human wants are countless in number and are varied in kind. As soon as one want is satisfied another want takes its place. This endless circle of wants continues through out life. For example, a person who has never used a fan would wish to have a fan. When this want is satisfied, he would wish to get an air cooler and a scooter. Once these wants are satisfied, then he would wish to have an air conditioner, a car and so on. Thus, we see wants never come to an end.

### (ii) A single want is satiable

Each want taken separately can be satisfied. It has rightly been said that there is a limit to each particular want. For example, if a man is thirsty he can satisfy his thirst by taking one, two or three glasses of water and after that he does not want water at that point of time.

### (iii) Some wants arise again and again

Most wants recur. If they are satisfied once, they arise again after a certain period. We eat food and hunger is satisfied but after a few hours, we again feel hungry and we have to satisfy our hunger again with food. Therefore, hunger, thirst etc. are such wants which occur again and again.

### (iv) Varying nature of wants

Wants vary with time, place and person. They are also influenced by many factors like income, customs, fashion, advertisement etc. For example, we want medicines only when we are sick. Ice is needed in summer season only. We need woollens even in summer at a place like Sri nagar. Similarly, people have started using things like T.V.

Sets, mobile phones, car and many other luxury goods due to increase in their income and change in fashion. Thus, wants have been found to vary and to multiply with the economic development of a country.

**(v) Present wants are more important than future wants:**

Present wants are more important. A person uses most of his limited resources for the satisfaction of present wants. He does not worry much about his future wants because future is uncertain and less urgent. For example, providing for the education of children in the present is more important than providing for old age security in future.

**(vi) Wants change and expand with development**

A simple example to show how wants are changing is the telephone. Earlier, in the rural areas there were not many telephones, but today telephone has become a necessity for everybody for keeping in touch with their near and dear ones. People using telephone earlier, are now using mobile phones. They want more and more facilities in their mobile phones such as, Camera, Internet and so on.



### INTEXT QUESTIONS 2.1

1. How does a desire differ from a want?
2. Give one example to show that wants arise and grow.
3. Why are all wants not satiable?
4. State any two characteristics of wants.
5. When does a desire become a want?

## 2.5 HOW RESOURCES SATISFY WANTS

As stated earlier wants are satisfied with the use of goods and services. To produce these goods and services, resources are used. With ever growing wants, we have been making greater use of resources. Resource may be natural or man-made. All resources can be classified into land, labour, capital and entrepreneurship. For example, for the production of wheat, we use land, labour, tractor pump set etc. (capital). Farmer (entrepreneur) organizes all these factors to produce wheat. He also uses seeds, manure and fertilizers in this process. Thus, production of wheat involves the use of resources. Similarly, production of all other goods & services also involves the use of resources. Are the resources unlimited like our wants? The answer is 'no'. The resources that we use to satisfy our endless wants are limited/scarse. With the development, new goods



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are invented which lead to increase in our wants. But the resources do not increase accordingly. This may lead to exhaust our resources.

## 2.6 ECONOMIC AND NON-ECONOMIC WANTS

We have so far learnt that wants are unlimited. They differ from person to person. As you know many of our wants are satisfied by using certain goods, and services. These goods and services are purchased from the market by paying a price. **The wants that can be satisfied by such goods and services are called economic wants.**

**A few things that we want, are not purchased from the market by paying a price. Such wants are called non-economic wants.** For example, we want air to breathe, rain water for agriculture etc. When we want a maid to cook, it is our economic want. But if the food is cooked by mother, it becomes non-economic want.



### INTEXT QUESTIONS 2.2

1. Name the resources used in the production of wheat.
2. Which one of the following is scarce in supply?
  - (a) Resources
  - (b) Wants
3. Give any two examples of economic wants.
4. Give any two examples of non-economic wants.

## 2.7 WANTS EXPAND AND CHANGE WITH DEVELOPMENT

In ancient times, man was satisfied with simple items of food, clothing and shelter etc. But with the development these wants grew in nature and number. Our want for food we eat has changed. We want to eat not only better and nutritious food but different varieties of food. Similarly we want to wear not only a pair of clothes but we want variety as well as latest designs according to the fashion. We want to have a better house with modern facilities like, air conditioners, geysers etc. you all know that for communication we not only want a simple telephone but also a mobile phones having many facilities like camera, internet, video recording etc. Thus, man's evergrowing and changing wants lead to many inventions and discoveries which result in new and better quality of goods and services.

## 2.8 INDIAN PHILOSOPHY OF LIMITING WANTS

As we all know our wants are unlimited but our resources to satisfy these wants are limited. Hence if we keep our wants as unlimited and growing, we will not be able to

satisfy all of them with our limited resources. This will give rise to a lot of dissatisfaction. But on the other hand, if we limit our wants we will be able to satisfy most of them with our limited resources and this will give us more and more satisfaction. The Indian philosophy has always been to limit our wants so that we feel satisfied in life. This helps us to lead a happy life as we do not have to suffer any unhappiness due to unfulfilled wants.

Even the father of our nation, Gandhiji always advocated controlling of one's wants so that we can have a satisfied life and we do not have to indulge into wrong deeds or practices to satisfy unlimited wants out of our limited resources. There have been many great thinkers who have advocated the same.

**INTEXT QUESTIONS 2.3**

1. What is the Indian philosophy related to the satisfaction of wants with limited resources?
2. Give one example of communication system to prove that wants change and expand with development.

**WHAT YOU HAVE LEARNT**

- The desires which are backed by money and willingness to purchase, may be called wants.
- Wants are satisfied with the use of goods and services
- Economic wants are satisfied by using goods and services purchased from the market by paying a price.
- Non-economic wants are satisfied by using goods and services which are not purchased from the market by paying a price.
- With the discovery and new inventions, new wants arise and grow.
- Some wants may be necessary for the existence of life. These are necessities.
- Wants, which make our life easy and comfortable, are called comforts.
- Some wants give us pleasure but they are satisfied by costly goods are called luxuries.
- Although a single want is satiable, all wants can not be satisfied due to the scarcity of resources.

**Notes**



## Notes

- Some most important characteristics of wants are :  
wants are unlimited, a single want is satiable, some wants arise again and again, wants vary with time, place and person. Present wants are more important than future wants, wants change and expand with development,
- Wants change and expand with development
- Indian philosophy is to limit our wants to get more and more satisfaction.



## TERMINAL EXERCISE

1. Give any two examples showing the conversion of desires into want.
2. How do wants arise and grow? Explain with the help of an example.
3. All wants can not be satisfied? Explain why?
4. State any four main characteristics of wants.
5. Prove with an example that present wants are more important than future wants.
6. How do the resources satisfy the wants.
7. Distinguish between economic and non-economic wants.
8. 'Wants expand and change with development' explain.
9. Why should we limit our wants?



## ANSWER TO INTEXT QUESTIONS

### Intext Questions 2.1

1. The desires which are backed by money and willingness to purchase are called wants.
2. With the discovery of fire man started cooking food which led to the increase of a large variety of food items.
3. All wants are not satiable because of scarcity of resources.
4. (i) wants are unlimited  
(ii) Some wants arise again and again
5. A desire becomes a want when it is backed by money and willingness to purchase.

### Intext Questions 2.2

1. Land, labour, capital (machinery), seeds, manures, fertilizers etc.
2. (a)
3. (i) Pen (ii) Book
4. (i) Air to breath (ii) Rain water for agriculture



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## GOODS AND SERVICES

You have learnt that human wants are unlimited and insatiable. Now the question is, how many of our wants can be satisfied and how they can be satisfied.

Human wants are satisfied by goods and services, which are carried through various economic activities. In this lesson you will learn about the terms goods and services, types of goods and services and significance of goods and services in relation to production, consumption, investment and human wants.



### OBJECTIVES

After completing this lesson, you will be able to:

- *explain the terms goods and services;*
- *identify various types of goods and services;*
- *distinguish between goods and services;*
- *understand the basis for different types of goods and services;*
- *know about free and economic goods and services;*
- *make out the difference between consumer and producer goods and services;*
- *explain how goods can be single use and durable use;*
- *differentiate between public goods and private goods.*

### 3.1 GOODS AND SERVICES

In our daily life, we come across variety of goods and services. When we are hungry, we take food. When we are thirsty, we take water. In a similar way we need many goods such as pen and paper to write, house to live in, chairs to sit, a washing machine to wash



**Notes**

the clothes,, a television to watch the programmes etc. All these are the examples of goods that satisfy our wants.

But goods alone are not sufficient to fulfill our wants. We need the services of different people for different jobs. For example we require a hairdresser to cut our hair, a doctor to cure us, a tailor to stitch our clothes, a cobbler for mending our shoes etc. These are a few examples of services that satisfy our wants. Both goods and services satisfy human wants. These goods and services are as diverse as our wants.

**3.2 DISTINCTION BETWEEN GOODS AND SERVICES**

Now that we know that both goods and services are important to satisfy human wants, let us understand how both are different from each other. The main points of distinction are:

**Goods**

1. Goods are tangible in nature i.e. they can be seen and touched.
2. There is a time gap between production and consumption of goods as they are produced first and consumed later.
3. They can be stored and utilized when required.
4. They can be transferred from one place to another.

Let us take example of any one good, say chair. You can see a chair and can also touch it. The carpenter first makes it in his workshop. You use it after purchasing it from the market. So there is a time gap between production of chair and its consumption. If suppose you do not require that chair immediately you can keep it in your store and can use it when you require it. You can even give it or sell it to another person.

**Services**

1. Services are non-tangible in nature i.e. they can neither be seen nor be touched.
2. There is no time gap between the production and consumption of services. That is why they are produced and consumed simultaneously.
3. Services cannot be stored.
4. Transfer of service is not possible.

Let us consider the example of services of a doctor. The doctor examines a patient and writes the medicines. Now he has delivered a service (for the treatment of the patient), which we cannot see or touch. The moment he examines the patient, he has delivered his services which is also consumed by the patient. So there is no time gap between production and consumption of services. Now this service cannot be stored or transferred.



**INTEXT QUESTIONS 3.1**

1. Which of the following items are goods.
  - (a) Car
  - (b) Cell phone
  - (c) Transportation of passengers
  - (d) Mending of shoes
2. Out of the following, which are the characteristics of a good.
  - (a) Goods can be seen or touched
  - (b) Goods cannot be transferred
  - (c) There is no time gap between the production and consumption of goods
3. Out of the following, which are the characteristics of services
  - (a) Services can be seen or touched
  - (b) There is no time gap between production and consumption of services
  - (c) Services can be stored
4. Human wants are satisfied by consuming.
  - (a) Goods
  - (b) Services
  - (c) Both goods and services
  - (d) None of the above

**Notes****3.3 CLASSIFICATION OF GOODS AND SERVICES**

We know that different types of enterprises produce different types of goods and services. It is not possible to study them individually; therefore to understand them properly we have to classify them in a number of broad groups. This classification can be done in many ways. This classification helps us to understand the relative economic significance of different goods. We will study the following classifications:

1. Free goods and economic goods.
2. Free services and economic services.
3. Consumer goods and producer goods.
4. Consumer services and producer services.
5. Single use goods and durable use goods.
6. Private goods and public goods.



## Notes

### 1. Free goods and economic goods

Let us assume that you are in a desert. If you fill a bag with sand, you need not pay any price. But otherwise in a city, you have to pay for it. This example helps us to differentiate a free good from an economic good. Free goods are free gifts of nature. They are available in abundance i.e. in unlimited quantity and the supply is much more than the demand. You don't have to pay anything to get them. That is why they are called free goods. In short we can define free goods as goods which possess utility but which are not scarce.

In our daily life, we use toothpaste, soap, shaving cream, footwear, bread etc. These goods are man made and their supply is not unlimited. Similarly we use machines, buses, table, chair, books, fans, television etc. They too are man made and their supply is not unlimited. We use water for various purposes at home, sand for construction and different minerals in different forms. Now these are not man made but free gifts of nature. But because they are scarce i.e. their demand is more than their supply, they command a price and are not freely available. They are the economic goods.

Economic goods are those goods (manmade or free gifts of nature) whose demand is more than supply. They command a price and they can be bought in the market.

### 2. Free services and economic services

In case of services too, there are free services and economic services. Free services are those, which cannot be bought in the market and which are rendered due to love, affection etc. For example services of parents for their children. All those services, which can be bought in the market, are economic services such as services of doctors, engineers etc. The rest of the classification of goods and services deal only with economic goods and services.

### 3. Consumer goods and Producer goods

This classification is based on the purpose for which a particular good is used. Consumer goods are those goods, which satisfy the want of consumer directly. They are goods, which are used for consumption. For example bread, fruits, milk, clothes etc.

Producer goods are those goods, which satisfy the want of consumers indirectly. As they help in producing other goods, they are known as producer goods. For example machinery, tools, raw materials, seeds, manure and tractor etc are all example of producer goods.

#### 3a. Intermediate goods

Raw materials, power, fuels etc. used by the producers for further production of final goods and services are also called intermediate goods. Example : Wheat flour is an intermediate good in the production of bread in the bakery.



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#### 4. Consumer's services and producer's services

Here too the basis of classification is the same as that of goods. When the consumers or the households directly use services, they are known as consumer services. For example services of a tailor stitching your shirt or services of a doctor giving you the treatment or services of a plumber repairing your leaking tap, etc.

Producer services on the other hand are used to produce other goods and services, which are in turn demanded by the consumers. In other words producer services satisfy the human wants indirectly. For example a tailor stitches a shirt for a readymade garment shop, an electrician repairs fault in the electric supply in a production unit or even a truck-transporting raw material to a factory.

#### 5. Single use and durable use goods

All types of goods whether consumer goods or the producer goods are further classified into single use and durable use goods. Single use goods are those goods, which can be used only once. They are finished only in one use. For example bread, butter, egg, milk etc are the single use consumer goods as they are consumed immediately and once for all. Similarly single use producer goods are exhausted in one production process. For example coal, raw material, seeds, manure etc. To elaborate it further let us take the example of production of sugar. Here the raw material is sugarcane, which is used only once.

Durable use goods are those goods, which can be used again and again for a long period of time. There are durable use consumer goods as well as durable use producer goods. Durable use consumer goods are cloth, furniture, television, scooter etc. that can be used by consumer again and again. Durable use producer goods are used in production again and again for example, machines, tools, tractors and implements etc. this does not mean that repeated use of these goods does not make any difference to them. In fact the value of these goods gets depreciated after continuous use.

#### 6. Private goods and public goods

Goods can be classified on the basis of their ownership. All goods that are privately owned and are exclusively enjoyed by individuals are called private goods. For example all the goods owned by you are private goods. This includes your watch, pen, scooter, books, table, chair, bed, clothes etc. If you own a factory then its building, machinery; tools etc are your private goods.

Public goods are those goods, which are owned and enjoyed by the society as a whole. For example roads, bridges, park, town hall etc. are all collectively owned. They are available to all people in a society without any discrimination, i.e. no one is denied from the consumption of public goods. Both government and private entrepreneurs may produce public goods.

**Notes****INTEXT QUESTIONS 3.2**

Which of the following are correct?

1. Economic goods are-
  - (a) Those which are scarce
  - (b) Those which have a price
  - (c) Those which are scarce and also have a price
2. Consumer goods are those goods –
  - (a) Which help in further production
  - (b) Which satisfy the human wants directly
  - (c) None of these
3. Examples of producer goods are-
  - (a) Machinery
  - (b) Tractors
  - (c) Bread
  - (d) Raw material
4. Which of the following statements are correct?
  - (a) Free goods are those goods whose supply is more than the demand.
  - (b) Single use goods are those goods, which are used one for all.
  - (c) Durable use goods can be used again and again.
  - (d) Public goods are those goods, which are collectively owned.

### 3.4 ROLE AND SIGNIFICANCE OF GOODS AND SERVICES IN AN ECONOMY

Goods and services have a multidimensional role to play in an economy. Their role can be stated in relation to-

#### 1. Human wants

You have studied that human wants are unlimited and they are also ever increasing. It means if the availability of different goods and services like clothes, shoes, furniture,

utensils, television, scooter, fruits, vegetable, food grains and services of doctor, plumber, electrician etc increases, it will satisfy more human wants.

## 2. Production

We require consumer goods and services to satisfy increasing human wants. But this increase in availability of consumer goods and services depends on the increased availability of producer goods and services. We can produce more if we have more and better machinery, raw material, tractors, seeds, manure etc. similarly we require more of transportation services, banking and insurance services. Thus it is the quantity and quality of producer's goods and services that will determine the availability of consumer goods and services in the market.

## 3. Investment

Increase in the production of goods and services will also determine the level of investment. Given the quantity of goods and services, a part of it is consumed, which satisfies the human wants. Whatever is not consumed is used for further production and it results in capital formation in the economy. If the production of goods and services is more, it is likely that the consumption will be more and the investment will also be more. The larger is the surplus, the larger is the productive capacity of the economy.



### INTEXT QUESTIONS 3.3

Write true or false against each of the following statements

1. Consumption of goods and services helps in the satisfaction of human wants. [ ]
2. Availability of goods and services depends on the availability of producer goods. [ ]
3. More production results in more consumption and more investment. [ ]



### WHAT YOU HAVE LEARNT

- Human wants are unlimited. Goods and services can satisfy them.
- Free goods are those goods which are available in unlimited quantity and do not command a price in the market.
- Economic goods are limited in supply in relation to their demand. They also command a price in the market.



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- Free services are rendered out of love, affection etc. They cannot be bought in the market.
- Economic services are the services, which can be bought in the market.
- Consumer goods are those goods, which satisfy consumer's want directly.
- Both consumer goods and producer goods are further classified into single use and durable use goods depending upon the number of times that good is used. If used only once, it is single use and if used again and again it is durable use good.
- Consumer services satisfy the wants of consumers directly whereas producer services help in the further production of goods and services.
- Quality and quantity of goods and services determine the level of production, investment, consumption and satisfaction of human wants.

**TERMINAL EXERCISE**

1. Distinguish between goods and services.
2. Distinguish between economic goods and free goods.
3. Distinguish between consumer goods and producer goods.
4. Distinguish between single use and durable use goods.
5. What is the role and significance of goods and services in an economy?

**ANSWERS TO INTEXT QUESTIONS****Intext Questions 3.1**

1. a, b
2. a
3. b
4. c

**Intext Questions 3.2**

1. c
2. b
3. a, b, d
4. a, b, c, d

**Intext Questions 3.3**

1. True
2. True
3. True

**MODULE-2**  
**ABOUT ECONOMY**

4. Economy – Its Meaning and Types
5. Central Problems of an Economy
6. Basic Economic Activities







## 4



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## ECONOMY – ITS MEANING AND TYPES

The purpose of every economy is to satisfy human wants by using limited or scarce resources available and known to a society. These wants can be satisfied by production and consumption of goods and services. For production, the factors of production are engaged in some economic activities. These economic activities bring income to the economic agents that can either be consumed or saved and invested. On account of these gainful economic activities and accumulated earnings, some countries grow fast while others cannot attain such high growth rate. As a result some economies attain the status of developed economies while others remain underdeveloped or developing economies. They are also known as rich and poor economies. We can look at economies on the basis of ownership of resources. The resources available may be in private ownership or the collective ownership. Thus there are different ways to look at the economy and its level of development. In this lesson we will explain all these terms in simple way so that you may understand and differentiate the meaning and nature of an economy and understand its various types.



### OBJECTIVES

After completing this lesson, you will be able to:

- *explain the meaning of an economy;*
- *differentiate between various types of economic organizations on the basis of ownership and control of resources as well as on the basis of level of development;*
- *understand the meaning of economic development and economic growth;*
- *distinguish between economic development and economic growth;*
- *understand the important determinants of economic development.*



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## 4.1 MEANING OF AN ECONOMY

An economy is a man-made organization for the satisfaction of human wants. According to A.J. Brown, “An economy is a system by which people get living”. The way man attempts to get a living differs in major respects from time to time and from place to place. In primitive times ‘get a living’ was simple but with growth of civilization it has become much more complex. Here it is important to note that the way person earns his/her living must be legal and fair. Unfair and illegal means such as robbery, smuggling may earn income for oneself but should not be taken into consideration as gainful economic activity or a system of ‘get a living’. **It will therefore be appropriate to call that economy is a framework where all economic activities are carried out.**

**Some of the salient features of an economy are as follows:**

1. Economic institutions are man made. Thus an economy is what we make it.
2. Economic institutions can be created, destroyed, replaced or changed. For example the capitalism was replaced by communism in 1917 in USSR and the communism was destroyed in 1989 through a series of economic reforms by former USSR. In India after independence in 1947 through economic and social reforms we abolished Zamindari system and introduced many land reform.
3. Levels of economic activities keep on changing.
4. Producers and consumers are the same persons. Thus they have a dual role. As producers they work and produce certain goods and services and consume the same as consumers.
5. Production, consumption and investment are the vital processes of an economy.
6. In modern complex economies we use money as a medium, of exchange.
7. Now-a-days the government intervention in the economy is considered undesirable and the preference for free functioning of prices and market forces is increasing in all types of economic system.

## 4.2 TYPES OF ECONOMIES

As you know that economy is a man-made organization, which is created, destroyed or changed as per the requirement of the society. We can differentiate in various types of economic systems on the basis of following criteria.

### 4.2.1 On the Basis of Ownership and Control over Means of Production or Resources

Resources or means of production remain either in private ownership with full individual freedom to use them for the profit motive or they can be in collective ownership



(government control) and can be used for the collective welfare of the society as a whole. Based on the criterion of degree of individual freedom and profit motive, economies are labelled as:

- (A) Capitalist or free enterprise economy
- (B) Socialist or centrally planned economy
- (C) Mixed economy

Now we shall discuss about the main characteristics of these economics in brief.

### **(A) Capitalist Economy**

The capitalist or free enterprise economy is the oldest form of economy. Earlier economists supported the policy of 'laissez fair' meaning leave free. They advocated minimum government intervention in the economic activities. The following are the main features of a capitalist economy;

#### **(i) Private property**

In a capitalism system all the individuals have the right to own property. An individual can acquire property and use it for the benefit of his own family. There is no restriction on the ownership of land, machines, mines, factories and to earn profit and accumulate wealth. After the death of a person the property or wealth is transferred to the legal heirs. Thus the institution of private property is sustained over time by the right of inheritance.

#### **(ii) Freedom of enterprise**

In a capitalist economy the government does not coordinate production decisions of the citizens. Individuals are free to choose any occupation. Freedom of enterprise implies that business firms are free to acquire resources and use them in the production of any good or service. The firms are also free to sell their product in the markets of their choice. A worker is free to choose his/her employer. In small business units owner himself takes the risk of production and earns profit or loss for himself. But in modern corporations the shareholders take risks whereas paid directors manage business. Thus the individual supervision of one's own capital is now no longer required to earn profit. Government or any other agency does not impose restrictions/obstacles in the way of workers to enter or leave a particular industry. A worker chooses that occupation where his income is maximum.

#### **(iii) Consumer's Sovereignty**

In a capitalist economy consumers are like a king. They have the full freedom to spend their income on goods and services that give them maximum satisfaction. In capitalist system production is guided by consumer's choices. This freedom of consumers is called consumer's sovereignty.

**Notes****(iv) Profit Motive**

Self-interest is the guiding principle in capitalism. Entrepreneurs know that they will own the profit or loss after the payment to all other factors of production. Therefore they are always motivated to maximize their residual profit by minimizing cost and maximizing revenue. This makes the capitalist economy an efficient and self-regulated economy.

**(v) Competition**

There are no restrictions on the entry and exit of firms in a capitalism system. The large number of producers are available to supply a particular good or service and therefore no firm can earn more than normal profit. Competition is the fundamental feature of capitalist economy and essential to safeguard against consumer's exploitation. Although due to large-size and product distinction monopolistic tendencies have grown these days still the competition can be seen among a large number of firms.

**(vi) Importance of markets and prices**

The important features of capitalism like private property, freedom of choice, profit motive and competition make a room for free and efficient functioning of price mechanism. Capitalism is essentially a market economy where every commodity has a price. The forces of demand and supply in an industry determine this price. Firms which are able to adjust at a given price earn normal profit and those who fail to do so often quit the industry. A producer will produce those goods, which give him more profit.

**(vii) Absence of government interference**

In a free enterprise or capitalist economy the price system plays an important role of coordinating agent. Government intervention and support is not required. The role of government is to help in free and efficient functioning of the markets.

**Capitalism in today's world**

Pure capitalism is not seen in the world now-a-days. The economies of USA, UK, France, Netherland, Spain, Portugal, Australia ect. are known as capitalistic countries with active role of their respective government in economic development.

**(B) Socialist Economy**

In the socialist or centrally planned economies all the productive resources are owned and controlled by the government in the overall interest of the society. A central planning authority takes the decisions. The socialist economy has the following main features.

**(i) Collective Ownership of means of Production**

In a Socialist economy means of production are owned by the government on behalf of the people. The institution of private property is abolished and no individual is allowed to own any production unit and accumulate wealth and transfer it to their heirs. However, people may own some durable consumer goods for their personal use.



Notes

### (ii) Social Welfare Objective

The decisions are taken by the government at macro level with the objective of maximization of social welfare in mind rather than maximization of individual profit. The forces of demand and supply do not play any important role. Careful decisions are taken with the welfare objectives in mind.

### (iii) Central Planning

Economic planning is an essential feature of a socialist economy. The Central Planning Authority keeping the national priorities and availability of resources in mind allocates resources. Government takes all economic decisions regarding production, consumption and investment keeping in mind the present and future needs. The planning authorities fix targets for various sectors and ensure efficient utilization of resources.

### (iv) Reduction in Inequalities

The institutions of private property and inheritance are at the root of inequalities of income and wealth in a capitalist economy. By abolishing these twin institutions a socialist economic system is able to reduce the inequalities of incomes. It is important to note that perfect equality in income and wealth is neither desirable nor practicable.

### (v) No class conflict

In capitalist economy the interests of the workers and management are different. Both of them want to maximize their own individual profit or earnings. This results in class conflict in capitalist economy. In socialism there is no competition among classes. Every person is a worker so there is no class conflict. All are co-workers.

### Socialism in today's world

Countries such as Russia, China and many eastern European countries are said to be socialist countries. But they are changing now and encouraging liberalisation in their countries for their economic development.

### (C) Mixed Economy

A mixed economy combines the best features of capitalism and socialism. Thus mixed economy has some elements of both free enterprise or capitalist economy as well as a government controlled socialist economy. The public and private sectors co-exist in mixed economies. The main characteristics of a mixed economy are as follows:

#### (i) Co-existence of public and private sectors.

The private sector consists of production units that are owned privately and work on the basis of profit motive. The public sector consists of production units owned by the government and works on the basis of social welfare. The areas of economic activities of each sector are generally demarcated. Government uses its various policies e.g. licensing policy, taxation policy, price policy, monetary policy and fiscal policy to control and regulate the private sector.



### Notes

#### (ii) Individual Freedom

Individuals take up economic activities to maximize their personal income. They are free to choose any occupation and consume as per their choice. But producers are not given the freedom to exploit consumers and labourers. Government puts some restrictions keeping in mind the welfare of the people. For instance, government may put restrictions on the production and consumption of harmful goods. But within rules, regulations and restrictions imposed by the government, for the welfare of the society the private sector enjoys complete freedom.

#### (iii) Economic Planning

The government prepares long-term plans and decides the roles to be played by the private and public sectors in the development of the economy. The public sector is under direct control of the government as such production targets and plans are formulated for them directly. The private sector is provided encouragement, incentives, support and subsidies to work as per national priorities.

#### (iv) Price Mechanism

Prices play a significant role in the allocation of resources. For some sectors the policy of administered prices is adopted. Government also provides price subsidies to help the target group. The aim of the government is to maximize the welfare of the masses. For those who can not afford to purchase the goods at market prices, government makes the goods available either free of cost or at below market (subsidized) prices.

Thus in a mixed economy people at large enjoy individual freedom and government support to protect the interests of weaker sections of the society.

Indian economy is considered a mixed economy as it has well defined areas for functioning of public and private sectors and economic planning. Even countries such as USA, UK, etc. which were known as capitalistic countries are also called mixed economies now because of active role of their government in economic development.



### INTEXT QUESTIONS 4.1

1. Which of the following statements are True or False?
  - (i) On the basis of ownership of resources we can classify an economy as Rich economy and Poor economy.
  - (ii) Socialisteconomy aims at maximization of social welfare.
  - (iii) Freedom of choice, profit maximization and private property are the characteristics of a Socialist economy.
  - (iv) In a mixed economy public and private sectors co exist.
2. Fill in the blanks with appropriate words given in the bracket.
  - (i) Price mechanism plays ..... role in capitalist or free market economy (the most important/a very limited)





**Notes**

- (ii) The freedom of choice is called ..... in capitalist economy (consumers sovereignty/consumer surplus)
  - (iii) The socialist economies are ..... economies. (centrally planned decentralized)
  - (iv) People can accumulate wealth and transfer it to their legal heirs in ..... economy. (capitalist/socialist)
  - (v) Public sector and private sector ..... in a mixed economy (co-exist/does not exist)
3. Classify the following characteristics of different types of economies and put them in appropriate boxes.

Profit motive, central planning, consumer sovereignty, public and private sector, laws of inheritance, social welfare, government regulations, subsidy, competition, price mechanism, inequalities, no class conflict, economic planning and limited freedom of choice.

Capitalist Economy	Socialist Economy	Mixed Economy
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#### 4.2.2 Types of Economics on the Basis of Level of Development

On the basis of level of development economies can be classified in two categories:

- (i) Developed economy
- (ii) Developing economy

The countries are labeled developed or rich and developing or poor on the basis of real national and per capita income and standard of living of its population. Developed countries have higher national and per-capita income, high rate of capital formation i.e. high savings and investment. They have highly educated human resources, better civic facilities, health and sanitation facilities, low birth rate, low death rate, low infant mortality, developed industrial and social infrastructures and a strong financial and capital market. In short, developed countries have high standard of living.

Developing countries are low on the ladder of development. They are sometimes also called underdeveloped, backward or poor countries. But economists prefer to call them developing countries because it gives a sense of dynamism. The national and per capita income is low in these countries. They have backward agricultural and industrial sectors with low savings, investment and capital formation. Although these countries have export earnings but generally they export primary agricultural products. In short, they have low standard of living and poor health and sanitation, high infant mortality, high birth

**Notes**

and death rates and poor infrastructure. Thus economic development depends on many factors and has different meanings. Although you have already read, it will be useful to discuss again the meaning of economic development, its determinants and the difference between the terms economic development and economic growth in the context of present lesson.

### **4.3 MEANING OF ECONOMIC DEVELOPMENT**

Economic growth, as distinguished from economic development, is a sustained increase in national income. Taking the differences in population into consideration, it is reflected in the growth of per-capita income (i.e. national income ÷ total population).

Although there may be year-to-year fluctuations or short-term variations in the growth of national income, there has to be a continuous growth in national income in the long-run for it to qualify as economic growth.

Economic development, on the other hand, includes not only economic growth but also various other economic changes that improve the quality of life or standard of living of people in a country. If with economic growth, a country experiences various economic changes such as reduction in poverty and unemployment, reduction in income and wealth inequality, increase in literacy rate, improvement in health and hygiene, decrease in population growth, improvement in environmental standards etc, that improve the quality of life then that is economic development. Such economic changes that are conducive to improvements in standards of living of people are necessary for economic development. Otherwise, people's standard of living may not improve in spite of economic growth. It may happen that with economic growth, the rich get richer while the poor get poorer if the fruits of growth are snatched by the richer sections of the society. Clearly, economic development is a much broader concept than economic growth. It not only includes economic growth but also various other economic changes that bring about improvement in the standard of living of people or quality of life.

### **4.4 DETERMINANTS OF ECONOMIC DEVELOPMENT**

The process of economic development is influenced by a number of economic as well as non-economic factors.

The important economic factors are as follows:

- (i) **Natural Resources:** The availability of natural resources facilitate and accelerate economic growth and economic development. It is believed that quality and quantity of natural resources affect the rate of growth.
- (ii) **Human Resources:** Another important determinant of economic development is the quantity and quality of human resources or the population. Other things being





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equal, educated and technically qualified manpower helps in achieving higher growth rate. On the other hand illiterate and unskilled population retards economic growth.

- (iii) **Capital Formation:** Stock of capital goods is crucial for rapid economic growth. For increasing the stock of capital, rate of savings must be high. The savings must be invested. Given the rate of savings and investment the rate of growth will depend upon capital output ratio. If the domestic savings are not sufficient government can seek external assistance to increase capital formation and growth rate in developing countries.
- (iv) **Technology:** Technology can play an important role in the economic development. Technological progress depends upon continuous research and development. Through technological progress a nation may overcome other constraints such as scarcity of natural resources and low productivity. Developed economies invest in its human capital.

Besides these economic factors many other non-economic factors such as (i) caste system, (ii) family type, (iii) racial factors, and (iv) government policies also affect the rate of growth and economic development. It is very difficult to measure economic development and to give one index of economic development. The most commonly used index of economic development i.e. increase in per capita income suffers from a serious drawback. This index does not take into account the consumption of natural resources and environmental degradation such as the smoke from the industries or the pollution caused by various industrial waste and by-products in the air and water resources. The cutting of forest and selling of timber will earn income and will be considered an economic activity and the income added in the national income statistics but the harm caused by deforestation will not be shown as a negative entry in the national accounts statistics. The economist therefore are seriously working on preparation of some new index that may account for these environment costs to the society and can be used as a welfare index of the society.

## 4.5 DISTINCTION BETWEEN ECONOMIC DEVELOPMENT AND ECONOMIC GROWTH

Economic growth is a short-term measure and generally refers to year to year rise in national and per capita income in real terms. But the income index does not take into account the distributional aspects of national income. Another important thing is that income approach does not take into account the unproductive and dysfunction growth and productive and socially useful growth. Economic development on the other hand is a long term measure over a long period. The economic development refers to overall rise in standard of living and a better quality of life. Besides income index some non-income indices are also taken into account. These are high life expectancy at birth, low

**Notes**

infant mortality and high rate of literacy. An improvement in these non-income indices imply that the quality of life has also improved. Some important institutions like UNESCO and ILO include the basic needs approach such as availability of food, clothing and shelter, availability of drinking water, sanitation and public transport facilities good health and education as an index of economic development. The objective of development, therefore, is meeting the needs of the vast masses of population. The United Nations Development Programmes emphasizes on Human Development Index (HDI) that is based on per capita income, educational attainment and life expectancy. Thus it is a composite index of economic and social indicators. The economic development, therefore, is a much wider term to capture over all improvement in the quality of life of people.

**INTEXT QUESTIONS 4.2**

Answer the following questions.

1. What are the two categories of economy on the basis of level of development?
2. Give simple meaning of economic development.
3. Give economic factors of determinants of development.
4. What are the non-economic factors affecting development?
5. What is the serious drawback in income approach to development?
6. Distinguish between economic growth and economic development.
7. How is capital formation important for economic growth?

**WHAT YOU HAVE LEARNT**

- In this lesson we have learnt the meaning of an economy. It is a system of socially and legally acceptable ways by which people get a living. An economy is also looked at as a system of cooperation for the satisfaction of human wants.
- In a modern complex economy, the cooperation exists in the form ‘you do this for me and I will do that for you is not enough’. The cooperation can be seen across national boundaries. Thus economy can be seen as a system of mutual cooperation and exchanges.
- Economy can be classified into the following three categories on the basis of ownership and control over means of production.

**Notes**

- (i) Capitalist Economy
  - (ii) Socialist Economy
  - (iii) Mixed Economy
- Economy can be classified into the following two categories on the basis of level of development:
    - (i) Developed Economy
    - (ii) Developing Economy
  - Capitalist Economy gives much importance to individual freedom and competition. Consumers behave like a king and play a significant role in the allocation of resources through price system, profit motive and markets.
  - Socialist Economy gives too much importance to collective ownership, society's welfare and economic planning. The inequalities are reduced and class conflict is avoided.
  - Mixed economy gives importance to the merits of both the systems. Here public and private sectors coexist. Public sector works on the basis of socialist economy whereas the private sector works on the basis of capitalist economy.
  - Developed rich countries have higher per capita income and better standard of living and quality of life.
  - Underdeveloped or poor countries on the other hand have low income, savings and investment and therefore they have poor standard of living.
  - The process of economic development is determined by number of economic and non-economic factors.
  - There is a difference between development and economic growth. Generally economic growth refers to short-run improvements in a few selected sectors and variables. The economic development on the other hand refers to long run increase in national and per capita income along with many other non-economy factors that improve overall quality of life.

**TERMINAL EXERCISE**

1. What is meant by an economy? Give the major characteristics of a capitalist economy.
2. "Economy is a system of mutual cooperation and exchanges." Discuss.



3. Explain the types of economy on the basis of ownership and control over means of production.
4. Distinguishes between economic development and economic growth.
5. What are the main determinants of economic development?



## ANSWERS TO INTEXT QUESTIONS

### Intext Questions 4.1

1. (i) False      (ii) True      (iii) False      (iv) True
2. (i) the most important      (ii) Consumer's sovereignty      (iii) centrally planned  
(iv) Capitalist      (v) Co-exist
3. Classify the following characteristics

Capitalist Economy	Socialist Economy	Mixed Economy
Profitmotive	Central Planning	Public and Private Sector
Consumer Sovereignty	Social welfare	Government Regulations
Law of inheritance	No class Conflict	Economic planning
Competition		Subsidy, Economic planning
Price mechanism		Limited freedom of choice
Inequalities		

### Intext Questions 4.2

1. Developed Economy and Developing Economy
2. Economic development is a process by which an economy's real national income increases over a long period of time.
3. Natural Resources, Human Resources, Capital Formation, Technology.
4. Caste system, family type, racial
5. It does not take into account the environmental costs and resource depletion.
6. Economic growth is a short term improvement in real income whereas economic development is long run increase in real income plus improvement in overall standard of living and quality of life.
7. Capital formation determines the growth rate given the capital output ratio.



5



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## CENTRAL PROBLEMS OF AN ECONOMY

As you are aware, we have multiple wants but only limited resources to fulfill them. We need different goods and services to satisfy different wants. But due to scarcity of resources, we cannot produce all the different types of goods and services for everybody in the economy at the same time. Also due to scarcity, we cannot afford to waste the resources. So every economy must find solutions to these problems.



### OBJECTIVES

After completing this lesson, you will be able to:

- *understand about the need to make a choice;*
- *know that scarce resources have alternative uses;*
- *be familiar with central problems of an economy;*
- *understand resource allocation in different types of economies;*
- *explain relationship between growth of economy and growth of resources.*

### 5.1 SCARCITY AND CHOICE

Suppose you want to buy a shirt, a book and a gift for your friend. You also want to watch a movie in a cinema hall. These are a number of wants which are to be satisfied. But you have only Rs.110 with you. Supposing a shirt is available at Rs.150, a book is worth Rs.95, a gift costs Rs. 90 and a movie ticket can be purchased at Rs.100. So together all of them will cost you Rs.435 which you do not have. Obviously, you cannot purchase all the things since you have limited money or resource with you. What will you do? With Rs.110, you cannot buy a shirt as its price is more than the money you have. But you can think of buying either a book



or a gift or a movie ticket. Here you have to make a choice about which one of these things you want to buy.

Why does the problem of choice arise? If you had a magic wand or a magic lamp, you could have had everything to satisfy your wants and the problem of making a choice would not arise. This is an ideal situation, which can never happen. You have only Rs.110 and not Rs.435 which implies that the resources (money in this case) with you are limited or scarce. Since you can buy only one item with your scarce resource, you face the problem of deciding exactly what good is to be bought to satisfy your want. While making a choice as to which one to buy, notice another important thing. That is, resources can be put into alternative uses. How? Even if you cannot buy all of them, you can buy a book or a gift or a movie ticket. So resources can be put to alternative uses.

Similarly, the economy also has to decide what goods and services are to be produced and how resources are to be used. **Thus the issue of 'choice' arises because a) the resources are scarce and b) the resources can be put to many alternative uses.**



### INTEXT QUESTIONS 5.1

1. What can be the alternative uses of the following items?
  - (a) A bus
  - (b) A room
  - (c) A building
  - (d) A computer

## 5.2 CENTRAL PROBLEMS OF AN ECONOMY

We may enlist three major problems facing any economy. These are

1. Problem of Allocation of Resources
2. Problem of Utilization of Resources
3. Problem of Growth of Resources

Let us discuss these issues one by one.

### 5.2.1 Allocation of Resources

An economy also confronts three fundamental economic problems:

1. What goods and services shall be produced and in what quantities?



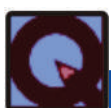
Notes

2. *How* shall goods and services be produced?
3. *For Whom* goods and services are to be produced?

*What* goods and services shall be produced and in what quantities? Every society may face similar problem of choice; however the priorities may be different. In less developed economies the choice may be between production of food crops and manufacture of bicycles. In advanced economies the choice may be between building more shopping malls or producing more cars.

*How* shall goods and services be produced? It is related to the method by which these are to be produced? Once the goods to be produced are decided, there is a problem of how to produce them. What tools are needed, how much land and how many workers are needed. There are many different ways of making things. For example, clothes can be produced by employing more labour and less machines or more machines and less labour. If goods and services are produced by employing more of labour and less of capital, it is known as labour intensive method of production. If goods and services are produced by employing more of capital (machinery etc.), it is called capital intensive method of production.

*For Whom* goods and services are to be produced? Who is to enjoy and get the benefit of the goods and services produced? It is not possible to satisfy everyone's want due to scarcity, so it must be decided to whose wants are to be satisfied. Should the economy produce more of food crops or more of computers? Whose needs are to be addressed, the poorer people or the richer people? Should everybody get equal share of the total goods and services produced, even if some people may need more than others? All these decisions refer to the distribution of income and wealth in the society.



### INTEXT QUESTIONS 5.2

1. Give one reason which gives rise to economic problems?
2. Name the three central problems of an economy.

#### 5.2.1.1 Resource Allocation in a Capitalist Economy

Capitalist economy is an economic system in which factors of production are privately owned and goods and services are produced with the objective of earning maximum profit. In a capitalist (market-oriented) economy, there is no central authority to guide the choice of goods and services. The production is in the hands of individuals - farmers, manufacturers, producers, service providers and others. The resources like land, labour, capital etc. are owned privately by people. All these individuals produce for the market and are guided by profit motive. They produce only those goods which





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are demanded by the consumers. They try to produce the goods in the cheapest possible way so that they can earn maximum profits. These individual producers will try to move their resources away from producing things which people do not buy, towards the production of goods which people like to buy. The products are meant for the people who demand such products and can afford to buy these.

Rajan is a businessman who produces shirts. He realized that a lot of his shirts remain unsold. He also observed that young boys and girls are wearing t-shirts these days. These young people are willing to spend money now-a-days on t-shirts rather than shirts. As Rajan's profit has started falling, he decides to produce t-shirts, instead of shirts. As his resources are limited, he diverts his resources to the production of t-shirts to satisfy the demands of the young people. Rajan now can produce the t-shirts by employing 2 sewing machines and all his 10 workers. By this process, each t-shirt will cost him Rs. 100/. Another option for Rajan is to produce t-shirts by using 5 machines and only 8 workers, in which case the t-shirt will cost Rs.125/. Rajan will choose the first and cheapest method because he wants to make as much profit as he can by selling his t-shirts. Now Rajan's t-shirts are very popular among the youngsters. He earns higher profits now than what he was earning when he produced shirts. The young people who can afford to pay Rs.100/ are all wearing the t-shirts produced by Rajan.

Thus, the important characteristics of a capitalist economic system are given below:

- Only those goods and services are produced which the consumers want.
- Maximum quantity of goods are produced at the minimum cost per unit.
- Goods and services are produced for everyone who can pay for them.

### 5.2.1.2 Resource Allocation in a Planned Economic System

In a planned economic system, there is a central planning authority of the government which decides what to produce, how to produce and for whom to produce. The planning authority sets the production targets. The government sets the goals and the firms try to meet the goals. When there is an agreement on the targets, the firms start the production. It is unlike the market economies, where people who have money can satisfy their wants and people who do not have money cannot afford to buy things to satisfy their wants. In a planned system, the government wants everybody to be equal. They produce the goods which everybody needs and can be shared equally by everyone. It is not that people who can afford can have more. At least in case of services like health and education, roads and housing, everyone should get equal opportunity, irrespective of their affordability. Thus in case of planned economies, the government decides to produce the goods and services which it thinks people should have and not what people think they should have. Thus, the government produces goods and services to satisfy the wants of masses.

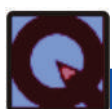




As the government determines the production of various goods and their quantities, it is possible that the government produces more scooters and tractors whereas the consumers demand car. Regarding how to produce, the central planning authority may not be able to calculate the cost of so many things and there is a danger that resources are not allocated in an ideal manner. A socialist economy solves the problem of whom to produce on the basis of basic needs of people like food, clothing and shelter are sought to be satisfied. Everyone is treated alike and no one gets precedence over the other. It is however said that planned economic system does not allocate the resources in the most ideal manner as it is not based on the choice and preference of people. It is based on the decision of government. However, the system is based on the principle of social welfare.

### 5.2.1.3 Resource Allocation in a mixed economy

A mixed economic system combines government planning with the free market economy. No economy in the world is totally centrally planned or totally market-oriented. Most of the economies today are mixed economies. In the mixed economic system the choice of goods and services to be produced by the private sector depends on the basis of profit motive. The choice of goods and services to be produced by the government depends on the basis of needs and requirements of the people. It combines the efficiency of production with the justice of distribution; the government owns scarce resources to produce goods and services that they think their country and people need. People and firms in the private sector also own some scarce resources with the aim of making as much money as possible. Thus, mixed economic system attempts to combine the advantages of the market economic system with the advantages of the planned economic system.



### INTEXT QUESTIONS 5.3

1. What is the main aim of producing goods and services:
  - (a) In a market economy
  - (b) In a planned economy
2. For whom are the goods are produced in a market economy?

We have discussed that total resources are limited and the resources are capable of producing different commodities. In deciding what to produce and how much, the economy has to take decisions regarding allocation of resources among thousands of different possible commodities. Let us assume that the economy is producing only two commodities, wheat and bicycles. With the limitation of the total resources, if all the resources are utilized in the production of wheat, 20 quintals of wheat can be produced and no production of bicycle will take place. If more and more resources



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are being diverted towards the production of bicycles, little amount will be left for the production of wheat. Similarly if all the resources are being used in the production of bicycles, 100 bicycles can be produced and no resources will be left for the production of wheat.

**Table1: Production Possibilities**

Production Possibilities	Wheat (quintals)	Bicycles
A	20	0
B	8	30
C	5	60
D	2	75
E	0	100

The above table shows an example of some of the production possibilities of different combinations of two goods, wheat and bicycles. There are only five possibilities. There can be many more possibilities. If some amount of wheat is given up, we can have more of the bicycles; if some bicycles are given up, more of wheat can be produced. Therefore the scarce resources are employed in various combinations to get alternative production possibilities.

### 5.2.2 Full Utilisation of Resources

The other central problem of an economy relates to full utilisation of resources- land, labour, capital. You have seen that you can have more of bicycles by sacrificing some amount of wheat. If all the resources in the economy are fully employed, then the quantity of one commodity can be increased only by forgoing some quantity of the other. This happens when production takes place efficiently. But in reality, most of the time production does not take place efficiently. The factors are not fully employed and the production is below the optimum capacity of economy. You must have seen some of your family members or friends who are unemployed despite being educated. Similarly in our agricultural land we still grow only one crop in a year. This is not a good sign, as the resources are already scarce. If these scarce resources are also not utilized fully, it is wastage of resources. Thus it is the duty of an economy to ensure that the scarce resources do not remain unutilized or under-utilised.

### 5.2.3 Growth of Resources

If resources like labour, capital and technology grow over a period of time, the problem of scarcity can be addressed. Thus, for the growth of any economy, the

resources available to the economy should grow. It is only through the effective growth of resources that a society can enjoy a higher standard of living. This is how the countries have developed. If the resources have failed to grow, the countries continue to be underdeveloped. Thus, the economies should make efforts so that their resources grow gradually to meet the growing needs.

**INTEXT QUESTIONS 5.4**

1. Give one example of under utilization of resources.
2. Give two examples of growth of resources.

**WHAT HAVE YOU LEARNT**

- The issue of 'choice' arises, because a) the resources are scarce and b) the resources can be put to many alternative uses.
- An economy confronts three fundamental economic problems, **what** goods and services to produce, **how** to produce and **for whom** to produce.
- Capitalist economy is an economic system in which factors of production are privately owned and goods and services are produced with the objective of earning maximum profit.
- In a planned economic system, there is a central planning authority of the government which decides what to produce, how to produce and for whom to produce.
- A mixed economic system combines government planning with the free market economy.
- For the growth of any economy, the resources available to the economy like labour, capital and technology should grow.
- If all the resources in the economy are fully employed, then the quantity of one commodity can be increased only by forgoing the quantity of other. This happens when production takes places efficiently.
- If the scarce resources are also not utilized fully, it is wastage of resources. Thus it is the duty of an economy to ensure that the scarce resources do not remain unutilized or under-utilised.

**Notes**

**Notes****TERMINAL EXERCISE**

Choose the write answers in Q1 and Q2

1. Central problem of an economy arise, because:
  - I. Many goods are sold in market
  - II. Government makes decisions
  - III. Shortage of labour
  - IV. Multiplicity of wants and scarcity of resources
2. Choice is fundamental to economic behavior, because:
  - I. People find it difficult to choose what they want
  - II. Resources are scarce in relation to people's wants
  - III. People behave rationally
  - IV. Price of a commodity depends on choice
3. Explain how scarcity and choice go together?
4. Why it is said that free market economy ensures most efficient allocation of resources?
5. Explain the three central problems with one suitable example of each.

**ANSWERS TO INTEXT QUESTIONS****Intext Question 5.2**

1. Scarcity of resources.
2. (i) what to produce, (ii) how to produce, (iii) for whom to produce.

**Intext Questions 5.3**

1. (i) Profit motive.  
(ii) To satisfy the wants of masses.
2. Who can pay for it?

**Intext Questions 5.4**

1. Unemployment of labour.
2. Increase in the number of skilled and unskilled workers through population growth.



## 6



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## BASIC ECONOMIC ACTIVITIES

Production, consumption and capital formation are called the basic economic activities of an economy. Scarce resources are used in the production of goods and services with the objective of satisfying our needs and wants. The process of production of goods and services is carried by combining the factors like land, labour, capital and entrepreneurship. Factors are paid rent, wages, interest and profits for their productive services. The consumption activity consists of the use of goods and services for the direct satisfaction of individual or collective human wants. A part of current production is saved for future to add to existing capital stock like, plant, machinery, building etc. every year in order to expand production potential in future. So whatever is produced is disposed of either for consumption or for capital formation or both.



### OBJECTIVES

After completing this lesson, you will be able to:

- *understand production and its goals;*
- *know the factors of production and factor incomes;*
- *know about consumption;*
- *be familiar with the goods produced for consumption;*
- *understand how production and consumption help in capital formation;*
- *explain circular flow of economic activities.*

### 6.1 PRODUCTION

In the last lesson you have read about scarcity of resources and making choice. These scarce resources are used in the production of goods and services. The goal of



## Notes

production is to satisfy our wants. These goods and services produced can be sold in markets or can be provided by the government to public at nominal charge. Therefore Production is defined as creation of utility.

Production activities involve making of goods and services. People who make and sell these goods and services are known as producers. The producers combine the factors like land, labour, capital and entrepreneurship along with raw materials in order to transform them into various goods and services. **Land, labour, capital and entrepreneurship are called the factors of production.** The producers try to produce maximum amount of goods and services by using various combination of factors of production. Let us know more about these factors of production.

### 6.1.1 Land

Land is a gift of nature. It includes plain region, mountains and plateau region. The plain region is useful for agriculture and industrial activities. Mountains ensure flow of rivers into the plain region and provide facilities for tourism. Plateau region possesses reserves of minerals, fossil fuels and forests. Production of food grains, vegetables, fruits etc require agricultural land in the plain region. Along with this people also carry out animal husbandry, fisheries and forestry which are called allied activities. In India rural area is known for carrying out agricultural and allied activities. Some amount of land in the plain region is specially developed to establish industries and urban areas such as towns and cities.

### 6.1.2 Labour

In general labour implies the human effort through physical and mental exertions in the production of goods and services. A person working on the agricultural field is said to provide his physical labour while a writer of a book is said to provide his mental labour. People who provide labour are known as human resources. Production activities require both skilled and unskilled labour. Purely physical labour such as loading and unloading, ploughing on the field etc do not require special skill. But to become an engineer, doctor, teacher, lawyer, mechanic, electrician or tailor etc one must acquire skill through education and training.

### 6.1.3 Capital

By **capital**, we mean all man made appliances and all types of wealth used in production. Capital consists of machinery, tools, buildings, materials etc. Whereas land is a natural resource, capital is a man made resource. Capital is used to increase the efficiency of other factors of production like land or labour. The efficiency of land can be increased by use of better irrigation facilities and machines. However, capital is a passive factor of production and cannot be used without employing labour to work. Capital has a limited span of life, and becomes obsolete after a certain period. Small tools like, screwdrivers, calculators to heavy machines like engines, tractors,

ships are all examples of **fixed capital**, as they can be used in production for many years. Fixed capital also includes the buildings and heavy machines. The **working capital** includes raw materials like cotton yarn, clay, seeds, fertilizers, which are used-up in the process of production.

#### 6.1.4 Entrepreneurship

Somebody must take the initiative to start the process of production of goods or services by bringing land, labour and capital together in right proportion. He will be responsible for choosing the right type of land, labour and capital and take important decisions with respect to quantity to be produced, money to be spent to buy the factors and raw materials, marketing the output produced etc. **Entrepreneurship** is the art of organizing the production activity. The person who makes the decisions and controls the production process and bears the risks and uncertainties involved in production is called an **entrepreneur**. He/She should be knowledgeable, courageous and should possess leadership qualities. The objective of an entrepreneur is to get maximum production by using the given resources and make arrangements for the sale of the finished products. He/she is also responsible to make payments to other factors of production.

He/she pays wages to the labourers, rent to the landlords and interest to the owner of capital in return for their productive services. Similarly, they earn profit for their productive activity. **Since these payments, rent, wages, interest and profits are received by the factors for their productive services, they are termed as factor incomes.**



#### INTEXT QUESTIONS 6.1

- Below is a list of some of the factors that are used to produce shirts. Group them into **natural resources**, **human resources**, **fixed capital** and **working capital**

*Yarn, machinery, tailors, land for factory, wooden doors, colour, dye, building, sewing machines, telephones, marketing managers, advertising managers, packaging machines, scissors, buttons, bank loans, cash money*

- Which one of the following is not a characteristic of land:
  - Mobile
  - Gift of nature
  - Limited in quantity
  - Indestructible



Notes





## Notes

## 6.2 FACTOR INCOMES

These factors of production are owned by people. Land is owned by the landlord, labour is owned by labourer, capital is owned by people who acquire capital goods, entrepreneurship is owned by the entrepreneur. The owners of factors of production are paid in return for their productive services. When you hire a piece of land, you pay rent to the landlord for using the services of land. Thus the tenant pays rent for the services of land. Labour refers to the services rendered by the workers. It refers to the all types of workers, manual labour, technical workers and so on. When an employer requires the services rendered by a worker, he/she is ready to pay for his services. By hiring a worker, actually his services are hired. When a loan is taken from a bank to buy a tractor, seeds, machinery etc. interest is paid to bank. Thus, rent is paid to the landlords, wages to the labourers, interest to the owners of capital resources and profit to the entrepreneurs. Since they are paid in return to their productive services, they are called factor payments and their incomes are called factor incomes.



### INTEXT QUESTIONS 6.2

Ram Singh is farmer in a village of Haryana, who owns 2 hectares of land. Both, he and his wife Rani, work in the field. Earlier, they only grew paddy on their land. Now they want to increase the productivity of their land by growing two crops and better variety of seeds and irrigation. They want to grow two crops, paddy and potatoes. For this they need money to buy good quality seeds and fertilizers. As they do not have enough money, both work in other's farms as labourer. They spend some money on the fertilizers, seeds, pump sets etc. After working very hard, they manage to have a good crop of both paddy and potato. They keep some paddy and potato grown in their farm for their personal use and sell the rest. They earn Rs. 12,000 by selling their crops.

- Identify the factors of production in this story?
- What are the capital goods used in this example?

## 6.3 CONSUMPTION

The objective of production is to produce goods and services for consumption. The consumption activity consists of the use of goods and services for the direct satisfaction of individual or collective human wants or needs. To satisfy their wants the households purchase a large variety of goods and services like cycles, furniture, television set, car, refrigerator, food grains, milk, oil, soap etc. and services like





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barber, teacher, doctor, bank and insurance companies etc. There is no time gap between the production and consumption of services. In case of services production and consumption take place simultaneously. They are consumed as soon as they are produced, such as the services of doctors, lawyers, teachers etc. As you visit a doctor to take medical advice, you consume his service. This is not the case with regard to goods. There is a time gap between the production and consumption of goods. Goods are considered to be consumed when they are purchased. However, certain durable goods like furniture, cycles etc. continue to provide services for many years, still they are considered to be consumed as soon as they are purchased.

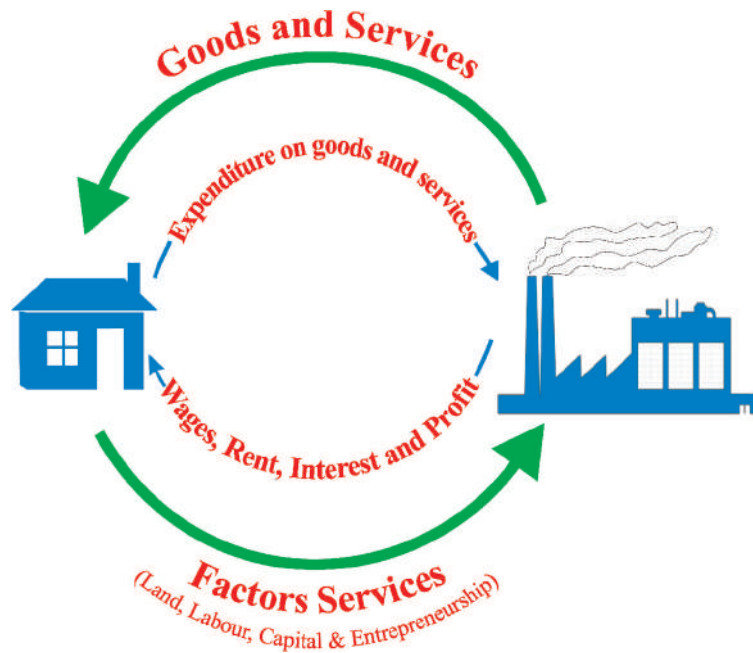
## 6.4 CAPITAL FORMATION

The third important activity of an economy is capital formation. As you have read, factor owners get factor incomes in return for their productive services. They spend a large part of their incomes on goods and services such as food articles, cloth, furniture, housing, bicycles, education, health care etc. However, they do not spend their entire income on these goods and services. They also save some income and deposit it in bank for future. For example, if an individual has an income of Rs. 500/ all of which she consumes, there is no saving. Instead if she restricts her consumption to Rs.300/, she saves Rs.200/ and may use this money to deposit in bank for future use. The bank, in turn, may use this money to lend an industrialist to invest in the expansion of his business. Capital formation is done by refraining from present consumption. It should be noted that saving, if kept idle, cannot constitute capital formation. If a person saves money and locks up in the house, no capital formation takes place. If only the saved money is invested in capital goods it leads to capital formation by facilitating production and consumption in future. Thus, current consumption is forgone and used towards adding to existing capital stock like, plant, machinery, building etc. every year in order to expand production potential in future. This increase in the stock of capital goods in a year is called capital formation or investment. Similarly, a part of nation's output is devoted not to immediate satisfaction of consumer wants but to the provision of plants and equipments by which production is maintained and expanded. To sum up, whatever is produced is disposed of either for consumption or for capital formation or both.

These three activities, production, consumption and capital formation are inter-related. An increase in the production of goods and services increases the level of consumption and capital formation. Increase in consumption is an indicator of rising standard of living of people and increase in capital formation is very important as the growth of the country depends on it. More consumption is possible if there is more production and more production is possible if there is more capital formation. Thus, the three economic activities have their impact on one-another to take the economy forward to the path of development.



Notes



Circular Flow Chart



## INTEXT QUESTIONS: 6.3

1. Give two examples of durable goods, non-durable goods and services.
2. There is an excess of production over consumption in a year. Where does it go?
3. How does production facilitate consumption and capital formation?



## WHAT HAVE YOU LEARNT

- Production, consumption and capital formation are three basic economic activities.
- Production is defined as creation of utility.
- Land, labour, capital and entrepreneurship are four factors of production.
- Wages, interest, rent and profits are the factor payments made by the firm to the owners of factors of production. For the owners of the factor services the same are called factor incomes.
- Consumption means using up of goods and services for direct satisfaction of individual and collective wants.
- Capital formation is the surplus of production over consumption over a period of time.

**TERMINAL EXERCISE****Notes**

1. An agricultural land is a fixed resource. How can its productivity be increased?
2. How can the productivity of labour be increased?
3. What are the main functions of an entrepreneur?
4. How does capital add to the productivity of labour?
5. If there is an excess of production over consumption in a year, where does it go? Also mention two goods which help in capital formation in an economy.
6. Mention the three important economic activities and show their inter-relationship diagrammatically.
7. Purchase of a cycle by a household is treated as:
  - (a) Capital formation
  - (b) Production by household
  - (c) Consumption
  - (d) Production for self consumption
8. Which of the following statements are true or false:
  - (a) Capital formation increases the capital of a country.
  - (b) Growing vegetables in the kitchen garden is not a part of production.
  - (c) A farmer producing wheat for self consumption is a part of production.
  - (d) A teacher teaching in school is production.
  - (e) A student using stationery is production.
  - (f) Digging a well by the members of a family in their own field is a part of capital formation.
  - (g) A truck transporting wheat from a village to the market in the nearby town is a part of production.
9. Fill in the blanks:
  - (a) Roads constructed by the government are ..... (production/ capital formation).
  - (b) Purchase of a tractor by a farmer is a part of ..... (production/ consumption).



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- (c) A new house purchased by an individual is .....(consumption/production).
- (d) A doctor seeing a patient is ..... (production/consumption).
- (e) A student studying in a school is ..... (production/consumption).



## ANSWERS TO INTEXT QUESTIONS

### Intext Questions 6.1

1. Natural resources – Land for factory

Human resources – Tailors, Marketing managers, Advertising managers.

Fixed capital – Machinery, wooden doors, buildings, sewing machines, telephones, packaging machines, and scissors.

Working capital- yarn, dye, buttons, bank loan, cash money.

2. a.

### Intext Questions 6.3

1. Durable goods: Television, refrigerator, washing machine etc.

Non-durable goods: Bread, butter, milk, flour.

Services: Barber's services, services of teacher, services of a doctor.

2. It goes to capital formation.
3. An increase in production of goods and services increases the level of consumption and capital formation. More consumption is possible only when there is more production and more capital formation is possible only when production is more than consumption.

**MODULE-3**  
**PRODUCING GOODS AND SERVICES**

- 7. Production
- 8. Cost and Revenue





## 7



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# PRODUCTION

In order to satisfy our wants we have to produce various types of goods and services. The production of goods takes place in agricultural fields, factories, firms, industries and production of services takes place in shops, offices, hospitals, schools, colleges, hotels, banks and at many other places. In an economy, there may be lakhs of production units which produce goods and services. Production is the result of the combined efforts of the four factors of production - land, labour, capital and entrepreneurship. These are also called inputs or resources. The relationship between inputs and output holds the key to optimum use of resources, producing maximum level of output possible and increasing the level of output etc.



## OBJECTIVES

After completing this lesson, you will be able to:

- *explain the concept of production function;*
- *analyse different techniques or methods used to produce goods and services;*
- *explain the terms, total product, average product and marginal product;*
- *know the law of diminishing marginal product;*
- *explain production process and organization of production activity;*
- *understand the role of factors of production;*
- *explain the role and importance of firms and industry;*
- *identify various types of producers in the economy.*

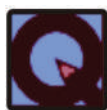
## 7.1 CONCEPT OF PRODUCTION FUNCTION

Production is defined as transformation of inputs into output. The resources used in production are called inputs and the goods and services produced are called output. For



example, for the production of an output called rice, we require inputs such as agricultural land, seeds, fertilizers, plough, water, pesticides, diesel to run tractor etc. All these inputs have to be combined in some prescribed amounts to produce some quantity of rice. **Production function tells us the technical relationship between inputs and output of a firm. It tells us the maximum quantity of output that can be produced with the help of given quantities of inputs.**

In short, the quantity of output is the function of inputs like land, labour, capital, entrepreneurship and required raw materials. There is a direct relationship between the amount of inputs and the amount of output produced. An increase in inputs leads to increase in output to certain extent and vice versa. The aim of every producer is to maximize the quantity of output from the given amount of inputs. The inputs must be combined in a particular manner for production of a particular type of output. Take the example of a tailoring shop. It requires a master who can cut the cloth as per measurement and one person for one stitching machine to stitch the cloth cut by the master to make shirt or pant etc. If work load is more then another machine and a person to work with it can be added. **Technology or method of production refers to the ratio in which inputs are combined to produce output.** So, the production function is also defined as ‘a technological relationship that tells us the maximum output producible from various combinations of inputs.’



### INTEXT QUESTIONS 7.1

1. Define inputs?
2. Define output?
3. Define production function?

### 7.2 DIFFERENT TECHNOLOGIES OF PRODUCTION

Goods and services can be produced in more than one way. For example, the production of cloth can be made either with the help of handloom or with the help of powerloom. The first one is labour intensive technology of production and the second one is capital intensive technology of production.

When a farmer makes use of wooden plough, bullocks etc. in the production of food grains he uses the labour intensive technology of production. On the other hand when he uses tractor, pumpset, harvester in the production of food grains, he uses capital intensive technology of production. In this way the technology of production can be of the following two types.

1. Labour Intensive Technology
2. Capital Intensive Technology





**Labour Intensive Technology:** When we make more use of labour and less use of capital per unit of output in the production of our commodity that is called labour intensive technology. This type of technology is used in household enterprises and in the enterprises which make production for self consumption or in case of small scale production.

**Capital Intensive Technology:** When we make more use of capital and less use of labour per unit output in the production of our commodity that is called capital intensive technology of production. This type of technology is used when the production is made on a large scale for sale in the market in order to earn profit. In corporations and government enterprises generally there is the use of capital intensive technology of production because there is large scale production of goods and services.

Another aspect of organising the production activity is division of labour. Division of labour increases the efficiency of workers due to which large scale production becomes possible. Division of labour means splitting up of the production activity into many processes and assigning every process among different workers according to their aptitude and ability. Division of labour is of the following two types.

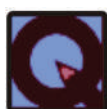
1. **Product based division of labour:** If a worker specializes in the production of a single good or service, it is called product based division of labour. In case of small farmers, a potter, a cobbler or a carpenter in a village we see that there is the use of product based division of labour. It is very common in household enterprises of developing countries like India. When the production is made for self consumption or on a small scale there is the use of product based division of labour. For example most of the farmers in our country make production of food grains mainly for self consumption. All of them make use of product based division of labour.
2. **Process Based Division of labour:** In big production units like corporations and government enterprises where the production is made on a very large scale, there is the use of process based division of labour. In case of process based division of labour, the production of a commodity is divided into many processes and a worker specializes in one or two processes, that is called process based division of labour. For example Britannia Bread Company manufactures bread. Raw material for bread is wheat flour. Conversion of wheat flour into bread requires three or four processes. The flour has to be converted into dough and dough has to be kept into containers for baking. Containers are kept in ovens for baking. The baked bread is cut into appropriate size and packed. All processes required in manufacturing of bread are undertaken by different workers and nobody can claim that he has manufactured the bread. He can say that he has performed one or two processes in the preparation of the bread.

In government sector also, the supply of any single good or service depends on the process based division of labour. For example, take the case of a simple street lighting



to be provided in a newly constructed group housing complex. It undergoes several processes. First is the installation of electric poles in the streets. The second process is connecting all the poles with electric wires. The third is fitting electric bulbs and tubes and the final stage is the release of electric supply from sub-station. All these processes are undertaken by different workers. For removing any defect in the functioning of the system, these are another team of workers from maintenance department who put the system in order.

Division of labour increases the efficiency of workers and lead to the possibility of inventions and discoveries because of repetitive nature of work. It encourages the use of machines in place of manual labour. It also leads to the use of capital intensive technique of production.



## INTEXT QUESTIONS 7.2

1. Define labour Intensive Technology.
2. Define Capital Intensive Technology.
3. Give one example each of product based and process based division of labour?

## 7.3 TOTAL PRODUCT, AVERAGE PRODUCT AND MARGINAL PRODUCT

There are mainly three concepts relating to production of a commodity (i) Total Product denoted as TP (ii) Average Product denoted as AP and (iii) Marginal Product denoted as MP.

1. **Total Product (TP):** TP refers to the total quantity of output of a commodity at a particular level of employment of an input, say labour, when the employment of all other inputs is unchanged. TP can be increased or decreased by increasing or decreasing the units of labour. So amount of TP directly depends upon amount of labour employed. Because it can be changed, labour is called variable factor.
2. **Average Product (AP):** AP is the output per unit of a variable input, say labour. It can be obtained by dividing TP by the number of units of a variable factor.

$$AP = \frac{TP}{L}$$

where L is the number of units of labour input.

3. **Marginal Product (MP):** MP may be defined as increase or decrease in TP resulted due to addition of one extra unit of labour, keeping all other inputs unchanged. In order to increase output or TP we have to increase the employment



of labour by 1 or more number of units. The smallest number by which labour can be increased is 1. Since 'marginal' means very small, accordingly we can say that MP is the output contributed by the last unit of labour. So we can write,

$$MP = TP_L - TP_{L-1}$$

### Example

One labourer works with a sewing machine to stitch two shirts. Another labourer joins and the two could stitch 6 shirts. Calculate MP?

**Ans:**  $MP = TP_2 - TP_{2-1} = TP_2 - TP_1 = 6 - 2 = 4$

'L' is the units of labour employed or the level of employment of variable factor, i.e. labour. It is given numerically as 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and so on.  $L=0$  means there is no employment of labour.

' $L-1$ ' is the previous level of employment, given 'L'. For example, if  $L=3$ , then  $L-1=2$  and so on.

The three concepts of TP, AP and MP can also be understood with the help of the following numerical example.

**Table 9.1 Total Product, Average Product and Marginal Product**

Units of labour (L)	TP (Units)	AP (Units)	MP (Units)
0	0	-	-
1	10	10	10
2	22	11	12
3	36	12	14
4	44	11	8
5	50	10	6
6	54	9	4
7	56	8	2
8	56	7	0
9	54	6	-2
10	50	5	-4

In the table above,  $L$  = Units of labour = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10.

When  $L=1$ , it means number of labour units or level of labour employment is 1. At this level  $TP=10$ . We know that  $AP = TP/L = 10/1 = 10$ .



When  $L = 2$ ,  $TP = 22$ . So  $AP = 22/2 = 11$ .

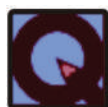
When  $L = 9$ ,  $TP = 54$ . So  $AP = 54/9 = 6$ .

Now calculate MP. As per formula given above,  $MP = TP_L - TP_{L-1}$ .

Let us calculate MP at  $L = 1$ . Here TPL means value of TP at  $L = 1$  which is 10.  $L - 1$  refers to the previous level of employment of labour. Since  $L - 1 = 1 - 1 = 0$ ,  $TP_{L-1}$  means value of TP at 0 or no employment. In the table at 0 units of labour  $TP = 0$ . So  $TP_L - TP_{L-1} = 10 - 0 = 10$ . Hence when unit of labour is 1, MP is 10.

Similarly, when there are 8 units of labour,  $MP = TP_8 - TP_{8-1} = TP_8 - TP_7 = 56 - 56 = 0$ .

Since MP is the difference between two consecutive values of TP, it can be negative also. In the table MP at 9 units of labour is  $-3$ . This is obtained as  $TP_9 - TP_{9-1} = TP_9 - TP_8 = 54 - 56 = -2$ .



### INTEXT QUESTIONS 7.3

1. Define marginal product.
2. Calculate MP and AP with the help of the following table.

Units of labour	TP (Units)	MP	AP
0	0		
1	10		
2	18		
3	24		
4	28		
5	30		
6	28		

### 7.4 LAW OF DIMINISHING MARGINAL PRODUCT OF LABOUR

Look at the values of MP at different units of labour in table 7.1. With increase in the units of labour from 1 onwards and by one unit at each stage the value of MP increases for first 3 units of labour i.e from 10 at  $L = 1$  to 12 at  $L = 2$  to 14 at  $L = 3$ . Then the value of MP decreases for next 4 units of labour i.e from 14 at  $L = 3$  to 8 at  $L = 4$  to 6 at  $L = 5$  to 4 at  $L = 6$  to 2 at  $L = 7$  to 0 at  $L = 8$ . Finally the value of MP becomes negative



at  $L=9$ . In other words after increasing temporarily for some time the marginal product of labour eventually decreases. In general way, **we can say that with continuous increase in the variable factor labour, its marginal product will increase initially till certain point is reached, but after that it will decrease and may become negative, keeping all other factors unchanged. This is popularly known as the Law of diminishing Marginal Product of labour.**

To understand the law properly think that there are two factors of production, Labour and Capital, where capital is in the form of a machine. Say that labour is the variable factor which can be increased to increase output and capital is the fixed factor which is kept constant. In the beginning only 1 labourer is working. May be one labourer is not sufficient to use the machine efficiently. So the unit of labour is increased to 2 and then to 3. Initially when we increase labour, it becomes fruitful because the labourers can handle different works as per their efficiency and choice. So output of the extra unit of labour increases. But there is a limit to which labour can be increased because then we may require another machine. But machine is a fixed factor and cannot be increased or decreased. So as a result of increasing the variable factor labour only, machine gets over used. Also the work of a machine cannot be done by the labourers that were added. So the output of each of the extra unit of labour i.e. MP of labour beyond a point starts decreasing.

A very pertinent question arises here. To what extent can the variable factor be increased or employed? To get the answer, see the table 7.1 again. See that when labour has been increased up to 9, the MP has started becoming negative. At employment of the 9<sup>th</sup> unit of labour MP is -2 and then at 10<sup>th</sup> unit of labour it is -4. Because of this the TP also has started falling. This clearly implies that labour should not be increased up to 9 and further. Employment of labour should stop before 9 units which means labour should be increased or employed up to 8 units. See that when 8 units of labour are employed the MP has become minimum at this point which is 0 and TP has become the maximum which is 56.

*Hence we learn that increase in the variable factor should take place till the point where its marginal product becomes minimum and stop employing further before the marginal product becomes negative.*



#### INTEXT QUESTIONS: 7.4

1. State the law of diminishing marginal product?
2. What is the level of Total Product when marginal product is minimum?
3. When the producer should stop employing more labour?



## 7.5 PRODUCTION PROCESS

Production process involves procuring or arranging the factors of production from the owners of the factors, forming the right combination of factors, purchasing and creating an inventory of raw materials for its use in the production, producing, storing and finally selling the output.

Somebody should take lead in organising the production activity. The person who takes such lead is called an entrepreneur. In lesson 6 you read that an entrepreneur is the organizer of a production unit. Entrepreneurship is the art of organising the production activity by the entrepreneur. He has to make efforts to bring labour by paying wage. Similarly, land and building, machinery etc have to be purchased or procured either by taking loan or by paying rent and interest respectively. Entrepreneur himself can keep some margin in the form of profit for all his efforts.



### INTEXT QUESTIONS 9.5

1. Define production process.
2. Who organises the production activity.

## 7.6 ROLE AND IMPORTANCE OF FIRMS AND INDUSTRIES

**A firm is an individual production unit which produces goods and services for sale in the market.** There are certain production units like charitable schools, charitable hospitals and government units etc. provide services not to earn profit. They work for social welfare. Normally a firm is concerned with the production of a single commodity.

Industry is a group of all the firms making production of a commodity (one type of good). For example Bata Shoe Company is a firm which makes shoes but the shoe industry includes all the firms producing shoes. So Bata, Action, Liberty, Adidas, Nike and Reebok etc form the shoe industry.

There are various types of industries supplying us different types of goods and services. For example agriculture industry supplies us food grains, vegetable, fruits, cotton, pulses, milk and butter etc. These things are required by all us. In the same way other industries supply various other goods and services like clothes, televisions, computers, scooters, refrigerators, air conditioners, cars etc. So all these industries play a vital role in our day to day life.

The importance of the firms and industries can be explained in brief as given.



1. **Goods and services for consumption:** These days human wants are growing at a faster rate. In order to satisfy these wants various types of goods and services are required for our daily consumption. All these goods and services are provided by firms and industries.
2. **Goods for investment:** We require various types of goods for investment. We require machines, plants, transport vehicles like buses, trucks, railways and aeroplanes, ships etc. and various other things for investment. All these things are produced by firms and industries.
3. **Employment to many persons:** Firms and industries are the source of employment to the people. Most of the people get employment in firms and industries by which they get income for the satisfaction of their wants. We cannot live without employment. So the importance of firms and industries can easily be understood.
4. **Infrastructure for the development of the country:** They provide us energy, transport, communication, health, education and housing which is the basic requirement to provide infrastructure for the country. Without the development of infrastructure the all round development of the country is not possible. So we cannot deny the role and importance of firms and industries.



### INTEXT QUESTIONS 7.6

1. What is a firm?
2. Give the meaning of industry?

## 7.7 IDENTIFYING VARIOUS TYPES OF PRODUCERS IN THE ECONOMY

On the basis of ownership the production units can be broadly classified into the following.

- (i) Indigenous production units
- (ii) Foreign production units

Let us discuss them one by one.

### 7.7.1 Indigenous Production Units

The production units located in a country and owned by the residents of the country are called indigenous production units. Around us most of the production units are indigenous. Farm houses in the villages, shops, small factories, big factories, hospital,





school, college, cinema hall, restaurant, dairy farm, government offices, self-employed doctors, lawyers and teachers etc are all examples of indigenous production units. Since production units are further divided into private and government, the indigenous production units can be classified into

- Private production units
- Government production units

### 7.7.1.1 Private Production Units

Most of the shops, offices, factories are owned by private persons or groups or families. They produce goods and services for sale in the market with the aim of earning profit.

Private sector units can further be classified on the basis of number of owners of such unit. Most of the small units like labour, washerman, cobbler, tailor, milk vender etc. are owned by a single person. But some of the production units may be owned by more than one person. The number of persons may be two, twenty, hundred, thousand or a lakh or even more. On the basis of number of owners, private sector production units can be classified into the following categories.

- (a) Sole proprietorship
  - (b) Partnership
  - (c) Company or Corporations
  - (d) Cooperative Society
  - (e) Private non- profit organizations (N.P.O.)
- (a) **Sole proprietorship:** Such production units are owned by a single person. He is responsible for the profit and loss of the production units. He is responsible for the management and working of the production unit.
  - (b) **Partnership:** Such production units are owned by two or more persons. Maximum number is 20. Owners of such production units are called partners of the company. All the partners are collectively responsible for the management and working of the production unit. The share of profit and loss is distributed among the partners according to agreement made at the time of forming the partnership.
  - (c) **Company or Corporations:** It is a production unit owned by a large number of persons. The sum invested in the company is divided into shares. The buyers of these shares are called shareholders. They are all the owners of the company. In private company the minimum number of share holders is two and the maximum number is 50. But in public company minimum number is seven but there is no maximum limit. These shareholders select some persons for the management of the company who are called directors of the company. These companies are established under companies act 1956. The profit of the company is distributed



among the shareholders according to the shares held by them. Tata iron steel company, Reliance industries limited, Bajaj auto limited, Lipton India limited are some of the examples of a company.

- (d) **Cooperative society:** It is also a production unit managed by a number of persons. It is a voluntary association of persons for mutual benefit. Its aims are achieved through self help and collective efforts. In same respects it is similar to the company. Its owners are also called shareholders. It works according to cooperative societies Act 1912. The minimum number of shareholders is ten but there is no upper limit. The shareholders select some persons among themselves for the managements of the society. The profits of the society are divided among the shareholders according to the shares held by them. Cooperative stores which sell various goods to consumers at reasonable rates, cooperative housing societies which provide flats and houses to its members are the example of cooperative societies. Kendriya Bhandar which provides various items to consumers is a very big cooperative society.
- (e) **Private Non-profit Organizations:** There are private production units which are run by institutions, such as trusts, societies etc. like charitable hospital, charitable school, welfare societies etc. Such production units provide services mainly with the aim of serving the member of society as a whole without any aim to earn profit.

#### 7.7.1.2 Government Production Units

Government provides a lot of services such as education, health care, law and order, post and telegraph, transport, telecommunication and broadcasting etc. Some of the organizations providing these services are run by the Departments and Ministries of the government. They are called Departmental Enterprises. Some examples of Departmental Enterprises are Indian Railways under the Ministry of Railways, All India Radio and Doordarshan which are sister concerns of Prasar Bharati under the Ministry of Information and Broadcasting etc. The government has direct control over the functioning of these enterprises.

There is another type of government production units which are supported and funded by the government but function independently. They are big Corporations and autonomous in nature. These units are non-departmental enterprises and called Public Sector Undertakings. Some examples of Public Sector Undertakings are Indian Airlines, Hindustan Machine Tools (HMT), Minerals and Metals Trading Corporation (MMTC), Life Insurance Corporation (LIC), General Insurance Corporations (GIC), Indian Oil Corporation (IOC) etc.

#### 7.7.1.3 Foreign Production Units

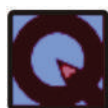
A foreign production unit is located in the country but is owned by foreigners or non-residents of the country. In such production units the contribution of foreigners must be more than 50% of total capital.





The foreign production units are further classified into:

- (i) Multinationals and
  - (ii) Collaborations
- (i) **Multinationals:** These are firms which have their main office in one country but have their business activities spread in many countries. These are called Multi-National Corporations (MNC) because they operate in more than one country other than the country of their origin. Some examples of MNCs in India are- Coca Cola, Pepsi Cola, Johnson & Johnson, Microsoft, Nokia, Sony, Samsung, International Business Machine (IBM), Nestle, Vodafone, Airtel, LG, Google, Ford Motors, Hyundai etc.
- (ii) **Collaborations:** These are production units in which foreigners and domestic entrepreneurs participate jointly. Such production units are partly indigenous and partly foreign. These are treated as foreign production units in terms of ownership if more than 50% of its total capital is contributed by the foreigners or non-residents. A good example of collaboration of Indian company with foreign company is -Maruti- Suzuki Limited,



### INTEXT QUESTIONS 7.7

Tick mark (✓) the correct answers

1. A production unit owned by a single individual, is known as:
  - (a) A partnership
  - (b) A private company
  - (c) Sole proprietorship
  - (d) A public production unit
2. In a partnership the maximum number of partners is:
  - (a) 5
  - (b) 10
  - (c) 15
  - (d) 20
3. Indian Railways is a:
  - (a) Private unit
  - (b) Public unit
  - (c) Sole proprietorship
  - (d) Partnership
4. Minimum number of members in a cooperative society is:
  - (a) 20
  - (b) 15
  - (c) 10
  - (d) 5



5. Maximum number of shareholders in a public company is:
  - (a) 10,000
  - (b) 15,000
  - (c) 20,000
  - (d) No limit
6. A Govt. production unit registered under companies Act 1956 is a:
  - (a) A statutory corporation
  - (b) Government company
  - (c) Departmental enterprise
  - (d) Non of these
7. The minimum number of owners in a private company is:
  - (a) 7
  - (b) 10
  - (c) 2
  - (d) 20
8. In which situation a production unit is not considered as a foreign production unit:
  - (a) entire capital is invested by non resident
  - (b) more than 50% of the total capital is invested by non-residents
  - (c) Residents have more than 50% of the total capital
  - (d) Less than 20% of the investment is made by resident



### WHAT YOU HAVE LEARNT

- Production process is the process of combining inputs, utilising their services and making production of goods and services.
- The entrepreneur organizes the production activities for which he earns profit or bears loss.
- There are two types of technologies of production (i) labour intensive in which we make more use of labour and less use of capital (ii) capital intensive in which we make more use of capital and less use of labour.
- Division of labour is of two types:
  - (i) Product based division of labour in which a worker specializes in the production of a commodity
  - (ii) Process based division of labour in which the production of a commodity is divided into different processes and a worker specializes in one or two processes only.
- Production is the result of the combined efforts of all the four factors of production i.e. land, labour, capital and entrepreneurship.
- Total Product (TP) refers to the total quantity of output of a commodity at a particular level of employment of an input, say labour, when the employment of all other inputs is unchanged.
- Average Product (AP) is the output per unit of a variable input, say labour.



- Marginal Product (MP) may be defined as increase or decrease in TP resulted due to addition of one extra unit of labour, keeping all other inputs unchanged.
- Law of diminishing Marginal Product of labour state that with continuous increase in the variable factor labour, its marginal product will increase initially till certain point is reached, but after that it will decrease and may become negative, keeping all other factors unchanged.
- Firm is a production unit which makes production of goods and services for sale in the market in order to earn profit. Industry is a group of all the firms making production of similar commodity. Both firms and industries are very important for the economic development of the country.
- On the basis of ownership production units are classified into indigenous and foreign production units. Indigenous units are owned by residents of the country and foreign units are owned by non-residents.
- Indigenous units are further classified into private and public sector production units. Private units are owned by private persons and institutions. Public sector units are owned by government.
- Private sector units are classified into (i) sole proprietorship (ii) partnership (iii) Company and (iv) Cooperative societies (v) Private non-profit organisation.
- A company is created under companies Act 1956. The minimum number of owners in a company is 7. There is no maximum limit.
- A cooperative society is created under co-operative society Act 1912. The minimum number of shareholders is 10. There is no maximum limit.
- Government production unit are classified into (i) Departmental and (ii) non-departmental enterprises. Departmental enterprises are under the direct control of some ministry. Non-departmental enterprises are autonomous known as public sector undertaking corporation.
- Production units owned by foreigners are called foreign production units. Some are multinationals and some are collaborations. A multinational has its head office in one country but its production units in many countries. Collaboration is jointly owned by residents and non-residents.

**TERMINAL EXERCISE**

1. Define production process.
2. How does an entrepreneur organise a production unit?
3. Distinguish between labour intensive and capital intensive technology of production.
4. Distinguish between product based and process based division of labour.
5. Distinguish between indigenous production units and foreign production units.
6. Distinguish between private sector and public sector production units.
7. Distinguish between sole proprietorship and partnership.



8. Distinguish between a company and cooperative society.
9. Distinguish between departmental and non-departmental enterprises.
10. Distinguish between autonomous corporations and government companies.
11. Distinguish between multinational and collaboration.
12. Distinguish between firm and industry.
13. Explain the role and importance of firms and industries.



## ANSWERS TO INTEXT QUESTION

### Intext Questions 7.1

1. The resources used in production are called inputs.
2. The goods and services produced by using inputs are called output.
3. Production function is defined as the technical relationship between inputs and output of a firm.

### Intext Questions 7.2

1. More use of labour and less use of capital per unit of output in the production of our commodity is called labour intensive technology.
2. More use of capital and less use of labour per unit of output in the production of our commodity is called capital intensive technology of production.
3. Product based- Pot- making ; Process based- Bread manufacturing

### Intext Questions 7.3

1. Marginal Product may be defined as increase or decrease in Total Product resulted due to change of one unit of labour, keeping all other inputs unchanged.
- 2.

Units of labour	TP	MP	AP
0	0	-	-
1	10	10	10
2	18	8	9
3	24	6	8
4	28	4	7
5	30	2	6
6	24	-6	4

**Intext Questions 7.4**

1. According to the law of diminishing marginal product, with continuous increase in variable factor, marginal product will increase initially till certain point is reached, but after that it will decrease and may become negative, keeping all other factors unchanged.
2. Total product is maximum.
3. When the marginal product becomes negative.

**Intext Questions 7.5**

1. The process of procuring inputs, utilizing their services and producing goods and services, is called production process.
2. Entrepreneur.

**Intext Questions 7.6**

1. Any individual production unit of a commodity is called a firm.
2. Industry is a group of all the firms making production of an identical commodity.

**Intext Questions 7.7**

- |        |        |        |        |
|--------|--------|--------|--------|
| 1. (c) | 2. (d) | 3. (b) | 4. (c) |
| 5. (d) | 6. (b) | 7. (c) | 8. (c) |



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## COST AND REVENUE

A producer has to work very hard to produce a good or service. He has to make a lot of effort in the process. In the beginning, the producer must arrange money to organize the production activity. We have already said that various factors in the form of land, labour, and capital are required to produce goods. These factors are not available for free. The producer must purchase them in the right quantity needed for production. Similarly, raw materials and other things have to be purchased and stored. To purchase these things, the producer must be ready to pay the price for them.

Once the goods or services are produced, the producer sells them in the market to various consumers. At this time, the consumers pay price to the producer to purchase the goods and services. With this the producer starts earning money. So, in order to produce goods and services, the producer first incurs expenditure to purchase factors of production and then receives money from the consumers by selling those goods and services to them.



### OBJECTIVES

After completing this lesson, you will be able to:

- *know different types of cost;*
- *calculate different types of cost;*
- *know the concept of revenue.*

### 8.1 MEANING OF COST

In order to understand the meaning of cost let us take the example of a farmer who is producing rice/paddy. You know that, it normally takes 5 to 6 months to produce rice. The production of rice involves the following:



### Notes

- (i) getting the land for cultivation
- (ii) using labour to prepare the land and make it suitable for growing the crop. This includes tilling the soil, sowing seed, fertilizing and irrigating the land and finally harvesting.
- (iii) Transporting rice to godown/mandi.

How does the farmer get land? It could be possible that, the farmer has ancestral land. Otherwise he has to hire land from others by paying rent. He has also the option of purchasing land by paying a very heavy amount. In the present example, let us say, that the farmer hires 5 acres of land on rent.

Suppose, he has to pay Rs. 5,000 as rent to the owner of the land for the whole period he uses it.

The farmer also needs labourers to work on the field for 5 months. Let us say the farmer hires 4 labourers. In the first two months he uses the labourers to till the soil, sow seeds, transporting the seedlings and planting them by hand, fertilising and irrigating the field. In order to hire a labourer, the farmer must pay wage. The wage rate prevailing in the market on an average is say, Rs. 75 per worker per day. When the farmer used only two labourers for two months to look after the standing crop. When the time of harvesting arrives, he again hires 4 labourers for 15 days. What is the total amount paid to the labourers by the farmer? First, 4 labourers work for two months or sixty days. So at Rs. 75 per worker it comes to  $75 \times 4 \times 60 = \text{Rs.}18,000$ . Then two labourers work for two months. This comes to  $75 \times 2 \times 60 = \text{Rs.}9,000$ . Finally 4 labourers worked for 15 days. This comes out to be  $75 \times 4 \times 15 = \text{Rs.}4,500$ . The total money paid to the labourers was  $18,000 + 9,000 + 4,500 = \text{Rs.}31,500$

To grow the crop, the farmer uses some raw materials such as seeds, water, fertilizer, pesticides etc. for which he spends, say, Rs. 3,000. He also uses tractor for which he pays rent of Rs. 2500. After harvesting the farmer produces, say, 30 quintals of rice.

Now, calculate the total money spent by the farmer to produce rice? We can do it in the following manner.

Items	Expenditure (Rs.)
Rent paid to Landlord	5,000
Wages to labour	31,500
Raw materials	3,000
Service of Tractor	2,500
Total	42,000





We can say that, the farmer spent Rs.42,000 to produce 30 quintals of rice.

### Definition of Cost

Cost is defined as the money expenditure incurred by the producer to purchase (or hire) factors of production and raw materials to produce goods and services.

In a way, cost is a kind of sacrifice made by the producer. In this example, the sacrifice was made in terms of making payments; such as wages to labourers, rent for the use of land and tractor and incurring expenditure on raw materials etc.



### INTEXT QUESTIONS 8.1

1. Name the payments made by the farmer to the factors of production?
2. Who bears cost?

### 8.2 TYPES OF COST

From the example above we can distinguish between following types of costs.

- (a) Fixed cost
- (b) Variable cost
- (c) Explicit cost
- (d) Implicit cost

Let us discuss them one by one.

#### (a) Fixed Cost

In the above example, we said that the farmer paid Rs. 5,000 as rent to the owner of the land. Once the land is procured for cultivation, the farmer must pay rent for it, even if he does not produce anything on it. The land is also fixed factor of production here. Because, whether or not the farmer cultivates on the entire 5 acres of land, he has to pay rent for the whole 5 acres. This is fixed. **So fixed cost is defined as the expenditure, on hiring or purchasing of fixed factors/inputs, which are compulsory and has nothing to do with the amount of production of the good or service.** Similarly, rent paid for the use of tractor is also a fixed cost.

#### (b) Variable Cost

In the above example, the farmer paid Rs.31,500 towards wage for labourers and Rs.3000 for purchase of raw materials. How much of wage was paid



## Notes

depends on how many labourers the producer hired. Labour as a factor of production can be changed. In the example, we said that the producer used 4 labourers during the first two months and only 2 labourers for the next two months. This is because in the beginning the amount of work was more and more labourers were required. Accordingly more amount of money, i.e Rs.18000, was paid. But when the amount of work was less during the next two months, only 2 labourers were hired and accordingly the wage bill also decreased to Rs.9000. Hence, payment towards wages can be changed. So it is called variable cost. **We can define variable cost as the expenditure on variable factors/inputs, such as labour, which can be changed.**

**(c) Explicit Cost**

Both the rent and wages paid by the farmer and the expenditure on raw materials incurred by him are also called explicit cost. Explicit cost is defined as the money expenditure incurred by the producer on both fixed and variable factors of production and raw materials etc. These are direct payments and are properly calculated and recorded separately. Bills, money receipts or vouchers etc exist with respect to such expenditure by the producer.

**(d) Implicit Cost**

Besides purchasing factors of production and raw materials, the producer also uses his own factors and materials for producing goods and services. For this he does not pay any money to himself. But he bears this expenditure indirectly. Suppose, a farmer uses his own tractor to cultivate land. Had he hired a tractor from somebody else, he would have paid rent for this. In that case it would have been called explicit cost of the farmer. Let us say the rent for using the services of a tractor is Rs. 3000 for a particular period of time. So the farmer can earn Rs.3000 if he gives his tractor on rent. Otherwise, if he uses it for himself, then he will consume a value of Rs. 3000 for the purpose of production. In this case, it will be called implicit cost of the farmer. **So implicit cost is the cost of self supplied factors.** The value of such cost has to be calculated on the basis of market value.

**8.3 TOTAL AND AVERAGE COST**

Total cost is the sum of total fixed cost and total variable cost which are given explicitly. Average total cost or simply the average cost is the ratio of total cost to the total output. We can also write,

$$\text{Total Cost (TC)} = \text{Total Fixed Cost} + \text{Total Variable Cost}$$

$$\text{Average Cost (AC)} = \text{Total Cost/Total Output.}$$

Average Cost is the cost per unit of output.



Notes

### Marginal Cost (MC)

If the producer wants to increase output, then he has to engage extra units of labour. Extra units of labour will lead to extra expenditure on wage paid to the labour. As a result the total cost of production will increase. In short, increase in total output will lead to increase in total cost of production. In this context **marginal cost is defined as increase in the total cost due to increase in one extra unit of output.**

**Example:** Suppose a tailor makes 10 pieces of shirts by incurring a total cost of Rs. 1110. Then he increased shirt production to 11 pieces for which he incurred Rs. 1199 as total cost. What is the marginal cost?

**Ans:** Here increase in output is  $11 - 10 = 1$  unit. Because of increase in output by one unit, cost



### INTEXT QUESTION 8.2

1. If 48 units of output are produced and the total fixed cost is Rs 180 alongwith a total variable cost of Rs 300 what would be the average cost of production?
2. Define explicit cost?
3. Let output increases to 49 units in Q.1 due to which total variable cost increases to Rs 307. What is the marginal cost?

## 8.4 COMPARING MARGINAL COST AND AVERAGE COST

In the above example while there is one value of marginal cost as calculated above, we can compute two different values of average cost.

First value of average cost relates to 10 pieces of shirts. With a total cost of Rs. 1110

$$\text{So AC} = 1110/10 = \text{Rs. } 111$$

Second value of average cost relates to output of 11 shirt pieces with total cost of Rs. 1199

$$\text{Here AC} = 1199/11 = \text{Rs. } 109.$$

From this we can say that average cost is calculated for every given level of output. On the other hand, marginal cost is calculated when a given level of output is increased by one unit. That is, marginal cost is calculated between two successive levels of output.



Notes

We can express the above example in the form of a table as follows:

Units of output (shirts)	Total cost (Rs.)	Average cost (Rs.)	Marginal cost (Rs.)
10	1110	111	-
11	1199	109	89

## 8.5 REVENUE

Revenue is another very important concept in economics. In fact the study of cost is not complete, if we do not talk about revenue. What is revenue?

### Definition of Revenue

Revenue is defined as the amount a person receives by selling a certain quantity of the commodity.

You know that a commodity can be purchased in the market by paying a certain price. So revenue can be calculated by multiplying price and quantity of the commodity. Hence we can write

$$\text{Revenue} = \text{Price of the Commodity} \times \text{Quantity of the Commodity}$$

During a given period of time, the seller sells certain quantity of the commodity.

So the total amount of money received by the seller during that time period is called total revenue. We denote it as TR where TR stands for total revenue. Let us denote price as 'P' and quantity as 'Q' then we can write

$$\text{Total Revenue} = \text{Price} \times \text{Quantity or } TR = P \times Q$$

**Example:** Continue with the example of the farmer in our section on "Cost". Think that the farmer produced 30 quintals of rice. Let us say that the price of rice is Rs. 1600 per quintal in the market. If the farmer sells all this rice then he will earn  $1600 \times 30 = \text{Rs. } 48,000$ . So his total revenue will be Rs. 48,000.

From this example, we can also say that revenue is the money receipts of the producer or seller from the sale of his output.

Another term used for "total revenue" is total sales proceeds. Because revenue is received by selling a commodity. It is also called total sales proceeds from that Commodity.



## INTEXT QUESTIONS 8.3

1. A seller sells 1 quintal of wheat. The Price of wheat is Rs. 15 per Kg. what is his total revenue?



You must remember that each and every commodity has its own price. A retailer sells different commodities to the buyers. Take the example of a provision store or a stationary shop. A seller sells various items in a provision store; such as rice, wheat, wheat flour, different varieties of dal, biscuits, edible oil etc. You will even find varieties of rice such as basmati, parmal, cella etc; there are different types of edible oils, such as refined vegetable oil, sunflower oil, mustard oil, soyabean oil, etc; and so on. A retail shopkeeper sells so many different kinds of goods as well as different types of the same good. So what will be his total revenue, say, after a time period of one week?

The answer is very simple. First make a list of the prices of the goods he sold during the week. Second, make a list of respective quantities of the goods. Third, find the total revenue of the shopkeeper for the given week. We can illustrate this in the following way.

### Illustration

Consider that the shopkeeper has sold 100 kg of basmati rice, 70 litres of sun flower oil, 100 packets of biscuits and 150 kg of wheat flour in the given week. The prices are Rs. 35 per kg of Basmati rice, Rs. 90 per liter of sunflower oil, Rs. 10 per packet of biscuit and Rs. 22 per kg of wheat flour.

We can calculate the total revenue of the shopkeeper in the following manner.

- (i) Total revenue from rice =  $35 \times 100 = \text{Rs. } 3500$
- (ii) Total revenue from oil =  $90 \times 70 = \text{Rs. } 6300$
- (iii) Total revenue from flour =  $22 \times 150 = \text{Rs. } 3300$
- (iv) Total revenue from biscuit =  $10 \times 100 = 1000$

Total Revenue from all goods = Rs. 14,100

So the shopkeeper's total revenue from all goods during the given week is Rs. 14,100.

## 8.6 AVERAGE AND MARGINAL REVENUE

### Average Revenue (AR)

Average Revenue is denoted as AR. It is calculated from the total revenue. The formula for average revenue is given as

$$\text{Average Revenue} = \text{Total Revenue} / \text{Quantity sold}$$

$$\text{Symbollically, AR} = \text{TR} / \text{Q}$$

Take the case of a single commodity, we know that  $\text{TR} = \text{P} \times \text{Q}$

$$\text{So} \quad \text{AR} = \text{P} \times \text{Q} / \text{Q} = \text{P}$$

Average Revenue and Price of the commodity are one and the same.



## Notes

## Marginal Revenue (MR)

Marginal Revenue (MR) is defined as increase in total revenue due to **one** unit increase in the sale of the quantity of output.

Refer to the above example. Let the vendor increased the sale to 21 kg. In that case the total revenue or TR becomes  $50 \times 21 = \text{Rs. } 1050$ . Earlier when the sale of output was 20 kg,  $\text{TR} = \text{Rs. } 1000$ . Hence  $\text{MR} = 1050 - 1000 = \text{Rs. } 50$ .

We can show it in the table below:

Sale of output (kg)	Price or AR (Rs per kg)	TR (Rs.)	MR (Rs.)
20	50	1000	-
21	50	1050	50

## Comparing AR and MR

It should be noted that average revenue is calculated for each and every given level of sale of the output while marginal revenue is calculated for two successive levels of sale of the output. (This is same as average cost and marginal cost told earlier.)

**One important observation:** In the example, we can see that if the seller is able to sell successive quantities of output at the given or same price, then AR and MR are equal. This further implies that if the price of the commodity in the market will change for different quantities, then AR and MR will be different from each other.

**Example:** Price of 1 kg of guava is Rs. 50. The Vendor sold 20 kg of guava in two days. What is his average revenue?

**Ans:** Total Revenue is  $50 \times 20 = \text{Rs } 1000$ , when Quantity is 20 kg

So  $\text{AR} = 1000/20 = \text{Rs. } 50$

(See that price per kg is Rs. 50. So  $\text{AR} = \text{Rs. } 50$ )

**Example:** To continue from the above example – If the vendor could sell 21 kg of guava at the same price then what is the marginal revenue?

**Ans:** Now  $\text{TR} = 50 \times 21 = \text{Rs } 1050$ . Earlier  $\text{TR} = \text{Rs. } 1000$ .

So  $\text{MR} = 1050 - 1000 = \text{Rs. } 50$

**Example:** A shopkeeper sells 10 kg of rice at Rs 30 per kg and 11 kg of rice at Rs 29 per kg. What is the marginal revenue?

**Ans:** In the first case  $\text{TR} = 10 \times 30 = \text{Rs. } 300$

In the second case  $\text{TR} = 11 \times 29 = \text{Rs } 319$

So  $\text{MR} = 319 - 300 = \text{Rs } 19$



## INTEXT QUESTION 8.4

1. What is the difference between average revenue and price of the good?
2. How are total and average revenue related?

## 8.7 USE OF REVENUE AND COST

Both revenue and cost are important concepts in economics. While cost is the expenditure incurred to produce a good or service during the production process, revenue is the money received by the producer by selling that good or service. So cost symbolizes sacrifice made by the producer and revenue symbolizes gains for the producer. By getting the required revenue from sale of the commodity the producer is able to recover the cost he has incurred earlier. In that case we say that the producer earned his due share which is called profit. **We can define that profit is the surplus of revenue over the total cost of production.**

$$\text{Profit} = \text{Total Revenue} - \text{Total Cost.}$$



## INTEXT QUESTION 8.5

1. If output is 50 units, price per unit is Rs.10, fixed cost is Rs.110 and variable cost is Rs.150, what is the amount of profit?



## WHAT YOU HAVE LEARNT

- Cost is the expenditure incurred to produce a good or service during the production process.
- Fixed cost is defined as the expenditure on the fixed factors of production.
- Variable cost is the expenditure on variable factors.
- Explicit cost is defined as the money expenditure incurred by the producer for production.
- Implicit cost is the cost of self supplied factors.
- Average Cost is the cost per unit of output.
- Revenue is the amount a person receives by selling certain quantity of the commodity at a given price.



Notes

## MODULE - 3

### Producing Goods and Services



#### Notes

## Cost and Revenue

- Average Revenue = Total Revenue/Quantity.
- Marginal Revenue is the change in total revenue due to change in the sale of quantity of output by one unit.
- Profit = Total Revenue – Total Cost.



### TERMINAL EXERCISE

1. Give the difference between fixed and variable cost?
2. Give the difference between explicit and implicit cost?
3. How can you calculate total and average cost?
4. How can you calculate total and average revenue?
5. Give the difference between revenue and cost? Why the producer must calculate them?



### ANSWERS TO INTEXT QUESTIONS

#### Intext Questions 8.1

1. Land – Rent  
Labour – wages  
Services of tractor – Rent  
and payment for raw materials
2. Producer bears the cost

#### Intext Questions 8.2

1.  $TC = TFC + TVC$   
 $= 180 + 300$   
 $= \text{Rs } 480$

$$AC = \frac{TC}{TQ}$$

$$= \frac{480}{48} = \text{Rs } 10 \text{ per unit}$$

2. Explicit cost is defined as the money expenditure incurred by the producer on production of a good.





$$\begin{aligned} 3. \quad TC &= 180 + 307 \\ &= \text{Rs. } 487 \\ MC &= 487 - 480 \\ &= \text{Rs. } 7 \end{aligned}$$

### Intext Questions 8.3

$$1. \quad \text{Total revenue} = 100 \text{ kg} \times \text{Rs } 15 = \text{Rs } 1500$$

### Intext Questions 8.4

1. Average revenue is revenue per unit

price of the good is the amount received by the seller for each unit of the commodity

However,  $AR = \text{Price}$

$$2. \quad TR = Q \times P$$

$$\begin{aligned} AR &= \frac{TR}{Q} \\ &= \frac{Q \times P}{Q} \\ &= P \end{aligned}$$

So, average revenue = Price

### Intext Questions 8.5

$$1. \quad \text{Profit} = \text{Rs } 240$$



**MODULE-4**  
**DISTRIBUTION OF GOODS AND SERVICES**

- 9. Demand
- 10. Supply
- 11. Determination of Price and Quantity
- 12. Market
- 13. Role of Government in Determination of Price and Quantity





## 9



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# DEMAND

We have already studied about needs and wants in lesson 2. To satisfy these wants, you buy goods and services from the market. We buy goods and services by paying different prices. Now a days the market is flooded with various types of goods. So we have to make a choice before purchasing any good. But, just making a choice or selecting a particular good to purchase is not enough. When we go to the market, we carry certain amount of money which we use to buy the goods and services. As consumers in the market, we decide to purchase certain amount of goods or combination of various goods depending on the amount of money we have, the price we have to pay, our liking for the goods etc. All these things are involved in the study of demand which depicts our behavior as consumers in the market.



## OBJECTIVES

After completing this lesson, you will be able to:

- *explain the concept of demand;*
- *differentiate between individual demand and market demand of a commodity;*
- *discuss the factors affecting demand;*
- *state the law of demand and establish relationship between price and quantity demanded;*
- *construct an individual demand curve;*
- *interpret the shape of individual demand curve.*

## 9.1 MEANING OF DEMAND

Suppose, Varsha went to the market last week and made the following purchases for the week for herself.



- 1 kg of rice at 25 Rs. Per kg.
- 0.5 kg of arhar dal (pulses) at Rs. 68 per kg.
- 1 kg of wheat flour at Rs.24 per kg.
- 2 kg of mangoes at Rs.50 per kg.

Whenever one purchases a good in the market, he/she has to pay the given price for it and accordingly buy certain quantity of it for consumption during the given time period, the way Varsha did.

### Definition of Demand

**Demand for a good is defined as the quantity of the good purchased at a given price at given time.**

We can express the above mentioned examples to show the different components of demand as follows.

Sl. No.	Name of the good	Price (Rs.per kg.)	Quantity (kg)	Time period
1.	Rice	25	1.0	Last week
2.	Arhar Dal	68	0.5	do
3.	Wheat Flour	24	1.0	do
4.	Mangoes	50	2.0	do

Thus the definition of demand includes three components

- Price of the commodity
- Quantity of the commodity bought
- Time period.

Note that time period may vary. This can be week, month, year etc.

So the examples of demand given above can be written as

- Varsha purchased 1 kg of rice at Rs.25 per kg last week. This is the demand for rice by Varsha.
- Varsha purchased 2 kg of mangoes at Rs. 50 per kg last week. This is the demand for mangoes by Varsha. And so on.



Now read the following examples:

- (i) Nitin bought 2 pairs of shoes last month.
- (ii) Mr. Jafri purchased 5 kg of apple at Rs.40 per kg.
- (iii) Ms. Harmit Kaur paid Rs.25 per litre for milk last month.

Are these examples of demand? No. You can easily see that in the case of Nitin, price of a pair of shoe is not given. In case of Mr. Jafri, time period is not mentioned. Finally in case of Ms. Harmit Kaur, quantity of milk consumed is not given.



### INTEXT QUESTIONS 9.1

1. Define demand.
2. Name the three components included in the definition of demand.

## 9.2 DIFFERENCE BETWEEN DEMAND AND DESIRE

On many occasions people confuse between desire and demand and use them interchangeably. In fact these are two different terms. Demand is desire backed by ability to purchase. This means that if somebody desires to have a good, he/she can demand it if he/she has the money to purchase it by paying its price. Anyone can desire any good or service. But just by desiring something, one cannot have it without paying the price. Once the price is paid by the person who has desired it, only then it becomes the demand for the good by that person. Take the example given above once again- “Varsha purchased 2 kg of mangoes at Rs. 50 per kg last week.” This is the demand for mangoes by Varsha. Had Varsha desired to have mangoes but could not pay the price to buy, then it would have been said as Varsha’s desire but not demand for mangoes.

## 9.3 FACTORS AFFECTING INDIVIDUAL DEMAND

Individual demand refers to the quantity of a commodity that an individual buyer is willing to buy at given price per unit of time. But how much quantity of a commodity one is willing to buy depends upon the following factors. These are also called determinants of demand. These are

- (i) Price of the commodity
- (ii) Price of related goods
- (iii) Income of the buyer
- (iv) Tastes and preferences of the buyer



Let us discuss these factors one by one.

### 1. Price of the commodity

When you visit a market to buy a commodity, you go to a seller of that commodity and ask for its price first. If you think that the price is reasonable, you buy the required quantity of the commodity. On the other hand, if the price is higher in your opinion, you may not buy or buy less quantity of it. Generally we are willing to buy more quantity of a commodity at a lower price and less of it at a higher price, if all other factors determining demand remain constant.

### 2. Price of related goods

The demand for a commodity is also influenced by the prices of its related goods. Related goods can be of two types : (a) substitute goods (b) complementary goods

Substitute goods are those goods which can easily be used in place of each other. Example of substitute goods are coke and pepsi, tea and coffee etc. If price of coffee increases, people will demand more of tea and thus demand for tea will increase. If price of coffee falls, people will demand more of coffee and thus demand for tea will fall. So, the demand for a commodity is directly related to the price of its substitute goods.

On the other hand, complementary goods are those goods which are used together in satisfying a particular want. Examples of complementary goods are car and petrol, ball pen and refill etc. If we have a car, we also require petrol to run it. Imagine, if price of petrol rises, what will happen to the demand for car? Demand for car will decrease. If the price of one of them increases, the demand for other good will decrease and if price of one of them falls, the demand for the other will increase. So, the demand for a commodity is inversely related to the price of its complementary goods.

### 3. Income of the buyer

The demand for a commodity also depends on the income of the buyer. When your income increases, you are likely to spend more on purchase of some goods such as fruits, full cream milk, butter etc. Such goods are normal goods. Normal goods are those goods whose demand increases with the increase in income. So, the demand for normal goods is directly related to the income of the buyer.

But there are some goods whose demand decreases when income of the buyer increases, such as jowar, bajra, toned milk etc. These goods are called inferior goods, so, the demand for inferior goods is inversely related to the income of the buyer.

### 4. Tastes, preferences and fashion

Tastes, preference and fashion are important factors which affect the demand for a commodity. For example, if Monika prefers jeans and tops in comparison to salwar





and kameej, her demand for jeans and tops will increase. So demand for those goods increases which are preferred by the buyer or which are in fashion. On the other hand, demand for those goods decreases which are not preferred by the buyer or which are out of fashion.

## 9.4 INDIVIDUAL DEMAND SCHEDULE

Every individual demands some goods and services for the satisfaction of his/her wants. In the example given earlier we talked about Varsha's demand for rice, dal, wheat flour and mangoes for a week. Varsha's purchases will not stop there. She will again purchase these items whenever she needs them. Whether she will buy the same quantity or not next time when she goes to the market depends on whether the price of the goods have remained same or not. Let us only consider the purchase of any one commodity, say mangoes by her in order to analyze the demand of one commodity by her over time. Let us also think that prices of other items, money in Varsha's pocket and her taste have not changed. After observing Varsha's purchases of mangoes over time we noticed the following.

"If price of mangoes is Rs. 50 per kg, Varsha buys 2 kg of mangoes for a week. If the price of mangoes rises to Rs 60 per kg she buys only 1.5 kg of mangoes for a week. If price falls to Rs 40 per kg. she is willing to buy more i.e. 2.5 kg. of mangoes for a week. It means, if price is Rs 50 per kg. Varsha's demand for mangoes is 2 kg per week, at a price of Rs 60 per kg, her demand is only 1.5 kg, per week and at a price of Rs 40 per kg, her demand is 2.5 kg." We can present this in the table 9.1 below.

**Table 9.1 Varsha's demand for mangoes**

Price of mangoes (Rs per Kg)	Quantity demanded of mangoes per week (in Kg)
80	0.5
70	1.0
60	1.5
50	2.0
40	2.5
30	3

Table 9.1 shows different quantities of mangoes demanded at different prices by Varsha per week. Such a tabular presentation of different quantities of a commodity demanded at different prices is called an individual demand schedule. Demand for a commodity by an individual buyer is called individual demand. Individual demand is the quantity of a commodity that an individual buyer is willing to buy at given price per unit of time.



Notes

## 9.5 LAW OF DEMAND

The law of demand gives the relationship between price of a commodity and its quantity demanded, when all factors other than price of the commodity remain unchanged.

As discussed earlier, the demand for commodity is affected by many factors such as price of the commodity, price of related goods, income of the buyer, tastes and preferences etc. So the law of demand gives effect of change in price of the commodity on the quantity demanded, assuming that all other factors such as, price of related goods, income of the buyer, tastes and preferences remain constant.

**The law of demand is given as, “If price of a commodity falls, its quantity demanded increases and if price of the commodity rises, its quantity demanded falls, other things remaining constant.”**

The law of demand means that, other factors determining the demand remaining constant, price of a commodity and its quantity demanded are inversely related.

## 9.6 INDIVIDUAL DEMAND CURVE

When the above mentioned relationship of price and quantity demanded is represented diagrammatically, it is called demand curve. Thus demand curve is a diagrammatic representation of law of demand. The demand curve shows different quantities of a commodity demanded at different prices in diagrammatic form.

We can construct Varsha’s demand curve for mangoes (individual demand curve) with the help of table 9.1. See the demand curve in Fig. 9.1.

Take quantity demanded of mangoes on X-axis and price of mangoes on Y-axis. On the Y-axis (vertical) the prices starting from Rs 30 to 80 are plotted. On the X-axis (horizontal) the quantities of mangoes starting from 0.5 to 3 kg are plotted. Varsha has demanded 0.5 kg of mangoes at Rs 80. This combination is shown at point A in graph given in Fig. 9.1. Similarly, the other combinations of price and quantity of mangoes as given in table 9.1 are shown as points B, C, D, E and F. By joining these points Varsha’s demand curve for mangoes has been derived.

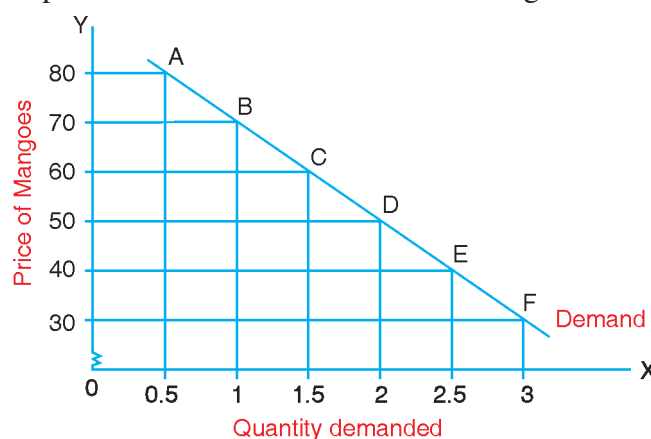


Fig. 9.1 Individual demand curve



Thus, the demand schedule and the demand curve both represent the same relationship between price and quantity demanded but the demand schedule represents it in a tabular form and demand curve in a diagrammatic form.



## INTEXT QUESTIONS 9.2

1. State the law of demand.
2. What are the assumptions of law of demand.
3. What will happen to your demand for apples if price of apples rises from Rs 80 per kg to Rs 100 per kg, assuming that your income, taste and preferences etc. do not change?

## 9.7 SHAPE OF INDIVIDUAL DEMAND CURVE

According to the law of demand, when all other factors determining demand remain constant, the buyer buys more quantity of a commodity at lower price and less of it at a higher price. Due to this inverse relationship between price and quantity demanded, the demand curve slopes downwards from left to right. But the question arises why does a buyer buys more quantity of commodity at a lower price and less of it at a higher price? Put it in another way, why does the demand curve slope downwards from left to right? The most important reasons for the inverse relationship between price and quantity demanded are explained below.

1. When more and more units of a commodity are consumed, satisfaction derived from successive units of the commodity goes on diminishing. For example, a hungry person gets maximum satisfaction from the first chapatti, lesser satisfaction from second chapatti and still lesser from third chapatti, and so on. If he gets more satisfaction, he will be ready to pay more and if he gets less satisfaction, he will be ready to pay less price for it. It means he will be willing to buy more quantity of a commodity at lower price and less of it at higher price. The law of demand also provides the same information which will lead to downward slope of demand curve.
2. Suppose, you buy mangoes from the market. If the price of mangoes is Rs 40 per kg and you buy 2 kgs of mangoes at this price. If the price of mangoes falls from Rs 40 per kg to Rs 20 per kg, your real income or purchasing power is doubled and you can now buy double quantity i.e. 4 kg of mangoes with the same money income. Thus a buyer can buy more quantity of a commodity when its price falls and less of it when its price rises leading to the downward slope of the demand curve.



- When price of a commodity falls, it becomes relatively cheaper than its substitutes (although price of substitutes remains the same). For example, if the price of coke falls, it becomes comparatively cheaper than its substitute i.e. pepsi. People start buying coke in place of pepsi. (alternatively pepsi is substituted by coke), leading to more demand for coke when its price falls. On the other hand, demand for the commodity will fall when its price rises. It will lead to downward slope of the demand curve.



### INTEXT QUESTIONS 9.3

- What will happen to the real income of the buyer if price of a commodity falls?
- What will be the shape of the demand curve when there is an inverse relationship between price and its quantity demanded?
- You are thirsty and you have already taken one glass of water. Whether the satisfaction derived from second glass of water you drink, will increase or decrease?
- Draw demand curve with the help of data given below:

Price (Rs per unit)	1	2	3	4	5
Quantity demanded (units)	20	16	12	8	4

### 9.8 MARKET DEMAND FOR A GOOD

Varsha is not the only buyer of mangoes in the market. There may be some other persons who may demand mangoes in the market. Suppose there are two other buyers Vibha and Somya who are willing to buy mangoes in the market.

**The total quantity of a commodity demanded by all the individual buyers in the market at the given price at given time is called market demand of that commodity.**

Let there are only three buyers buying mangoes in the market – Varsha, Vibha and Somya, market demand will be the sum of individual demand schedules of these three buyers. Now if we add another two columns showing respective demand of Vibha and Somya in table 9.1 along with the demand by Varsha, we can get the market demand schedule. This is shown in table 9.2 below.



Notes

Table 9.2 Market demand for Mangoes

Price of mangoes (Rs per Kg)	Quantity demanded of mangoes per week (in kg)			Market demand of mangoes per week (in kg)
	Varsha	Vibha	Somya	
80	0.5	1.0	0	1.5
70	1.0	1.5	0.5	3.0
60	1.5	2.0	1.0	4.5
50	2.0	2.5	1.5	6.0
40	2.5	3.0	2.0	7.5
30	3	3.5	2.5	9.0

When price of mangoes is Rs. 80 per Kg, Varsha demands 0.5 Kg of mangoes, Vibha demands 1.0 kg of mangoes and Somya demands no mangoes. Thus market demand for mangoes at a price of Rs 80 per kg. is  $0.5 + 1.0 + 0 = 1.5$  kg of mangoes per week. Likewise, market demand for mangoes can be obtained at other prices also as shown in the table 9.2.

**INTEXT QUESTION 9.4**

1. If there are only three households buying a commodity in the market, calculate their market demand in the table given below:

Price (Rs per unit)	Quantity demanded (in units)			Market demand (in units)
	House- hold A	House- hold B	House- hold C	
5	15	13	30	—
6	12	11	25	—
7	9	9	20	—
8	6	7	15	—
9	3	5	10	—



Notes

2. Complete the following table

Price (Rs per unit)	Quantity demanded (in units)			Market demand (in units)
	House- hold A	House- hold B	House- hold C	
1	10	12	–	48
2	8	15	–	40
3	6	12	–	32
4	4	9	–	24
5	2	6	–	16

### 9.9 FACTORS AFFECTING MARKET DEMAND

As stated earlier, market demand is the total quantity of a commodity that all the individual buyers in the market are willing to buy at given prices per unit of time. In addition to the factors affecting individual demand for a commodity market demand is also influenced by the following factors.

- 1. Number of buyers:** Number of buyers buying a commodity determine the demand for the commodity in the market. As you have seen in Tale 9.2 showing market demand of mangoes there were three buyers of mangoes in the market namely, Varsha, Vibha and Somya. Now if one more buyer Abha also starts buying mangoes, what will happen to the market demand of mangoes? Market demand of mangoes will definitely increase, so, if the number of buyer of a commodity is large, market demand for the commodity will be more. On the other hand, if the number of buyers is small, market demand for the commodity will be less.
- 2. Distribution of income and wealth:** The distribution of income and wealth in a society also determines the market demand of a commodity. If the distribution of income and wealth is more in favour of the rich, demand for the commodities preferred by the rich is likely to be higher. On the other hand, if the distribution of income and wealth is more in favour of poor, demand for the commodities preferred by the poor is likely to be higher.
- 3. Climatic condition:** It is generally observed that the demand for ice increases during summer season. Similarly, demand for umbrella and rain coats increases during rainy season and demand for woollens increases during winter season. So the market demand for a commodity is also influenced by the climatic conditions.



### INTEXT QUESTIONS 9.5

1. Name four factors that affect the individual demand for a commodity.
2. What will happen to the demand for tea if price of sugar increases?
3. What will happen to the demand for coke if price of pepsi falls?
4. Distinguish between normal goods and inferior goods.
5. Prepare a list of at least five items which are in fashion now a days.
6. Fill in the blanks with appropriate words:
  - (i) If the income of a buyer falls, his demand for inferior goods will .....
  - (ii) When price of ink increases, the demand for fountain pen will .....
  - (iii) ..... is the number of buyers of a commodity in the market, higher will be the demand for the commodity.
  - (iv) If the distribution of income and wealth is more in favour of the ..... the demand for goods used by the poor will be more.



### WHAT YOU HAVE LEARNT

- Demand for a commodity refers to the quantity of the commodity that a buyer is willing to buy at given price at given time.
- Individual demand is the quantity of a commodity that an individual buyer is willing to buy at the given price at given time.
- Market demand is the total quantity of a commodity that all the individual buyers in the market are willing to buy at given price at given time.
- The determinants of individual demand are – price of the commodity, price of related goods, income of the buyer, tastes, preferences and fashion.
- The determinants of market demand are – number of individual buyers buying that commodity, distribution of income and wealth and climatic condition in addition to the determinants of individual demand.
- The law of demand states that if all other factors affecting demand remain constant, the buyers will buy more quantity of a commodity at lower price and less of it at a higher price.
- Demand curve is a diagrammatic representation of law of demand.
- The demand curve of a commodity slopes downwards from left to right.



Notes



## TERMINAL EXERCISE

1. Define demand. Distinguish between individual demand and market demand.
2. Briefly explain the determinants of individual demand for a commodity.
3. State the factors which may affect market demand for a commodity.
4. State and explain the law of demand with the help of a hypothetical numerical example/schedule.
5. What is a demand curve? Draw an individual demand curve with the help of a hypothetical demand schedule.
6. Why does the demand curve slope downwards from left to right?
7. What are the reasons behind the law of demand.



## ANSWERS TO INTEXT QUESTIONS

### Intext Questions 9.1

1. Demand refers to the quantity of a commodity that a buyer is willing to buy at given price per unit of time.
2. (i) Price of the commodity  
(ii) Quantity of the commodity to be bought  
(iv) The time period

### Intext Questions 9.2

1. The law of demand states that other factors determining the demand remaining constant, price of a commodity and quantity demanded are inversely related.
2. (i) Income of the buyer does not change.  
(ii) Price of related goods does not change  
(iii) Tastes, preferences and fashion do not change.
3. Demand for apple will fall

### Intext Questions 9.3

1. Real income will increase
2. Demand curve will slope downwards from left to right.





3. Decrease

### Intext Questions 9.4

1. 58, 48, 38, 28, 18
2. 26, 17, 14, 11, 8

### Intext Questions 9.5

1. Price of the commodity, Price of related goods, Income of the buyer, tastes, preferences and fashion.
2. fall
3. fall
4. Demand for normal goods increases with the increase in income whereas demand for inferior goods decreases with the increase in income of the buyer.
5. Jeans, Tops, electronic watches, ball pen, Mobile phone
6. (i) Increase (ii) Decrease (iii) More (iv) poor

## MODULE - 4

### Distribution of Goods and Services



Notes



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10

## SUPPLY

In the previous chapter we have studied about the meaning of demand for a commodity, determinants of demand and the law of demand. But the buyers will be able to buy a commodity only when it is available in the market. So the question arises, who supplies the commodities in the market? A commodity must be produced first, stored properly and transported to the market in order to be available for the buyers. Have you ever visited an agricultural farm? Since farmers produce food grains, fruits and vegetables etc. in their farms, they are the producers of these commodities. Similarly consumer goods such as garments, soaps, tooth paste, tooth brush, shoes, pens, etc are manufactured in the factories. Producers of such items are called manufacturers. Buyers buy these items from the sellers in the market. The original producer and the seller in the market could be the same person or different persons. If they are different, it simply means that the sellers in the market have procured these items from the original producers to sell them to the buyers in the market. So the farmers, manufactures and sellers supply the commodities in the market. They are all called producers. The production unit in which production of a commodity takes place is called a firm. Thus we can say that firms supply the commodities.



### OBJECTIVES

After completing this lesson, you will be able to:

- *understand the meaning of stock and supply;*
- *understand the meaning of individual supply and market supply of a commodity;*
- *explain the determinants or factors affecting supply of a commodity;*
- *understand the relation between price of a commodity and its quantity supplied;*
- *explain how to construct an individual supply curve and know its shape.*



## 10.1 MEANING OF SUPPLY

We should not confuse between “availability of a commodity in the market” and “supply of that commodity. They are not the same. Even if a commodity is available, it does not mean that it has been supplied. The **definition** of supply is given as follows:

**Supply of a commodity is the quantity of the commodity that a seller offers for sale at a given price at a given time.**

The definition of supply includes the following three things:

1. The quantity of a commodity offered for sale by a seller.
2. The price of the commodity given in the market at which the seller is willing to sell that quantity of the commodity.
3. The time period during which the seller is willing to sell that quantity of the commodity.

### Examples of Supply

- Ganga Singh sold 120 litres of milk at a price of Rs.25 per litre during last week from his dairy farm.
- The fruit seller sold 600 Kg of apples during past 15 days at Rs. 50 per Kg of apple.
- A firm called ‘X’ Ltd. sold 8 quintals of sugar at a price of Rs.2800 per quintal in one day.
- The grain merchant sold 300 quintals of rice at Rs.2300 per quintal in the month of August.

Note that the time period may vary. It may be a month, a week or two weeks and so on.

## 10.2 STOCK AND SUPPLY

The total quantity of a commodity available with a seller/firm at a particular point of time is called stock. On the other hand supply is that part of stock of the commodity that the seller is ready to sell at some given price during a given time period. So supply is a flow. Stock is measured at a particular point of time whereas supply is measured over a period of time. Take the example given above-“The grain merchant supplied 300 quintals of rice at Rs.2300 per quintal in the month of August.” Let us say that the merchant procured 820 quintals of rice on the first day of August 2011. This was called the stock as on 1<sup>st</sup> August 2011. Here 1<sup>st</sup> August 2011 is the point of time at which the stock has been measured. The supply of 300 quintals



at a price of Rs.2300 during August was the flow. Since there are 31 days in August, we term it as period of time during which the supply has been measured. Over these 31 days the merchant sold some amount every day which if added becomes 300 quintals at the end of that month at the given market price of Rs. 2300.

So, supply is a part of the stock of the Commodity.



### INTEXT QUESTIONS 10.1

1. Define supply.
2. Name three elements included in the definition of supply.
3. Distinguish between stock and supply.

### 10.3 FACTORS AFFECTING INDIVIDUAL SUPPLY

What factors influence the individual supply of a commodity? The most important factors are the following:

- Price of the commodity
  - Technology of production
  - Price of inputs
  - Price of other related goods
  - Objective of the firm
  - Government policy
- (i) **Price of the commodity:** Price of the commodity is an important determinant of supply of a commodity. When a producer produces a commodity he incurs a lot of expenditure on factors of production and raw materials etc. which we call cost of production. He can recover these costs by selling the product at certain price in the market. Since price is also the average revenue, higher the price higher will be the average revenue and accordingly higher will be total revenue. So price is a very important determinant of supply.
- (ii) **Technology of production:** An improvement in technology of production reduces the cost of production per unit of the commodity which increases the margin of profit of the firm. This induces the firm to supply more of the commodity with the use of improved technology. On the other hand if a firm uses old and inferior technology; it increases the cost of production per unit of the commodity and reduces the margin of profit which leads to decrease in supply of the commodity.



- (iii) **Price of inputs:** Suppose a firm is producing ice cream. If the price of milk falls, the cost of production per unit of ice creams will fall. It will lead to increase in margin of profit per unit. So, the firm will increase the supply of ice cream. On the other hand, if the price of milk increases, cost of production per unit of ice cream will increase. It will lead to decrease in margin of profit and firm will decrease the supply of ice cream. Thus, if price of any input used in production of a commodity falls, it leads to decrease in cost of the production per unit and as a result supply of the commodity will increase. On the other hand, an increase in price of any input used in production of a commodity increases cost of production per unit and decreases supply of the commodity.
- (iv) **Price of other related goods:** Supply of a commodity is also influenced by the price of other related goods. Let us suppose that a farmer produces two goods wheat and rice with the help of given resources. If the price of rice increases, it will be more profitable for the farmer to produce more of rice. The farmer will divert his resources from production of wheat to production of rice. As a result the supply of rice will increase and that of wheat will decrease. On the other hand, a fall in price of rice will result in decrease in supply of rice and an increase in supply of wheat.
- (v) **Objective of the firm:** Different firms have different objectives. Some firms have an objective to maximize their profits whereas some may have an objective of maximizing sales. Some other firms may have an objective to increase their goodwill/prestige and some may have an objective of increasing employment opportunities. A firm having an objective of increasing sales may supply more of a commodity even at a lower price. Thus supply of a commodity is influenced by the priority given to the objective by the firm and readiness to sacrifice the one for the other.
- (vi) **Government policy:** Government policy also influences the supply of a commodity. For example if the government increases the rate of value added tax or sales tax on a commodity, it will increase the cost of production per unit which will decrease the supply of the commodity. On the other hand, a reduction in the tax on a commodity will decrease cost of production per unit and increase the supply of the commodity.

## 10.4 INDIVIDUAL SUPPLY SCHEDULE OF A COMMODITY

Supply of a commodity by an individual firm is called individual supply. In order to construct an individual supply schedule of a commodity, we need information on quantities supplied at different prices. In all the examples on supply given earlier in this lesson, we have only mentioned a particular quantity of the good supplied at a particular price over a given period. We know that in reality price of the commodity



does change. Now let us ask the question- what happens if the price of the commodity changes? Accordingly it is expected that the quantity of the commodity will also change. Let us take an example of a firm X Ltd which sold 8 quintals of sugar in a day at the given price of Rs. 2800 per quintal. Suppose the price increased to Rs.2900 per quintal. It is found that X Ltd supplied 9 quintals sugar in a day at this price. Similarly when the price increased to Rs.3000 the quantity supplied increased to 10 quintals. Further at prices Rs.3100 and 3200 the quantity supplied increased to 12 and 15 quintals respectively. This information about the different quantities supplied at different prices is given in the Table 10.1 below.

**Table 10.1 Supply of sugar of 'X' Ltd.**

Price (Rs per quintal)	Quantity supplied of sugar per day (in quintal)
2800	8
2900	9
3000	10
3100	12
3200	15

Such a tabular presentation of different quantities of a commodity supplied by a firm at different prices is called individual supply schedule.

### 10.5 LAW OF SUPPLY

Just now we said that the six major factors determining supply of a commodity are – price of commodity, price of other related goods, price of inputs, technology of production, objective of the firm and government policy. A change in any one or all of these factors may lead to change in the quantity supplied of the commodity. Suppose we want to know the manner in which the quantity supplied of a commodity changes due to change in one of the factors. In other words, let us try to know the effect of change in any one factor on the quantity supplied. To know this we must keep all other factors unchanged or constant. To begin with, out of the six factors, let us only consider the effect of change in price of the commodity on its quantity supplied. To know this we must assume that all other factors such as price of other related goods, price of inputs, technology of production and government policy etc. remain constant or do not change at this time. The relationship between price and quantity supplied, when all factors other than price of the commodity remain constant, is given by the law of supply.

Consider table 10.1 again. It shows different quantities of sugar supplied by 'X' Ltd. at different prices. In the table you can only see two columns on price and quantity supplied. The absence of columns on other factors implies that they are held constant. You can see that when price of sugar is Rs 3000 per quintal, the firm offers 10 quintals



of sugar for sale per day. When price rises to Rs 3200 per quintal, it offers more i.e. 15 quintals of sugar for sale per day. On the other hand, when price of sugar falls to Rs 2800 per quintal it offers less, i.e. 8 quintals for sale per day. It means the firm supplies more quantity of a commodity at a higher price and less of it at a lower price. We can state it as a law in the following manner.

**All other factors determining supply remaining constant, the price of a commodity and its quantity supplied are directly related.**

The law of supply can be explained with the help of another example given in table 10.2.

**Table 10.2 Supply of mangoes by Mohan**

Price of mangoes (Rs per kg)	Quantity supplied of mangoes per day (in kgs)
20	100
30	200
40	300
50	400
60	500

The table 12.2 shows the different quantities of mangoes supplied by Mohan, a seller of mangoes, at different prices. Mohan supplied 100 kg of mangoes per day when the price is Rs 20 per kg, when price rises to Rs 40 per kg he is ready to supply 300 kg of mangoes per day, and so on. Thus the quantity supplied increases as the price of mangoes increases. This is in accordance of law of supply.

## 10.6 SUPPLY CURVE

The information given in table 10.2 can also be represented diagrammatically. The diagrammatic representation of law of supply is called the supply curve. Thus, supply curve shows different quantities of a commodity supplied at different prices per unit of time in diagrammatic form.

We can construct an individual supply curve with the help of the information given in table 10.2. The supply curve is drawn in Fig. 10.1

Take quantity supplied of mangoes on X-axis and price of mangoes on Y-axis. On the Y-axis (vertical) the prices starting from Rs 20 to 60 are plotted. On the X-axis (horizontal) the quantities of mangoes starting from 100 to 500 kg are plotted. Mohan has supplied 100 kg of mangoes at Rs 20. This combination is shown at point A in graph given in Fig. 10.1. Similarly, the other combinations of price and quantity of mangoes as given in table 10.2 are shown as points B, C, D, E and F. By joining these points Mohan's supply curve for mangoes has been derived.



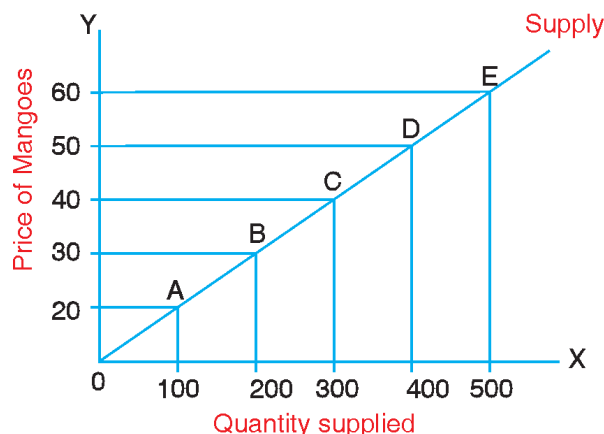
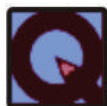


Fig. 10.1 Individual supply curve

### 10.7 SHAPE OF THE SUPPLY CURVE

According to the law of supply when other factors determining supply remain constant, a firm offers more quantity of a commodity for sale at a higher price and less of it at a lower price. Due to this direct relationship of price and quantity supplied of the commodity, the supply curve is upward sloping. This means that the supply curve which looks as a straight line in the diagram, starts from a point closer to the origin and then moves up towards right. Now, the question arises, why does a firm supply more quantity of a commodity at a higher price and less of it at a lower price i.e. why does the supply curve slope upwards? The following factors are responsible for upward slope of the supply curve:

- A rise in price of the commodity causes rise in profits, as a result firms are induced to supply more quantity of the commodity to increase profit.
- A rise in price of the commodity induces the seller to dispose of at least a part of his stock. The reverse happens when there is a fall in price of the commodity.
- An increase in the price of the commodity causing higher profit attracts the new firms to enter the market and this adds to the supply of the commodity leading to more quantity supplied at a higher price.



### INTEXT QUESTION 10.2

- Draw a supply curve with the help of data given below:

Price (Rs per unit)	1	2	3	4	5
Quantity supplied (in units)	50	100	150	200	250

- Draw a supply curve by using Table 10.1.





## 10.8 MARKET SUPPLY OF A COMMODITY

'X' Ltd is not the only firm in the market supplying the sugar. There may be other firms also supplying sugar in the market. In order to know the total quantity of sugar supplied by all the firms taken together in the market we have to simply add the individual quantities at the prevailing price and time. The resultant quantity will be called the market supply of sugar.

**Hence the total quantity of a commodity supplied by all the firms in the market at a given price at a given time is called the market supply of that commodity.**

### Example

Suppose, there are only three firms X, Y and Z who are supplying sugar in the market. At a price of Rs.2800 per quintal X, Y and Z supplied 8, 10 and 15 quintals of sugar respectively in a day. Adding these quantities, we get 33. So the market supply of sugar is 33 quintals per day at a price of Rs.2800.

## 10.9 MARKET SUPPLY SCHEDULE OF A COMMODITY

Like an individual supply schedule, the market supply schedule of a commodity is the sum of the quantities of the commodity supplied by all the firms in the market at different prices. We have seen that in case of individual firm/seller, when price of the commodity increases, the quantity of the same increases and when the price decreases the quantity decreases as per law of supply. Similarly all other firms/sellers in the market will also increase or decrease their respective quantities. Accordingly there will be different quantities supplied at different prices by all firms/sellers taken together in the market.

Continue with the example of supply of sugar. Study the market supply schedule of sugar as given in table 10.3.

**Table 10.3 Market supply of sugar**

Price (Rs per quintal)	Quantity supplied of sugar per day (in quintals)			Market supply of sugar (in quintal)
	Firm X	Firm Y	Firm Z	
2800	8	10	15	33
2900	9	11	16	36
3000	10	12	17	39
3100	12	14	20	46
3200	15	17	25	57



### Notes

You can see in table 10.3 that when price of sugar is Rs 2800 per quintal, firm X supplies 8 quintals, firm Y supplies 10 quintals and firm Z supplies 15 quintals of sugar per day. Therefore market supply of sugar at a price of Rs. 2800 per quintal is  $8 + 10 + 15 = 33$  quintals per day. When the price changed to Rs.2900, the supply of X, Y and Z was 9, 11 and 16 quintals respectively which comes to 36 quintals. So at price Rs.2900 the market supply of sugar was 36 quintals. Similarly you can see the individual and the market supply of sugar at prices Rs.3000, 3100 and 3200 respectively in the table.



### INTEXT QUESTIONS 10.3

- If there are only three firms A, B and C in the market supplying a commodity, find out the market supply of the commodity with the help of their supply schedules as given below

Price (Rs/unit)	Quantity supplied (in unit)			Market supply (in unit)
	Firm A	Firm B	Firm C	
100	1000	1500	2000	—
200	2000	2000	3000	—
300	3000	2500	4000	—
400	4000	3000	5000	—
500	5000	3500	6000	—

- Complete the following table (assuming that there are only three firms A, B and C in the market)

Price (Rs per unit)	Quantity supplied (in units)			Market supply (in units)
	Firm A	Firm B	Firm C	
10	150	—	200	650
11	200	—	300	1000
12	250	—	400	1350
13	300	—	500	1700
14	350	—	600	2050



## 10.10 FACTORS DETERMINING MARKET SUPPLY

All the factors which influence individual supply of a commodity also influence its market supply. In addition to these factors, the market supply of a commodity is also influenced by following two factors:

- Number of sellers/firms
  - Expected future price
- (i) **Number of sellers/firms:** Market supply is an aggregate of all individual supply schedules in the market. Consider table 10.2 showing market supply of sugar. There are three firms X, Y and Z supplying sugar in the market. Now suppose another firm 'W' comes into existence and starts supplying sugar. What will happen to the market supply of sugar? Market supply of sugar will increase. Therefore, it is clear that if the number of firms increases, market supply will also increase. On the other hand, if number of firms decreases, the market supply will also decrease.
- (ii) **Expected future price:** If the price of a commodity is expected to rise in the near future, the firm will supply less quantity of the commodity at present in expectation of higher profit due to rise in price in future. But if the price of a commodity is expected to fall in near future, firms will offer more quantity of the commodity for sale at present in expectation of less profit in future.



### INTEXT QUESTIONS 10.4

1. Fill in the blanks with appropriate words:
  - (i) Supply of a commodity ....., when its price increases.
  - (ii) A firm having an objective of maximization of profit will supply ..... quantity of a commodity at a higher price.
  - (iii) If a firm produces two goods X and Y with given resources and price of good Y falls, supply of good X will .....
  - (iv) A fall in wage rate will lead to ..... in supply of a commodity.
  - (v) An increase in excise duty on production of T.V. sets will ..... the supply of T.V. sets.
2. What will happen to the supply of a commodity, when
  - (i) The price of raw material used in production of the commodity increases.
  - (ii) A new firm supplying the commodity comes into existence.
  - (iii) There is a technological progress.
3. What will happen to the supply of stainless steel utensils if the price of stainless steel falls?

**WHAT YOU HAVE LEARNT**

- Supply of a commodity is the quantity of a commodity that a seller/firm offers for sale at given price per unit of time.
- The total quantity available with a seller/firm at a particular point of time is called stock. Supply is that part of stock of the commodity that the seller is ready to sell at a given price during a given period of time.
- Individual supply schedule shows the quantities of a commodity offered for sale by an individual firm at different prices in a tabular form. Individual supply curve is derived from an individual supply schedule.
- Market supply is the total quantity of a commodity offered for sale by all the firms in the market at given price and given time.
- The determinants of individual supply are – price of the commodity, price of other related goods, change in technology of production, change in price of inputs, objective of the firm and government policy.
- The determinants of market supply are number of firms supplying the commodity, expected future price in addition to the determinants of individual supply.
- The law of supply states that other factors determining supply remaining constant, price of a commodity and quantity supplied are directly related.
- Supply curve is a diagrammatic representation of law of supply.
- The supply curve of a commodity slopes upwards as per law of supply.

**TERMINAL EXERCISE**

1. Define supply. Distinguish between individual supply and market supply.
2. Explain the factors which affect individual supply of a commodity.
3. Explain three determinants of market supply of a commodity in brief.
4. Distinguish between stock and supply with the help of a suitable example.
5. State and explain the law of supply using a suitable numerical example.
6. What is a supply curve? Draw an individual supply curve with the help of a hypothetical supply schedule.
7. Why does the supply curve slope upwards?
8. What are the reasons behind the law of supply?



## ANSWERS TO INTEXT QUESTIONS



Notes

**Intext Questions 10.1**

1. Supply refers to the quantity of a commodity offered for sale at given price per unit of time.
2. Price of the commodity, quantity supplied and time period.
3. Stock is the total quantity of a commodity available with a firm at a particular point of time.

Supply is that part of stock of a commodity that the seller is ready to sell at given price during a given period of time.

**Intext Questions 10.3**

1. 4500, 7000, 9500, 12000, 14,500
2. 300, 500, 700, 900, 1100

**Intext Questions 10.4**

1. (i) Increases  
(ii) More  
(iii) Increase  
(iv) Increase  
(v) decrease
2. (i) supply of the commodity will decrease  
(ii) supply of the commodity will increase  
(iii) supply of the commodity will increase
3. Supply of stainless steel utensils will increase.



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## DETERMINATION OF PRICE AND QUANTITY

In lesson 9 you have studied how changes in price of a commodity affects its demand. In lesson 10, the same type of study was done about the supply of a commodity. In fact, both demand and supply of a commodity are affected by change in price of the commodity. But the interesting point to be noted is that the change in both demand and supply of a commodity also influences the price of the commodity. But the question arises how is the price of a commodity determined in the market. What factors influence the price of a commodity? How changes in demand and supply of a commodity influence its price, is the subject matter of this lesson.



### OBJECTIVES

After completing this lesson, you will be able to:

- *understand what is meant by determination of price;*
- *explain price determination with the help of demand and supply schedule;*
- *understand the equilibrium with the help of schedule;*
- *understand the effects of changes in demand and supply on price and quantity of a commodity.*

### 11.1 MEANING OF PRICE

When a seller sells a commodity, he exchanges it for money. The buyer pays money to the seller in exchange of goods and services. The amount of money which a buyer pays for one unit of a good or service to the seller, is called the price of the good or service. For example a buyer pays Rs 36 to buy one litre of full cream milk, the price of full cream milk will be Rs 36 per litre.



Normally, the main aim of the seller is to earn profit. Profit is the difference between total revenue and total cost. Total revenue means total money receipts of the producer from the sale of given volume of output. Total cost means total expenditure incurred by a seller in the production of that output.

The seller fixes the price of the commodity supplied by him. The market price of a commodity is the price at which it is sold in the market. While fixing the price of a commodity the seller keeps in mind many factors besides earning maximum profit. Some of the important factors which influence the decision of a seller in fixing the price of a commodity are given below.

- (i) **Cost of production:** A seller fixes the market price of his commodity which is more than the per unit cost of production of commodity. The difference between the per unit price and per unit cost of production of the commodity is profit per unit. Thus, higher the difference between price and per unit cost of production greater will be the margin of profit. So per unit cost of production is of great importance in fixing the price of the commodity by a seller.
- (ii) **Price fixed by other sellers:** While fixing the price of his commodity, the seller also considers the price of commodity fixed by the other sellers of similar commodity. If a seller fixes the price of his commodity which is much higher than the price fixed by other sellers of similar commodity, he may not be able to sell more quantity of the commodity. So in order to increase his sales he will have to decrease the price of his commodity. Thus, it is also very important for the seller of a commodity to fix the price of his commodity which is comparable to the price of other sellers in order to earn maximum profit.
- (iii) **Expected sales at different prices:** The seller also considers the quantity of the commodity he will be able to sell at different prices. So, the price of the commodity fixed by him must be such that the total quantity of the commodity sold by him gives him maximum total profit.



### INTEXT QUESTIONS 11.1

1. Suppose you are a seller of tomatoes in the market. Name the factors you will consider while fixing the price of tomatoes sold by you.
2. What will be the effect on price of tomatoes fixed by you if the cost of transportation increases due to increase in price of diesel.





## 11.2 MEANING AND DETERMINATION OF PRICE

If the seller fixes a higher price of the commodity, the quantity supplied of the commodity may be more than the quantity demanded and if he fixes the lower price of the commodity, the quantity demanded of the commodity may be more than its quantity supplied. You have already learnt that according to the law of demand the buyer of a commodity buys more of a commodity at a lower price and less of it at a higher price when all other factors determining demand remain constant. According to the law of supply, the sellers of a commodity are willing to sell more of it at a higher price and less of it at a lower price, other factors determining supply remaining constant. The aim of buyer is to get maximum satisfaction by spending minimum and the aim of the seller is to get maximum profit. If at a price both quantity demanded and quantity supplied of a commodity are equal that is called equilibrium price of the commodity. In this way, the price of a commodity is determined by the forces of demand and supply in the market. But in case of some commodities, the price is determined by the government to protect the interest of consumers or producers. In this lesson, we will discuss how the price of a commodity is determined by the forces of demand and supply.

## 11.3 MEANING OF EQUILIBRIUM PRICE

Equilibrium literally means a state of balance from where there is no tendency to change. In other words equilibrium is a situation where the forces determining equilibrium are in balance or are equal to each other. Here the forces determining equilibrium price are quantity demanded and quantity supplied of the commodity. The price at which quantity demanded of a commodity is equal to its quantity supplied is called the equilibrium price.

At equilibrium price quantity demanded and quantity supplied of a commodity are equal. This quantity is called the equilibrium quantity of the commodity.

## 11.4 DETERMINATION OF EQUILIBRIUM PRICE

In practical life, the price at which the seller/firm wants to sell a commodity, its quantity supplied may be greater or lesser than its quantity demanded. So this price is not the equilibrium price of the commodity. Now the question arises as to how will equilibrium be reached?

Consider the market demand and market supply schedule of tomatoes at different prices as given in table 11.1. You have already read about market demand and supply schedules of a commodity in lesson 9 and 10 respectively.





Notes

Table 11.1 Quantity demanded and supplied of tomatoes

Price of tomatoes (Rs per kg)	Quantity demanded per day (kgs)	Quantity supplied per day (kgs)
20	100	300
18	150	250
<b>16</b>	<b>200</b>	<b>200</b>
14	250	150
12	300	100

In table 11.1, it is observed that when the price of tomatoes is Rs 20 per kg, the seller offers 300 kg of tomatoes for sale but the buyers are willing to buy only 100 kg of tomatoes. If the price falls to Rs 18 per kg, the quantity demanded rises to 150 kg but the quantity supplied falls to 250 kg of tomatoes. In both the cases, the quantity supplied of tomatoes is more than its quantity demanded showing excess supply of tomatoes. This will result in further fall in price of tomatoes.

Now due to excess supply, the price of tomatoes falls to Rs 16 per kg. At this price buyers are willing to buy 200 kg of tomatoes and the sellers are also willing to sell the same quantity of tomatoes i.e. 200 kg of tomatoes. This is how equilibrium price is reached. Thus Rs 16 per kg is the equilibrium price of tomatoes at which quantity demanded of tomatoes is equal to quantity supplied at 200 kg of tomatoes.

### 11.5 DISEQUILIBRIUM SITUATIONS AND ADJUSTMENT TO EQUILIBRIUM POSITION

In the table 11.1 see that at prices Rs 12 and 14 (less than equilibrium price) quantity demanded and supplied are not equal. Similarly at prices Rs 20 and 18 (more than equilibrium price) quantity demanded and supplied are also not equal. These two situations are disequilibrium situations. Let us explain them.

Consider the situation in which the market price of tomatoes is Rs 12 per kg. At this price the buyers are willing to buy 300 kg of tomatoes where as the sellers are willing to sell only 100 kg of tomatoes. Similarly when the price of tomatoes is Rs 14 per kg the quantity demanded of tomatoes falls to 250 kg and quantity supplied rises to 150 kg. Both these case show **excess demand** of tomatoes in the market. This will lead to further rise in price of tomatoes. The price of tomatoes will continue to rise till a price is reached at which quantity demanded of tomatoes equals their quantity supplied. Thus equilibrium

**Notes**

price of tomatoes will be reached at Rs 16 per kg at which both quantity demanded and quantity supplied of tomatoes are equal at 200 kg.

On the other hand, when the price of tomatoes rises to Rs 18 per kg, quantity demanded is 150 kg and quantity supplied is 250 kg i.e. quantity supplied of tomatoes is more than their quantity demanded. This is situation of **excess supply** of tomatoes. This will lead to fall in price and price will continue to fall till it reaches equilibrium price Rs 16 per kg at which quantity demanded and supplied of tomatoes are equal i.e. 200 kg.

**INTEXT QUESTIONS 11.2**

1. Suppose you are a seller of tomatoes and you have 100 kg of tomatoes for sale. The market price is Rs 20 per kg. At this price the demand for tomatoes is only 60 kg. How will it affect the price of tomatoes fixed by you?
2. As in Question No. 1, if at price Rs 20 per kg the demand for tomatoes is 150 kg. How will this affect the price of tomatoes fixed by you?
3. Tick mark (✓) the correct answer

Excess demand is a situation where:

- (a) Quantity demanded of a commodity equals its quantity supplied
  - (b) Quantity demanded of a commodity is more than its quantity supplied.
  - (c) Quantity supplied of a commodity is more than its quantity demanded
4. Thick mark (✓) the correct answer

Excess supply is a situation where:

- (a) Quantity supplied of a commodity is more than its quantity demanded
  - (b) Quantity supplied of a commodity equals its quantity demanded
  - (c) Quantity supplied of a commodity is less than its quantity demanded.
5. Tick mark (✓) the correct answer:

If at a given price of a commodity quantity demanded of a commodity is more than its quantity supplied:

- (a) Price of the commodity does not change
- (b) Price starts falling
- (c) Price starts rising



6. If at a given price quantity supplied of a commodity is greater than its quantity demanded:
- (a) Price starts falling
  - (b) Price remains the same
  - (c) Price starts rising

### 11.6 EFFECT OF CHANGE IN DEMAND ON EQUILIBRIUM PRICE AND QUANTITY

You have studied that equilibrium price of a commodity is the price at which quantity demanded of the commodity is equal to its quantity supplied. But what happens when the demand for commodity increases but its supply remains the same. An increase in the demand of the commodity will lead to increase in equilibrium price and quantity demanded and supplied of the commodity. On the other hand, if demand for the commodity decreases but its supply remains the same, it will lead to decrease in equilibrium price and quantity demanded and supplied of the commodity.

### 11.7 EFFECT OF CHANGE IN SUPPLY ON EQUILIBRIUM PRICE AND QUANTITY

When the supply of a commodity increases but its demand remains the same, equilibrium price will decrease but equilibrium quantity demanded and supplied will increase. On the other hand when the supply of a commodity decreases but its demand remains the same, its equilibrium price will increase but equilibrium quantity demanded and supplied will decrease.



#### INTEXT QUESTIONS 11.3

1. What happens to the equilibrium price of a commodity when
  - (a) its demand increases and supply remains the same
  - (b) its supply increases and demand remains the same
  - (c) its demand decreases but supply remains the same
  - (d) it supply decreases but demand remains the same
2. How is equilibrium quantity demanded and supplied of a commodity affected when
  - (a) its demand increases but supply remains the same



- (b) its supply increases but demand remains the same
- (c) its demand decreases but supply remains the same
- (d) its supply decreases but demand remains the same.

**WHAT YOU HAVE LEARNT**

- The amount of money given by a buyer to a seller in exchange of a unit of a goods or service is treated as price of that good or service.
- Equilibrium price is the price at which both quantity demanded and supplied of a commodity are equal.
- Equilibrium price is determined by the market forces of demand and supply of a commodity.
- Excess demand is a situation when at a given price quantity demanded of a commodity is greater than its quantity supplied.
- Excess supply is a situation when at a given price quantity supplied of a commodity is greater than its quantity demanded.
- When there is excess demand of the commodity the price starts rising and it continues to rise till equilibrium price is reached.
- When there is excess supply of the commodity its price starts falling and continues to fall till equilibrium price is reached.
- When demand for a commodity increases but its supply remains the same, both equilibrium price and quantity demanded and supplied will increase.
- When demand for a commodity decreases but its supply remains the same both equilibrium price and equilibrium quantity demanded and supplied will decrease.
- When supply of a commodity increases and its demand remains the same, equilibrium price will decrease and equilibrium quantity demanded and supplied will increase.
- When supply of a commodity decreases but its demand remains the same equilibrium price will increase but equilibrium quantity demanded and supplied will decrease.

**TERMINAL EXERCISE**

1. What is meant by price?
2. What is meant by equilibrium price?
3. What is meant by equilibrium quantity?
4. How is equilibrium price of a commodity determined?
5. What happens to the price of a commodity when at a given price:
  - (a) Quantity demanded of a commodity is greater than its quantity supplied
  - (b) Quantity supplied of a commodity is greater than its quantity demanded
  - (c) quantity demanded of a commodity is equal to its quantity supplied
6. How is equilibrium price of a commodity affected when demand increases but supply remains the same.
7. Explain the effect of decrease in supply of a commodity on its equilibrium price and equilibrium quantity demanded and supplied when its demand remains the same.

**ANSWERS TO INTEXT QUESTIONS****Intext Questions 11.1**

1. (i) cost of production  
(ii) price fixed by other seller of similar commodity  
(iii) expected sales at different prices.
2. Price of tomatoes will increase.

**Intext Questions 11.2**

1. The price of tomatoes will decrease
2. The price of tomatoes will increase
3. (b)

**Notes**



4. (a)
5. (c)
6. (a)

**Intext Questions 11.3**

1. (a) Equilibrium price will increase  
(b) Equilibrium price will decrease  
(c) Equilibrium price will decrease  
(d) Equilibrium price will increase
2. (a) will increase  
(b) will increase  
(c) will decrease  
(d) will decrease



12



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## MARKET

In previous lesson we studied about production and factors of production. Whatever goods are produced by the combined efforts of factors of production have to be placed in market or offered for sale in the market. Whenever and wherever we want to have anything, we go to the market and buy that thing. It may be soap, shampoo, cloth, and so on.



### OBJECTIVES

After completing this lesson, you will be able to:

- *explain the meaning of market;*
- *understand the structure of market;*
- *distinguish the markets on the basis of channels of distribution;*
- *explain the meaning of online market.*

### 12.1 MEANING OF MARKET

Ordinarily, the term market refers to a place, where goods are purchased and sold, such as Big Bazaars, Chandni Chowk in Delhi, Fashion Street in Mumbai and many more. Market should not be limited to a particular place. In economics Market can exist even without personal contact of buyers and sellers. In this way, **“Market refers to the arrangement in a given area whereby buyers and sellers come in contact with each other directly or indirectly, to buy or sells goods.”** This definition indicates that face to face contact is not necessary for market. Buyers and sellers can carry on their transaction indirectly, through agents, telephone, mobile or internet. Whatever way the buyers and sellers interact, they do so to exchange goods and services for money. In the process, the price and quantity of the goods and services traded are also determined.

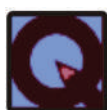


Thus, market is a mechanism or system by which buyers and sellers interact to determine the price and quantity of a good or service.”

### Important Features of a Market

As per the definition stated above, a market has following features:

1. **Commodity, i.e., there must be a commodity which is being demanded and sold.**
2. **Buyers and sellers, i.e., there must be buyers and sellers of the commodity.**
3. **Communication, i.e., there must be communication between buyers and sellers.**



### INTEXT QUESTIONS 12.1

Fill in the blanks.

1. A market exists where there is ..... between buyers and sellers.
2. Buying and selling takes place in a .....
3. The process of ..... and ..... takes place simultaneously in market place.
4. A market has existence of buyers and sellers, communication between them and .....

## 12.2 STRUCTURE OF MARKET

By “structure of market” we mean nature of the product, number of sellers and buyers in the market etc. On this basis we can give two extreme forms of market:

1. Monopoly market
2. Perfectly Competitive market

### 12.2.1 Monopoly

The word “Monopoly” has been derived from the two Greek words ‘Monos’ and ‘Polus’ means single seller. ‘Monos’ means single and ‘Polus’ means seller, so the word “Monopoly” means single seller. Monopoly is a market structure in which there is a single firm producing all the output and there is no close substitute of product sold by the monopolist, thereby ruling out any sort of competition. In this market the seller does not face any competition because there are no other sellers of the product he is selling. The seller is in a position to charge a high price of his product depending upon the response of the consumers. **Example: In India the government has monopoly in atomic energy, defence, public water supply system, railways, etc.**





Notes

### Features of Monopoly

- (i) **A single firm:** The monopolist is the only producer of the good. He has got no competitor. He is the only one who rules the market with his commodity.
- (ii) **No close substitute of the commodity:** There are no close substitutes of the commodity produced by the monopolist. “Close substitute” means another similar product having same use. The monopolist produces all the output in a particular market.
- (iii) **Pricemaker:** The monopolist being the sole seller of the commodity in the market decides the price of the commodity as there is no one to challenge his price. The monopolist is a ‘price-maker’. It does not mean that monopolist can fix both price and the quantity demanded. If he fixes a high price, less quantity of the commodity will be demanded.
- (iv) **No Entry of New Firm:** It is not possible for new firms to enter in the market and compete with the single seller. Being the single seller or firm, there is no difference between firm and industry under monopoly.
- (v) **The aim of the monopolist is to maximise profit**

### 12.2.2 Perfectly Competitive market or Perfect Competition

The other extreme situation of monopoly market is called perfectly competitive market or perfect competition.

#### Feature of Perfect Competition

- (i) **Large number of sellers and buyers** – As against monopoly market, a competitive market has large number of sellers selling the commodity to a large number of buyers.
- (ii) **Homogeneous product:** Under perfect competition only a single product is sold. This means all the sellers sell the same type of product to buyers. So the product is a perfect substitute.
- (iii) **Free entry and exit:** Under perfect competition there is no bar on any new firm or producer to enter the market to sell or produce the product. Similarly if any existing seller wants to exit then he is free to do so.
- (iv) Every seller wants to earn **maximum profit**
- (v) **The government’s role is to provide protection to sellers and do not interfere in business.**
- (vi) Under perfect competition sellers and buyers have **perfect knowledge** about the product.
- (vii) There is no bar on factors of production such as labour etc. to move from one production unit to another to do work.



### Market Structure in Real World Situation

The situation of monopoly or perfect competition is not seen in real world. As per law private monopoly is not allowed. Only monopoly by the government exists. Now-a-days the market is flooded with so many varieties of the same product that perfect competition in real sense also does not exist. Take the example of “soap” – a product meant for taking bath or washing hands. Under perfect competition it is expected that only one type of soap will be sold by many sellers. But in reality we have different brands of soaps available in the market and sold by different firms such as Lux, Dove, Liril, Godrej, Nim, Mysore Sandal, Johnsons, Hamam, dettol, Lifebuoy etc. These are all used for the same purpose i.e. taking bath. but they are different in terms of colour, packaging, fragrance etc. All these sellers also incur heavy expenditure on advertisement to sell their kind of soap. Contrary to perfect competition where there are many sellers selling a single product without any advertisement, in this case there are many sellers selling different variations of particular product. So we cannot say that this type of market is perfectly competitive. **This type of market is called monopolistic or imperfect competition.**



### INTEXT QUESTIONS 12.2

1. What is meant by monopoly?
2. Give two examples of monopoly in India?
3. Why is there no difference between firm and industry under monopoly?
4. Whether the monopoly firm is price maker or price-taker?
5. What do you mean by “free entry” under perfect competition?
6. Say Yes or No
  - (a) There is one seller under perfect competition.
  - (b) There are different goods sold under perfect competition.
  - (c) Government interferes in production under perfect competition.
  - (d) Product is perfect substitute under perfect competition
  - (e) Buyers have perfect knowledge about product under perfect competition

### 12.3 CLASSIFICATION OF MARKETS ON THE BASIS OF CHANNELS OF DISTRIBUTION OR SALEABLE LOTS

On the basis of channels or saleable lots, markets are classified into:

- (a) Wholesale markets
- (b) Retail markets.

**(a) Wholesale markets**

A wholesaler is a distributor or middleman who sells mainly to retailers and institutions, rather than consumers. When in a market goods are transacted in big lots it is called a wholesale market. Wholesalers usually do not sell goods in small lots. They usually sell to the retailers. The wholesaler is the essential link between manufacturers and end consumers. It is the presence of wholesalers that manufacturers are in comfort zone as they can sell their products in large quantities and focus on business and production.

**(b) Retail markets**

Retail consists of the sale of physical goods or merchandise from a fixed location, such as a departmental store, shopkeeper in small or individual lots for direct consumption by the purchaser. In retail markets, goods are sold in small lots. Retailers normally sell to the ultimate consumers.

Manufacturer → Wholesaler → Retailer → Consumers

In the channel of distribution of goods and services the position of a retailer is most important as it is indirect contact with the final consumers. So the location of the retail shop or outlet is very important as compared to wholesale business. A retail outlet must be located nearer to residential localities so that people can easily come to buy goods and services. The retailer also has to incur lot of expenditure on decoration of offices shops and proper presentation of the commodities so that consumers are attracted towards the retail shop.

**INTEXT QUESTIONS 12.3**

1. Give some examples of retail outlet in your locality.
2. Define Wholesaler.
3. Define Retailer.
4. Define Retail Market.

**12.4 ONLINE MARKET OR ONLINE SHOPPING**

It is an innovative process whereby consumers directly buy goods or services from a seller without an intermediary service over the internet. It is also known as electronic commerce. Now a days, online shopping has become popular, shopping has evolved with the growth of technology. In this shopping one can use a credit card or debit card to make payments, however some systems enable users to create accounts and pay by alternative means, such as:

- Billing to mobile phones and landlines
- Cash on delivery

## MODULE - 4

### *Distribution of Good and Services*



#### Notes

#### Market

- Cheques
- Debit card
- Postal money order

Once payment has been accepted the goods or services can be delivered through downloading, distribution, in-store picking etc.

Online stores are usually available 24 hours a day, and many consumers have internet access both at work and at home so they can, rather than visiting any store or shop, they prefer to purchase through internet only. Online stores must describe the products for sale with text, photos, and multimedia files with detail instructions. In present scenario through online shopping one can shop for varieties of goods and services in no time. Over all, this mode of shopping has gained importance in recent years only due to exposure to technology in the market.



#### WHAT YOU HAVE LEARNT

- In economics market refers to the arrangement in a given area where buyers and sellers come in contact with each other directly or indirectly to buy or sell goods.
- Monopoly and Perfect Competition are two extreme forms of Market structure.
- Monopoly is a market structure in which one firm possesses control over the market. It is a market of single seller, who sells a unique product having no close substitutes
- Perfect Competition is a market structure where many firms sell a homogeneous product. There is free entry and exit under this market. Buyers and sellers have perfect knowledge about the market situation.
- A wholesaler is a distributor or middleman who sells mainly to retailers and institutions, rather than consumers.
- A retailer is one who sells varieties of goods or services directly to the general public.
- Online shopping is the process whereby consumers directly buy goods or services from seller without any wastage of time, without an intermediary service, over internet on computer.
- Online shopping is a form of electronic commerce.



#### TERMINAL EXERCISE

1. Define Market.
2. Define Perfect Competition.

3. Define Monopoly.
4. Differentiate between Retail and Wholesale Market.
5. Explain the features of Perfect Competition.
6. Explain the features of Monopoly.
7. Do you think that retailer is concerned about location and presentation of goods that he offers for sale? If yes then why.



## ANSWERS TO INTEXT QUESTIONS

### Intext Questions 12.1

1. Interaction      2. Market place      3. Buying; Selling      4. commodity

### Intext Questions 12.2

1. Monopoly is a market structure in which a single seller producing all the output and there is no close substitute of product sold by the monopolist.
2. Atomic energy, Indian Railways and Post and telegraph
3. Because monopolist is the single producer/seller,
4. Price -maker
5. "Free Entry" means sellers under perfect competition are free to move in and out of the market. There are no barriers on entry of new firms.
6. (a) no      (b) no      (c) no      (d) yes      (e) yes

### Intext Questions 12.3

1. Stationery shops, Kendriya Bhandar, Mother dairy, Medicine shops
2. A wholesaler is a distributor or middleman who sells mainly to retailers and institutions, rather than consumers.
3. Retailer is one who sales goods or merchandise from fixed location such as departmental store, shopkeeper in small or individual lots for direct consumption by the purchaser.
4. Retail market means the market in which goods are sold in small lots to the ultimate consumers.





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**13**

## **ROLE OF GOVERNMENT IN DETERMINATION OF PRICE AND QUANTITY**

We have studied in the previous lesson that the equilibrium price of a commodity is determined by the forces of demand and supply without any intervention of the government. But the price so determined may be so high that some consumers may not afford to buy the commodity at this price or it may be so low that the producers may not be willing to sell their products at this price or it may not even cover their cost of production of the commodity. In such a situation government intervenes and fixes the price either below the equilibrium price or above the equilibrium price to save the interests of consumers or producers as the case may be.



### **OBJECTIVES**

After completing this lesson, you will be able to:

- *understand the role of government in production and distribution of goods and services;*
- *explain how government controls the price;*
- *understand the concept of minimum support price;*
- *explain how and why government helps consumers and producers.*

### **13.1 ROLE OF GOVERNMENT IN PRODUCTION AND DISTRIBUTION OF GOODS AND SERVICES**

As explained earlier, the equilibrium price of a commodity is determined by the free play of the forces of demand and supply of the commodity without any intervention of the government. But sometimes the price so determined is very high when there is shortage of some commodity in the market. In such a situation some consumers can not afford



to buy the commodity due to its high price. So in order to protect the interest of consumers the government has to fix the price of the commodity which is generally lower than the equilibrium price. In the same way when there is bumper crop of food grains, the price of food grains is determined at a lower level. At this price the farmers are unable to meet their cost of production even. So, the farmers are badly affected due to heavy fall in price. In such cases the government fixes the price of food grains which is higher than the equilibrium price in order to protect the interest of producers specially farmers. So, sometimes the government does not allow free play of the forces of demand and supply for determination of price of some commodities in order to protect the interest of consumers or producers. Government can fix the price of the commodity either below the equilibrium price or above the equilibrium price. Such a price is called administered price (Government determined price). Administered price may be in the form of:

- (i) Control Price
- (ii) Support Price
- (iii) Token Price
- (iv) Dual Price

### 13.2 CONTROL PRICE

In order to protect the interest of consumers government fixes the maximum price of the commodity. This maximum price is generally lower than the equilibrium price. This is called control price or ceiling price. This price is fixed by the government because poor people can not afford to buy the commodity at equilibrium price. This situation arises when the production of a commodity is less than its demand. As the price of the commodity fixed by the government is less than the equilibrium price, it may create excess demand of the commodity which means the buyers are willing to buy more than what the sellers are willing to sell. In India government has a control price or ceiling price of the commodities which it considers essential for the masses. For examples some goods such as wheat, rice, sugar, kerosene oil etc. have a control price. Due to excess demand for the commodity at ceiling price government resorts to rationing. Rationing means fixing of quota per head per unit of time. Due to excess demand of the commodity at ceiling price the problem of black marketing may also arise. Black marketing is a situation in which the seller illegally charges the price of the commodity which is much higher than the control price. The problem of black marketing can be solved through dual price policy which will be discussed in the later part of this lesson.



#### INTEXT QUESTIONS 13.1

1. Why does government fix the price of some commodities below the equilibrium price?



## MODULE - 4

### Distribution of Good and Services



#### Notes

### Role of Government in Determination of Price and Quantity

2. Name the problems faced in fixing the price of a commodity below the equilibrium price.
3. What is meant by rationing?
4. What do you mean by black marketing.
5. What policy is adopted by the government to check black marketing arising due to price control?

### 13.3 SUPPORT PRICE

Sometimes, in order to protect the interests of producers specially farmers government fixes the minimum price of the commodity which has to be paid to the producers. This price is generally higher than the equilibrium price. This problem arises when the producers do not cover even their cost of production at equilibrium price. This price fixed by government to safe guard the interests of producers, is called support price. It may create the situation of excess supply of the commodity. It means the sellers are willing to sell more than what the buyers are willing to buy.

In India low price of food grains such as wheat, rice etc. adversely affects the farmers. They may loose their interest in producing food grains. This may result in acute shortage of food grains. Therefore, the system of support price is usually followed in case of agricultural products. The system of support prices assures the farmers that they will be able to sell their products at least at this price.

In case of excess supply of the commodity at support price government is ready to purchase any quantity of the commodity to make buffer stock of the commodity.



### INTEXT QUESTIONS 13.2

1. What is support price?
2. Why does the government fix the price of a commodity higher than the equilibrium price?
3. Suppose the farmers are unable to sell their total output of wheat at a price which si fixed by the government higher than the equilibrium price what policy is adopted by the government?
4. Name the two commodities which have support price in India?

### 13.4 TOKEN PRICE

There are some goods and services which are considered necessary for the existence of life e.g. medical services, health services and education services. Poor people are





unable to make use of these services at prevailing market prices. Therefore, government and some private 'Charitable Institutions' provide these services at a price which is much below even their per unit cost of production. Such a price is called token price for these goods and services. The tuition fees charged in government schools is much below the cost incurred per student by the government.

Token price is charged in order to prevent the wasteful use of these services. Otherwise these services can be made available free of cost also. If these services are provided free some people may try to stay in hospital for a longer period in order to get free shelter and free food.

### 13.5 DUAL PRICE

As explained earlier in this lesson that price control may lead to the shortage of the commodity because sellers are not willing to supply adequate quantity of the commodity at the price fixed by the government as the price is lower than the equilibrium price. This may also lead to black marketing of the commodity. To avoid this situation government adopts dual price policy under this policy a part of the production of the good is sold at control price through fair price shops and the remaining part is sold at prevailing market price which is determined by the forces of demand and supply. At this market price any quantity of the commodity can be bought. For example government sells wheat, rice and sugar to BPL (Below poverty line) card holder at control price through fair price shops and the producers are also allowed to sell their remaining production at equilibrium price in open market.



#### INTEXT QUESTION 13.3

1. What is a token price?
2. What is meant by dual price?
3. Why does the government not supply some commodities free? Why does it charge a token price for them?
4. Tick mark (✓) the correct answer
  - (a) Token price is the price fixed by the government which is higher than the per unit cost of production.
  - (b) Token price is the price which is much below the per unit cost of production.
  - (c) Token price is the price which is charged from rich persons
  - (d) Token price is equal to the per unit cost of production.



### 13.6 EFFECT OF TAXES AND SUBSIDIES ON MARKET PRICE

Government imposes various types of taxes on production and sales of the commodities and also on the imports of raw material etc. in the form of excise duty, sales tax and import duty respectively. These taxes are paid to the government by producers, sellers and importer of these commodities. The producers, sellers and importers of these commodities recover them from the buyers of these commodities. So these taxes increase the market price of the commodities. If the government increases the rate of these taxes, the market price of the commodities will also increase.

On the other hand government gives subsidy to the producers to sell some goods at a lower price in order to make the commodity available to the common men at a reasonable price. Thus an increase in subsidy leads to decrease in market price of the commodity. For example, government gives subsidy on kerosene oil, cooking gas etc.

### 13.7 PUBLIC DISTRIBUTION SYSTEM (PDS)

Poor people cannot afford to buy even the essential commodities at their market price. To help these people, one of the methods adopted in India is public distribution system under this system essential commodities like wheat, rice, sugar etc. are made available to the common man at cheaper rate through fair price shops called ration shops. These commodities are sold through an identification paper called ration card. Following are the essential elements of public distribution system in India.

1. **Subsidy:** Government gives subsidies on the commodities sold through public distribution system. Therefore, the prices of the commodities sold under this system are relatively lower.
2. **Fixed quantity (Rationing):** Government fixes the quantity (quota) per head per unit of time on the basis of minimum requirement of a person. Every household is issued a ration card mentioning the number of persons in the family. Every household can buy the fixed quantity of the commodity according to the number of persons in the family from the fair price shops.
3. **Fair price shops (FPS):** Government sells these commodities through fair price shops popularly known as ration shops. These shops are opened in all parts of the country. The government supplies these commodities to the owner of these shops according to the number of ration cards registered with each shop. The owner of these shops are paid a commission on their total sales.



#### INTEXT QUESTIONS 13.4

1. Name the three elements of public distribution system.
2. How does increase in tax affect the price of a commodity?



3. How does increase in subsidy affect the price of a commodity?
4. What is meant by the term 'rationing'?
5. On what basis are the fair price shops allotted the quota of goods to be distributed by them?
6. Write the full form of
  - (i) BPL
  - (ii) FPS
  - (iii) PDS

**WHAT YOU HAVE LEARNT**

- Administered prices are the prices which are fixed by the government below or above the equilibrium price to protect the interests of consumers or producers.
- Control price is the price which is fixed by the government below the equilibrium price to protect the interest of consumers.
- Support price is the price which is fixed by the government above the equilibrium price to protect the interest of producers specially farmers.
- Token price is the price which is fixed by the government/private charitable institutions far below the per unit cost of production of the commodity.
- Under dual price system, a part of the total output is sold at control price through fair price shop and the remaining output is sold in the open market at the prevailing market price which is determined by the forces of demand and supply without any intervention of the government.
- An increase in tax on a commodity increases the market price of the commodity.
- Subsidy given on a commodity decreases the market price of the commodity.
- Commodities are sold through public distribution system on the basis of ration cards.

**TERMINAL EXERCISE**

1. What is control price? How does it affect the consumers?
2. What is support price? How does it affect the producers?

## MODULE - 4

### *Distribution of Good and Services*



Notes

## Role of Government in Determination of Price and Quantity

3. What is token price? What is the purpose behind fixing token price of a commodity?
4. Explain the system of dual price policy. How does it help the poor?
5. How do taxes and subsidies affect the market price of a commodity?
6. What is meant by public distribution system? Explain its essential elements in brief.



## ANSWERS TO INTEXT QUESTIONS

### Intext Questions 13.1

1. To protect the interest of consumers.
2. (i) problem of excess demand or shortage of the commodity.  
(ii) problem of black marketing
3. Rationing means fixing quota per head per unit of time
4. Black marketing is a situation in which the seller illegally charges a price which is much higher than the control price
5. Dual price policy

### Intext Questions 13.2

1. Support price is the price fixed by the government higher than the equilibrium price to protect the interests of producers especially farmers.
2. To protect the interest of producers especially farmers.
3. Government is ready to purchase any quantity of the commodity at that price to make buffer stock of the commodity.
4. (i) Wheat  
(ii) Rice

### Intext Questions 13.3

1. Token price is the price which is fixed by government and some private charitable institutions much below the cost of production per unit of the commodity.
2. Dual price is a policy in which a part of the production of a good is sold at control price through fair price shops and the remaining part is sold at prevailing market price determined by the forces of demand and supply.

3. Government does not supply some commodities free in order to avoid the misuse of these commodities.
4. (b)

**Intext Questions 13.4**

1. (i) Subsidy (ii) Fixed quantity or rationing (iii) Fair price shops
2. Price of the commodity increases.
3. Price of the commodity decreases.
4. Rationing means fixing quota per head per unit of time.
5. On the basis of the ration cards registered with the shop
6. (i) Below poverty line (ii) Fair price shops (iii) Public Distribution System







14



214en14

## MONEY AND ITS ROLE

The word “money” generates a lot of interest. In today’s busy life money has occupied a very important role. We need money to buy various types of goods in order to satisfy our wants. Similarly, we need money to avail various services such as- transport, communication, education, health, entertainment, home deliveries and so on. As a buyer, we pay money to buy goods and services and as a seller, we receive money by selling them. Normally, we pay or receive money in the form of paper currency and coins. But do you know that in ancient days people used to exchange good for good? This was called barter system. With passing of time, money replaced barter system. Why? To know all these continue reading this lesson.



### OBJECTIVES

After completing this lesson, you will be able to:

- *understand the meaning of barter system;*
- *realize the need for money by the society;*
- *explain the functions of money;*
- *know paper currency and coins as types of money.*

### 14.1 BARTER SYSTEM

In the past when people were living in small societies and there was not much development as you see today, they were helping each other through barter system to mutually benefit one another. What is the meaning of barter system? **Barter system means exchange of one kind of goods and services for another kind of goods and services. There was no involvement of money in barter system.**



**When one good is exchanged for another good without use of money, we call it trade through barter system.** This was happening in ancient civilizations.

Some examples of Barter System are given below.

- (a) In the past traders from Europe used to trade goods such as fur and crafts in return for perfumes and silk from the Eastern part of the world.
- (b) In many tribal societies in India families used to exchange labour services in return for food and other labour services. For example, if a family needs labourers to harvest crop then another family would come to provide the service with the promise that it will get the same type of help in return either for harvesting crop or roofing house etc. This type of practice is still prevalent today in remote tribal areas of India.
- (c) People in various occupations, namely, farmers, artisans, cobblers, carpenters etc. used to exchange their products and services among themselves.



### INTEXT QUESTIONS 14.1

1. Define barter system?
2. Give two examples of barter system?

## 14.2 NEED FOR MONEY

The barter system as described above is not prevalent now. In today's world nobody pays any good in exchange of another good. Everybody pays money to buy goods and services. So the following question arises - Why is the barter system not prevalent now? Why did the need for money arise? The answers to these questions lie in the fact that the barter system has many demerits as described below.

### 14.2.1 Demerits of barter System

The demerits of barter system are as follows.

1. A common problem with the barter system is **the lack of double coincidence of wants**. What does this mean? Double coincidence of wants mean that if one wants to exchange some good with another person then the latter must also be willing to exchange his good with the first person. Take for example, a person wants cloth and he has rice with him to offer in return. Then he can exchange rice for cloth with another person who has cloth and who also wants rice. In practical life, such situation may or may not arise. If the person who has cloth does not want rice, then exchange of rice for cloth will never take place and both the individuals cannot





satisfy their wants. This is an example of lack of double coincidence of wants. So barter system will work when there is double coincident of wants, otherwise it will not work.

A related problem of barter system was that, one had to spend lot of time in searching for the person who was ready to exchange. However, in the early period of human civilization this was a very difficult task as there was no proper facility with regard to transport and communication.

2. **Lack of division of goods:** Certain goods are not physically divisible into small pieces. Suppose, a person possesses a cow and he wants items, such as cloth, food grains etc. Then how much of cow can be traded for cloth; how much of cow can be traded for food grains? It was very difficult to determine because, a cow cannot be divided into several pieces.
3. **Because of lack of divisibility of goods:** under barter system, it was difficult to equate the values of different goods which were traded because of **lack of common unit of measurement**. Taking the example in the previous paragraph, it will be very difficult to determine the amount of cow required to trade for some specific amount of food grains, or some yards of cloth. Also it sounds absurd. This happens because a cow can never become a common measure of value. This problem is same for all other goods.
4. Another problem of barter system is that a person must **store** a large volume of his own good in order to exchange for his/her desired goods with others on day to day basis.. Take the example of a farmer who has produced wheat. Obviously he will use some amount of wheat for his own consumption and keep some amount to get other necessary items by trading with others. If he wants furniture, then he will go to a carpenter who is willing to trade furniture in return of his wheat. Similarly, if he wants cloth, then he has to trade with a weaver who is ready to give cloth by receiving wheat and so on. So the farmer must construct a warehouse first to keep a stock of his wheat in order to carry out the transactions at the time of need for his desired good. But constructing and maintaining a warehouse was itself a very difficult task in early days of civilization.
5. Finally, a major problem of barter system is that, a good loses its original quality and value if it is stored for a long period. Many goods, such as salt, vegetables etc, are perishable. Hence, goods were never accepted for trading in future because they could not be used as store of value. This also implies that no good could be used for the purpose of lending and borrowing.

Due to above problems, the barter system could not continue for long. As human civilization progressed people realized that there has to be some common medium of exchange which can be easily carried, stored, and used to express value of a good. So money came into being. Hence the need for money arose due to the failure of barter system.

**INTEXT QUESTIONS 14.2**

1. Define double coincidence of wants?
2. Give two difficulties associated with barter system?

**14.3 DEFINITION AND FUNCTIONS OF MONEY**

Money is defined as something which is generally accepted by the society as a medium of exchange and which can act as unit of account, can store value and be used for repayment of debt.

The functions of money can be known from its definition. They are given below.

**1. Medium of Exchange**

The primary function of money is that it acts as a medium of exchange. This means that people can buy or sell goods and services with the help of money. Money is received by the seller who sells the good. Money is paid by the buyer who buys the good from the seller.

**Example:** You pay Rs. 10 to buy a pen. The seller receives Rs. 10 from you by selling the pen. So a pen is exchanged for Rs. 10.

**2. Measure of Value**

Another fundamental function of money is that it serves as unit of account or common measure of value. The value of a good is determined by multiplying its price with quantity sold in the market. Since the price is expressed in monetary units, the value of a good is also expressed in monetary term.

**Example:** Let price of rice be Rs. 20 per Kilogram. One bag full of rice weighs 25 Kilograms. Then the value of the bag of rice is Rs.  $20 \times 25 =$  Rs. 500

**3. Store of Value**

Money also acts as store of value. How? As medium of exchange you can pay money to buy goods. This means if you have money, you have the power to purchase a good or a service. So money has purchasing power. The value of the good is contained in that purchasing power. Hence value of good is indirectly stored in money you hold. Similarly as a seller of good you receive the money which means value of good you sold comes back to you through money.

**Example:** Sushila has got some mangoes which she sells to a buyer for Rs. 250. This means a value of Rs. 250 was exchanged. The buyer, who purchased the mangoes, has the purchasing power to give Rs. 250 as value. Hence a value of



Notes

Rs. 250 was stored in the money received by Sushila as a seller. Sushila could not have stored mangoes but she can definitely store money which has stored the value of Rs. 250.

#### 4. Making Payments in Future

We all indulge in lending and borrowing activities. Suppose, your friend requests you to give him Rs. 300 to purchase a book because he does not have any money at present. He promises to pay back the money after a week. If you agree with this and actually give him the money, then you will be called lender and your friend will be called borrower. As a lender, you can also charge some interest on the money you have lent to your friend. If you charge no interest, then your friend will pay you Rs.300 after a week. If you charge Re.1 as interest, then your friend will have to give you Rs.301 after a week. Like your friend, there are many people who want to borrow money today to satisfy their present needs with the condition that they will settle the payment along with interest at some future date as agreed with the lender. This payment in future is acceptable in money only. We can also say that the borrower has deferred the payment under certain condition. So money has acted as a standard of deferred payment. Let us think for a while, that, your friend gives you the book which he purchased, instead of Rs.300 or 301. Then, will you accept this? Most probably not. Because after a week the book may have lost some value as it has not remained the same new book. But money will always be acceptable in a future date as it has stored the value.



#### INTEXT QUESTIONS 14.3

1. Define “medium of exchange”?
2. Give the meaning of value of good?

### 14.4 TYPES OF MONEY

#### 14.4.1 Paper currency and coins

How money looks like? What is the form of money? Over the years the form of money has changed. You must have read in history that during the days of Kings, people used to trade by using gold coins, silver coins, copper coins etc. Before that, in the ancient days, in some places people used to hold money in the form of cattle, salt etc.

Now a days, no body holds cattle or salt to buy or sell goods and services. Keeping cattle is not feasible as it requires huge space and special environment. Salt is perishable and cannot be stored for a long time for the purpose of exchange. Hence after so many

## MODULE - 5

### Money, Banking and Insurance



#### Notes

#### Money and its Role

experiments over centuries, now people keep money in the form of paper notes and coins which are easy to carry. In India, we have paper notes in the denomination of 1, 2, 5, 10, 20, 50, 100, 500 and 1000. Normally they are called currency notes and named as Rupee (Singular) or Rupees (Plural). The symbol of Rupee is '₹'.

Money is paid by buyer or received by seller in the form of currency notes. For smaller denominations, we have coins called "Paisha", such as 50 paise where 50 paise is equal to half of one rupee. Now coins up to Rs. 10 denominations are in circulation in India.

You should know that the currency notes and coins which are in circulation are guaranteed by government of India. Otherwise anybody can make and misuse them.

Remember that currency notes and coins of India are valid only in India and not in other countries. Every country has its own currency. If you visit other countries, then you have to exchange Indian currency with the currency of the country you are visiting. The name of the currency of some of the countries of the world is given below.

- (a) Currency in USA is called dollar with symbol \$.
- (b) The European currency is called euro having symbol €.
- (c) Currency in United Kingdom is called pound having symbol £.
- (d) In Japan the currency is called Yen having symbol ¥.



#### INTEXT QUESTION 14.4

1. Give the meaning of currency note?



#### ACTIVITY

Make a list giving names of the currencies of France, Germany, China, Brazil.



#### WHAT YOU HAVE LEARNT

- Before money was invented people used to exchange goods for goods which was called barter system.

- There were many problems of barter system such as absence of a common measure of value, lack of double coincidence of wants, lack of space to store goods to exchange them for other goods etc. This prompted human society to discover money.
- The functions of money include medium of exchange, measure of value, store of value and used in making future payments.
- Money is exchanged in the form of paper currency notes and coins.

**TERMINAL EXERCISE**

1. Explain the working of barter system?
2. What are the main demerits of barter system?
3. Define money and state three of its functions?
4. Write a short note on currency notes in India?

**ANSWERS TO INTEXT QUESTIONS****Intext Questions 14.1**

1. Exchange of good for good is called barter system.
2. (i) 10 kg of wheat for 5 kg of sugar.  
(ii) 8 kg of rice for a pair of shoes.

**Intext Questions 14.2**

1. Mutual exchange of goods between two persons.
2. (i) Lack of double coincident of wants (ii) lack of store of value.

**Intext Questions 14.3**

1. Anything which is generally acceptable for buying and selling goods and services.
2. Value of good = Price of the good × Quantity of the good.

**Intext Questions 14.4**

1. Currency note is a type of money.





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**15**

## **BANKING AND CREDIT**

Money and banking go together. They are complementary to each other. So after studying 'money' we must study banking. A 'Bank' is a very important institution in the modern society. Note that when society realised the benefits of using money as a medium of exchange, it also felt the need to store money in a safe place. This 'safe place' ultimately evolved over time into a bank, which deals with money in various ways. People make visit to a bank for various purposes; such as- to deposit their surplus money, to withdraw money from their account in order to make payments in cash, to take loan etc. In the economy banks play a very important role of facilitating the production, distribution and business activities.



### **OBJECTIVES**

After completing this lesson, you will be able to:

- *understand the meaning of a Bank and Banking;*
- *explain functions of a Bank;*
- *understand the meaning of credit and the process of credit creation;*
- *distinguish between various types of banks in India.*

### **15.1 MEANING OF BANK AND BANKING**

A bank is an institution which accepts money from public as deposits and gives loans to them. Banking refers to accepting for the purpose of lending or investment of deposits of money from the public, payable on demand or otherwise and withdrawable by cheque, draft, order or otherwise.

### **15.2 FUNCTIONS OF A BANK**

From the meaning as given above the functions of a bank are clearly understood. The primary functions of a bank are as follows :

1. Accepting deposits from public
2. Giving Loans.

### PICTURES OF LOGOS OF SOME BANKS



Notes

#### 15.2.1 Accepting Deposits from Public

A bank accepts monetary deposits from public which include individuals, groups, business firms etc.

It should be noted that when some body wants to deposit money in the bank, the bank accepts the money by opening an account in the name of the depositor. The bank gives an account number to the depositor. Whenever the depositor wants to deposit money again he or she has to mention the account number so that the bank will keep that money in that account. If the depositor withdraws money from his / her account then the bank deducts that money from the depositor's account. On the other hand, bank gives interest on certain types of deposits of the public.

Note that, the bank issues cheque books to its depositors. Cheques are used by the depositors to withdraw money from the bank and making payments to any party through the bank.

#### 15.2.2 Giving Loans

The bank gives loans to public who want to borrow and who has the capability to repay that loan amount in future. What does this mean? For this we have to first know, as to why do people borrow? People borrow money because they want to buy some thing today or do some business for which there is not enough money with them at present. But they have the ability to repay that money in future. Goods, such as, television, refrigerator, washing machine, car etc are expensive items. Similarly, purchase or construction of house requires lots of money. For all these things, bank provides a loan. Bank also gives loan to start business.

#### 15.2.3 Keeping Valuable Materials

There is another function performed by a bank. The bank also keeps valuable things of people such as jewellery, property documents etc. Normally, people want to keep valuables in safe custody which is provided by the bank in the form of '**locker facility**'.



**INTEXT QUESTIONS 15.1**

1. Name an institution in which someone can deposit surplus money?
2. Name any two purposes for which a loan can be sanctioned by a bank?

**ACTIVITY 15.1**

Visit a bank with your parents and enquire about the ways in which that bank helps people and what all it does?

**15.3 MEANING OF CREDIT**

Credit is defined as the claim to receive payments. When a bank gives loans to people, then the bank becomes a lender and the person who takes loan from the bank is called a borrower. When bank gives loan today it also makes arrangements to recover the same from the person in future. This means that the bank can claim the money from the borrower in future. Accordingly, the bank is able to expand its deposits. This is called credit creation by the bank. So we can say that credit is created through the act of lending and borrowing.

**15.4 THE PROCESS OF CREDIT CREATION**

Now the following question arises – How does a bank create credit? Or to say in other words, where from does a bank arrange the money in order to give loan to others and how much of loan or credit it can create? We provide the answer below.

We know that a bank accepts money from public as deposits. Normally these deposits are supposed to be returned back to the public if they want to withdraw them. So if all the persons, who have deposited money in the bank, withdraw their total money, then bank will be left with no money at all. But such things normally do not happen.

From common experience it has been observed that once somebody deposits money in the bank, he/she doesn't withdraw it at once. Mostly, people withdraw a smaller amount from their deposit whenever they require and leave the rest of the amount with the bank. To make this possible, the bank always keeps some fraction of its total deposits in the form of cash from which it keeps giving money to people who come to withdraw it. This fraction is given in percentage term. What percentage of the total deposit has to be kept as cash? Well, this is decided by the banking authority of the country. The cash amount is kept as reserve for making cash payments to





public who come to the bank to withdraw money. We call the fraction of the total deposit to be kept in the form of cash as **cash reserve ratio**. Once the bank calculates the amount to be kept as cash on the basis of cash reserve ratio, it deducts the amount from the total deposits and uses the rest of the amount to give loans to the borrowers. With this act of the bank, the process of credit creation starts from here. Let us describe the process of credit creation step by step through the following example.

### 15.4.1 Steps in Credit Creation

To make things simple, let us think that there is only one bank in the economy.

Let the banking authority has decided that the cash reserve ratio is 20 percent. So, the bank must keep 20 percent of its current deposit in the form of cash to make cash payments to persons who come to withdraw money.

**Step1.** A person called A, deposits Rs.100 in the bank. As a result the bank's deposits increases by Rs.100. As per rule the bank keeps 20% of 100 as cash. This comes out to be Rs.20. So the bank keeps Rs.20 to make cash payments. Now deduct 20 from 100.  $100 - 20 = 80$ . So the bank can use Rs.80 to give loan.

**Step 2.** A person called B approaches the bank to take a loan of Rs.80. After the bank gives this loan, it can claim the amount from B in future. This means that by giving loan to person B, the bank can create another deposit Rs.80.

Now calculate the total deposit with the bank

First, person A deposited Rs.100. By giving loan to B, the bank is able to claim Rs.80. So after two steps the bank has total deposit of Rs.180. i.e  $100 + 80 = 180$

**Step 3.** Another person called C wants a loan from the bank. How much amount of money the bank can give as loan to C? In the previous step we saw that, the bank could increase its deposit by Rs.80 by claiming the amount from B. As per rule it has to keep 20% of 80 as cash before giving further loan to anybody.  $20\% \text{ of } 80 = 16$ . So the bank will now keep Rs.16 as cash and give the rest of the amount as loan.  $80 - 16 = 64$ . So the bank can give Rs.64 as loan to C. Again by claiming this amount from C, the bank can create another deposit of Rs.64 in step 3.

Continuing from the previous two steps, we can say that, after three steps the total deposits with the bank has increased upto  $180 + 64 = 244$ . Or  $100 + 80 + 64 = 244$ .



This chain will continue for some time. But when it will come to an end? You know that in each round the bank keeps 20% of the increase in the deposit as cash. You also know that the bank started with an increase in its deposit by Rs.100 in step 1. So the process of credit creation (or increase in deposits) will come to an end when 20% of the deposits of each and every round taken together become 100 itself. Then ask the question, 20% of what amount is 100? The answer is 20% of 500 is 100. This means that in our present example, with initial increase of the bank deposit by Rs.100 and cash reserve ratio of 20 percent, the total credit creation will be Rs.500. There is a link among these three. You know that  $20\% = 20/100 = 1/5$ . Here,  $500 = 100 \times 1/20\% = 100 \times 1/5 = 100 \times 5$ . Accordingly we can give the following formula for credit creation

$$\text{Total Credit} = \text{Initial Increase in Deposit} \times 1/\text{Cash Reserve Ratio.}$$

$$500 = 100 \times 1/20\%$$

Also remember another important point. Since the bank deposit is divided into 20% as cash and the rest as loan through various steps, the total deposit of Rs.500 can be divided in the following manner

$$\text{Cash Reserve} = 20\% \text{ of } 500 = \text{Rs.}100$$

$$\text{Loan Amount} = 500 - 100 = \text{Rs.}400$$

Now we can present the various steps (or rounds ) of credit creation in the following manner

Steps	Increase in Deposit	Cash Reserve	Loan
1	100	20	80
2	80	16	64
3	64	12.8	51.2
4	51.2	10.24	40.96
5	40.96	8.19	32.77
.....	.....	.....	.....
.....	.....	.....	.....
Total	500	100	400

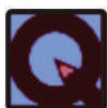
Finally, remember that, in the process of credit creation two types of deposits are recorded. The first one is called Primary Deposit. Primary deposit is the initial increase in the bank deposit resulted when the bank receives a new deposit from public. In our example given above, primary deposit is Rs.100 deposited by person A in the



beginning. The second type of deposit is called Secondary Deposit. The deposits created due to the loans given by the bank in each round are called secondary deposits. Credit creation is possible due to the increases in the secondary deposits.

### 15.4.2 What is the Credit Creation Capacity of a Bank?

The credit creation capacity of a bank depends on the cash reserve ratio. If the cash reserve ratio is higher, then the bank has to keep more cash to make payments to public and accordingly, fewer amounts will be available for giving loans. So less credit will be created. Credit creation will be higher, if the cash reserve ratio is lower. In our above example, total credit was Rs.500, given that the cash reserve ratio was 20% and initial increase in deposit was Rs.100. Now decrease the cash reserve ratio to 10%. As a result total credit will be  $100 \times 1/10\% = 100 \times 1/10/100 = 100 \times 10 = \text{Rs. } 1000$ .



### INTEXT QUESTION 15.2

1. A bank received a deposit of Rs. 200. It gave a loan of Rs.180 to a borrower. What is the cash reserve ratio?
2. In the above question find out the amount of (a) primary deposit, (b) secondary deposit and (c) total deposit?
3. Define credit?

## 15.5 VARIOUS TYPES OF BANKS IN INDIA

In India there are following types of banks.

1. Reserve bank of India (RBI), which is the central bank of our country.
2. Commercial banks.
3. Cooperative banks.
4. Development banks.

Let us discuss them briefly.

### 15.5.1 Reserve Bank of India (RBI)

RBI is the head of the banking system in the country. This means that all other banks such as, commercial or cooperative or development banks, follow the rules and regulations made by RBI. Its head quarter is in Mumbai. RBI's main function is to issue currency notes. The paper currency of various denominations such as-2, 5, 10,



50, 100,500 and 1000 are issued by the RBI. You can see the signature of the governor of RBI on these currency notes. The note, bearing the signature of the Governor of RBI is approved by the government so that it can be used for buying and selling goods and services. One rupee notes and coins as well as coins below one rupee are issued by Ministry of Finance, government of India.



Source: [mysarkarinaukri.com](http://mysarkarinaukri.com)

Another function of RBI is that it acts as banker to the government. In India both central and state governments take loan from RBI and deposit their money with RBI.

### **15.5.2 Commercial Banks**

Just now we were discussing credit creation. The 'bank', which we were talking there, was actually a commercial bank. The functions of a bank which we have discussed earlier are also functions of a commercial bank.

There are some commercial banks which are under the public sector; for example- State Bank of India (SBI), Punjab National Bank (PNB), Bank of India (BOI), Indian Bank, Canara Bank, Bank of Baroda (BOB) etc.

There are other commercial banks which are under private sector such as- ICICI Bank, Yes Bank, HDFC Bank etc. These banks are privately run.

The aim of a commercial bank is to earn profit by charging rate of interest on loans and fees for various services such as issuing draft, transferring money etc.

### **15.5.3 Cooperative Bank**

In India there are many banks which are run by cooperative societies and are governed by the laws of the state in which they are operating. Such banks are of two types - agricultural (or rural) and non - agricultural (or urban).

In rural areas cooperative banks provide credit for farming, cattle, fishery etc. In urban areas the cooperative banks provide credit for self employment activities, small scale industry, purchase of durable goods such as television, refrigerator etc. and personal finance.



Examples of cooperative banks are state cooperative banks, primary agricultural credit societies, urban cooperative banks, land development banks, and district central cooperative banks. These banks may bear different names in different states and areas.

#### 15.5.4 Development Banks

To achieve economic development for the country, investment in industries and infrastructure is required. To make such thing possible there are development banks in India. These banks provide credit for a long period to private business companies and public sector units who want to establish industries and create infrastructure. Some example of development banks are Industrial development bank of India, Industrial Financial corporation of India and State Finance Corporations etc.



#### **INTEXT QUESTIONS 15.3**

1. Give one example each of a commercial bank, cooperative bank, and development bank?
2. For which activities, do the cooperative banks provide credit both in rural and urban areas? Give two examples of each.
3. Which is at the head of banking system in India?



#### **WHAT YOU HAVE LEARNT**

- Bank is an organization which accepts deposits from public and advances loans to people.
- Bank can increase its deposits by creating credit as lender. Credit means claims to receive payments from the borrowers.
- In India Reserve Bank of India is the head of the banking system.
- The different types of banks which are operating in the country are - commercial banks, cooperative banks and development banks, besides RBI.



#### **TERMINAL EXERCISE**

1. Explain two functions of a bank?
2. What is credit? How does a bank create credit?

## MODULE - 5

*Money, Banking and Insurance*



**Notes**

3. What are the different types of banks in India?
4. Write short notes on the following.
  - (i) RBI
  - (ii) Cooperative Bank
  - (iii) Commercial Bank



### ANSWERS TO INTEXT QUESTIONS

#### Intext Questions 15.2

1. 10 percent
2. (a) Rs.200      (b) Rs.180      (c) Rs.380
3. A contractual agreement in which a borrower receives something of value now or at present and agrees to repay the lender at some later date or future date.

#### Intext Questions 15.3

3. Reserve Bank of India



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## SAVING AND INSURANCE

Apart from production and consumption, saving is also a very important economic activity. We all want to lead our present and future life properly. To do so, we produce things and consume them. But if we consume everything today from our production, then nothing will remain to start the activities tomorrow. That is why it is important to consume less than what we produce today. Saving is necessary to keep continuing our production activities in future. But we also know that future is uncertain and unpredictable. Nobody can tell with certainty as to what will happen to our health, life, property etc in future. They must be properly taken care of, so that, the production and consumption activities are carried out smoothly in future. It is in this context that, insurance is necessary to protect life, health, property etc. against any damage.



### OBJECTIVES

After completing this lesson, you will be able to:

- *understand the meaning of and need for saving;*
- *explain the use of saving;*
- *understand the concept of interest;*
- *know the meaning of insurance and its need;*
- *acquaint yourself with Life Insurance, Health Insurance and Automobile Insurance.*

### 16.1 MEANING OF SAVING

Actually people earn money to fulfill both their present and future needs. If they spend their whole income today then nothing will remain for future and then they won't be



able to satisfy their wants tomorrow. But if there is saving, then it can be used in future. So saving is the amount of income which is carried forward to future after meeting the current expenditure on goods and services and other things. This means that saving is the surplus of income over consumption. We can write that

$$\text{Saving} = \text{Income} - \text{Consumption}$$

Study the table 16.1 given below. The table gives the statement of income and expenditure of a person, say Mr. X, on monthly basis for a year. See that we have started with the month April and ended with the month March. This is because, in India, accounting year spans from April of this year to March of next year.

**Table 16.1 Income and Expenditure of Mr. X on monthly basis for last Year**

Month	Income (Rs.)	Expenditure (Rs.)	Saving (Rs.)
April	15,500	14,300	1200
May	15,500	15,000	500
June	15,500	15,500	0
July	15,500	15,500	0
August	15,500	15,500	0
September	15,500	15,000	500
October	15,500	14,000	1500
November	15,500	15,500	0
December	15,500	15,000	500
January	15,500	15,300	200
February	15,500	15,400	100
March	15,500	15,000	500
<b>Total</b>	<b>1,86,000</b>	<b>1,81,000</b>	<b>5,000</b>

You see that last year's total income of Mr. X was Rs.1,86,00. His total expenditure was Rs. 1,81,000. So he saved Rs. 5,000 last year, i.e

$$1,86,000 - 1,81,000 = \text{Rs.}5000$$

Note that, we have taken into account the whole accounting year and not one or two months, to calculate saving. This is because, there are some expenditures which are made towards the end of the year and not necessarily every month. For example, we spend money on food, daily use goods etc. regularly. But expenditure on fees, tax to government etc. are calculated on yearly basis. So, it is better to take income and expenditure of the whole year to calculate saving.





Notes

## 16.2 HOW SAVING IS USEFUL?

Saving is useful in the following ways.

- (i) Start from the last example. Mr. X saved Rs.5000 last year. This implies that, in the beginning of the current year he starts with an extra Rs. 5000. So his income will increase by at least Rs.5000 this year, provided his income and expenditure do not change. This means that, saving increases the future income of the person.
- (ii) Saving can act as a kind of security for future. How? Suppose Mr.X falls ill in the beginning of this year. So he could not go to work for a week. How he can sustain for a week? There is no need to worry. He can always use his last year's saving to carry on for some time till he recovers from illness and start going to work and earn again.



### INTEXT QUESTIONS 16.1

1. Define Saving?
2. If income is 1000 and saving is 200 then what is the amount of consumption?

## 16.3 WHERE YOU KEEP YOUR SAVING

It is a common practice in almost every household that, coins and currency notes of small denominations such as 50 paisa, Re.1, Rs. 2 are put in a small saving box. All the members of the household find pleasure in contributing to this mini saving activity. After some time, say a month or some months, when the box is opened, the family finds good amount of money existing in the box which becomes very useful to buy some new thing. It is a kind of tradition for families to have such a saving box.

A family saving box is an informal way of saving. It cannot be used for saving a big amount. It is also not safe to keep money in this manner because of the threat of theft. The money kept in the box also remains idle or unused till the time box is opened. Since it is a private affair, nobody else, except the particular family can use it. Finally, no reward is given in return for saving in this manner.

The most important thing is that, money needs a secured place to be kept. It is also needed for use. It should not be left idle. Think that you have a saving of Rs. 5000. If you do not use it for a long period, then it remains idle and useless like a dead wood. You are neither using it for yourself nor are you allowing anybody. Keeping all these things in mind society has provided institutions where you can keep your savings. They are post offices and commercial banks.



### **16.3.1 Post Office Savings Bank**

Any individual can keep his/her unspent money in post office saving bank. You can find a post office in almost every locality. So it is close to anybody's reach. Any citizen of the country can open an account in his/her name in any post office by depositing a minimum Rs. 50 only. A person can keep money for any period of time and he/she is allowed to withdraw any amount from his/her account at any time subject to the condition that a minimum balance of Rs. 50 is left in the account. A pass book is provided by the post office to keep record of the transactions made by the holder of the account holder. The post office also allows a nominal rate of interest on saving bank account. If a person wants to issue a cheque book, then he/she has to keep a minimum balance of Rs. 500 in his/her account.

### **16.3.2 Savings Account in Commercial Bank**

We have already said that commercial banks accept deposits from the public. An individual who wants to save money can open a saving account in the bank. The minimum amount necessary to open an account and minimum balance to be left after withdrawal of money are prescribed by the concerned bank where the person saves money. Like the post office, a bank also provides a pass book to the depositor which shows details of deposits and withdrawals and the balance available. A commercial bank allows a nominal rate of interest on the saving bank account.

## **16.4 USES OF SAVING**

Savings can be used for the purposes of lending and borrowing as well as development of the economy.

### **(i) Lending and Borrowing**

A person, who saves, can become a lender, because he has surplus money available with him presently. Many people in the society want to consume more than what their present income could allow for various reasons. These people can borrow money at the time of need and repay it in future.

### **(ii) Development of the Economy**

When many individuals save money in post offices and banks, a very large amount of money becomes available for use by the society. We know that small drops taken together make an ocean. Similarly, an individual may be saving very less depending on how much he is earning and how much he is spending. But when many individuals start saving, they are added together to make a large amount. For a society, a large amount of money is required to build roads, office buildings, railway stations, street lights, amusement parks, schools etc. Because of this the whole country is benefited in future. So saving by an individual eventually becomes useful in the process of development of the economy.



Notes

## 16.5 INTEREST AS RETURN ON SAVING

One can use his/her saving to earn money which is called return on saving. This return is termed as Interest. How does this become possible? We know that a person who has saved money can become a lender by providing that money to a borrower who wants to borrow now. For the use of this saving, the lender can charge some money from the borrower which is called interest earned by the lender and paid by the borrower. Normally the borrower pays back the lender's money (his saving) along with the interest money on a specified future date. Note that when a borrower takes money from a lender, we say that the lender provided loan to the borrower. This means that when a lender gives his/her saving to a borrower then it is converted into a loan. The loan amount has to be returned by the borrower to the lender in future along with interest.

Example: Let Ms. Sarita has a saving of Rs.1000. Mr.Aashish wanted to borrow that money. So Sarita became a lender and Aashish, a borrower. It was decided that, Aashish would have to repay the loan amount of Rs.1000 to Sarita after a year. It was also decided that Aashish will have to pay Rs.120 as interest. Accordingly, after a year, Aashish paid a total sum of Rs.1120 (1000+120) to Sarita. Hence, by lending her saving, Sarita earned Rs.120 as interest on her saving besides getting back the same amount she saved.

### 16.5.1 Rate of interest

Now a question arises- how much amount did Sarita earn for every 100 Rupees she gave to Aashish?

Ans. Sarita gave Rs.1000 as loan to Aashish for a year.. She earned Rs.120 on this amount. So earning on Rs.100 =  $120 \times 100/1000 = \text{Rs.12}$ .

Hence Sarita earned Rs.12 per Rs.100 as interest, i.e 12% per year.

When we find value out of 100, we call it percentage. Hence, we can say that Sarita earned at a rate of 12 percent per year. This 12% per year is called the rate of interest paid by the borrower, (Aashish) and received by the lender, (Sarita). Rs.120 is the total interest money on the loan amount of Rs.1000. This loan amount is also called the Principal amount.

**Rate of interest is defined as the earning by the lender/payment by the borrower for the use of every 100 Rupees given by the lender to the borrower for a period of one year.**

### 16.5.2

Since people keep their savings in the post offices and banks, they receive interest. The Post office offers around 3.5 percent rate of interest while bank offers around



4 percent rate of interest per year to individuals. When you receive interest on your savings in a post office or bank, your money grows. Hence when money is saved today, it grows to a higher amount tomorrow.

**INTEXT QUESTIONS 16.2**

1. Define rate of interest?
2. Distinguish between lender and borrower?
3. What is the rate of interest if you earn Rs. 20 in a month by lending Rs. 200?

**ACTIVITY**

Visit your nearby post office and enquire about opening of a saving bank account?

**16.6 INSURANCE**

We are living in a world of uncertainty. This means we do not know what will happen in future. Many things are not in our control. Take the following examples.

- (a) A farmer depends on a good rainfall so that he can produce large quantity of grains. But the farmer has no control over rainfall. If there is good rainfall he gets good crop. But if there is no rainfall there will be drought and the farmer will incur heavy loss.
- (b) People have houses in which they live. But they do not have any control over some untoward incident that may take place, such as fire, theft causing loss to the property.
- (c) Now a days lots of people have automobiles in the form of two wheelers and cars. As the number of vehicles has increased, number of theft cases or accidents on roads has also increased. No body can predict about accidents which cause damage and loss.
- (d) We all fall ill and incur expenditure on medical treatment. No body can predict when illness will come. Due to illness we cannot work. Because of this, we may lose our earnings during the period of illness.

In this way a lot of examples of uncertainties can be given. Interestingly, winning a lottery is also uncertain. This is an unexpected gain. However, the loss of earning



or damage to property occurring due to uncertainty is a matter of concern. Uncertainty involves risk of loss or damage. We can take precautions to some extent but it is not possible to avoid them totally.

Whoever suffers a loss due to the reasons as said above, he/she would like to be compensated in monetary terms either fully or partially for that loss or damage. Insurance ensures some compensation against loss/damage to the person concerned.

Insurance is just like a good or product. Anybody who thinks that he/ she has some chance to incur loss/ suffer damages to his/her belongings, he/she can have “insurance” by paying some money. The seller of ‘insurance’ is called “insurer” and buyer of insurance is called “insured”. The money paid by the “insured” or buyer of insurance is called “premium”. Normally the premium is paid for a specified number of years. If any loss occurs during this period then the insured person get due compensation from the insurer.

### Definition of Insurance

Insurance can be defined as **a financial product which can be purchased to partly or fully recovered any loss happening due to event beyond the control of the insured party.**

Normally the seller of insurance is a insurance company. When the insured person incurs any loss, the insurance company pays back some amount of money to compensate him/her for the loss. This is called insurance claim. Hence insurance allows a person to reduce risk due to uncertainty.



### INTEXT QUESTIONS 16.3

1. Differentiate between insurer and insured?
2. Give two examples of uncertainty?
3. Is insurance a product?

## 16.7 SOME SELECTED INSURANCE PRODUCTS

Let us discuss in brief the following insurance products

- (i) Auto Insurance
- (ii) Health Insurance
- (iii) Life Insurance
- (i) **Auto Insurance**

People who have scooters, bikes, cars etc. can buy auto insurance from a concerned insurance company. Since automobile is a durable good and has a



long life span, say 10 to 15 years, the insurance policy is made in the following way.

- (a) In the first year, the auto is new. So the insurance company charges higher money as premium from the insured person.
- (b) In subsequent years, the vehicle becomes old and its value falls gradually. So the company will charge less premium from the insured person.
- (c) Whenever there is any damage caused to the automobile, the company gives the claim calculated on the basis of terms and conditions mentioned in the insurance policy.

### **(ii) Health Insurance**

Under health insurance scheme, a person who buys this insurance, can get back some amount of money out of his/her total expenditure on medical treatment. In this case also, the insurance company asks the interested person to pay a nominal amount as premium every year. Whenever the insured person falls ill and spends money on medical treatment, the insurance company gives some amount to reduce the burden of the person. Normally the premium is low, if a person buys the health insurance at a younger age. The premium amount increases as the person grows older.

### **(iii) Life Insurance**

A person can buy life insurance for a particular time period. The time period could be 10 or 25 years. Every year the insured person has to pay a certain amount of premium to the insurance company. The company gives back the claim to the person after the time period is over. The amount can also be paid in installments by the insurance company on yearly basis also. If the person dies in between, the claim is given to his/her nominee, whom the person had named while buying life insurance.



### **WHAT YOU HAVE LEARNT**

- Saving is the income which remains after consumption.
- People save for security in future and to earn interest on their saving.
- Lender is the person who has saved money and gives it to borrower as loan at some rate of interest.
- Borrower is the person who borrows money by paying the interest rate.
- People save their money in post offices and banks.
- Insurance is a product which people buy to reduce the risk of loss or damage to their life, health, automobiles etc.



### TERMINAL EXERCISE

1. Define saving? Give two of its uses?
2. How saving is calculated? Why do people save?
3. Write a short note on post office saving bank?
4. Why people buy insurance?
5. Explain auto insurance?
6. Distinguish between health and life insurance?



### ANSWERS TO INTEXT QUESTIONS

#### Intext Questions 16.1

1. Saving is defined as surplus of income over consumption.
2. 800

#### Intext Questions 16.2

1. Rate of interest is the payment made by the borrower for use of every 100 rupees given by the lender for one year.
2. Lender – The person or institution who gives money on loan.  
Borrower – The person or institution who takes money on loan from the lender.
3. 120 per cent

#### Intext Questions 16.3

1. Insurer is the seller of insurance.  
Insured is the buyer of insurance.
2. drought, illness
3. yes



**Notes**





**MODULE-6**  
**PRESENTATION AND ANALYSIS OF DATA**  
**IN ECONOMICS**

- 17. Collection and Presentation of Data
- 18. Analysis of Data





17



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## COLLECTION AND PRESENTATION OF DATA

Getting information on various things around us has become a way of life. Information itself is a major source of knowledge. Without information it is difficult to take decisions. With development of science and technology the sources of information have increased and become accessible as well. Books, News papers, magazines, telephone, television, internet and mobile phones etc. are all medium of providing information of various kinds.

Information is both qualitative and quantitative in nature. Good, bad, ugly, beautiful, responsible, noble, handsome, educated etc are terms used to describe persons, can be said to be qualitative in nature. Information on income, expenditure, savings, rate of growth, height, weight, marks secured, population, food production, etc are given in quantitative or numerical terms. In the study of economics quantitative informations are mostly used for analysis.



### OBJECTIVES

After completing this lesson, you will be able to:

- *understand the meaning of the term data;*
- *distinguish between various types of data;*
- *distinguish between variables and attributes;*
- *identify the areas of an economy where we cannot do without the data;*
- *classify and tabulate data;*
- *understand various forms of presentation of data.*

### 17.1 MEANING AND FEATURES OF DATA

Data means quantitative information providing facts in an aggregate manner. The information could be on any thing that can be given numerically and useful for decision



## Notes

making. It is also called statistical data or simply statistics. Data is a plural term. The singular of data is datum.

From the meaning we can give some features of the term statistics or data below with example.

### (i) Statistics are the aggregate of facts

A single fact cannot be considered as statistics or data. For example, the marks secured by a student of class X in mathematics are 95. This is given as single information which is simply a fact and not the data. However, the marks secured by all the students of class X of a school, either section wise or in total can be considered data, because it becomes an aggregate of facts. By just telling the marks of one student, we cannot know the performance of others and accordingly we cannot carry out any analysis to recommend for their betterment. This means that by giving aggregate of facts, data become meaningful as it provides scope for carrying out analysis.

See the table below. It gives the marks secured by all the 18 students of a class in mathematics. By looking at this we can compare the performance of the whole class. So this is an example of data.

Table 17.1

Students	Marks	Students	Marks
A	95	J	35
B	90	K	30
C	75	L	85
D	65	M	20
E	90	N	90
F	100	O	80
G	80	P	70
H	45	Q	100
I	40	R	50

From the above data we can know the following

- How many students have secured more than 90?
  - How many students have failed?
  - How many students secured less than 50?
- On the basis of the answers to these questions, the teacher can take necessary steps to improve the performance of students wherever needed. So in this way as aggregate of facts data are more meaningful than any single information.



Notes

**(ii) Numerically expressed**

Statistics or data are always quantitative in nature. Qualitative information such as good, bad, average, handsome, ugly are examples of some attributes, the magnitude of which can not be quantified and as such these can not be called statistics or data. When facts are put into a framework of numbers either through counting and calculation or estimation, these may be called data. In the above table marks of students are given numerically. We can give another example as in table 17.2 below which shows number of students admitted in the 1<sup>st</sup> year in different colleges in an imaginary city.

**Table 17.2**

College	Number of Students
Govt. College	409
Savitri College	308
J.P. College	401
N.D. College	510

**(iii) Data are affected to a marked extent by multiplicity of causes**

Data are not influenced by a single factor but are influenced by many factors. For Example, rise in prices of commodities may have been due to several causes like, reduction in supply, increase in demand, rise in taxes, rise in wages etc.

**(iv) Reasonable standard of accuracy**

100% accuracy in statistics is neither possible nor desirable. What is needed and expected is only a reasonable standard of accuracy. If a doctor has invented a new medicine to control cholesterol and statistically he ascertained that 90% of patients have responded well and statistically if 95% persons responded to the treatment, it may be considered that the new medicine is good and it has reasonable standard of accuracy as the results show that only 90% of patients have responded well and not 100%. It reflects reasonable standard of accuracy.

**(v) Predetermined purpose**

Data are collected for a predetermined purpose. Both the above tables serve some important purposes. The data in table 17.1 can be used to evaluate the performance of students in mathematics. Data in table 17.2 can be used to know the situation of higher education in the city to some extent on the basis of knowing number of young people entering college.

**17.2 IMPORTANCE OF DATA IN ECONOMICS**

Some specific areas of economics where the use of data is very important are as follows:



## Notes

1. **In economic planning:** The data of the previous years are generally used to prepare future plan. For example, if we have to plan expenditure to be incurred on primary education for a year, data regarding number of students who were enrolled up to class fifth in previous years and the expenditure incurred during those years is important to look at. Forecasting is done on the basis of economic planning. For example, if we want to predict the growth of per capita income of a country, the data on the growth rate of population and the national income are also to be collected and considered.
2. **To determine national income:** In order to know the state of our economy it is important to know the national income besides various other things. But national income can be determined by using certain methods which require quantitative information on various things such as wages and salaries received by workers, rent received for use of land and building, interest received for use of funds and profit earned by the entrepreneurs in the economy in the given year.
3. **Basis of government policies:** Statistical data are widely used by government to frame policies for economic development of the country. On the basis of data on the vast number of poor and unemployed people in India, the government had to make policy to remove poverty and unemployment by enacting National Rural Employment Guarantee Act. This policy of the government guarantees an unemployed person at least 100 days of wage employment in a year. In India Census which is carried out once in every 10 years provide data on male and female population, number of literates, number of workers etc. On the basis of the data on male and female population it was found that India has 938 females per 1000 males. In some states like Haryana there are only 848 females per 1000 males. This is a very alarming situation because one of the reasons for low female population is killing of girl child before its taking birth. On the basis of this data now the government is making policy to save the girl child.



## INTEXT QUESTIONS 17.1

1. Identify whether following are data or not. Write yes/no in the bracket
  - (i) Miss Monika secured 75% marks in economics ( )
  - (ii) Krish is a better player than Hari ( )
  - (iii) Lalita secured good marks ( )
  - (iv) Number of students in the records of schools are as follows; would you call these records as data?



Notes

Table 17.3

Faculty	School A	School B
Arts	400	700
Science	600	400
Commerce	300	300

### 17.3 TYPES OF DATA

On the basis of the source of collection data may be classified as:

- (a) Primary data and
- (b) Secondary data

#### (a) Primary data

The data which are originally collected for the first time for the purpose of the survey are called primary data. For example facts or data collected regarding the habit of taking tea or coffee in a village by an investigator.

#### Methods of collecting primary data

1. **Direct personal investigation:** Under this method the investigator collects the data personally from the respondent. The person who collect the information is called the investigator and the person who gives the responses/answers the questions asked by the investigator is called a respondent. The data collected in this manner are therefore most reliable. However, there is a chance that the results are influenced by the personal bias and prejudice of the investigator.
2. **Indirect investigations:** Under this method the investigator obtains information indirectly from a third person who is expected to know facts about the person about whom the enquiry is done. It is generally used by the commission appointed by the government.
3. **Through correspondent:** Under this method correspondents or agents are appointed by the investigator to obtain data from various places. These correspondents are required to collect and pass the transmit information to the investigator or the central office. This method is widely used by newspaper offices.
4. **By mailed questionnaire:** Under this method a well structured questionnaire is prepared and mailed to the respondent by post. The respondent after filling up the questionnaire send it back within the given time. However, this method can only be used when respondents are literate and can fill in the questionnaire.

**Notes**

**5. Through schedules:** Under this method the field workers are asked to go to the respondent with questions contained in the schedule. They collect the answers in their own hand writing and provide data to the investigator. This method is useful when the respondent is illiterate.

**(b) Secondary data**

When we use the data, which have already been collected by others, the data are called secondary data. This data is said to be primary for the agency which collects it first, and it becomes secondary for all the other users.

**Sources of secondary data**

Secondary data may exist in the form of published or unpublished form. In its published form secondary data may be obtained from

- (a) Published reports of newspapers, RBI and periodicals.
- (b) Publication from trade associations
- (c) Financial data reported in annual reports
- (d) Data available in SEBI publication
- (e) Information from official publications
- (f) Publication of international bodies such as UNO, World Bank etc.
- (g) Others

In its unpublished form secondary data may exist as

- (a) Internal reports of the government departments
- (b) Records maintained by the institutions
- (c) Research reports prepared by students in the universities

**17.4 PRESENTATION OF DATA**

Data collected in the form of schedules and questionnaires are not self-explanatory. These are in the form of raw data. In order to make them meaningful, these are to be made presentable. Classification and tabulation are the basic tools of presenting raw data in systematic way.

**17.4.1 Classification**

Classification is a process of arranging data into classes or groups according to their resemblances and affinities. Mass data in its original form is called raw data.





Notes

### Variable and attributes

**Variable:** When data is capable of being classified in the magnitude of time or size it is called as variable. Height, weight, length, distance are example of variables. Variables may be either discrete or continuous. Discrete variable usually have a specific value or measurement. Number of children per family, say for example, is a discrete variable because it cannot be broken into factors

**Table 17.4**

No. of children per family	0	1	2	3	4
No of families	4	8	20	38	10

This table reveals that there are four families without children, 8 families having one child and so on. Since the no. of children varies from family to family we call it the variable and denote it with symbol  $x$ . A variable can have different values. How frequently a value occurs is its frequency. Variable ( $x$ ) 0 to 3 are values and their frequencies are 4, 8, 20 and 38.

Here value '0' occurs 4 times value '1' occurs 8 times and so on.

A continuous variable on the other hand has continuity in its scale and measurement, such as scale of height, weight, length, distance etc. continuous variables are usually placed in continuous series as given below:

Height ( $x$ )	60"-62"	62"-64"	64"-66"	66"-68"
Number of soldiers (frequency)	100	200	110	80

Table shows the range of heights ( $x$ ) with the corresponding frequencies. It can be read as 100 soldiers having their height between 60"-62", 200 having height between 62"-64" and so on.

**Attributes:** When data cannot be classified in the magnitude of time or size it is known as an attribute such as beauty, bravery, intelligence, laziness etc. Attributes are difficult to be investigated in depth. These can only be numbered for a study of a limited purpose.

**Statistical series:** In statistics there are three types of series into which data can be organised.

**Individual series:** In this kind of series items are shown individually with their corresponding value. Each item has its separate and individual existence. Mass data in its original form are called raw data or unorganised data. But when they are arranged in ascending or descending order of magnitude, is called an array.

Suppose an investigator has got the following information about the marks obtained in economics out of 100 scored by 20 students in a school.



Notes

**Table 17.5**

Marks obtained by 20 students in Economics out of 100

40	50	35	40	48
50	80	70	75	47
45	75	90	60	57
60	50	80	55	73

The above raw data can be arranged in ascending order which starts from lowest number and goes towards highest number as shown in the following table:

**Table 17.6 Arranged in ascending order (Marks out of 100)**

35	47	50	60	75
40	48	55	70	80
40	50	57	73	80
45	50	60	75	90

The above data can also be arranged in descending order i.e. from highest number to lowest number as shown in the following table:

**Table 17.7 Arranged in descending order (Marks out of 100)**

90	75	60	50	45
80	73	57	50	40
80	70	55	48	40
75	60	50	47	35

**Discrete Series:** This type of series is designed to show variables with definite break with their respective frequencies. Frequency refers to the repetitiveness of a value or item. If a particular value (X) appear 4 times in a set of data X will have a frequency of 4. Theoretically this kind of series is prepared only for a discrete variable, however, in practice continuous and discrete variables are used interchangeably. Following is an example of discrete series.

**Table 17.8**

Marks	30	40	50	60	70	80	90	Total
Number of students (f)	4	6	10	20	10	6	4	60

**Continuous Series:** This kind of series is framed for placing frequency with corresponding group of variables which are classified in groups as shown below.

Table 17.9

x	0-10	10-20	20-30	30-40	40-50
f	7	13	20	13	7

This kind of series may be constructed using inclusive method or exclusive method. Above example is that of an exclusive series. In case of inclusive series frequency corresponding to the upper limit of group is included in the same group, while it is included in subsequent group in case of exclusive series.



### INTEXT QUESTIONS 17.2

1. Identify whether the following items are variable or attributes?

- (i) Height of a student
- (ii) Beauty of a girl
- (iii) Intelligence level of a boy
- (iv) Mileage of a car
- (v) Weight of Mr X

#### 17.4.2 Tabulation

After the data is collected and classified, it is always useful to put them into rows and columns in a table.

A statistical table may be a simple one or it may be a complex one, depending upon number of variable incorporated into it. Given below is a format of simple statistical table.

**Table 17.10**  
**Part of a table**

Sub Heading	Caption		
	Column I	Column II	
Rows			
Rows			
Rows			
Source:			

Footnote



Notes



## Notes

This table may be one way or two ways or manifold. Following illustration are simple example of tabulation.

### Illustration 1

During 2010-11, there were three faculties with 840 students in commerce, 660 in science and only 50 students in management.

The percentage of males is 40%, 25% and 20% respectively in each subject stream.

This data can be tabulated as follows

**Table 17.11**

Faculty	Number of students		Total
	Male	Female	
Commerce	336	504	840
Science	165	495	660
Management	100	400	500
Total	601	1399	2000

### 17.4.3 Diagrammatic and Graphic Presentation of Data in Economics

Data relating to two variables may be shown with the help of a simple graph. It is usually in the form of line or curve. Data relating to a time series or a frequency distribution can be easily presented in a graph.

Diagrammatic presentation is a geometrical version of the data. Diagrams present the facts in such a manner that just by glancing at them one can understand the most complex data. Diagrams may be one-dimensional or two dimensional and even three-dimensional. Bar diagrams are usually one dimensional diagram, only height of the diagram is relevant and not the width.

Here we will discuss only about one dimensional diagram.

#### One dimensional diagrams

One dimensional diagrams are also called bar diagram which are most commonly used in practice. There are various types of bar diagrams but here we will study about simple bar diagrams only.

**Simple Bar Diagram:** They are very simple to present but only one type of variable can be presented. A simple bar can be drawn either on horizontal or vertical base. But vertical bars on horizontal base are more commonly used in practice. Bars must be of uniform thickness and they should be placed at equal distance.

Let us now explain how a simple bar diagram can be presented from the given data. The following table gives data on birth rate in India, according to census survey of different years. This information is presented in simple bar diagram as given below.

Table 17.12

Year	1931-40	1941-50	1951-60	1961-70	1971-80	1981-90
Birthrate	45	35	30	28	24	20

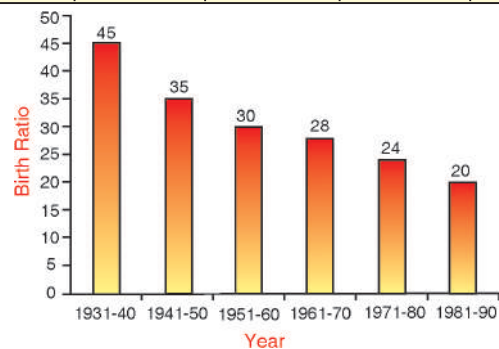


Fig. 17.1 Birth rate in India

Data may also be presented graphically. In economics and statistics the values may be of time, relationship, frequencies etc. In case of time series graph, x-axis represents time and y-axis the variable. It is necessary to decide a convenient scale for each axis to accommodate the complete data given. The scale of two axis can be different.

### Illustration 2

The number of students in a school for five years is given below:

Table 17.13

Year	2007	2008	2009	2010	2011
No. of students	1000	2500	3800	4500	5200

We can present this data in the form of a graph

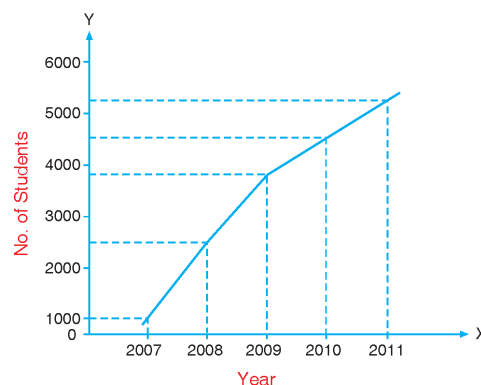


Fig. 17.2 Enrolment of student P (2007-2011)

Notes



**Notes****WHAT YOU HAVE LEARNT**

- Data means any quantitative information about income, population, prices etc.
- Statistics/Data are the aggregate of facts, affected to a marked extent by multiplicity of cause, numerically expressed, having reasonable standard of accuracy, collected for predetermined purpose and placed in relation to each other.
- Data are important in economic planning, for determination of national income, in forming fiscal and monetary policies and assist central bank of a country.
- Data which are originally collected for the first time for the purpose of the survey, are called primary data.
- When we use the data which have already been collected by others, the data are called secondary data.
- Primary data can be collected by: (i) Direct personal investigation (ii) Indirect investigation (iii) through correspondent (iv) by mailed questionnaire (v) through schedules
- Sources of secondary data may be in the form of published or unpublished data.
- Data can be presented in the form of classification individual series, discrete series and continuous series; graphs and diagrams.
- Data can be presented in the form of simple bar diagram

**TERMINAL QUESTIONS**

1. Define data. How are primary data collected?
2. What is the difference between primary and secondary data?
3. Distinguish between variable and a an attribute.
4. Explain the following (a) Classification
5. Explain the following methods of presentation of data:
  - (a) Tabulation
  - (b) Diagram
6. Construct a simple bar diagram from the data given below:

State	Number of management colleges
Rajasthan	200
Punjab	400
Gujarat	150



## ANSWERS TO INTEXT QUESTIONS

### Intext Questions 17.1

- (i) No                      (ii) No                      (iii) No                      (iv) Yes

### Intext Questions 17.2

- (i) Variable              (ii) Attribute              (iii) Attribute              (iv) Variable              (v) Variable



**Notes**



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**18**

## ANALYSIS OF DATA

Economic data are usually studied with the help of statistical methods. Science of statistics is a method of collection, classification and tabulation of numerical facts, which help in explanation, description and comparison of phenomena.

Clearly in singular sense statistics is a scientific subject, which is descriptive as well as conclusive. In descriptive statistics we include a complete gamut of scientific enquiry. In all kinds of statistical enquiry the first step is to gather the facts through various methods. The facts collected from respondents are first edited. These facts are then presented with the help of tables, graphs and diagrams. Quantitative information is statistically analysed. Representative figures are interpreted in the context they have been studied.



### OBJECTIVES

After completing this lesson, you will be able to:

- *understand the meaning of the term central tendency;*
- *use the concept of average in your day-to-day life;*
- *calculate arithmetic mean of various series;*
- *use alternate methods to calculate arithmetic mean.*

### 18.1 MEANING OF CENTRAL TENDENCY

After the data have been collected, organised and presented they need to be analysed. Analysis of data is a technique through which significant fact from the numerical data are extracted. One of the most important objects of statistical analysis is to get one single value that describe the characteristics of the whole data.

In statistics we deal with certain problems, which are largely affected by multiplicity of causes. Whatever conclusions we draw are based on combined effect of the various





Notes

causes and it is very difficult to trace out impact of all such causes separately. However, the first step in data analysis is to ascertain representative values from the raw data. It is known as average or measure of central tendency.

Raw data are first edited and then converted into frequency distribution. One of the basic purposes of descriptive statistics is to find out a most representative value or figure from the data. This representative figure is called average or mean. This is the value or single figure, which is typical to all. This is also known as measure of central tendency. Thus averages are the descriptive statistics, which measure the tendency called central tendency. It has been well established that there is a tendency of data to move towards a particular direction.

**Tendency of data to cluster towards the central location or value is called central tendency.**

The purpose for computing an average value for a set of data is to obtain a single value which is representative of all the items and which the mind can grasp simply and quickly. The single value is the point around which the individual items cluster.

We often use the term average in our day-to-day discussions. If one claims that his average marks are 76 out of 100 in 6 subjects. It shows that he succeeded in total of 456 i.e.  $76 \times 6$  marks. For example, if actual runs scored by Sachin in five innings in a series are 59, 78, 100, 50 and 63 he scored 350 runs in total. His average score is  $350/5 = 70$ . It is important to note that Sachin never scored exactly 70 runs in any inning he played. However, on an average this figure is a good representative of his scores in five innings.

The purpose of computing an average value for a set of observations is to obtain a single value which is representative of all the items and which the mind can grasp simply and quickly.

## 18.2 PURPOSE AND FUNCTIONS OF AVERAGES

- to convert the collected information and raw data in brief
- to facilitate comparison between two or more groups
- to present a representative value from raw data
- to facilitate future policy and programme.

## 18.3 ARITHMETIC MEAN AS A MEASURE OF CENTRAL TENDENCY

There are various measures of central tendency. Arithmetic mean is one of them

Arithmetic mean is obtained by dividing the sum of the items by the number of items mathematically speaking:



## Notes

$$\bar{X} = \frac{\Sigma x}{N}$$

where,  $x$  = item

$\Sigma x$  = sum of the item

$N$  = Number of items and

$\bar{X}$  = Arithmetic mean

Arithmetic mean in common language is popularly known as average. It is very easy to calculate it, say for example there are 10 students in a class. They scored marks in economics out of 10 as follows

Student	A	B	C	D	E	F	G	H	I	J
Mark	2	7	10	8	6	3	5	4	5	0

Here 'x' is marks in economics. Let us start with the sum of the  $2 + 7 + 10 + 8 + 6 + 3 + 5 + 4 + 5 + 0 = 50$ , clearly 10 students secured 50 marks ( $\Sigma x$ ) in all. Number of students ( $N$ ) is 10, the average of the marks scored by 10 students is thus  $50/10 = 5$  in other words

$$\bar{x} = \frac{\Sigma x}{N} = \frac{50}{10} = 5$$



## INTEXT QUESTIONS 18.1

1. Give an example of central tendency.
2. Give basic formula to calculate arithmetic mean.
3. If sum of items is 40 and mean is 4 find out "N" (number) of items.
4. Weekly consumption of sugar of Mr. Raja is 35 kg what is his average daily consumption?
5. If average marks of 10 students is 50 if one more student is added to group who secured 5 marks. What will be the new average?

18.4 CALCULATION OF ARITHMETIC MEAN IN  
DIFFERENT TYPES OF SERIES

As given in Lesson 17, data can be organized in different types of series. They are – Individual series, Discrete series and Continuous series. Calculation of arithmetic mean for different series of data is given below



Notes

- A. Individual series: Above formula for calculation of arithmetic mean or mean is valid under all circumstances. However, if shortcut method is to be used for complexed data, above formula is modified as follows:

$$\bar{x} = A + \frac{\sum dx}{N}$$

Here  $A$  is assumed mean,  $dx$  is deviating  $x$  from assumed mean and  $N$  is number of items.

**Illustration 1.** Ascertain arithmetic mean from the following marks secured by 10 students out of 30.

$x$  : 4, 3, 8, 9, 12, 10, 25, 10, 21 and 20

$x$  = Marks

### Solution

#### (a) Direct method

$$\sum x: 4 + 3 + 8 + 9 + 12 + 10 + 25 + 10 + 21 + 20 = 122$$

$$\bar{x} = \frac{\sum x}{N} = \frac{122}{10} = 12.2$$

#### (b) Shortcut method

x marks	$dx = x - A$ $A = 12 = x - 12$
4	-8
3	-9
8	-4
9	-3
12	0
10	-2
25	+13
10	-2
21	+9
20	+9
$\sum x = 122$	$\sum dx = 2$

Let us assume 12 as assumed mean ( $A$ )

$$\bar{x} = A + \frac{\sum dx}{N} = 12 + \frac{2}{10}$$

$$\bar{x} = 12 + 0.2 = 12.2$$



## Notes

**B. Discrete series:** for ascertainment of arithmetic mean in discrete series following formulae can be used

**(a) Direct method**

$$\bar{x} = \frac{\sum fdx}{N}$$

where N = Sum of frequencies

**(b) Shortcut method**

$$\bar{x} = A + \frac{\sum fdx}{N}$$

**Illustration 2.** Calculate arithmetic mean from the data given below:

Number of children per family	0	1	2	3	4	5	6
Number of families	13	17	20	40	20	17	13

**Solution.**

**(a) Direct method**

x = number of children

f = number of families

x	f	fx
0	13	0
1	17	17
2	20	40
3	40	120
4	20	80
5	17	85
6	13	78
	<hr/> 140	<hr/> 420

$$\bar{x} = \frac{\sum fx}{N} = \frac{420}{140} = 3$$

Thus, average is 3, which indicates that there are 3 children per family on an average



Notes

**(b) Shortcut method**

x	f	dx = (x - A) A = 2	fdx
0	13	-2	-26
1	17	-1	-17
2	20	0	0
3	40	+1	40
4	20	+2	40
5	17	+3	51
6	13	+4	52
	<hr/> 140		<hr/> +183
			<hr/> -43
			<hr/> 140

$$\bar{x} = A + \frac{\Sigma fdx}{N} = 2 + \frac{140}{140} = 3$$

**C. Continuous series:** Following three methods are used for ascertainment of arithmetic mean in a continuous series

**(a) Direct method**

$$\bar{x} = \frac{\Sigma fdx}{N}$$

**(b) Shortcut method without step deviation**

x = mid value of a class

$$\bar{x} = A + \frac{\Sigma fdx}{N}$$

**(c) Shortcut method with step deviation**

$$\bar{x} = A + \frac{\Sigma fdx'}{N} \times c$$

Here c = common factor

Calculation of arithmetic mean for continuous series is explained in detail below with the help of an example



Notes

**Illustration 3.** The marks secured by 300 students in a school

x (marks)	0-10	10-20	20-30	30-40	40-50	50-60	60-70
f(no. of students)	23	27	40	120	40	27	23

**Solution.** First let us calculate mid value for each class. It is done by taking a sum of lower and upper limit of each group and dividing it by 2 i.e.

$$x = \frac{L_1 + L_2}{2}, \frac{0+10}{2}, \frac{10+20}{2}, \frac{20+30}{2}, \frac{30+40}{2}, \frac{40+50}{2}, \frac{50+60}{2}, \frac{60+70}{2} \text{ i.e. } 5, 15, 25, 35, 45, 55 \text{ and } 65$$

Here  $L_1$  is lower limit while  $L_2$  is the upper limit of each class

**(a) Direct method**

x	$x = \frac{l_1 + l_2}{2}$	f	fx
0-10	5	23	115
10-20	15	27	405
20-30	25	40	1000
30-40	35	120	4200
40-50	45	40	1800
50-60	55	27	1485
60-70	65	23	1495
		300	10500

$$\bar{x} = \frac{\sum fx}{N} = \frac{10500}{300} = 35$$



Notes

**(b) Shortcut method**

(i) Without step deviation

x	f	MV(x)	dx(x-A) A = 25	fdx
0-10	23	5	-20	-460
10-20	27	15	-10	-270
20-30	40	25	0	0
30-40	120	35	+10	1200
40-50	40	45	+20	800
50-60	27	55	+30	810
60-70	23	65	+40	920
	300			3000

$$\bar{x} = A + \frac{\Sigma f dx}{N} = 25 + \frac{3000}{300} = 25 + 10 = 35$$

**(c) Shortcut method with step deviation**

x	MV(x)	f	dx(x-A) A = 25	$35 dx_{L=1}^1 = \left(\frac{dx}{10}\right)$	fdx <sup>1</sup>
0-10	5	23	-20	-2	-46
10-20	15	27	-10	-1	-27
20-30	25	40	0	0	0
30-40	35	120	+10	1	120
40-50	45	40	+20	+2	+80
50-60	55	27	+30	3	81
60-70	65	23	+40	4	92
		300			300

$$\bar{x} = A + \frac{\Sigma f dx'}{N} \times c = 25 + \frac{300}{300} \times 10 = 35$$

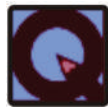


Notes

## 18.6 PRECAUTIONS OF USING ARITHMETIC MEAN

Let us provide two important precautions while using arithmetic mean.

1. It is important to note that arithmetic mean is a theoretical value, which may not be represented by actual fact. Say for example, if in all there are 27 children in 10 families. Average number of children per family would be 2.7 ( $27 \div 10$ ). It is unrealistic. There can be either 2 or 3 children per family but not 2.7.
2. Arithmetic mean cannot be qualitative data such as honesty, bravery, loyalty and beauty etc.



### INTEXT QUESTIONS 18.2

1. Calculate arithmetic mean from the following data: 4, 6, 3, 7, 8, 2 and 5
2. Calculate arithmetic mean from the following data:

Marks (out of 5)	0	1	2	3	4	5
Number of student	3	7	8	5	3	4

3. If sum of the deviation measured from assumed mean of a group 10 is +50 and assumed mean is 20, what will be the actual mean.



### WHAT YOU HAVE LEARNT

- Tendency of data to cluster towards the central location or value is called central tendency.
- An average is a value which is representative of set of data.
- Arithmetic mean is a mathematical average and which is commonly used as a measure of central tendency.
- Arithmetic mean is obtained by dividing the sum of the items by the number of items mathematically speaking:

$$\bar{X} = \frac{\sum x}{N}$$

where,  $x$  = item  
 $\sum x$  = sum of the item  
 $N$  = Number of items and  
 $\bar{X}$  = Arithmetic mean



- Arithmetic mean can be calculated for Individual series, Discrete series and Continuous series by using different formulae.

**TERMINAL EXERCISE**

- What do you mean by analysis of data?
- What is meant by descriptive analysis?
- Discuss the concept of central tendency.
- What do you mean by arithmetic mean? How is it calculated?
- Define arithmetic mean. What does it reflect?
- What do you mean central tendency? How does arithmetic mean reflect it?
- From the following data find out mean: 7, 4, 17, 19, 11, 16, 15, 14, 9 and 11.
- If the following items are also added to above set of data, what would be the revised mean 18, 14, 14, 8, 10 and 21
- Calculate mean from the data given below:

x	f
0	1
1	13
2	20
3	40
4	40
5	13
6	7

- Calculate arithmetic mean from the data given below:

x	f
0-10	5
10-20	15
20-30	20
30-40	25
40-50	20
50-60	15
60-70	5

**Notes**



Notes

11. From the data given below find out mean

x	f
20-40	2
40-60	7
60-80	9
80-100	24
100-120	9
120-140	7
140-160	2



## ANSWERS TO INTEXT QUESTIONS

### Intext Questions 18.1

- 1
- $\bar{x} = \frac{\sum x}{N}$
- 45.9
- 7 kg
- 5

### Intext Questions 18.2

- 5
- 2.33
- 18
- 25

**MODULE-7**  
**INDIAN ECONOMY**

19. An Overview of Indian Economy
20. Sectoral Aspects of Indian Economy
21. Challenges before Indian Economy
22. Indian Economy in Global Context





19



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## AN OVERVIEW OF INDIAN ECONOMY

As citizens of India, it is very important for all of you to know about the economy of India. As you also know from history that India became an independent nation on August 15, 1947. Prior to that the Indian subcontinent was under the British rule for nearly two centuries which is a very long period to sufficiently influence every aspect of the country such as- politics, culture, social system, economy etc. We will only concentrate on the study of economy of India here.



### OBJECTIVE

After completing this lesson, you will be able to:

- *the state of Indian economy at the time of independence resulted out of two hundred years of British Rule;*
- *the changes in the features of Indian economy after achieving independence;*
- *understanding of Economic reforms.*

### 19.1 STATE OF THE INDIAN ECONOMY AT THE TIME OF INDEPENDENCE

India inherited the economy from the British who were ruling this country for their gain. The British were never interested in the development of India or its citizens. Their aim was to exploit the resources of India and take away as much as possible to England. This is the reason why railway lines were laid so that things can be transported to port areas for shipment to England. Even if construction of railways was a positive contribution, it was mostly used to serve the British interest.

At the end of British period some notable economic features were as follows:

- Decline of handicrafts industry



## Notes

- (ii) Production of cash crops
- (iii) Famines and food shortage
- (iv) Rise of intermediaries in agriculture

Let us discuss these points one by one.

### 19.1.1 Decline of Handicraft Industry

Before the British came to India, Emperors and kings were ruling this land. They promoted the interest of local artisans, carpenters, artists, weavers etc. who were very good at making beautiful paintings, decorating walls, designing textiles and jewelry, tailoring, making furniture, toys and idols of stones and metals etc. These people were using their labour and local skills to create these things. A lot of concentration and long time was required to create such things. The Kings' courts in various parts of the country were full of decorative items of various types made of different materials. But when the British came they defeated the Kings and took over their kingdoms. Towns were destroyed and with this the handicraft industry was also faced closure.

An important part of Indian handicraft were the textile handicrafts. In the latter half 19<sup>th</sup> century England was experiencing changes in production technology. Machine was replacing human labour to produce goods. Producing goods at large scale was becoming easier. More factories were coming up. The British could bring their machine made textiles and sell in India at a cheaper price and also in large quantities. The British government also made policies to help the British producers only. So Indian handicraft suffered.



#### INTEXT QUESTION 19.1

1. Compare the methods of production of Indian textile handicrafts with that of the British.



#### ACTIVITY

Visit a museum / historical palace and study the handicrafts of those days.

### 19.1.2 Production of Cash Crops

As said above, England was under going change in terms of industrialization so factories there were in need of raw materials to produce goods. In order to make textiles raw



Notes

cotton was needed. Similarly indigo was in high demand to make prints on textiles. Also jute, sugarcane, ground nuts were all in great demand in England as they were all needed in factories there. Since these were all cultivated in India, the British offered money to poor farmers of India to raise these crops so that they could send them to England. Since these crops are used in factories as raw materials to produce goods, they are called cash crops.

Attracted by money, Indian farmers grew these cash crops for the British who supplied them to factories in England. The factory made goods were sent for sale in the Indian market. Now the British sold these goods to Indian people and made profit.

### 19.1.3 Famines and Shortage of Food

The worst part of British rule in India had been the frequent occurrences of famines. Famine is a situation wherein many people do not get food to eat and die from hunger and diseases. Famine occurred nearly 33 times during whole British period. The most devastating famine was the Bengal famine of 1943, just four years before independence. More than 1.5 million people died at this time due to lack of food. Some reasons for occurrence of famines were as follows:

- (i) Bad rainfall upsetting food grain production since irrigation facilities were not available. Agriculture was dependent on rainfall.
- (ii) British government kept on exporting food grains to its native country England and elsewhere even if there was local need for these things. British government was only interested in earning revenue for itself by exporting food grains to other countries. It also used food grains to feed its soldiers who were fighting wars in different parts of the world. You know that the British had not only captured India, but also many other countries of the world. So they were sending food from India to these countries where their soldiers were fighting to capture territories.
- (iii) Poor people had not enough money to purchase food grains from the market.
- (iv) As said above, Indian farmers were encouraged to produce cash crops on their fields. This led to fall in production of food grains because less area was available for their cultivation.



### INTEXT QUESTIONS 19.2

1. Give the meaning of famine?
2. Why were the British exporting food grains?



Notes

**ACTIVITY**

Make a list of cash crops and food grains.

**19.1.4 Intermediaries in Agriculture**

Agriculture was major occupation of people of India during British rule. More than 70 percent of the population was dependent on agriculture. So it was the major source of revenue for the government. The British introduced two types of land revenue, such as:

- (i) Permanent settlement under which land revenue to be collected was permanently fixed.
- (ii) Temporary settlement under which land revenue was changed after 25-30 years of time.

In order to collect revenue the British appointed Zamindars in eastern part of India, Mahalwari in western part and Ryotwari in south India. These persons were called intermediaries because they used to act between British Government and common people. Their job was to collect revenue in the form of rent, tax etc from the villagers, farmers and other households and submit that revenue with the government. Over the years these people became exploiters of common people as they mercilessly collected revenue without considering their poor status. Similarly no mercy was shown even during poor harvest due to bad rain fall or floods. Out of the total revenue collected from the villagers these intermediaries used to keep a part of it before depositing with the British government. Besides collection of land revenue the British government also depended on them for running the administration. In this way the Zamindars, Mahalwaris and Ryotwaris became mini rulers in their respective areas. They used force to take away belongings of persons who failed to give revenue. This way these intermediaries became rich and powerful at the cost of common man and with the blessings of British government.

**INTEXT QUESTIONS 19.3**

1. Distinguish between Permanent and temporary settlement?
2. Write three sentences about the Zamindars?

**19.2 POSITIVE CONTRIBUTION OF BRITISH RULE**

Some positive things did happen during British period. The Railways you see today was first introduced by the British government in 1850. Between 1850-1855 the first



jute mill, the first cotton mill and the first coal mine were established. In the later years the length of Railway lines and the number of the above said mills kept increasing. The British government also established telecommunication, telegraph, post offices in the country.



Notes

### 19.3 CHANGES IN THE FEATURES OF INDIAN ECONOMY AFTER INDEPENDENCE

A new era began in India's history after its independence. Obviously so, because the governance of India became the responsibility of its people. Unlike the British government, the aim of the government of India was to take India towards the higher levels of development and achieve welfare for all its citizens. By the year 2010, the government of India has completed more than sixty years of governing India. This is long enough time to make an evaluation and accordingly describe the major features of Indian economy which are as follows

Low level of per capita income, slow growth of per capita income, Heavy population pressure, Existence of Poverty, Dependence on agriculture and Planning for Development

Let us discuss them one by one in the following way.

#### 1. Low level of per capita income

Per capita income is calculated by dividing national income by population. Income of an individual is a major indicator of his or her standard of living. Per capita income gives the idea of income earned on an average by an individual in the economy in a year. India's per capita income for the year 2009-10 was Rs. 33731. This comes out to be around Rs 2811 per month. (i.e.  $33731/12 = 2811$ ).

This amount is very low to lead a decent life. A person needs a room to live, cloths and dress materials to wear and food to eat. All these things have to be purchased from the market by paying some price. Even if a person has his or her parental house to stay where he / she does not pay rent, still he / she needs to buy clothes and food for him / her self. Since price of food grains, vegetables, clothes etc. are high so you think Rs.2811 is sufficient to meet these expenditures?



#### ACTIVITY

Go to the market and find out the prices of rice, wheat floor, potato and onions. Estimate the amount of these goods, you consumed in the last month? Then find out the expenditure on these goods? Similarly find the expenditure on these goods by your family? Then think what should be income to meet their expenditure?



## Notes

## 2. Slow growth of per capita income

India's per capita income is not only low but also growing very slowly. Growth refers to increase over time. Why we want our income to increase every year? There are a few reasons for it .

First, our wants are increasing, as we grow over time. In order to satisfy the extra wants, we need more income. Take for example your own case. Don't you want to watch a movie in a cinema hall; don't you want to wear nice dresses; don't you want to eat in a hotel; don't you want to watch IPL cricket match in a stadium; don't you want to study in a college; don't you want a mobile phone for yourself etc. The list could go endless. But these things are not available free of cost. So you need more income than before to satisfy these wants.

Second, another reason for earning more income is that the prices of goods you buy in the market are also increasing. So you may have to pay more money for the same goods and services you consume. Recently the prices of petrol and diesel were increased. In Delhi the price was increased by around Rs 5 per litre. Suppose a person runs a truck from Delhi to Shimla carrying shoes. He sells shoes in Shimla market at the rate of Rs.300 per pair. His expenditure on diesel before the rise in price was around Rs.3100 per trip. But because of price rise his expenditure on diesel increased to ,say, Rs.3700. How he will manage this extra Rs.600? One way is to increase the price of a pair of shoes from Rs.300 to say Rs.325. If you are staying at Shimla and buying shoes then you have to pay Rs.25 more for a pair than before. Where from you get this extra money of Rs.25? Your income must increase to adjust this increase in expenditure. Since you spend on other goods as well and prices of others goods are also increasing in a similar fashion, your income must increase even faster.

But ironically, the per capita income in India has not increased in the desired manner.

We just told that India's per capita income was Rs.33,731 in the year 2009-2010. Do you know what was the amount in the preceding year. 2008-9? It was Rs.31,801. This means, income of an individual was increased by only Rs.1930. What is the increase per month? It was around Rs.160 per month. Is this amount sufficient for you to meet the extra expenditure on various goods due to rise in prices? Remember that you have to pay extra Rs.25 for shoes only. These are so many other things you need for which you have to pay more. So increase of Rs.160 is not just enough to satisfy your existing wants, what to talk of satisfying increase in wants? We reproduce the data on per capita income in the table below given economic survey.

**Table 19.1 Per capita income of India**

Year	per capita income (Rs)	Growth (Rs)
2008-09	31801	—
2009-10	33731	160



Notes

Third, finally we want our income to grow because we may want to help each other at times of needs or to please each other. Let us not forget that we live in a society with our relatives, friends and others. We need each others help and cooperation all the time. Have you ever helped a friend who was in need? You may want to help a poor person who wants food to eat? You may want to purchase a book for your needy friend? You may want to buy chocolates for your little brother or sister? In all these cases you need more money after taking care of your own needs But if we are not able earn more for ourselves to satisfy our own increase in wants, then how can we help others which we want to do?

**INTEXT QUESTION 19.4**

1. Find out the percentage increase in per capita income in 2009-10 over 2008-09 from table-19.1 above? (use your arithmetic skill).
2. Define per capita income?
3. What was India's per capita income in 2009-10?

**3. Heavy population pressure**

India's economy is over populated. It has grown by more than three times in last 60 years. At the time of independence in 1947 the population was 350 million. According to 2011 census, India's population stands at 1.21 billion. It is second only to China in the world and may even over take China in future. Why are we worried about high population? Very simple. More people means more mouths to eat. This implies that more food grains to be produced. Since population is increasing every year, more food grains must be produced every year. This is not an easy task. Because the land area meant for cultivation is not increasing proportionately. So if food production does not match with increase in population then availability of food grain per head or per capita supply of food grain will fall. Taking the hole of India as one family, this further means that, each member of the family will have less food to eat. Is it not alarming?

Besides food, more population mean more clothes, more expenditure in education and health services, more houses, roads and what not? Who will provide it? Is our government bestowed with sufficient resources to provide all these facilities? May be not. Otherwise there would not have been slums in cities and beggars on the streets.

The positive thing about India's population is that the number of young people is very high as compared to other nations in the world. About half of India's population is in the age group of 0 to 25 years. Around 78.5 crore out of 121 crore people belong to below 35 years of age. What does it mean? Youth are full of energy and strength and expected to perform better as they have the ability to work more. It also indicates low dependency ratio.



### Notes

Do you know which are the three most populous states in India? They are Uttar Pradesh, followed by Maharashtra and then Bihar. It is interesting to know that the population of Uttar Pradesh (UP) is almost equal to that of Brazil which is one of the largest countries in the world as per land area, while Maharashtra's population is equal to that of Mexico. See the table-2 below to verify this.

In fact total of India's population almost equals the combined population of USA, Japan, Indonesia, Pakistan and Bangladesh.

**Table 19.2 Population of India and States as per Census 2011.**  
(in crores)

UP -19.9	Brazil -19.07
Maharashtra-11.2	Mexico-11.2
India-121	

### 4. Existence of Poverty

Nearly one third of world's poor live in India. See the beggars on the streets, the slums in towns and cities, children working on the fields or in the street side dhabas or employed in houses or in factories etc. These are visuals of poverty in the country. See table-3 below. More than 30 crores of India's population suffer from poverty which is about 27.5 percent of the total population. Out of these, more than 22 crores live in rural areas. The rest live in urban areas i.e. towns and cities.

Among various states of India, Odisha is the most affected by poverty. Because the percentage of poor people out of its total population is 46 which is highest among all the states. It is followed by Chhatisgarh, then Bihar. In terms of number of poor people, UP has the maximum number of poor people. Look at Punjab, Haryana and Andhra Pradesh. They are among the least affected by poverty because, percentage of poor people in these states is lower as compared to Odisha, Bihar and Uttar Pradesh.

**Table 19.3 Poverty situation in some states in India**

State	% of Poor People	Total number of Poor People (Lakh)
Odisha	46	179
Chhatisgarh	41	91
Bihar	41	369
Uttar Pradesh	35	590
Andhra Pradesh	16	126
Haryana	14	32
Punjab	08	22
<b>All India</b>	<b>27.5</b>	<b>3017</b>

**Source:** compiled from economic survey



Notes

When you study table – 19.3 what do you make out? Percentage of poor people tells about how many persons out of 100 are poor, while total number of poor people is the absolute number. See that Odisha has 179 lakh poor people which is very less than that of 590 lakh in UP. But in Odisha nearly 46 out of every 100 people are poor while in UP, 35 out of every 100 people are poor. Because UP's total population is higher than that of Odisha, the absolute number of poor people is also higher in UP than in Odisha. Because of higher percentage, Odisha is more affected by poverty than UP.

Poverty is a curse on humanity. A poor person cannot afford his or her daily needs or necessities to buy from the market. He or she is not able to eat even two square meals a day, nor she or he can wear proper clothes. A poor person has no shelter to live or has katcha house. It is difficult for him or her to get education, health care etc. Why does this happen? There could be many reasons.

First, a person affected by poverty is either unemployed or earn very small amount of income from his or her current occupation which is insufficient to fulfill his or her basic needs.

Second, the person must be subjected to exploitation by others on the basis of caste or religion or gender.

Third, the person has become poor because he or she has not got any property in the form of land or house etc. Those who have inherited property from their ancestors enjoy certain advantages over others who do not have property.

Fourth, perhaps the efforts of the government have not been effective. Corruption and slow pace of decision making, in government are obstacles in removing poverty. However, existence of poverty is not the failure of the government alone, but also failure of the people and society at large who should help each other and cooperate so that everyone can lead a decent life.

(We will discuss the concept of poverty and various steps taken by the government to remove poverty in unit 22.)



### INTEXT QUESTIONS 19.5

1. Do you think poverty and unemployment are linked?
2. Compare the figures for Odisha and Punjab as given in table-19.3.



### ACTIVITY

Calculate total Population of the states from the data given in table – 19.3 ? Use your knowledge of arithmetic.



### Notes

### 5. Dependence on Agriculture

In an economy people pursue various activities to earn their livelihood, such as, agriculture, industry and services. (we will study this in detail in lesson-20). Indian economy has been traditionally based on agriculture. In 1951, at the beginning of first plan, more than 70 percent of the population were engaged in agriculture and related activities. Even if this has come down, still around 60 percent of the population is still dependent on agriculture at the beginning of the 21<sup>st</sup>. century i.e year 2001.

### 7. Planning for Development

A major feature of Indian economy after independence has been its consistent effort to achieve development through the process of economic planning. This is a very positive phenomena going on for the past 60 years.

The government of India adopted five year plans beginning with the first five year plan in 1951. The duration of this plan was 1951 to 1956. Accordingly the second five year plan began in the year 1956 and ended in 1961. And so on. See the table -4 below to know the time period of different plans in India.

**Table 19.4**

Plans	Plan Periods in India
First	1951-1956
Second	1956-1961
Third	1961-1966
Annual Plan	1966-1967, 1967-68, 1968-69
Fourth	1969-1974
Fifth	1974-79
Annual Plan	1979-80
Sixth	1980-1985
Seventh	1985-1990
Annual Plans	1990-91 and 1991-92
Eighth	1992-1997
Ninth	1997-2002
Tenth	2002-2007
Eleventh	2007-2012



**Notes**

What do you mean by planning? Planning means to make preparation to do something in future. It could be solving a problem to achieve some target you have fixed.

You can take your own example. Suppose you have to appear for your tenth class examinations next year. Say, you have ten months times from today. How will you go about it? Obviously you will prepare in a systematic manner to achieve your target i.e. passing the examination and also with good score. In order to realize this, your preparation will include the following

- (i) arranging money to purchase books
- (ii) allocating time every day for study and other works
- (iii) Allocating time for each subject every day. i.e. Economics, Mathematics, Biology, Hindi, English etc.
- (iv) Evaluating your preparation after say each month or after every two or three months.

Similarly the government of India has been planning to solve its economic as well as various other problems. Planning is necessary because the problems are not easy to solve in a day or two. Take for example the problem of increasing production of food grains. It requires allocation of resources in the form of man power, raw materials, machinery, money etc. which must be used in proper manner so that there are minimum wastages. Similarly there are many other problems as well, such as—problem of giving employment or jobs to so many young people every year, problem of improving the standard of living of poor people, providing safe drinking water to rural population, building roads to connect different villages and towns of India etc. You can count thousands of such problems

India has adopted five year plans so that at the beginning of the particular plan it declares as to which problems should be taken up in the coming five years and at the end of the term reviews the whole situation and the progress made in that direction. In the table-19.4 above the time period of the five year plans are given. We have completed ten five year plans. The eleventh plan will be over in 2012. You can see that during the period 1966-1969 there was no five year plan but merely annual plans. This was because of lack of monetary and other resources to run a five year plan. Why did this happen? It happened because India fought wars against China in 1962 and against Pakistan in 1965 for which the government had to divert its resources to fight these wars. India also faced drought situation which decreased our agricultural production in this period. So it was difficult to go for a five year plan and India had to manage with annual plans. When the situation got better it restarted five year plan in 1969 with the fourth plan.

In 1979 there was change of government in the centre. So the sixth plan was started in 1980 and the period 1979-80 was converted to annual plan.



### Notes

### Expenditures on Plans

In each and every plan the government allocates resources to various areas such as agriculture, industry, education, health, transport and communication, community development and other social sectors. The aim is to use the given resources earmarked for the said area for its development as per the target fixed by the government for the said period. For example the resources for agriculture can be used for improving productivity of land, extending irrigation facilities etc. Similarly the resources for education can be used for construction of school buildings, granting scholarships to meritorious students, etc. and so on. We can express the resources in rupee terms. In the first five year plan a total amount of Rs. 2070 crores were allocated to meet the expenditures on various sectors. In the Eleventh five year plan, which is going to be completed in the year 2012, a total sum of Rs. 36,44,718 crores has been proposed to meet expenditures on different areas. Some of the reasons for manifold increase in the amount of expenditure from first plan to eleventh plan are: (a) increase in population, (b) increase in wants and (c) increase in prices in the markets.



### ACTIVITY

1. You want to increase wheat production on an acre plot of land from, say 5 quintals in this year to 8 quintals next year. How will you plan to achieve this target?



### WHAT YOU HAVE LEARNT

- The story of Indian economy has two distinct phases. One, the economy during British period and two, the economy after independence .
- During the British period Indian economy was totally exploited by the British for their benefit. As a result the economy suffered from famines and exploitations by the intermediaries. The result was that there was large scale poverty in India at the time of independence.
- After independence the situation has not changed to match the expectations of its people. India is still known by -low per capita income and its slow increase over time; poverty; heavy population pressure etc.
- But India has got hope through its five year plans which set a target to achieve certain goals.



**TERMINAL EXERCISE**

1. What do you mean by temporary settlement?
2. Why did the British want cash crops to be cultivated ?
3. Give two reasons for occurrence of famines in India ?
4. Cite one positive aspect of India's population?
5. From the definition of per capita income can you give one reason of its slow growth?
6. Give a brief account of famines during British period. What are the reasons of occurrences of such famines?
7. Who were the intermediaries? Describe the role played by them?
8. Why did the government of India adopt Planning?
9. Do you think India is a poor country? Give reasons. for your answer.

**ANSWERS TO INTEXT QUESTIONS****Intext Questions 19.1**

1. Indian textiles used labour while British textile used machines for production.

**Intext Questions 19.2**

1. Famine refers to a situation of food shortage leading to hunger and death of many people.
2. British were exporting food grains to earn revenue.

**Intext Questions 19.3**

1. Permanent settlement implies fixation of land revenue permanently.  
Temporary settlement implies revision of land revenue every 25-30 years.
2. Zamindars were appointed by the British in the Eastern provinces of India. Their job was to collect revenue from people. They were also responsible to run local administration.

**Notes**

**Notes****Intext Questions 19.4**

1. 6.06
2. Per capital income =  $\frac{\text{National Income}}{\text{Population}}$
3. Rs 33,731

**Intext Questions 19.5**

1. Yes
2. Odisha has 46 per cent of its population as poor whereas Punjab has only 8 percent of population who are poor. So Punjab is richer than Odisha.



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## SECTORAL ASPECTS OF INDIAN ECONOMY

We consume various types of goods and services. They can be classified into two types- (i) food items and (ii) non-food items. To make food we need food grains, fruits and vegetables, edible oil etc. These things are produced by farmers in the rural area. There are countless non-food items which we use, such as, clothes, shoes, furniture, utensils, automobiles, pen, paper, book etc. These are produced by industries in towns and cities. Since production of food grains and production of non-food items take place in different environment we classify them as different sectors of the economy.



### OBJECTIVE

After completing this lesson, you will be able to:

- *know the three major sectors of Indian economy which the households pursue to earn their living;*
- *understand the role and importance of each of these sectors in the economy;*
- *know the linkages among these sectors.*

### 20.1 TYPES OF OCCUPATION PEOPLE PURSUE

To earn livelihood people pursue different types of activities based on their education, skill, family tradition etc. Normally we classify them into three different sectors of the economy, such as (i) primary sector, (ii) secondary sector and (iii) tertiary sector.

#### 20.1.1 Primary Sector

Take the scenario in rural areas of India. How do the people, who are living in villages, earn their livelihood? Many of them work on the fields to raise crops, which is known

**Notes**

as cultivation. They are known as farmers and agricultural labourers and the occupation is called agriculture. There are different types of crops which are cultivated; such as food items and non food items. Food items include cereal, pulses, fruits and vegetables etc. and non-food items include cotton, jute etc.

Similarly people also earn their livelihood from forestry which refers to collection of forest products and selling them in the market. This occupation is called forestry. Forest products include- timber, firewood, herbal medicines etc. Many people work in mining area to extract minerals. There also people who are engaged in raising live stock such as poultry and dairy farming. Finally fishery is another occupation in which people catch fish in ponds, rivers or sea to sell them in the market. All these activities i.e. agriculture, forestry, mining, livestock and fishery are complementary to each other. We classify them as primary production and place them in primary sector.

So primary sector of our economy includes the following.

- (i) Agriculture and allied activities
- (ii) Fishery
- (iii) Forestry
- (iv) Mining and Quarrying

Villages have been existing from ancient days in India and agriculture and the allied activities are very traditional occupation of people. It comes naturally to them because food which comes from agriculture is the basic need of life. But with progress of time human settlements have expanded beyond villages. Towns and cities have come up in the process of development. These are called urban areas. Jaipur, Ahmedabad, Pune, Bhubaneswar etc. are examples of cities in India. Delhi, Chennai, Mumbai and Kolkata are called Metros because they are even bigger cities. These urban areas are known for its non-agricultural occupation. We can divide the non agricultural activities into two sectors.

- (i) Secondary Sector
- (ii) Tertiary sector

**20.1.2 Secondary Sector**

This sector includes the following production activities

- (a) Manufacturing
- (b) Construction
- (c) Gas, water and electricity supply

**Manufacturing**

This implies production of goods by using raw materials in manufacturing units called factories and industries. In terms of size and expenditure involved there are small and large scale industries. Examples of small scale units are: shoe factory, textile unit, printing, glass making, furniture etc. The large scale manufacturing includes steel, automobiles, aluminum, etc. Skilled people work in manufacturing business.

**Construction**

This activity includes construction of residential and non-residential buildings, roads, parks, bridges, dams, airports, bus stops and so on. It is a regular activity seen in urban areas.

Another occupation people pursue in secondary sector is gas, water and electricity supply. These are essential services.

**ACTIVITY**

- (i) Visit a poultry farm and note down the products it sells.
- (ii) Make a list of five forest products and note down their prices.

**20.1.3 Tertiary Sector**

People are also engaged in tertiary sector activities which are different in nature.

This sector is called service sector where following services are provided.

- (i) Trade, Hotels and Restaurants
- (ii) Transport, Storage and Communication
- (iii) Financial services such as Banking, Insurance etc.
- (iv) Real estate and Business services
- (v) Public Administration
- (vi) Others services.

Table 20.1 provides the percentage of working population in the above mentioned different sub sectors for the year 2009-10.

**Notes**



Notes

**Table 20.1 Occupational Distribution of working Population in India (percentage) in 2009-10**

(i) Agriculture	50.19
(ii) Mining and quarrying	0.61
(iii) Manufacturing	13.33
(iv) Electricity, water etc	0.33
(v) Construction	6.10
(vi) Trade, Hotels etc.	13.18
(vii) Transport, storage etc	5.06
(viii) Financial, business services etc.	2.22
(ix) Other services etc.	8.97

Source: Economic Survey



### INTEXT QUESTIONS 20.1

- (i) Which of the following is a part of primary sector?
  - (a) Fishery
  - (b) electricity
  - (c) banking
- (ii) Which is the largest sector in terms of share in working population in India?



### ACTIVITY

Visit three households in your neighborhood and ask them about their occupation. Then categorize their occupation into different sectors.

Since people work in various activities under the above mentioned sectors and earn income we can analyse the contribution of these sectors to national product as well as their role and importance in the economy.

### 20.2 ROLE AND IMPORTANCE OF PRIMARY SECTOR

In the primary sector agriculture is the predominant occupation and has the largest share in national income. So let us concentrate on the role and importance of agriculture

in the Indian economy in terms of its share in the national income, providing employment food and raw materials. Let us take them one by one.

### 1. Share in National income

At the time of independence agriculture was contributing more than 50 percent to national income. In recent years its share has come down. In 2009-10 agriculture contributed around 15 percent to national income.

### 2. Providing employment to largest section of population

Agriculture is the mainstay of Indian economy. It is the occupation of the largest section of India's population. At the time of independence about 70 percent of our population depended on agriculture and allied activities to earn their livelihood. With development of manufacturing and service sector dependency on agriculture has slightly reduced. About 50 percent of India's population was working in agriculture in the year 2009-10.

### 3. Providing Food to Millions

Food is the most basic requirement of life. Without agriculture food production and supply would be non-existent. India's food requirement is not only very high but also increasing every year because of increase in its population. The total food grain production of India in 2008-9 was around 234 million tonnes. This includes wheat, rice and pulses.

### 4. Providing raw materials to industries

Industries such as sugar, jute, cotton textiles, vanaspati etc. get their raw materials from agriculture. Do you know how paper is made? It requires a special type of grass, bamboo etc. Without agriculture paper production is not possible. Look at the food processing industry which is supplying so many different varieties of packed food items such as pickles, fruit jam, juice, biscuits, bread, semi –prepared food etc. Food processing industry is operating because of agriculture only.



#### INTEXT QUESTIONS 20.2

1. How much was the food grain production of India in 2008-09?
2. Give three examples of products from food processing industry?
3. What was the share of agriculture in National income at the time of independence?
4. How much has agriculture contributed to India's income in 2009-10?



Notes



## Notes

## 20.3 ROLE AND IMPORTANCE OF SECONDARY SECTOR

In the secondary sector manufacturing industries form the major part. These industries are categorized into small scale industry and large industry.

What is a small scale industry? An industry which can be established by spending a minimum of Rs. 25 lakh on plants and machinery is called a small scale industry. These industries mostly use labour-intensive technology. i.e. production process of these industries use more labour force. Large scale industry, on the other hand needs huge amount of investment in the form of plant and machinery. It is also physically spread over many acres of land and employs large number of people. It also uses capital intensive technology in the form of big machines. Take for example an iron and steel plant. The Tata Iron and steel plant is the oldest in the country. It is situated in Jamshedpur over an area of about 37.31 km. square of land.

The importance of Industrial sector, both small and large, has been increasing after independence. Let us discuss them one by one.

### (i) Share in national income

The contribution of industrial sector has been increasing slowly over time after independence. In 2009-10 the share of this sector was 28 percent in India's domestic product. At the time of independence it was only 14 percent. The increase is due to increase in number of manufacturing units and increase in industrial production.

### (ii) Employment generation

Industrial sector has also largely contributed to providing employment opportunities to India's population. Nearly 3 crores 30 lakhs people are engaged in both small and large scale industries combined. Out of this small industries provide nearly 3 crore 12 lakh jobs.

### (iii) Creation of Infrastructure

Today it has become easier to travel to distant places because of existence of roads, highways, railways, airways. Think of the big Dam projects such as Hirakud and Bhakra-Nangal which provide electricity and irrigation. Look at the big buildings which accommodate offices, shopping centers, factories, institutions etc. and provide residences. Also see the Radio and Telephone towers which facilitate communication. These are all part of infrastructure. You can imagine, how impossible will it be to live without these facilities today? Infrastructure building is possible because of contribution of large scale industries which make the machinery and equipments needed build infrastructure.



**(iv) Provision of consumer goods**

The clothes you wear, the pen, the tooth brush, soap, shoes, cycle, scooter, car etc. you use are produced by manufacturing industries. Today the market is flooded with many goods of your choice. This is possible because of industrialization.

**INTEXT QUESTIONS 20.3**

1. Define small scale industry?
2. What was the share of industrial sector in national income in 2009-10?
3. Give two examples of infrastructure?

**20.4 ROLE AND IMPORTANCE OF SERVICE SECTOR**

Service sector of India has been expanding and growing very fast. Look around and you will see that number of trains carrying people as well as goods have increased significantly. You also find so many buses, cars and trucks moving on the roads from one place to another. This means that the transport services have grown over time. More number of people are having telephones including mobile phones. More number of schools have been built in the country to provide education. The number of study centers under open schooling has increased so that more students can be benefitted. You can also find hospitals; health centers etc are providing health services to people. Banks have also opened their branches so that people can open their account, withdraw money they want and take loans to purchase house, car, scooter etc. There are hotels and restaurants in almost all public places to provide food to people. These are examples of different types of services. It is difficult to think life in the economy without services. Hence it is important to know the role and importance of service sector which we will discuss below under the following heads.

- (i) Contribution of service sector to National income.
- (ii) Contribution of service sector in providing employment
- (iii) Attracting funds from foreign countries.
- (iv) Contribution of service sector in Exports.

**ACTIVITY**

Prepare a project on your local “transport service” in about 200 words.

**Notes**



Notes

## 20.5 CONTRIBUTION OF SERVICE SECTOR

### (i) Contribution to National Income

Among all the three sectors i.e. agriculture, industry and service, it is the service sector that has contributed maximum to the national income of India. If India's income is 100, then service sector contributed 55.20 in the year 2009-10 which is more than half of the total. We have presented the share of different services in table 20.2 below.

**Table 20.2 Contribution of services sector in GDP (2009-10)**

Trade, Hotels etc.	16.3
Transport, Communication	7.8
Finance, real estate, business	16.7
Community, social and others	14.4
Total service sector	55.2

Source: Economic Survey

You can see that financial, real estate and business services contributed 16.7 percent out of the total 55.2. Financial services include Banking and Insurance. Trade and hotel services contributed 16.3 percent. Community and social services which include public administration, defense etc. has contributed 14.4 percent while transport and communication contributed 7.8 percent to national income.

### (ii) Contribution to Employment

Now a days more and more people are getting employment in service sector. Out of total employment level in the country, this sector has absorbed 29.4 percent of them in 2009-10. In times to come this figure is going to increase further. The main reason is that the number of educated people in India is increasing every year. They belong to various fields such as matriculates, graduates in arts, commerce, science, engineering, medicine and other professional and vocational streams. Service sector needs these people. In terms of wages and salaries, service sector, pays more than that of agricultural sector. Compared to agriculture, service sector provides more job opportunities. There is existence of large varieties of services which are provided round the year. But there are some seasonal activities in agriculture. So as people become more educated they move to service sector. So employment in service sector is increasing.

### (iii) Attracting Funds from Foreign Countries

Looking at the growth of service sector of India people from foreign countries are showing more interest to invest money in this sector to earn profit. Banking, insurance,

trade, transport, hotel services combined have attracted more than 1 lac 18 thousand crores rupees from foreign countries in the form of direct investment. Recently computer service has grown many fold in India. This has attracted more than forty seven thousand crores of rupees from foreign countries. If investments are made then more job opportunities are created. This is advantageous for the nation.



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### (iii) Contribution of Service Sector to Exports

Exporting means selling goods and services to citizens in foreign countries to earn foreign exchange in the form of dollar, euro, yen, pound etc. In recent years India's service sector has contributed a lot in earning foreign exchange for the country through exports. Our business services which include—IT, consultancy, legal services, etc. have become world standard.

In the year 2009-10 India earned nearly 4.35 lakh crores of rupees from exports in services.



### INTEXT QUESTIONS 20.4

1. What was the share of service sector in employment in 2009-10?
2. What was the share of service sector in national income of India in 2009-10?

## 20.6 LINKAGES AMONG THE THREE SECTORS OF THE ECONOMY

All the three sectors are interlinked. In fact they complement and supplement each other. We give you the following story to understand it.

Hari Singh is a farmer who cultivates wheat on his agricultural land in the village Rampur. Last year he had a good harvest due to good rain fall. So he could sell 10 quintals of wheat in the local mandi and keep another 10 quintals for his household consumption. This year there is no proper rainfall. The area is also having no irrigation facility. Then how to provide water to the wheat crop? Hari Singh decided to lift ground water. But for this he needs a diesel pump set. Who will provide a diesel pump set? It is produced by a manufacturing unit called Ravi manufacturers which is situated 200km away in an industrial area called Karim Nagar. Now going to such distant place is a difficult task. Ganga Singh, a friend of Hari Singh told that there is no need to worry. He took Hari Singh to the nearest township market called Shiv Mandi. In the market complex there is a shop called Pappu Hardware Store run by Ganga's brother-in-law named Pappu who sells pump sets. When Hari Singh asked for the pump set Pappu told him to wait for two hours because the truck carrying 50 Ravi pump sets and some spare parts for



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tractors from Karim Nagar would reach his shop by that time. Pappu also talked to Ravi Khetrpal, who is the owner of Ravi pumps, over his mobile phone to confirm this. In the mean time Ganga and Hari took tea and snacks in the tea stall, went to enquire about admission into primary schooling for Hari's little daughter and brought medicines from the health center for Ganga's son who was having fever at home. After two hours when they came back to Pappu's shop they saw labourers unloading the pumpsets. Pappu told them that he had ordered 50 pumps from the factory in Karim Nagar. The truck would deliver the spare parts to another shop in the same market place which sells auto and tractor parts. Hari saw that Pappu gave a cheque of Rs. 100, 000 to the truck driver who received it on behalf of Ravi Khetrpal. "Since the amount is big, it is not safe to give cash. Cheque is a better option. Mr. Khetrpal can deposit the cheque in his bank account to get the money" Pappu said. He further said that this payment was made to settle some earlier dues. The payment for pumps would be made after he sells the pumps to the customers in the similar way. Hari Singh paid Rs. 7000 to Pappu and bought one pump set. "Due to bad monsoon this year pump sets are in great demand and will be sold quickly" said Pappu confidently. "What about the truck now?" asked Hari while returning back to village with Ganga Singh. "The truck will now carry wheat and vegetables from the mandi which would be sold to households in the Karim Nagar industrial area and township" replied Ganga.

From the story above you can easily establish the link between the agriculture, industry and service sectors. Like Hari Singh there are many farmers in the agricultural sector who need diesel pumps to irrigate their land. Besides pumps there are many other inputs such as fertilizer, pesticides, plough, tractor etc. are required for cultivation. These things are supplied by industry in the same way as the pump in the story. In return people working in industries and services get food supplied by the agricultural sector in the same way as Hari Singh had sold his surplus wheat in the mandi. What is role of service sector then? Its role is to facilitate and ensure these transactions between agriculture and industry. In the story the truck carrying pumps and spare parts from Karim Nagar to Shiv Mandi and food items on its journey back is a part of transport service. Use of mobile phone to keep track of the order as part of communication services. Cheque deposit in the bank is part of financial service. Pappu's shop provides business service of delivering the good. Note that all these activities are duly backed and supported by money flow. Here in the story Hari Singh sold wheat and got money. He used the money to buy a pump. Pappu got money from Hari and paid it back to supplier of pumps after keeping his profit. After receiving the money the pump supplier will pay the truck driver his due and give wages to people in the factory. These people will use the money to buy food in the local market transported by the truck from mandi.

From this simple story, now you can imagine how the whole of the economy is linked and connected internally.

**INTEXT QUESTIONS 20.5**

1. Give one benefit of making payment by cheque?
2. “Transporting food grain” is a part of which sector?  
(a) agriculture      (b) industry      (c) service

**ACTIVITY**

Visit your local market and make a list of some services you get there. Also make a list of five agricultural and industrial products you see there and find out their place of origin?

**WHAT YOU HAVE LEARNT**

- There are three sectors in the economy, namely, primary (agriculture and allied activities), secondary, (manufacturing etc.) and tertiary (services).
- All these sectors contribute towards generation and growth of national income, creation of employment opportunities, supply of goods and services and creating infrastructure.
- All the three sectors are interlinked by complementing and supplementing each other.

**TERMINAL EXERCISE**

1. Name the sub sectors of primary sector?
2. Name the sub sectors of secondary sector?
3. Name the sub sectors of tertiary sector?
4. Explain the role and importance of primary sector?
5. Explain the role and importance of secondary sector?
6. Explain the role and importance of tertiary sector?
7. How are the three sectors of the economy interrelated?

**Notes**

**Notes****ANSWERS TO INTEXT QUESTIONS****Intext Questions 20.1**

1. (a)
2. Agriculture

**Intext Questions 20.2**

1. 234 million tonnes
2. bread, fruit jam and pickles
3. more than 50 percent
4. 15 percent

**Intext Questions 20.3**

1. An industry which can be established by spending a minimum of Rs 25 lakhs on plants and machinery is called a small scale industry.
2. 28 percent
3. Telephone tower, Hirakud Dam

**Intext Questions 20.4**

1. 29.4 percent
2. 55.2 percent

**Intext Questions 20.5**

1. safety (reaches the person through bank amount)
2. service



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## CHALLENGES OF INDIAN ECONOMY

Each and every citizen of the country has a right to lead a decent life. Every body must be able to fulfil his minimum needs such as food, health care, housing, basic education, etc. However, India is a poor country where a large section of the population cannot afford all these. The matter is made worse due to the fact that our economy does not provide adequate employment opportunities so that poor people can get jobs and earn income. Hence eradication of poverty and unemployment is a major challenge before the economy. Similarly higher quality of life is achieved by getting proper education and health care facilities. Since India is a very large country in terms of population, provision of education and health care by the government to all its citizens is also a major challenge. Another important concern before the government is the rising prices of commodities in the market which is called inflation. Rise in prices hit the poor and middle class people very badly. So controlling the price level is a major problem to be dealt with whenever it occurs. Finally, the income of the nation must also grow with rise in population and their wants so that the development process continues. So achieving economic growth every year is also a major challenge before the economy.



### OBJECTIVE

After completing this lesson, you will be able to:

- *understand the meaning of poverty and programmes implemented by the government to eradicate poverty and generate employment;*
- *Know the steps taken by the government to provide education and health care facilities;*
- *understand the methods to control price rise or inflation;*
- *the strategy of the government to achieve higher economic growth.*





Notes

## 21.1 TACKLING POVERTY AND UNEMPLOYMENT

Who is poor in India? According to planning commission of the government of India any body who is not able to get 2400 kilo calories (kcl) from food intake in rural area and 2100 kcl from food in take in urban area is termed as poor. We call this **Poverty Line** in India. How to explain this poverty line? You know that food is most essential for our existence. We take food to get energy for our body so that we can perform certain activities. How is energy measured? What is the minimum energy requirement for our body per day?

Energy is measured in terms of kilo calories. In rural areas people do lot of hard work to earn their living. According to experts the minimum energy required by a person for doing such work is 2400 k cal in rural area and 2100 k cal in urban area. To get this energy a person requires some amount of food in the form of cereals, pulses, vegetables etc. To buy these food items the person must have some amount of money. This implies that if the person is not able to earn this money to buy the food needed in order to get the required energy to do work, then the person is said to be below poverty line or simply poor.

On this basis it is found that about 27.5 percent of the population in India was poor in the year 2004-5 which was around 27 crores. But do you think that poverty should be measured only in terms of food in- take. Other essential items such as clothing, shoes etc. also come under minimum requirements? This means that even more money is required to buy all these items. According to the government of India if food, clothes, shoes and other non-food items are taken together, then more than 37 percent of India's population i.e. more than 37 crores, were poor .

Similarly on the employment front India is also not doing well. One major reason of poverty being unemployment among the population who are willing to work. Slow growth of industries, education and training are main reasons for unemployment in India. Also our agriculture is already over burdened with population and employment is seasonal there. After harvesting is over, agricultural labour and small farmers become unemployed. In India the population of labour force was more than 43 crores by the year 2010. Labour force means people who are able to work and are between age group of 15 years to 59 years. On a daily basis about 3 to 4 crores or around 8 percent of this labour force do not get any employment.

## 21.2 EMPLOYMENT GENERATION OR POVERTY ALLEVIATION PROGRAMMES

What is the government doing to remove poverty and create employment opportunities for its citizens? In order to tackle these serious problems the Indian government has been making policies and spending a lot of money since the time of independence. That is why population below poverty line has been reducing over time. Though





slowly. Similarly unemployment rate has not been allowed to rise beyond control. These were possible due to the following programmes implemented by the government.

### 1. The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)

MGNREGS aims at providing at least one hundred days of guaranteed wage employment in a year to rural population. The nature of work is unskilled manual work. The scheme was launched in 2006 in 200 districts of India. Then it was notified for the entire country in 2008. Any adult member of a family living in rural area can do manual labour on daily wage basis for 100 days in a year. In 2010, upto the month of December about 4.1 crores households were benefited under this scheme. In 2010-11 the government had allocated Rs. 40,100 crores to run this scheme.

### 2. Swarnjayanti Gram Swarozgar Yojana (SGSY)

SGSY was launched in April 1999. The aim of this programme is to help the rural poor to increase their income generating capacity through self employment. The primary focus of this scheme is the SC and ST population, as well as women. But others can also get benefit. Under this scheme poor people are given training, bank loans and other facilities so that they can build up their capabilities to overcome poverty. People who work on their own are called self employed or Swarozgaris. This scheme is specially meant for these swarozgaris. In order to give training to people belonging to poor households government has set up rural self employment training institute (RSETI) in each district under this scheme. About 77000 rural youths have got training from RSETI by December 2010.

### 3. Swarna Jayanti Sahari Rozgar Yojna (SJSRY)

SJSRY is meant for providing employment to poor families living in urban areas of the country. It was first launched in 1997. Then many new initiatives were introduced in 2009 which include the following :

- (i) Programmes to generate self employment
- (ii) Programmes for urban women
- (iii) Training for urban poor
- (iv) Community development programme
- (v) Wage employment programme

The government has allocated about Rs.590 crores for SJSRY for the year 2010-11. A total of more than 6 lac 50 thousand families in urban areas have been benefited under this scheme by December 2010.



Notes

**INTEXT QUESTIONS 21.1**

1. What is the poverty line for rural areas?
2. What is the population of India's labour force?
3. Name a scheme to tackle urban poverty?

**21.3 PROVIDING EDUCATION**

Another challenge before our nation is to educate all the citizens. According to census 2011, the literacy rates of India were 82.14 per cent for males, 65.46 percent for females and 74.04 percent for all adults.

The government of India has taken following measures to provide education to all.

**1. Right of children to free and compulsory education Act 2009.**

The government of India has made “free education for all children between 6 to 14 years of age” a fundamental right in 2009. This law has been made effective from April 2010. Now children between age group of 6-14 years can have claim to free education and the government is duty bound to provide so. Accordingly the government will open more and more primary and upper primary schools and appoint teachers to teach.

**2. Schemes for elementary and secondary education**

Some of the important schemes to develop elementary and secondary education are given below

**(i) Sarva Siksha Abhiyan (SSA)**

SSA has been implemented by the central government in partnership with state governments to give education to children in the age group 6-14 years. Keeping in view the right to education act which came latter, SSA scheme has been accordingly modified. The goals of this scheme are

- (a) enrolment of all children in school
- (b) Retention of children in the school up to upper primary level
- (c) Hosting “back to school camps”
- (d) Building education guarantee centers
- (e) Closing the gap arising due to caste, gender etc. in giving education

By September 2010 there were 309, 727 new schools with more than 11 lac teachers being appointed. Nearly 9 crore children were provided text books.



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To provide education to girl child SSA has an important component called national programme for education for girls at elementary level (NPEGEL). Under this programme “model schools” are being set up in every cluster to impart education to girls. Uniforms and study materials etc. are provided freely to girls. Teachers get special training to teach girl students under this programme.

There are also residential schools for girls called Kasturba Gandhi Balika Vidyalyayas (KGBVs) under SSA. 75 percent of total girls students admitted in KGBVs belong to SC, ST, OBC and minority communities. Remaining 25 percent belong to families who are below poverty line. More than 2 lac girls are enrolled in KGBVs by March 2010.

### (ii) National programme of Mid-day meals in Schools

In order to attract children into schools and retain them, the government has started mid day meals programme. The idea is to provide healthy diet to children by providing good food. Mid day meals also bring children from different sections of the society together and develop sense of belongingness towards each other. More than 14 crore children were benefited in 2009-10.

### (iii) Rashtriya Madhyamik Shiksha Abhiyan (RMSA)

RMSA was launched in 2009 to increase the enrolment ratio in the secondary stage. 75 percent of the total expenditure on this programme comes from central government while state government provide 25 percent. For the north east region this ratio is 90 : 10.

### (iv) Inclusive education for the disabled at secondary stage (IEDSS)

To help the children with special needs, the government has launched IEDSS programme with effect from 2009-10. Its aim is to provide 100 percent central assistance for education of disabled children studying class IX-XII stage.

### (v) Saakshar Bharat

To promote education and literacy among the adults above 15 years of age, the government has recast its national literacy mission as Saakshar Bharat. The special focus of this program will be women.

## (3) Programme for Higher and Technical Education

Higher education starts with college education after passing out from schools. Higher and technical education includes graduation in arts, social science, science, engineering, medicine, information technologies etc. A country must improve the level of its higher & technical education if it wants to establish knowledge society and compete with

**Notes**

other countries at international level. The government of India has taken several steps to develop higher and technical education as given below.

1. In the eleventh plan period the central government has aimed at establishing 8 new universities, 10 new engineering colleges with cooperation from state governments.
2. New model colleges will be set up at educationally backwards districts of the country.
3. To promote IT education 20 more Indian institutes of information technology (IIT) will be set up.
4. More engineering colleges in the form of national institutes of technologies (NITs), and Indian Institutes of Technology (IITS), will be built and become operational in 2011-12 in different parts of India.
5. To promote research in science the government has set up five Indian Institutes of Science Education and Research (IISER) in various parts of the country.
6. Finally five new Indian Institute of Management (IIMS) have become operational in the Eleventh plan and two more will become operational in 2011-12.

**INTEXT QUESTIONS 21.2**

1. Mention three goals of Sarva Siksha Abhiyan ?
2. Give suggestions to provide education to girl child ?
3. Give one advantage of mid-day meal programme?

**21.4 PROVIDING HEALTH CARE**

Another major challenge before the country is to provide better health care facilities to its people. Due to lack of proper health care 254 females out of every 100,000 die while giving birth. This is called maternal mortality rate (MMR). 50 out of 1000 children die at the time of birth which is called infant mortality rate (IMR). 15 children out of 1000 die before completing 4 years of age which is known as child mortality rate (CMR). Certainly these news are not encouraging. There are so many villages and remote areas in the country. But unlike cities and towns, these areas do not have adequate health centers or hospitals and doctors to attend to the problems of people there..

In 2010-11, the government spent only about 5 percent of total expenditure on health care which is only 1.27 percent of our national income. Even our neighbor Sri Lanka spends more than India on health services per head.

Let us look at the role played by the government in providing health facilities.

### (i) National Rural Health Mission (NRHM)

NRHM was launched in 2005 to provide affordable and qualitative health service to rural population. It aims at strengthening health and family welfare programmes, removing diseases such as malaria, kala azar, blindness, iodine deficiency, T.B. filaria, leprosy etc. by improving public health delivery system. NRHM has started revitalizing the existing primary and community health centres. By September 2010 around 8 lac health workers have been given training on health care and more than 9 thousand doctors and 26 thousand nurses have been appointed on contract basis to give health services to rural population. NRHM is also running many mobile medical units (MMUs) which run from one place to another to provide health care at door step.

### (ii) Janani Suraksha Yojana (JSY)

In order to save the life of the mother at the time of the delivery the government has started the Janani Suraksha Yojana.

### (iii) Pradhan Mantri Swasthya Suraksha Yojana (PMSSY)

Health care facilities are not uniformly available in India. Some states have very good health infrastructure in the form of medical institutes / colleges and hospitals while others do not have these facilities. This has created regional imbalances in provision of health care service and over crowding of certain places where these facilities are available. For example the All India Institute of Medical Sciences (AIIMS) is situated in Delhi and is a world class medical institute cum hospital. Since other states do not have such a facility, people from different states come to Delhi to get treatment in AIIMS. As a result AIIMS has become over crowded with a long waiting period for treatment. To remove these problems the government of India has launched PMSSY. Under this scheme six new AIIMS like institutions will be constructed in different parts of the country. It also aims at upgrading 12 existing government medical colleges in different states.

### (iv) National AIDS Control

AIDS (Acquired Immune Deficiency Syndrome) is a dangerous health disorder which affects people infected with HIV. About 24 lakh people in India were affected by HIV in 2009, which is one of the highest in the world. Once the virus called HIV attacks the human body, the person loses strength to fight diseases and his/her immune system become weak over time. Under such a circumstance the person cannot recover if he/she suffers from any disease. AIDS has endangered population all over the world. The government of India has created centers to generate awareness to prevent AIDS as well as treat people affected by the virus.



Notes



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**INTEXT QUESTION 21.3**

1. Write the objectives of national rural health mission ?

**21.5 CONTROLLING PRICE RISE**

People pay prices to buy different commodities in the market. If prices increase then it becomes difficult to buy the same amount of the good and service. As a result, the level of satisfaction of the individual falls. When you pay more prices, your existing income looks less than before since you have to now pay more money to buy less amount of the commodity. This hits the buyer badly. Why do prices rise? The most common reason is that if the amount of a good people wants to buy in the market is more than its actual availability then this will create a situation of shortage of the particular good. As a result the price of the good will rise. Shortage may occur if production of the good has not been adequate. For example, food grain production falls if a draught situation happens. Another reason of shortage could be wastage of the good due to lack of proper storage facility. Finally, shortage will occur if the sellers hoard the good without selling it so that a man-made shortage takes place. Sellers do it deliberately to charge more prices for the good. Hoarding often takes place in case of essential commodities such as onion, rice, medicines etc.

The government plays a major role in controlling prices in the following ways

- (i) By helping farmers in several ways so that food grain output does not suffer. One example is that the government allows the farmers to buy seeds, fertilizer etc. at lower price.
- (ii) By building store houses and cold storages to keep food grains and vegetables properly so that there will be no problem of availability of such goods.
- (iii) By keeping a strict vigil on hoarding of essential commodities and punishing the guilty since hoarding is a crime.

**21.6 ACHIEVING HIGHER ECONOMIC GROWTH**

In a simpler manner we can define economic growth as increase in our Country's total income and per capita income. This is possible when India's agricultural and industrial production increase as well as Service sector expands in the desired manner. Some of the steps taken by the government in this direction are as follows.

1. India has been encouraging establishment of small scale, large scale and heavy industries since the second plan onwards i.e from 1956. These industries produce goods for the use of people, machines and equipments needed to build infrastructure and help service sector to expand. Industries provide lots of jobs and higher wages.



2. The government has been encouraging the use of better inputs in the form of better seeds, fertilizers etc. to improve food grain production.
3. Because of better infrastructure in the form of roads, railway lines, Airports, communication towers, power etc. India's service sector is growing fast.

In order to maintain the momentum of economic growth the government has modified rules and regulations so that people can easily participate in the process of development. These steps are known as economic reforms.

**Notes****INTEXT QUESTIONS 21.4**

1. Why is price rise bad for a buyer?
2. Give the meaning of hoarding?
3. Define economic growth?

**WHAT YOU HAVE LEARNT**

- The programme implemented by the government to generate Employment and alleviate poverty are - The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Swarnjayanti Gram Swarozgar Yojana (SGSY), and Swarna Jayanti Sahari Rozgar Yojna (SJSRY).
- To provide education various schemes such as-mid day meals, Saaksher Bharat, Sarva Siksha Abhiyan etc are implemented .
- For better health care, national rural health mission, aids control Programme etc. are being run.
- Checking price rise and achieving economic growth are also challenges before the government which are tackled by encouraging production besides others.

**TERMINAL EXERCISE**

1. What are the poverty alleviation programmes? Explain any one.
2. Describe any two schemes to provide elementary and secondary education.
3. Write a short note on national rural health mission.

**Notes**

4. Give some measures to solve the problem of price rise.
5. What the government has been doing to achieve economic growth?

**ANSWERS TO INTEXT QUESTIONS****Intext Questions 21.1**

1. 2400 kcal per day per person
2. 43 crores
3. Swarn Jayanti Sahari Rozgar Yojna

**Intext Questions 21.2**

1. (a) Enrolment of all children in schools  
(b) Building education guarantee centres  
(c) Hosting “back to school” camps
2. (i) set up model schools for girls in every cluster  
(ii) provide uniforms and study materials to girls  
(iii) Train the teachers to teach girl students
3. Midday meal programme allow the children from different sections of the society to eat together and develop a sense of belongingness towards each other

**Intext Questions 21.3**

1. (i) To strengthen health and family welfare programmes  
(ii) Removing diseases such as malaria, kala azar, blindness, iodine deficiency, TB, filaria and leprosy etc.

**Intext Questions 21.4**

1. Buyer has to pay more money than before out of his given income. It becomes a burden.
2. Hoarding means storing goods secretly to create artificial shortage
3. Economic growth means increase in national and per capita income.





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## INDIAN ECONOMY IN THE GLOBAL CONTEXT

You know that India is one among many countries in the world. Countries do interact with one another and keep relationship in various areas of interest. Citizens of one country travel to other countries as tourists, to seek jobs, to do business, to study, to do charity and on some government assignments etc. In this lesson the major focus is on economic relationship between India and rest of the world.



### OBJECTIVES

After completing this lesson, you will be able to:

- *understand the meaning of economic relationship between countries;*
- *understand the importance of Trade;*
- *know the exports and imports of goods and services by India;*
- *understand the meaning of globalization;*
- *know a brief over view of two most important economies, USA and China so that you can have an idea about India's comparative position in the world.*

### 22.1 MEANING OF ECONOMIC RELATIONSHIP BETWEEN COUNTRIES

If you are in need of money you can borrow it from a friend or from a bank. If you want to buy a book you can pay money to your local book shop and get the book. If you are a seller of goods such as stationery or garments or shoes etc. then you sell them to consumers who pay you. If you want to produce any good, you can invest some money and start a factory and give jobs to people who can provide their labour. All these are examples of economic activities inside your country in which

**Notes**

the citizens of your country participate. But when such activities take place between the citizens of two or more countries then we call it economic relationship between these countries. Take the example of India. Since we are citizens of India, we call India our domestic country and rest of the world consists of foreign countries. So when there is economic relationship between India and other countries then we mean that Indian citizens are exchanging goods and services (both buying and selling) with citizens of foreign countries and going to foreign countries to do jobs and business. Similarly, foreign citizens are coming to India to do jobs and business etc. Accordingly some examples of Economic relationship can be given as follows:

1. Selling of goods and services by the domestic citizens to citizens in a foreign country. This is called exports.
2. Buying of goods and services by domestic citizens from the foreign countries. This is called imports.
3. Sending gifts to some body in a foreign country and receiving the same from foreign countries.
4. Sending money to and receiving money from foreign countries respectively.
5. Visits made by tourists, business persons and government delegation.

When a country has economic relationship with other countries, then it is called an open economy.

**22.2 IMPORTANCE OF TRADE**

Examples (i) and (ii) above are part of “trade”. People buy and sell goods and services through markets inside the country. When the same thing takes place between citizens of various countries, we called it international trade.

Exports and imports are international trade in goods and services.

Trading activities are integral part of the economy. It is very difficult to look at life without trade in the economy. Goods are constantly transported from one place to other by trains, trucks, etc inside the country. Similarly aero planes, ships are used to transport goods between countries.

The aim is to provide the goods or service to the person who wants to pay for it, no matter, wherever the buyer resides. It means that distribution of goods or service is possible because of trade. That is why trade is so important. We can think of many other advantages of trade as given below.

1. Through trade people get a lot of varieties of goods and services. During summer you would always like to have cold drinks. Some of the cold drinks available in the market are coca cola, pepsi cola etc. Do you know from where coca cola came to India first? It was manufactured in USA which is far away from India. Now of course coca cola plants are established in India. But it is still a foreign



Notes

company. Similarly Indian pickles are sold abroad in many countries by Indian business men. There are many examples of Indian goods being consumed by foreign people and foreign goods consumed by Indian people for satisfaction of wants.

2. Trade encourages production of new goods and services. Through trade sellers and buyers interact with each other. So sellers know the choice and preferences of the buyers and accordingly provide the goods and services for consumption.
3. People of different countries meet and interact through trade. Accordingly people of one country can know the culture, tradition, language etc. of another country.
4. Because of international trade it is possible to produce the goods more efficiently because it leads to specialization. This means goods can be produced at lower cost so that people will get them at lower prices. How? A good may be produced in more than one country. But one country may have better raw materials and technology to produce it. Take for example the case of India. In India spices and cotton etc. are easily cultivated due to climatic and soil conditions. Because of its rich customs, tradition and culture India's handicrafts are world famous. So they are easily produced in India at less cost. Accordingly India can specialize in the production of these goods. Hence other countries can buy these goods from India at cheaper price. Similarly in South Africa diamond are easily available because of the mines existing there. You can get many other such examples. The main thing is that if a country can produce a good with better quality and at lower cost, the country will become efficient in the production of that good and gain by exporting the good to other countries.



### INTEXT QUESTIONS 22.1

1. Give one advantage of international trade?
2. What do you mean by export?
3. Define import?

## 22.3 EXPORT AND IMPORT BY INDIA

India is having economic relationship with many countries in the world. As a result India exports many commodities to foreign countries and imports many commodities from the foreign countries. The countries with which India is engaged in export and import activities are called India's trading partners.

### (a) India's Exports

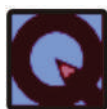
The major items that India exports to different countries are engineering goods, handicrafts, chemicals and allied products, readymade garments, cotton yarn, iron

**Notes**

ore, leather, fish, rice, fruits and vegetables etc. Some of the countries where Indian exports reach, are : France, Germany, UK, USA, Iran, UAE, China, Hongkong, Singapore and some African and Latin American countries.

**(b) India's Imports**

Petroleum and lubricants are the most important items that India imports from the Oil and Petroleum Exporting Countries (OPEC) such as Iran, UAE, and Saudi Arabia etc. India also imports non-ferrous metals, capital goods and fertilizer. Capital goods include electrical and non-electrical machinery and transport equipment. India's imports come from most of the countries to which it exports its goods and services.

**INTEXT QUESTIONS 22.2**

1. Name two main items of India's exports?
2. Name two items of India's imports?
3. Name two major trading partners of India?

**22.4 MEANING OF GLOBALIZATION**

Now a days the word globalization is commonly used. The reason is obvious. Today television and internet and mobile phones become easily available. People in remote areas can now talk and keep in touch through mobile phones. Today you can watch India-West-Indies cricket match live on television. You can talk to your friend in USA or Europe through mobile phone. There is no need of sending letters if you want to say something in detail. Getting a letter in USA from India takes at least 3 to 7 days. But through internet you can send e-mail which can reach your friend in seconds.

You can order a new good produced in Germany or Japan through internet and it will reach you in India. Because of these developments we think that the world has become very small and looks like various households staying in one village. We should not forget that this development has not taken place in a few days. The process has been there from a long time. In earlier days individuals or groups used to travel to different countries through sea routes to trade goods and services. Travel and sending of goods became easier with the invention of aero plane and ships. Then governments of different counties started interacting with one another in order to minimize any obstacle that may arise so that citizens of all nations can exchange things without any problem. Technological and scientific developments in the field of transport and communication that you see today have made this process of interaction among citizens of different countries easier now. So we are no longer separate in the world even if we are living separately in different places in different countries. Rather people

have come closer to each other through trade, transport and communication systems. People can consume both domestic and foreign goods, go to foreign countries to do jobs and exchange ideas with foreign citizens, export goods and services to different countries etc.

The different countries of the world seem to be coming closer. This process is known as globalization in simple term.

**Notes**

## 22.5 COMPARISON OF ECONOMIC DEVELOPMENT IN INDIA, CHINA AND USA

USA is world's one of the most – developed economies. The common thing between India and USA is that they are the two largest democracies in the world i.e. both the countries are governed by the elected representatives of people. The common thing between India and China is that both are part of the Asian continent and are neighbors. Some time back the level of economic development both in India and China was almost similar. Both were developing nations. But in the last few years Chinese economy has been developing very fast. So it is worthwhile to compare these economies. You have already studied Indian economy in previous three lessons. Here, do have a bird's eye view of the economies of USA and China respectively.

### 22.5.1 Brief account of USA economy

One of the most important features of USA economy is that the private sector plays a major role in production of goods and services. The government does not interfere much in business activities. There are 30 million small business in USA. Out of 500 largest companies in the world, 139 are in USA. About 40 percent of world's richest people stay in USA. American businessmen and corporations have got influence and presence all over the world. Multinational corporations such as ford motors, general electric, coca cola, wall mart etc. have emerged from USA.

USA's agriculture is also very advanced. It is one of the biggest exporters of food grains, such as wheat, corn, fruits and vegetables.

In terms of manufacturing, USA manufacturing output was greater than that of China, India and Brazil combined. Only recently i.e in 2010 China is said to have over taken USA. Petroleum, steel, automobiles, construction machinery, and agricultural machinery are some of the major manufacturing industries in USA.

Education and health care services are of high quality in USA. 85 percent of children enter public schools in USA AS AGAINST 15 percent in India.

USA is one of the top three exporters of goods and services in the world and biggest importer from rest of the world. Every one knows its currency called US dollar (\$) which is an international currency as it is circulated almost everywhere because of USA's dominance in world trade.



## Notes

In spite of its richness USA does have poverty and unemployment. About 16 percent of its population did not have access to good food in 2008. Its unemployment rate in 2010 was 9.9 percent.

### 22.5.2 The Economy of China

It is said that Chinese economy is now the second largest after USA in the world. Till the 1980s China was not very important in terms of its economic power. Its position was the same as that of India. But after 1980s, China's economy grew very fast because of the economic reforms it pursued. You should know that unlike India and USA China does not have democracy or rule of people. In China one party rules and people do not enjoy freedom of expression. But Chinese government slowly allowed private sector to establish business and produce goods and services in large quantities. As a result China could export large quantities to different countries and earn large amount of foreign money.

Like India China has also adopted a five year plan strategy. Its twelfth five year plan has started recently and its duration is 2011-2015. The first plan period of China was 1953-57. Through planning and strict implementation of economic reforms China is achieving faster economic development. Now China's national income and per capita income are growing faster than India's. During the first half of 2010 China has 10 percent share in the total world exports as compared to only 1.4 percent for India. In the area of controlling its population, China is performing better than India. It is said that India will even overtake China in population in future. Because of its better economic environment China is attracting more money than India from foreign countries towards its industrialization and development of services. Today China's standard of living has improved so much that its poverty ratio fell from 51 percent in 1981 to 2.5 percent in 2005 while India had 27.5 percent of poor population at that time.



### INTEXT QUESTIONS 22.3

1. Tell one common economic feature of India and China.
2. Compare India, China and USA with regard to poverty.



### WHAT YOU HAVE LEARNT

- Meaning of economic relationship and benefits of international trade between countries.
- Which commodities India exports and imports.

- The meaning of globalization at elementary level.
- The status of the economies of USA and China respectively so that you can compare them with India which is given in earlier lessons.

**TERMINAL EXERCISE**

1. Explain the benefits of international trade?
2. Give examples of India's trading partners and some of the commodities it trades?
3. Write a short note on USA economy?
4. Write a short note on Chinese economy?

**ANSWERS TO INTEXT QUESTIONS****Intext Questions 22.1**

1. International trade leads to specialization and efficient production of goods and services.
2. Selling goods and services to rest of the world is called export.
3. Buying goods and services from rest of the world is called import.

**Intext Questions 22.2**

1. engineering goods, handicrafts
2. Petroleum, electrical machinery
3. USA, UAE

**Intext Questions 22.3**

1. Five year planning
2. In 2005, India's poverty ratio was 27.5 percent while that of China was only 2.5 percent. In USA 16 percent of its population did not have access to food in 2008.

**Notes**





## **MODULE-8**

### **CONTEMPORARY ECONOMIC ISSUES**

- 23. Environment and Sustainable Development
- 24. Consumer Awareness





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## ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

In the earlier lessons, you have learnt about economic development and how it can improve the quality of life of people. Goods and services are produced to satisfy human wants. The production of various goods and services requires resources- both man-made and natural. As more goods are produced, more resources are used up. The process of production not only uses up resources, but also causes other problems. For example, when goods are produced in factories, the factories emit smoke which pollutes the air we breathe. Similarly, sewage discharged into rivers pollutes our drinking water. As the demand for goods and services keeps increasing, so does the demand for resources. As a result, resources are getting depleted and also being damaged irreparably. As we cut down forests, pollute the air and rivers, and mine minerals from the earth, we destroy nature. Such a destruction of nature is adversely affecting human life.



### OBJECTIVES

After completing this lesson, you will be able to:

- *know the definition and significance of environment;*
- *understand the various environmental problems such as pollution, degradation, depletion of resources;*
- *explain the meaning of sustainable development;*
- *tell the ways to achieve sustainable development.*

### 23.1 THE ENVIRONMENT: DEFINITION AND SIGNIFICANCE

The **environment** encompasses all living and non-living things occurring naturally on Earth or some region thereof. It includes all the biotic and abiotic factors that



influence each other in nature. All the living elements like birds, animals, plants, forests, etc. comprise the **biotic** elements. On the other hand, everything non-living like air, water, rocks, sun, etc. are examples of the **abiotic** component of the environment. A study of the environment is thus a study of the inter-relationship between the abiotic and the biotic components of the environment.

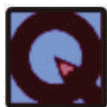
### Significance of the Environment

1. The environment provides various resources to man-both renewable and non-renewable. Renewable resources are those resources which are replenished easily over time, and hence can be used without the possibility of the resource becoming depleted or exhausted. Examples of **renewable** resources include trees in the forests, fishes in the ocean, etc. **Non-renewable** resources, on the other hand, are those resources which can get exhausted or depleted over time as they are used up. Examples of non-renewable resources include fossil fuels and minerals like petroleum, natural gas, coal, etc. Thus these resources need to be used carefully, while keeping in mind the requirements of the future generations.

#### Do you know?

Based on current projections, within around 50- 75 years, all the world's extractable coal, oil, natural gas, and uranium-235 deposits- that is, all our current energy sources-would have been used up.

2. The environment is also an absorber of harmful wastes and byproducts, that is, it assimilates waste products. The smoke from chimneys and exhaust pipes of vehicles, sewage from cities and towns, industrial effluents are all absorbed by the environment. These harmful wastes and byproducts are absorbed, cleaned and recycled by various natural processes.
3. The environment also sustains life by providing bio diversity. The genetic variations created by the pressures exerted by the environment on various life forms allows those life forms to adapt, evolve and produce genetic variations which can survive in harsh environments. Hence the environment produces and maintains relationships between different life forms and the abiotic components and sustains life. It is therefore important to preserve these life forms by preserving the environment.
4. Apart from the biological significance of the environment, the environment is also important from the aesthetic point of view. It provides scenery and landscapes to us which are priceless to us, and often play an important role in man's culture around the world.



## INTEXT QUESTIONS 23.1

1. What is meant by 'environment'?
2. Name two main components of environment.
3. Name two renewable and two non-renewable resources.

## 23.2 ENVIRONMENTAL PROBLEMS

With the advance of human civilization, human wants have expanded and diversified. This has led to a rapid depletion of natural resources. Many resources are being used up at a rapid rate, which has caused over-utilization and depletion of many resources. With the rapid use of resources, a lot of accompanying environmental problems has cropped up. These include pollution of air and water, degradation of natural resources like soil and forests, and the depletion of non-renewable resources like fossil fuels and minerals. In the sections below you will read about these environmental problems and understand the significance of their impact on the economy and the planet earth.

### 23.2.1 Pollution

The term **pollution** refers to an undesirable change in the quality of a natural resource or the natural ecosystem. The change may be harmful to life immediately or over a long period of time. Thus, pollution adversely affects the health of living beings.

Pollution is caused by a pollutant. A **pollutant** is a waste material or substance which causes an undesirable change in a natural resource or ecosystem. Smoke, dust and poisonous gases in the atmosphere and industrial effluents and sewage from cities in water are some common examples of pollutants. Further, human activities also generate heat and create noise or harm living beings in a multitude of other ways.

#### 23.2.1.1 Air pollution

Air pollution is the introduction of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or cause damage to the natural environment or built environment, into the atmosphere. Major air pollutants include sulphur oxides, nitrogen oxides, carbon monoxide, carbon dioxide (which is also a major greenhouse gas), toxic metals, and particulate matter.

#### Do you know?

The World Health Organization states that 2.4 million people die each year from causes directly attributable to air pollution. Worldwide more deaths per year are linked to air pollution than to automobile accidents.



Notes



## Effects of air pollution:

The health effects caused by air pollution may include difficulty in breathing, wheezing, coughing and aggravation of existing respiratory and cardiac conditions. These effects can result in increased medication, increased doctor or emergency room visits, more hospital admissions and premature death.

## Sources of Air Pollution

Major **artificial sources** (caused by human beings) of air pollution include:

- Smoke from power plants, factories, incinerators, furnaces, etc.
- Exhaust of vehicles and automobiles like cars, buses, bikes, airplanes, ships, etc.
- Chemicals like pesticides and fertilizers and dust from farming and other agricultural practices.
- Fumes from paint, hair spray, varnish, aerosol sprays and other solvents.
- Waste deposition in landfills, which generates methane, which also contributes to global warming.

Major **natural sources** of air pollution include:

- Dust from natural sources, usually barren land.
- Methane, emitted by the digestion of food by animals, for example cattle.
- Smoke, particulate matter and carbon monoxide from wildfires.
- Volcanic activity, which produce sulphur, chlorine, and ash particulates.

### 23.2.1.2 Water pollution

Water pollution is the contamination of water bodies (example lakes, rivers, oceans and groundwater) by pollutants discharged directly or indirectly into water bodies without adequate treatment to remove harmful compounds. Major sources of water pollution include industrial chemicals and effluents, nutrients, waste water, sewage, etc.

## Effects of water pollution:

A number of waterborne diseases such as cholera, typhoid, diarrhea etc. are produced by the pathogens present in polluted water, affecting human beings and animals alike. Water Pollution affects the chemistry of water. The pollutants, including toxic chemicals can alter the acidity, conductivity and temperature of water. It also kills life that inhabits water-based ecosystems like fish, birds, plants, etc. and hence disturbs the natural food-cycle, which causes instability in ecosystems.



Notes

### Sources of Water Pollution

Major **sources** of water pollution include:

- Discharge from sewage treatment plants and sewage pipes from cities and towns.
- Industrial effluents released by factories into water bodies.
- Chemicals like pesticides and fertilizers from agricultural farms which constitute runoff from farms.
- Contaminated storm water from storm water drains in cities.
- Release of heated or radioactive water by power plants into water.
- Oil spills and leakages from tankers and oil rigs.
- Growth of algae in water bodies.

#### 23.2.1.3 Noise pollution

Noise pollution is an excessive and displeasing environmental noise that disrupts the activity or balance of human or animal life.

#### Effects of noise pollution:

Noise pollution in the form of unwanted sound can damage physiological and psychological health. Noise pollution can cause annoyance and aggression, hypertension, high stress levels, hearing loss, sleep disturbances, and other harmful effects. Chronic exposure to noise may cause noise-induced hearing loss. People exposed to significant occupational noise demonstrate significantly reduced hearing sensitivity compared to non-exposed people. High and moderately-high noise levels can contribute to cardiovascular effects, a rise in blood pressure, and an increase in stress thus affecting the physical and mental health of people.

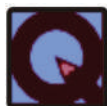
#### Sources of Noise Pollution

Major **sources** of noise pollution include:

- Vehicular traffic, like cars, buses, airplanes, trains etc.
- Industrial processes like stone crushing, making of steel plates, sawing, printing, etc.
- Construction work on roads, bridges, buildings, etc.
- Various noises from houses like stereos, televisions, etc.
- Consumer products like air conditioners, refrigerators, etc.



In the above section you have read about different types of pollution, their sources and effects. Think of different kinds of pollution which affect you and your family and make a list of them. What are the measures you or your family and community can take to reduce the harmful effects of pollution?



## INTEXT QUESTIONS 23.2

1. What is a pollutant?
2. Name any two sources of air pollution.
3. Name two harmful affects of water pollution.
4. What is meant by noise pollution?

### 23.2.2 Degradation

In the following sections you will read about two different kinds of degradation- soil and habitat degradation.

#### 23.2.2.1 Soil degradation

Soil degradation refers to an undesirable or deleterious change or disturbance in the quality of the soil. It leads to a change in the species of plants and animals in an area, and often leads to a loss of quality and productivity of the soil in an area. The soil loses its natural nutrients, minerals and organic matter (known as **humus**) and disrupts the natural balance of the natural ecosystem. The soil hence becomes unfit or unsuitable for growing plants and crops.

#### Causes of Soil Degradation

Major **causes** of soil degradation include:

- Excessive use of chemical fertilizers and pesticides, which causes soil acidification, increases salinity and alkalinity of the soil, reduces organic matter, and increases levels of organic pollutants and toxins and heavy metals (like Cadmium, Lead, etc.).
- Waterlogging caused by excessive irrigation and failure to subsequently drain the water from the fields causes an increase in salt content of the soil, making it unfit for growing plants, as well as serves as a breeding ground for mosquitos.
- Overgrazing by animals in fields, which reduces plant cover and leaves the soil prone to erosion.



**Do you know?**

Damage from soil erosion worldwide is estimated to be \$400 billion per year (around Rs 20 lakh crores per year). As a result of erosion over the past 40 years, 30 percent of the world's arable land has become unproductive.

**Effects of soil degradation**

Soil degradation can significantly reduce the yield potential of soil for growing crops. The presence of pollutants in soil also leads to pollution of groundwater, which has increased levels of nutrients, organic toxins, and heavy metals. Also, degradation of soil causes the soil to lose its green cover, and hence reduces biodiversity in that region, as the growth of plants in an area is essential for animals to survive and for the food chain to function normally. This also leads to extinction of plant and animal species. Soil degradation also leads to desertification, that is, the land gradually gets converted into a desert which becomes unfit for cultivation or habitation.

**23.2.2.2 Habitat degradation**

Habitat degradation refers to the process in which habitats lose their normal functioning or quality to support native life due to human activities. Habitat degradation leads to a reduced **carrying capacity** of that area, that is, the number of animals or plants of a particular species the area can support. This leads to a reduced population of various species in that area (or habitat) which in turn leads to an imbalance in the natural food chain and ecosystem. This imbalance can lead to the mass extinction of many plants and animals on our planet.

**Causes of Habitat Degradation**

Major **causes** of habitat degradation:

- Deforestation and wood extraction for the timber industry.
- Conversion of forest land into agricultural land
- Urban expansion of natural habitats
- Soil erosion and desertification, which can lead to whole forests degenerating into deserts.
- Slashing or slash-and-burn agricultural methods, where forests are burnt and crops grown using the ashes as a natural fertilizer.

**Effects of habitat degradation:**

Habitat destruction vastly increases an area's vulnerability to natural disasters like flood and drought, crop failure, spread of disease, and water contamination. Agricultural land too suffers from the destruction of the surrounding landscape.



Over the past 50 years, the destruction of habitat surrounding agricultural land has degraded approximately 40% of agricultural land worldwide through erosion, nutrient depletion, pollution, etc. Habitat degradation has also led to the loss of many valuable ecosystem services like the nitrogen, phosphorus, sulphur and carbon cycles, which in turn has increased the frequency and severity of acid rain, algal blooms, and fish kills in rivers and oceans and contributed tremendously to global climate change. It also leads to loss of biodiversity and species extinction, which upsets the natural balance and may alter the ecosystem. Aesthetic uses such as bird watching, recreational uses like hunting and fishing, and ecotourism are also affected adversely by habitat degradation, as most of them rely upon virtually undisturbed habitat.

### Do you know?

If the current rate of deforestation continues, there will only be 10% of the world's tropical forests left by 2030, and another 10% in a degraded state.

### 23.2.3 Depletion of Resources

**Resource depletion** is an economic term referring to the exhaustion of raw materials in an area or region. Resource depletion is most commonly used in reference to farming, fishing and mining. Today's economy is largely based on fossil fuels, minerals and oil. The value of these resources has increased over time as demand for them has increased rapidly, while at the same time the supplies of these resources have decreased considerably due to over-exploitation.

Many resources which are so essential in our lives—example petroleum, natural gas, coal, uranium-235, and gold—are becoming increasingly difficult to find. The reserves of many natural resources have been diminishing rapidly in the last 100-150 years, as the human population has been increasing significantly and hence the demand for the resources has been increasing. The search for new reserves of these resources is expensive, and often does not yield any new mines. The earth is quickly running out of resources, as we are putting too large a burden on it, caused due to overpopulation.

Alongside the depletion of the resources, many environmental effects are also caused by the over-exploitation of mineral resources. Global warming, air, water and soil pollution, loss of biodiversity all accompany mining and drilling projects and extraction and purification procedures for these resources.

To stop the harmful effects of resource depletion and other environmental problems, we need to carefully monitor resources usage and check the environmental effects of resource depletion. Many agencies around the world like UNEP (United Nations Environment Programme), EPA (Environment Protection Agency), IPCC (Intergovernmental Panel on Climate Change), and in India the MEF (Ministry of Environment and Forests) along with many NGOs worldwide actively advocate the



protection of the environment throughout the world, and implement acts and laws to protect the environment and prevent the overexploitation of resources.

The careful usage of the limited resources available to human beings, which is now being advocated as an essential solution to the worldwide environmental crisis that threatens our very existence, is also referred to as **sustainable development**, which is explained in detail along with its significance in the following pages of this chapter.



### INTEXT QUESTIONS 23.3

1. What is meant by degradation of soil.
2. What are two different kinds of degradation of environment?

## 23.3 SUSTAINABLE DEVELOPMENT

**Sustainable Development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for generations to come.** Sustainable development has been defined in many ways, but the most frequently quoted definition is from *Our Common Future*, also known as the *Brundtland Report*. According to this definition, “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

This definition emphasizes two important things. One, that natural resources are vital to every one of us- even to the unborn future generations. Two, that it is a long term concept. It does not narrowly focus only on the present economic growth but it also takes into account the future economic growth.

In the above section you have read about different resources like air, water, minerals etc. which are essential to meet our needs. If we pollute the air and water sources and deplete the non-renewable resources like coal, petroleum, natural gas etc. then future generations would suffer. The concept of sustainable development therefore emphasizes that we have no right to deny the right to life to future generations. The world’s stock of resources is not only meant for present generation but also for future generations. That is why it is our responsibility to use the environment judiciously to meet our needs of today, then bequeath them to our children and grandchildren (the future generations) so that they are able to meet their own needs as well.

Sustainable development, is, therefore, a kind of development that takes into account the needs of the economy, and the environment without compromising either of the aspects. If the economic development is **sustainable** then the present use of natural resources will not limit us from their use in the future. Thus sustainable development tells us that development must be of a kind which can take care of our needs as well as the needs of future generations. That makes it a long term concept.



Notes

## 23.4 HOW CAN WE ACHIEVE SUSTAINABLE DEVELOPMENT?

In this chapter we have learnt about how the growth of population and mankind's quest for economic development and a better quality of life in the last two centuries has caused a lot of problems to our environment and the planet earth. The problems we focused on were pollution, degradation and depletion of resources.

We also learnt about the meaning of sustainable development and how important it is to keep in mind the development and wellbeing of future generations. But how do we **achieve** sustainable development? The environmental crisis we face is serious and pressing. However, by taking swift and decisive action, we can tide over the crisis.

All definitions of sustainable development require that we see the world as a whole. You have already understood that the concept of sustainable development is a long-term concept that gives equal importance to development of future generations also. Sustainable development also emphasizes that actions and measures taken in one part of the world has consequences for people in other parts of the world. For development to be sustainable we must think of development not only for our community or village or country but for the world as a whole. To give an example, if factories emit smoke in North America, then that air pollution from North America affects air quality in Asia. Similarly, pesticides sprayed in Bangladesh could harm fish stocks off the coast of West Bengal.

Measures for sustainable development therefore focus on policies that must be adopted in the whole world. Some of these policies are implemented at the level of governments of individual countries while others require coordination at the international level.

Some examples of ways in which we can contribute to sustainable development are given below.

- **Resources**- finding substitutes for nonrenewable resources and using renewable resources judiciously. Solar energy, wind energy, hydropower, tidal energy and biofuels (like gobar gas) are being widely and increasingly used as substitutes for energy sources like coal, oil and natural gas that are being depleted rapidly. In many villages of India, solar energy appliances like solar cookers, solar lanterns and solar heaters are being encouraged and promoted by the government. In coastal areas the wind energy harnessed by windmills is being used to generate electricity.
- **Recycling** - to use again, to re-process. To make paper we need wood pulp which comes from trees. Therefore by recycling used paper we can contribute to saving trees from being cut down. Water is a scarce resource yet we do not use water judiciously. We can reuse rainwater by rainwater harvesting.



- **Reduce** - to use less or economize. Our consumption should be restrained to meeting our basic needs. We can walk instead of driving to the local market or climb using stairs instead of taking a lift, switch off fans and lights that we don't need.

As an exercise, consider how you could promote sustainable development in your local community. What can you do to improve your local environment? Write down how your actions can help improve the environment and the lives of people who live in other parts of the world.



### INTEXT QUESTIONS 23.4

1. What do you mean by sustainable development?
2. Give one example of recycling of products for sustainable development of the environment.



### WHAT YOU HAVE LEARNT

- The environment includes all the biotic and abiotic factors that influence each other in nature.
- Resources may be renewable like forests, and non-renewable like petroleum.
- Pollution is an undesirable change in the quality of a natural resource or natural eco-system.
- Air pollution causes difficulty in breathing, coughing etc. water pollution causes water borne diseases like cholera, typhoid, diarrhea etc.
- Noise pollution can cause hypertension, hearing loss, etc.
- Soil degradation reduces the yield potential of soil for growing crops.
- Resource depletion refers to the exhaustion of raw material in an area or region.
- Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- We can contribute to sustainable development
  - (i) By finding substitute for non-renewable resources and using renewable resources judiciously.
  - (ii) By recycling the used products
  - (iii) By restraining our consumption.

**Notes****TERMINAL EXERCISE**

1. Distinguish between renewable and non-renewable resources. Give at least two examples of each.
2. With the advance of human civilization many environmental problems have cropped up. Do you agree? Give reasons for your answer.
3. What is meant by air pollution. Name any three major sources of air pollution. What are its harmful effects?
4. What is water pollution? Mention major sources of water pollution. What are its harmful effects.
5. What is noise pollution? Name its major sources. Describe its harmful effects.
6. What is meant by soil degradation? What are its major causes? Write two harmful effects of soil degradation.
7. What do you mean by habitat degradation? Mention its major causes. What are harmful effects of habitat degradation?
8. What is meant by depletion of resources? Give two examples of resources whose reserves have been diminishing rapidly in the last 100-150 years.
9. What is meant by sustainable development? Suggest two ways by which we can contribute to sustainable development.

**ANSWERS TO INTEXT QUESTIONS****Intext Questions 23.1**

1. The environment encompasses all living and non-living things occurring naturally on earth or some region thereof.
2. (i) Biotic element (ii) Abiotic elements
3. Renewable resources: Forest, water  
Non-renewable : Petroleum, coal

**Intext Questions 23.2**

1. A pollutant is waste material or substance which causes an undesirable change in natural resource or eco-system.

**Notes**

2. (i) smoke from factories  
(ii) Exhaust of automobiles
3. (i) Causes diseases like cholera, typhoid etc.  
(ii) kills aquatic life
4. Excessive and displeasing environmental noise that disrupts the activity or balance of humans and animal life, is noise pollution.

**Intext Questions 23.3**

1. Soil degradation refers to a undesirable or deleberious change or disturbance in the quality of soil.
2. (i) Soil degradation  
(ii) Habitat degradation

**Intext Questions 23.4**

1. Sustainable development is a pattern of resource use that aims to meet human needs with preserving the environment so that these needs can be met not only in the present, but also for generations to come.
2. We can reuse rain water by rain water harvesting





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**24**

## CONSUMER AWARENESS

To satisfy various wants people purchase goods and services by paying price. But what to do if the goods and services bought are found out to be bad in quality or unreasonably priced or measured less in quantity etc. In such situations the consumers, instead of getting satisfaction, feel cheated by the sellers who have sold the goods and services. They also feel that they should be properly compensated for the loss. So there should be a system to redress such issues. On the other hand consumers should also realize that they do have responsibilities not just rights.



### OBJECTIVES

After completing this lesson, you will be able to:

- *know the meaning of a consumer, goods and services and consumer awareness;*
- *understand the need for consumer awareness;*
- *explain the consumer redressal system in India;*
- *realise the rights and responsibilities of consumers;*
- *understand the procedures for filing the complaints in the consumer courts;*
- *know the challenges of consumers' movement in India.*

### 24.1 SOME DEFINITIONS

First let us know the meaning of - a consumer, goods and services and consumer awareness.

- **Who is a consumer?**

To begin with, let us know the definition of a consumer. A consumer is the buyer of goods and services. The user of goods and services with the permission of the buyer is also treated as a consumer. But a person is not a consumer if he/she purchases goods and services for resale purpose.





Notes

- **What are goods and services?**

Goods are those products which are manufactured or produced and sold to consumers through wholesalers and retailers. Service means service of any description which is made available to the potential user with respect to the provision of facilities in connection with banking, finance, insurance, transport, supply of electrical or other energy, housing, construction, water supply, health, entertainment, amusement etc. It does not include any service rendered free of charge or under a contract of personal service.

- **Consumer Awareness**

Consumer awareness refers to the combination of the following :

- The knowledge of the product purchased by the consumers in terms of its quality. For example the consumer should know whether the product is good for health or not, whether the product is free of creating any environmental hazard or not etc.
- The education about the various types of hazards and problems associated with marketing of a product - For example, one way of marketing a product is advertisement through news papers, television etc. Consumers should have proper education about the bad effects of advertisement. They must also verify the contents of the advertisement.
- The knowledge about 'Consumer Rights' - This means that, first, the consumer must know that he/she has the right to get the right kind of product. Secondly, if the product is found out to be faulty in some manner, the consumer should have knowledge of claiming compensation as per the law of the land.
- The knowledge about consumer's own responsibilities- This implies that consumers should not indulge in wasteful and unnecessary consumption.

## 24.2 NEED FOR CONSUMER AWARENESS

The market today is flooded with very large number as well as varieties of goods and services. The number of producers and final sellers of the commodities have also increased many folds. So it has become very difficult to know as to who is a genuine producer or seller? It is practically not possible for consumers to personally come in contact with a producer or seller. Moreover in the age of advanced information technology the physical distance between consumer and producer/seller has also increased, since consumers can get their commodities at door step by booking orders over telephone or through internet etc. Similarly from among large varieties of commodities, it has become very difficult to know as to which one is genuine? People think that a product which has appeared in some advertisement must be good or the



producer whose name is known through advertisement must be selling the right product. But this may not be true always. Much information is deliberately hidden in certain advertisements to mislead the consumers.

In case of packed food products and medicines, there is an expiry date which implies that the particular product must be consumed before that date and not at all after that date. This information is very important because it involves the health of the consumer. Some times it so happens that either such information is not provided or the seller deliberately did not give the information since the consumer did not ask for it or notice the inscription written on the product.

It also happens many times that a consumer buys goods and services without taking the bill or the seller does not provide the bill. This is done to avoid paying tax on the product to the government. Such a tax is value added tax (VAT) i.e. a type of tax that is place on a product whenever value is added at a stage of production and at final sale. If this tax is included then price of the product will be higher because of the tax and accordingly it will be acknowledged by providing the bill. But in order to attract the consumer by selling the product at a lower price, the seller deducts the tax and so does not provide the bill. Just because the price is less the consumer also does not bother to ask for the bill. Such practice creates two serious problems. One, the government is deprived of its tax revenue and two, the consumer may suffer if the product comes out to be faulty and he/she cannot even return the product or file a complaint since there is no bill to give proof of purchase.

Another major issue is that the consumers are not united. Producers have become stronger and organised because there are Producers' and Traders' Associations to protect their interest. But the buyers are still weak and unorganised. As a result the buyers are duped and deceived quite often.

Because of the above arguments it is very important for consumers to protect themselves from the unfair trade practices of the traders and service providers. They need to be aware of their rights as consumers and use them promptly.

It should be noted that consumer awareness is not just only about consumers' rights. It is a well known fact that many consumers around the world have been indulging in mindless and wasteful consumption because of their money power. This has divided the society into rich consumers and the poor. Similarly many consumers are also not bothered about the safe disposal of wastes after consumption is over which causes environmental pollution. By agreeing to pay a lower price for the product without asking for the bill, many consumers indirectly help the sellers to avoid paying tax to the government. Hence there is also need for consumer awareness to educate the consumers about their responsibilities.

Consumers also need to act more responsibly and join hands with the government.



### INTEXT QUESTIONS 24.1

1. Who is not a consumer?
2. Why must the consumers take the bill on purchase of a product?
3. What is VAT?



Notes

## 24.3 CONSUMER REDRESSAL SYSTEM IN INDIA

There is legal and administrative machinery working in the field of consumer education in our country. It is important for you to understand it.

Consumer redressal system is a system under which the consumers can file a complaint in a consumer court and demand justice when they are cheated by the sellers or manufacturers of the commodity or service they buy. **It comprises of the Laws to protect the interest of the consumers and the Institutions to enforce the laws to uphold consumers' rights.** Thanks to the government, we have consumer laws made through legislations in our country with a special focus on consumer education. The purpose is to help the people understand their rights and responsibilities as consumers and to redress their grievance. There is also existence of Institutions in the form of government departments and consumer courts to deal with the grievances of the affected consumers. Let us discuss them below.

### 24.3.1 Government Legislations

We have had several government legislations in our country even before independence to protect the rights of the consumers. But Consumer Protection Act 1986 (CPA) is the most important one and gives you as a consumer all the support and guidance against violation of your rights. CPA is specifically designed to protect consumer interest.

There are a couple of other legislations aimed at providing consumer protection, enacted after independence, like Prevention of food adulteration Act (PFA) 1954, the Essential Commodities Act, 1955 (ECA) and the Standard of Weights and Measures Act (SWMA) of 1976.

The CPA was enacted with the objective of providing 'cheap', 'simple' and 'quick' justice to the millions of consumers in the country. It ensures justice which is less formal, involves less paperwork, cuts delays and is less expensive. CPA applies to all goods and services, unless specifically exempted. It covers the private, public and cooperative sectors. It also empowers a consumer to haul up municipal authorities in consumer courts if they fail to provide all the services ranging from street lighting and drinking water to drainage and health.



Among other measures included in CPA some recent ones are:

- Consumers are allowed to decide where they want to seek redressal.
- A company cannot insist on being liable to be tried only in a court of its choice.
- Consumers are allowed to sue service providers of a company for passing on their personal information to salespersons e.g. banks, insurance company etc.
- Real estate developers are classified as traders and liable to be tried in a consumer court.
- Oversees agencies operating through e-commerce sites on the internet or telemarketing are not allowed to sell their products unless they maintain an office in India. They have to organise the inspection of goods prior to purchase, or refund goods within 30 days.
- Officials and stakeholders like state government departments of post and telecom, passport offices, municipal services, Central Government Health Scheme (CGHS) and railways are demanding exemption from the Act fearing, they will have to face a barrage of litigation.



## INTEXT QUESTIONS 24.2

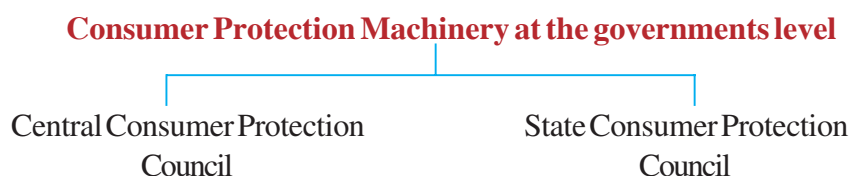
1. Give the full form of CPA, ECA and SWMA?
2. How can a foreign agency sell its product in India?

### 24.3.2 Institutions to Deal with Consumers' Grievances

The citizens of India have an Institutional machinery, to deal with consumers' grievances, working at all levels: national, state and district. There are two types of institutions- (i) Government Councils and (ii) Consumer Courts. Besides this there are also several Non-Governmental Organizations (NGOs) registered under the government law which provide various kinds of support to the aggrieved consumers.

#### (i) Government Councils

Read the following flow chart to know the government councils working at national and state levels.

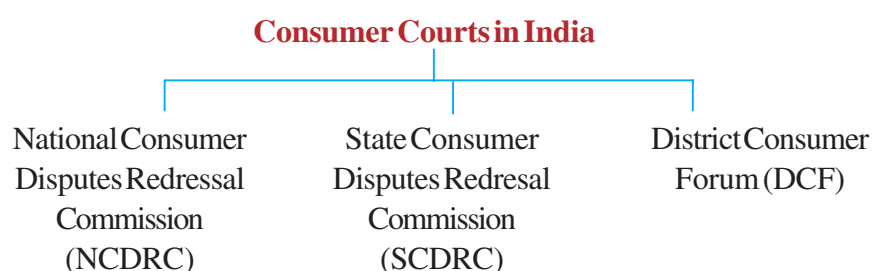




As shown in the chart there is a Central Consumer Protection Council (CCPC) at the National Level which is headed by a Central Minister in-charge of the Consumer Affairs in the Central Government at New Delhi. At the State Level there is a State Consumer Protection Council (SCPC) in each state of India which is headed by a State Minister-in-charge of the Consumer Affairs in the State Government.

### Consumer Courts

Read the following flow chart to know the types of Consumer Courts working at national and state and district levels.



As given in the chart, there are three layers of Consumer Courts in India. At the bottom is the District Consumer Forum (DCF) at the district level in the state. There are 604 District Forums in the country now.

At the mid level there is State Consumer Disputes Redressal Commission (SCDRC). There are 35 State Commissions in the country.

Finally at the top there is an apex body known as National Consumer Disputes Redressal Commission (NCDRC) working hand-in-hand to provide cheap, speedy and simple redressal to consumer disputes in the country.

A Consumer Court is quasi-judicial in nature and is directly accountable to the people. The central and the state governments are responsible for making policies with respect to the working of these courts.

### 24.3.3 Redressal Mechanism

Now the question arises- How a consumer who feels cheated can get justice or relief in the form of compensations? For this he or she can approach any consumer court by filing a written complaint on his/her own or through a lawyer. The particular court that he/she must approach depends on the value of the commodity. In case of any product or in respect of a service valuing up to Rs. 20 lakhs the affected consumer can file a written complaint before the District Consumer Forums. If the value is up to Rs. 1 crore, then he/she has to approach the State Commission. Finally, for value above Rs. 1 crore, the consumer should approach the National Commission for grant of relief. According to CPA the relief should be given within 90-150 days and if a consumer is not satisfied by the decision of the District Forum he/she can challenge the same before the State



Commissions. If still not satisfied with the order of the State Commission, the consumer can go to the National Commission.

#### 24.3.4 What You Need To Do? How to file a Complaint?

For filing a complaint, the aggrieved consumer must always keep the cash memo, receipt or bill of the product he/she has purchased. The format to file a complaint is located on the booklet provided by consumer protection Act. Then the person must select the proper category under which he/she is filing the complaint. These categories are - unfair trade practice, deficiency of service etc. Then the nature of the complaint needs to be explained in simple words. The consumer should be clear about the fault and what he/she wants as a remedy i.e a replacement or a refund or compensation in case of a service. The documents like the receipt or other evidences must be attached along with the complaint. There has to be three copies of the entire set; one for the complainant, one for the other party against whom the complaint has been made and one for the consumer court. Some nominal filing fees have to be paid to the court by the complainant in the form of a demand draft.

It should be noted that a complaint should be filed within 2 years of the date on which the defect occurs. This is not dependent on the purchase date. The affected consumer can either appear in person, send a representative or a lawyer or even a letter. In case, a complainant has died, his legal heirs can go to the court. If not satisfied with decision of the lower court, the person must appeal to a higher court within 30 days of the lower courts' order. Remember, however, that the court can fine you up to Rs. 10,000/- if it thinks that the consumer has filed a frivolous complaint. Check the latest rules by visiting local consumer rights officer or online at the web sites - [ncdrn.nic.in](http://ncdrn.nic.in) and [core.nic.in](http://core.nic.in).

Now a days communication through internet has become a way of life. So a person can also mail the complaint. The e-mail ID/Website is printed on the cover of the product.

#### 24.3.5 Role of NGOs

In case the producer/company/seller gives the aggrieved party a cold shoulder then the role of non- governmental organisations i.e NGOs becomes very important. One can lodge complaints with some NGO's like Consumer Grievance ([www.consumer-grievance.com](http://www.consumer-grievance.com)), Consumer Guidance Society of India ([www.cgs\\_india.org](http://www.cgs_india.org)), Common Cause ([www.commoncauseindia.org](http://www.commoncauseindia.org)) and Consumer Forum ([www.consumer.org.in](http://www.consumer.org.in)). NGOs not only help in filing a case but also they provide logistic, manpower and other supports. NGOs also conduct various programmes to educate consumers about their rights and responsibilities.

One can also approach consumer help organisation called Jago Grahak Jago. Almost every newspaper provides complete information about it through advertisement. The online grievance form can be had by visiting the site.





Some other web sites for banking, insurance, tax and telecom related problems are:

- [www.banking\\_ombudsman.rbi.org.in](http://www.banking_ombudsman.rbi.org.in)
- [www.irdaindia.org](http://www.irdaindia.org)
- [www.incometaxindia.gov.in](http://www.incometaxindia.gov.in)
- [www.trai.gov.in](http://www.trai.gov.in)

### 24.3.6 The Grounds for Filing a Complaint

The deficiency in a service is one of the grounds for filing a complaint under the Act. The term deficiency has been defined as any fault, imperfection, short coming or inadequacy in the quality, nature and manner of performance which is required to be maintained by or has been undertaken to be performed by a person in pursuance of a contract or otherwise in relation to any service. Compensation has to be paid by the wrong doer for their faulty or defective goods and services.



### INTEXT QUESTIONS 24.3

1. Name the government councils which deal with consumer grievances at national and state levels?
2. Name the consumer courts at national and state and district levels?
3. When a complaint can be filed in the consumer court?

## 24.4 CONSUMERS' RIGHTS

The purchase of goods and services entitles you to certain rights as a consumer. They are as follows.

### 24.4.1 Right to Information

This right states that sellers and producers should always provide consumers with enough and appropriate information regarding the price, weight, company brand, manufacturing & expiry dates, quality identification marks, ingredients, contact links of the company and so on, to make intelligent and informed product choices. Here is an example from the services sector.

When a customer was trying to find the lowest fare to travel from Delhi to Bangalore, the results of the search indicated airfares from Rs. 1450 onwards. He chose a flight that costed Rs. 1500/- plus taxes. He has no idea what the tax component was. As



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he proceeded with the booking, he got to know that Rs. 1500 is the basic fare and on that, taxes and other fees cost another Rs. 3445 and the final fare will be Rs. 4995.

Now why can't the airlines and portals be more honest and transparent and mention the actual fare clearly at the beginning? Why should they mislead consumers into paying three times more than what they first see? You have to be cautious and get full informations from such service providers who are concealing part of the informations on the basis of which they would later harass the consumers.

#### 24.4.2 Right to Choose

The consumers have the Right to Choose regarding what to buy and what not to buy. Sometimes when you receive a service or purchase a good you cannot do so because you are forced to buy things that you may not wish to. The shopkeeper puts a condition and you are left with no choice. You as a consumer lose your right to choose. Read the case below:

“When Senthil applied for a new gas connection, little did he realise it would be the first step towards a troublesome journey. He walked into the Kumaran Gas Agency for a Bharat Gas cylinder, assuming he would have to pay Rs. 1500/-. Instead he walked out poorer by Rs. 7000/- after being forced to buy products he did not really need such as a pressure cooker, gas lighter; even a packet of detergent. The reason; the agency insisted that it was mandatory for a new customer to acquire the whole ‘kit’. Senthil complained to the Consumer Online Resource and Empowerment Centre (CORE) which sent a mail to the agency. Within a week he was refunded about Rs. 5000/-. Contrary to general belief, this customer is a proof that resolving a grievance need not be long and financially draining”. (India infoline News Service, Mumbai, April 2, 2009)

#### 24.4.3 Right to Safety

This right provides protection against the marketing of goods that are unsafe to the health and life e.g. adulteration in food, medicines, electronics and so on.

#### 24.4.4 Right to be Heard

This right ensures that consumers' interest will be given due consideration in the appropriate forums. This right also empowers the Indian consumers to fearlessly voice their complaints against the defective products and the erring producer/company/seller.

#### 24.4.5 The Right to Seek Redressal

In case of cheating, fraud or any other injustice as explained above the consumer can get compensation for the damage caused by the unfair and exploitative trade practices.





Notes

The redressal courts through their intervention help consumers get justice.

Let us look into some cases where the retailers violate consumer's right to redressal particularly in respect to goods bought during sale.

"A busy doctor bought 3 pairs of trousers at a discounted price of Rs. 2000/- each, during a sale from a well known retail brand from a particular outlet. However to his utter surprise, the fabric just gave way within a few wears, even before it was washed. On his complaint a person in-charge of the company showroom took back one pair and said, it would be sent to the company's quality cell for testing. A year has passed and he has neither heard from the company, nor got back his trousers.

Should the doctor not ask for his money and also for compensation for all the discomfort undergone in purchasing the trousers? The doctor has the right to seek redressal as a consumer."

#### 24.4.6 The Right to Consumer Education

It means to have access to programs and information that help consumers make better decisions before and after purchase. Instructions and guidelines for consumers are issued by the government departments and NGOs. This helps the consumers to take right decision with regard to purchase of a commodity. to bring Trademarks and Logos authentication marks such as ISI, AGMARK, BIS and other educational campaigns done in public interest.



#### INTEXT QUESTIONS 24.4

Mention the appropriate consumer right to file a complaint with regard to the following

1. A person falling sick after consuming a packaged food item.
2. A seller forcing a buyer to purchase a certain brand of goods and not showing other varieties of goods.
3. Samir wants to buy a computer and wants to know the exact configuration from the seller.
4. Rekha was cheated by a seller and wants to file a complaint.
5. Reshma has gone to a district consumer forum against the local hospital to seek compensation for wrong diagnosis for which she had to spend Rs. 2 lakhs unnecessarily.
6. You have requested the concerned department of Delhi Government to give you booklet on consumer protection act.



## 24.5 CONSUMERS' RESPONSIBILITIES

Consumer education is not always about rights of the consumers, but also about responsibilities and shouldering them honestly and sincerely. Let us highlight some of the issues here.

### 24.5.1 Dealing with Advertisements

Advertisements have become a part and parcel of our lives and even if we try we cannot avoid them. Companies are trying to sell their products by making attractive audio-visuals, publishing only that part which may be eye catching and hiding other crucial information and so on. Consumers need to be cautious of such deceptive advertisements. Children are the worst victims. They need to be guided properly.

### 24.5.2 Buying Quality Certified Products

There are lot of products which are certified by recognised agencies as safe to consume and good in quality. For example the Indian Standard Institute (ISI) conducts quality testing of many consumer goods. If found proper the product is labelled with ISI mark on it. For many food products the quality assurance is certified by seal called AGMARK. Consumers should choose products with ISI mark and AGMARK.

A very important thing before purchasing food products or medicines etc is that the consumer must see the expiry date.

### 24.5.3 Demanding Bill of the Purchase

Every consumer must demand the bill after purchase of goods and services. The bill is the proof of purchase and can be used to seek justice if the consumer feels cheated after buying the commodity. Through the bill the consumer also ensures that the government receives tax on the product because it is mandatory for the seller to mention the tax amount on the bill. Such act of the consumer makes him/her a responsible citizen of the country.

### 24.5.4 Being a Green Consumer

A consumer must consume those products which do not cause damage to our environment. Plastic bag is one example which has caused serious damage to the environment. People should use biodegradable products which can easily mix with soil and water after they are disposed off. Similarly people should save electricity, gas etc by judicious use. Consumers are also responsible for automobile pollution in town and cities. They should use public transport system and eco-friendly vehicles.

### 24.5.5 Consumers as Managers

Consumers can unite together to provide themselves and the community at large of a locality or village some basic needs such as drinking water supply, health, education etc.



Notes

It is the government who acts as the manager for delivery of services. But the government departments are often blamed for inefficient and erratic delivery of such services. So consumers can unite to provide such services. Read the following story:

### Consumers as Managers

(A true story from Gujarat)

Gujarat has more than 13000 village 'Pani Samitis' which are acting as managers of service delivery at the village level. The village 'Pani Samitis' are formed in Gram Sabhas through consumers. They manage their in-village systems for water supply service upto the household level, with a strong sense of ownership. They are also testing the quality of water and providing quality assurance upto the consumers' level.

Community engagement for making people as managers has resulted in reducing the cost of delivery, timely and efficient delivery of water, efficient repairs of water supply system, efficient utilization of water resource, innovative tariff mechanisms measures for sustainability of water resources like developing 'check dams', ponds for recharging of ground water leading to conservation of water resources in the area.

In a vast country like India consumers have a responsibility to stand by the government. You can also play a constructive role by joining hands with your local water, electricity, sanitation boards, through the local federations of your locality or Gram Sabhas of your village.

## 24.6 MAJOR CONCERNS OF CONSUMER MOVEMENT IN INDIA

For successful consumer movement people need to be educated. India is not only highly populated but also culturally diverse and has vast number of illiterates. So bringing consumer awareness is a big task. It is slowly picking up and lots to be done in this regard. Two major concerns are (i) spreading consumer awareness in rural area of India and (ii) timely delivery of justice. Let us briefly discuss them below.

### 24.6.1 Consumer Awareness in Rural India

On account of the globalization and liberalisation, increase in middle income and high income population in the villages our rural markets are also expanding. So companies are reaching with their products to our rural markets as well. But the rural consumers in India are generally ignorant and illiterate. So they are exploited by the manufacturers, traders and service providers. Rural consumers face problems like fake brands, spurious products, lack warranties and guarantees, imitation, unreasonable pricing, lack of varieties and so on. There is a need for spreading consumer awareness in the rural areas more seriously.



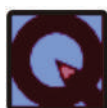
Notes

## 24.6.2 Timely Delivery of Justice

You know that justice delayed is justice denied. Unlike the civil courts, the consumer courts are quasi-judicial bodies that need to follow a simple, summary procedure for quick disposal of complaints. However repeated adjournments, delays on the part of the state government to fill up the posts of judges and unnecessary technicalities slow down the process of justice for the consumers. Delays often take away the essence of the law. Read the following case that illustrates these points.

Following loss of yield during the sowing season of 1993 due to defective hybrid cotton seeds sold to them, 130 farmers from Maharashtra filed a class action suit seeking compensation. Eventually, they won the case, but it took 14 years during which time ten farmers had died.

The Government amended CPA in 2003 to eliminate such delays. Accordingly, consumer courts are not to give adjournments at all. In exceptional circumstances where it is given, the court has to record the reasons for it in writing and justify it.



### INTEXT QUESTIONS 24.5

1. What should you do as a responsible consumer in the following cases
  - (a) To purchase an electric iron from among several brands available
  - (b) You are purchasing bread and fruit jam.
  - (c) The seller gives you the items in a polythene packet.
2. Give two reasons of delay in delivery of justice with respect to consumer grievances?



### WHAT YOU HAVE LEARNT

- Consumer awareness includes knowledge of the products purchased along with their effects on health and environment and consumers rights and responsibilities.
- Need for consumer awareness arises due to several reasons such as- bad quality of goods and services sold, selling without providing bill, misleading advertisement, lack of complete information about the product and producer/seller, environmental pollution due to mindless and wasteful consumption etc.
- Consumer redressal system comprises of the Laws to protect the interest of the consumers and the Institutions to enforce the laws to uphold consumers' rights.



Notes

- Consumer Protection Act 1986(CPA) is the most important legislation to protect interest of the consumers.
- Central Consumer Protection Council (CCPC) at the National Level and State Consumer Protection Council (SCPC) at the State Level are government institutions which deal with consumer issues. NGOs also provide help.
- For redressal of grievances there are three layers of Consumer Courts in India with the District Consumer Forum (DCF) at the bottom, State Consumer Disputes Redressal Commission (SCDRC) at the mid level and an apex body known as National Consumer Disputes Redressal Commission (NCDRC) at the top.
- A complaint can be filed by the affected consumer concerned or through a representative or through a letter in a prescribed form giving the nature of complaint and the bill within 2 years of purchase. A nominal fee must also be paid in the court.
- Consumers Rights in India include- Right to Information, Right to Safety, Right to Choose, Right to be Heard, , Right to Redressal and Right to Consumer Education.
- Consumers' Responsibilities include- not to be misled by advertisement, seek complete information for empowerment, checking the expiry date, quality assurance seal, demanding bill, avoiding wasteful and mindless consumption, protecting the environment etc.

**TERMINAL EXERCISE**

1. Why there is a need for consumer awareness?
2. What you must do as an aggrieved consumer to file a complaint?
3. Describe the consumer redressal system in India?
4. Give the provisions of Consumer Protection Act?
5. Discuss in brief the rights of consumers in India?
6. What you must do as a responsible consumer?
7. Explain two major challenges facing consumer movement in India?

**ANSWERS TO INTEXT QUESTIONS****Intext Questions 24.1**

1. A person is not a consumer if he/she purchases goods and services for resale purpose.



2. Because the bill is required to be produced before the consumer court if consumer finds the product to be faulty for which he/she wants to file a complaint. Bill also ensures that tax on the product has been paid to the government.
3. Value Added Tax.

**Intext Questions 24.2**

1. CPA- Consumer Protection Act  
ECA- Essential Commodities Act  
SWMA- Standard of Weights and Measures Act
2. By opening an office in India.

**Intext Questions 24.3**

1. Central Consumer Protection Council (CCPC) at the National Level and State Consumer Protection Council (SCPC) at the State Level.
2. National Consumer Disputes Redressal Commission (NCDRC) at the National Level, State Consumer Disputes Redressal Commission (SCDRC) at the State Level District Consumer Forum (DCF) at the District Level.
3. Within 2 years from the date of purchase of the commodity.

**Intext Questions 24.4**

1. Right to Safety,
2. Right to Choose
3. Right to Information
4. Right to be Heard
5. Right to Consumer Education.

**Intext Questions 24.5**

1. (a) look for quality assurance seal such as ISI mark.  
(b) Check the expiry date before purchase.  
(c) say no to plastic bag and demand a cotton or jute bag.
2. Repeated adjournments and delay in appointment of judges by the government.