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ਪੰਜਾਬ ਸਟੇਟ ਓਪਨ ਯੂਨੀਵਰਸਿਟੀ
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The Motto of Our University

(SEWA)

SKILL ENHANCEMENT

EMPLOYABILITY

WISDOM

ACCESSIBILITY

JAGAT GURU NANAK DEV
PUNJAB STATE OPEN UNIVERSITY, PATIALA

(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)

BACHELOR OF COMMERCE

(Hons.)

SEMESTER- IV

BCB32404T

BUSINESS ECONOMICS

Head Quarter: C/28, The Lower Mall, Patiala-147001

WEBSITE: www.psou.ac.in

JAGAT GURU NANAK DEV PUNJAB STATE OPEN UNIVERSITY, PATIALA

(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)

COURSE COORDINATOR AND EDITOR:

DR. PINKY

Assistant Professor

JGND PSOU, Patiala

BACHELOR OF COMMERCE (Hons.)

SYLLABUS
BCB32404T: BUSINESS ECONOMICS
SEMESTER-I

MAX. MARKS: 100
PASS: 40%
INTERNAL: 30
EXTERNAL: 70
TOTAL CREDITS: 4

OBJECTIVE

This course acquaints the students with the basic principles of Microeconomics and economic activities. It will help the students to understand the subject by applying it to their day to day experiences.

INSTRUCTIONS FOR THE CANDIDATES:

Candidates are required to attempt any two questions each from the sections A, and B of the question paper, and any ten short answer questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

SECTION – A

Meaning, nature and scope of economics; Methodology of Economics. Role of Assumptions

Theory of Demand and Elasticity of Demand

Consumer Behaviour: Cardinal utility analysis; Indifference curve analysis

Production Function: Law of Variable Proportions and Returns to Scale

Concepts of Cost and Revenue: types, shapes of cost curves in short and long period; shapes of revenue curves in different market forms; relationship of AR, MR and Elasticity.

SECTION – B

Price and Output Determination of Firm and Industry under Perfect Competition

Imperfect Competition: Monopoly and Monopolistic Competition

Theories of Distribution: Marginal Productivity Theory and the Modern Theory

Theories of Rent and Profit: Ricardian and Modern Theories of Rent, Risk and Uncertainty theories of Profit

Theory of Interest: Classical and Loanable Funds theories.

RECOMMENDED READINGS:

1. A. Koutsoyiannis: Modern Microeconomics, Palgrave Macmilan.
2. N. Gregory Mankiw, Economics: Principles and Applications, India edition by South Western, a part of Cengage Learning, Cengage Learning India Private Limited, 4th edition, 2007.
3. Salvotore. D (2006) Theory and Problems of Microeconomic Theory. (3rd ed.) Tata McGraw-Hill Publishing Company Ltd.
4. Samuelson, Paul A and Nordhaus, William D : Economics, 18th Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2006

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BCB32404T: BUSINESS ECONOMICS

SEMESTER -I

SECTION A

UNIT NO:	UNIT NAME
Unit 1	Meaning, Nature and Scope of Economics; Methodology of Economics, Role of Assumptions
Unit 2	Theory of Demand and Elasticity of Demand
Unit 3	Consumer Behaviour: Cardinal Utility Analysis; Indifference Curve Analysis.
Unit 4	Production Function: Law of Variable Proportions and Returns to Scale
Unit 5	Concepts of Cost
Unit 5A	Concepts of Revenue

SECTION B

UNIT NO:	UNIT NAME
Unit 6	Price and Output Determination of Firm and Industry under Perfect Competition
Unit 7	Imperfect Competition: Monopoly and Monopolistic Competition
Unit 8	Theories of Distribution: Marginal Productivity Theory and the Modern Theory
Unit 9	Theories of Rent: Ricardian and Modern Theories of Rent
Unit 9A	Theories of Profit: Risk and Uncertainty theories of Profit
Unit 10	Theory of Interest: Classical and Loanable Funds Theories

BACHELOR OF COMMERCE (HONS.)

SEMESTER –IV

COURSE: BUSINESS ECONOMICS

UNIT 1: MEANING, NATURE AND SCOPE OF ECONOMICS

STRUCTURE

1.0 Learning Objectives

After reading this unit, learner will be able to:

- Describe the nature and scope of economics
- Identify the basic problems of the economy
- Determine the methodology of economics
- Know about the role of assumptions in economic analysis.
- Interpret the economic models

1.1 Introduction

Economics is the study of how society manages its resources which are limited in nature. It also studies the economic activities of man. Everyone has to make a choice with regard to the use of scare resources, so that they may get maximum satisfaction from them. Economists study how individuals, firms and other organisations make decisions about what commodities and quantities are produced, how these commodities are produced and who gets how much of the goods produced for consumption with the given limited resources.

1.2 Meaning of Economics

Economics, according to Adam Smith (1976), the father of economics, is "*an inquiry into the nature and causes of the wealth of a nation".* In his well-known work, "The Wealth of Nations", he expresses these views. According to him, economics enquires the factors that influence a country's wealth and growth. The subject matter of economics, according to this definition, is the production and expansion of wealth. Ricardo, on the other hand, moved the focus away from production of wealth to distribution of wealth.

According to him, "*The produce of the earth-all that is derived from its surface by the united application of labour, machinery and capital is divided among three classes of the community, namely, the proprietor of the land, the owner of the stock of capital necessary for its cultivation and the labourers by whose industry it is cultivated"*. Thus, Adam Smith and Ricardo definition of economics considered economics as „science of wealth". However, according to Marshall,

wealth is just a secondary consideration; the main focus of economic study is on man and his everyday activities. According to Alfred Marshall (1922), *"Economics is the study of mankind in the ordinary business of life; it examines that part of individual and social actions which is most closely connected with the attainment and with the use of material requisites of well-being"*.

In his book "Principles of Economics", Marshall understood it in terms of "material welfare" material goods are those which can be touched and seen like chairs, books etc. and an analysis of man's behaviour in everyday life, but Robbins criticised Marshall's concept of economics. He believes that economics should not have any connection with material well-being. He emphasizes that we study not only material but also immaterial things in economics. He said under it we also investigate how the prices of immaterial services such as professional musicians, actors and actresses, dancers, and others are determined and these are important topics of price theory. As a result, Robbins not only criticised Marshall's idea of economics and other welfare definitions, but also proposed a new definition that he believed to be more scientific and correct. In 1931, he published "An Essay on the Nature and Significance of Economic Science," which included this description. According to him, economics is the study of problems that occur as a result of resource scarcity. Nature has not supplied humanity with enough resources to meet all of its needs or wants. As a result, the people must decide how the money can be used and for what purposes.

According to Robbins, *"Economics is the science which studies human behaviour as a relationship between ends and scarce resources which have alternative uses."*

This definition is based upon the following three facts:

A. Man‟s wants are unlimited and all are of not equal intensity. Some are more intense than others; therefore, one is compelled to choose between the more urgent and less urgent wants.
B. Despite the fact that wants are unlimited, the resources to satisfy them are strictly limited. It is important to note here that if resources like wants are unlimited then there will be no possibility of any economic problem because all wants could have to be fulfilled. It should be carefully noted that according to this definition, resources here refer to natural productive resources, consumer goods, man-made capital goods, time available with man and financial resources, etc.
C. The third fact is that scarce resources can be put to alternative uses. Here alternative uses

have an example of milk. As milk used for different purposes such as curd, butter and cheese etc. These alternate uses are of varying significance, with some being more urgent than others. It means we must choose the use to which resources have been employed. Thus, the problem of choice comes in.

It is observed from Robbins‟s definition of economics that economics is a science of choice. Although Robbin‟s definition of economics is considered superior because of above mentioned three facts, it should not be termed as perfect. It is criticised on the ground that it does not cover the theory of income and employment determination as well as the theory of economic growth. Thus, all three essential subjects of economics, namely the distribution of national income and production, the determination of national income and employment and the theory of economic growth, must be included in a proper definition of economics. Prof. Samuelson defines economics as, *"the study of how societies use scarce resources to provide valuable commodities and distribute them among different people*". Thus, according to this definition economics is the study of scarcity of resources and choice and distribution of national product among people of a society.

1.3 Nature and Scope of Economics

Economics as a subject is experiencing continuous growth. A discussion on the scope of economics includes the definition of economics, whether economics is an art or a science and whether it is a positive or a normative science.

There has been a lot of controversy among economists about the true scope of economic theory or its subject-matter. The subject matter of economics has been defined by various economists. Like Adam Smith defined it as, *economics inquiries into the nature and causes of the wealth of nations.* Ricardo defined economics as, *"how the produce of the earth is distributed"*, that is economics deals with the distribution of income and wealth. A.C. Pigou says, *"Economics studies that part of social welfare which can be brought directly or indirectly into relationship with the measuring rod of money"*. Whereas Gustav Cassel defined economics as dealing with markets, prices and market exchange. Robbins has defined economics as a study of the allocation of scarce resources among competing ends or uses. The scope of economics has been divided into the following fields:Microeconomics and Macroeconomics and Positive Science and Normative Science

It is evident from figure 1.1 that economics as a social science has two main branches.

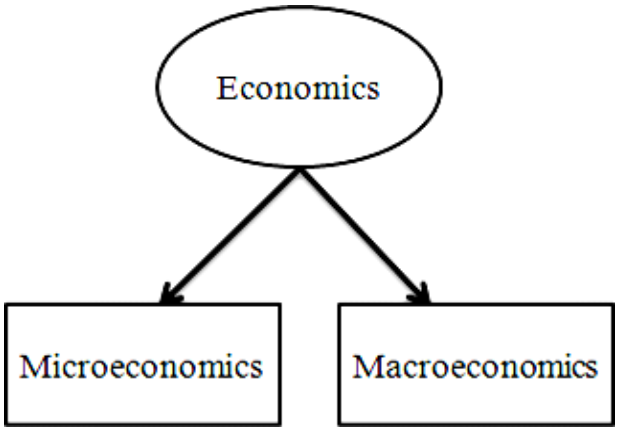

Figure 1.1

1.3.1 Microeconomics

The word micro comes from the Greek word *mikros*, which means "small". As a result, it focuses on the study of small individual units of the economy such as individual consumers, individual firms and small groups of individual units like various industries and markets. To put it another way, microeconomics is the study of how individual consumers choose which goods and services they want to buy and how they share their limited income among those goods and services to maximise their overall welfare.

According to K.E. Boulding, *"Microeconomics is the study of particular firms, particular households, particular households, individual prices, wages, incomes, individual industries and particular commodities"*.According to Prof. Lerner, *"Microeconomics consists of looking at the economy through a microscope, as it were, to see how the millions of cells in the body economic-the individuals or households as consumers, and the individuals or firms as producers-play their part in the working of the whole economic organism."*

The microeconomics has some important components:

A. It analyses how a consumer allocates his income to different uses so that maximum satisfaction can be derived. Inverse price-demand relationship is the outcome of the theory of demand.

B. It examines how a producer decides what to produce, how to produce and how much to produce. The main motive of a producer is profit maximization.

C. It studies how prices of goods are determined in the market through the interaction of supply and demand forces.

Thus, microeconomics is helpful in the formulation of economic policies that will promote the welfare of the society. It tells us how goods and services produced are distributed among the different people for consumption through price or market mechanism.

1.3.2 Macroeconomics

The word macro comes from the Greek word *macros,*which means"large". As a result, macroeconomics is concerned with the overall analysis of the economy. It studies the behaviour of the large aggregates such as total employment, the national product or incomeand the economy's overall price level.According to K.E. Boulding, *"Macroeconomics deals not with individual quantities as such but with the aggregates of these quantities; not with individual incomes but with the national income; not with individual prices but with the price level; not with individual output but with the national output"*.

It is important to mention herethat each definition given above is incomplete and inadequate since they do not indicate the true scope and subject-matter of economics. It is a controversial subject whether economics is a science or an art or both.

1.3.3 Economics as a Science

Science refers to a systematised body of knowledge. It deals with the cause and effect relationship. It helps us in drawing generalisations in the form of principles or laws. Some of the economists believed economics as science because it is a systematised body of knowledge that studies and analyses economic data. The law of demand, for example, states that, all other factors being held constant, a decrease in price leads to a rise in demand and increase in price leads to decrease in demand. It can be understood from the law of demand that increase or decrease in price is the cause while the decrease or increase in demand is the effect of the same.

Economics is a science and its principles, such as the law of demand and the law of diminishing marginal utility, are universally true. Some argue that economics is not a science because in science we are doing experiments; however, in economics there is no scope of any kind of experiment. It means in science we are collecting facts and putting them to the test through experimentation. Statistical, quantitative and econometric methods for research are used in economics, but they are not always effective in determining the true validity of economic laws

and theories. Consequently, precise quantitative forecasting is impractical. Economic phenomena are complicated because they include man acting irrationally as a result of society's tastes, habits, social, and legal institutions. For example, an increase in price may not result in a decrease in demand, but rather an increase in demand because there are some other factors which affect the demand of the commodity like taste and preferences of the consumers and future expectations. If consumers are expecting that in future, there will be shortage of the commodity then in the present time period they will increase the demand. Thus, economic phenomenon‟s are complicated because consumers are behaving irrationally. However, from the above we cannot say that economics is not a science. It is a social science which deals with human beings.

Now an important question emerged from the above discussion, whether economics is a positive science or a normative science. Prof. Robbin‟s and Freight-men thought of economics as a positive science, while Prof. Pigou and Marshall thought of it as a normative science.

A. Positive Science: It may be defined as a body of systematized knowledge concerning what it is, what was and what ought to be. Thus, positive science deals with economic problems related to the past, present and future. We are analysing economic conditions with the help of facts and figures. Positive statements have a few distinguishing features like:

(i) These statements highlight the nature and extent of economic problems.

(ii) These are based on facts and figures related to the past, present or future.

(iii) It is not necessary that these statements are based on truth. These may be true or false but are verifiable for truth.

(iv) These do not reflect any value judgment or opinion of the economists.

Let us understand economics as positive science with the help of an example. If someone says that the population of India is more than China, it is a positive statement, but it is wrong as per population statistics.

B. Normative Science: It is concerned with economists‟ opinion or value judgments to understand the economic problem. Different economists have different opinionson how to solve any economic problem. These opinions are often based on value judgments. It is concerned with the question of „*what ought to be'*. As a result, when an economist suggests a solution to a problem in normative economics, they do it based on people's ethics and beliefs rather than scientific rules and principles. The normative statements also have some

essential characteristics:

(i) These statements involve value judgment.

(ii) These statements may create controversies and debates.

(iii) Because these statements are based on opinions, it is impossible to verify the truth.

(iv) These statements are related to „what ought to be" as a solution to any economic issue.

For instance, if someone says that the government should spend more on health care. Then it is just an opinion or value judgment.

1.3.4 Economics as an Art

According to Prof. Pigou and Marshall, Economics is an art. Art is generally considered as practical implementation of knowledge for achieving particular goals. In other words, Art is an action and an art of application of scientific laws in practice. As a form of art, economics is useful in solving many of the economic issues that arise in the economy. Economics is considered as an art because in these different theories and laws are explained with the help of tables, graphs, statistics and equations. Besides this, assumptions are also used in economics which are helpful to describe the conditions under which theories, rules and relationships between economic variables can be applied.

Thus, from the above discussion we can say that economics is considered as a science (social science) as well as an art too.

Check Your Progress- I

Q.1 Define Robbin"s definition of economics. How is it superior to Marshall"s definition?

Ans .....

.....

Q.2 Define Micro Economics.

Ans .....

.....

1.4 Basic Economic Concepts of Economics

A. Scarcity: The existence of an economy is based on two fundamental facts. To begin with, human wants for goods and services are unlimited; nevertheless, resources to produce goods and services are scarce. As a result, the first economic lesson is scarcity. We can't satisfy all of our wants and desires by producing what we want because our wants are unlimited and resources are scarce. It means that one must decide how to utilize scarce resources in order to get maximize satisfaction.

B. Choice: Because it is impossible to satisfy all the desires with limited resources, each society must decide a method for determining which desire is to be satisfied. The necessity for economising arises because we have limited productive resources at our disposal, such as land, raw materials, skilled labour, capital equipment, and so on. Because these resources are in limited supply, the goods they may produce are also limited. As a result, goods are scarce due to a scarcity of productive resources. We should make the most of what we have because our resources are limited in comparison to our desires.

In economics, it is thought that man is rational in his decision-making; that is, if a man has to pick between two options, he will always pick the one that will provide the greatest satisfaction as compared to other available choices. Similarly, if a firm had to choose between producing one product or another, it would choose the product with the highest profit margin. The scale of choice displays a list of desires ranked from most urgent to least urgent, with the most urgent want listed first, followed by the second most urgent and so on.

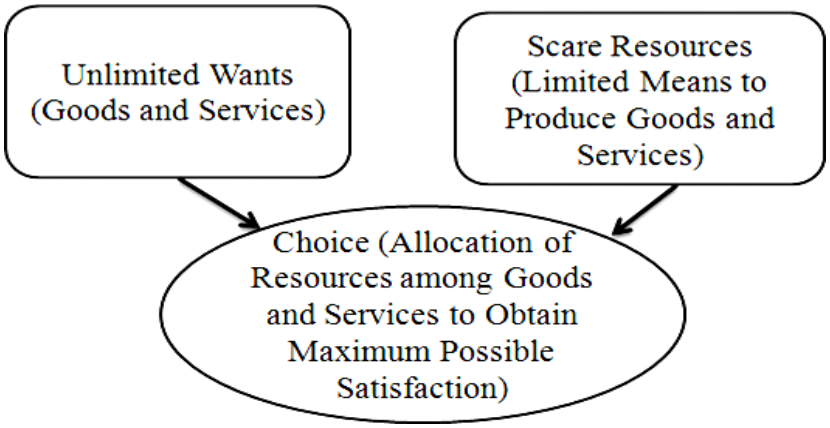

Figure 1.2 The Economic Problem

Figure 1.2 depicts the problem of choice that results from unlimited wants on the one side and limited resources on the other. The study of economics teaches us how to use and allocate limited resources to obtain maximum possible satisfaction for the people.

There are many types of resources that assist us in producing goods and services. They are called factors of production. Economists divide factors of production into four categories.

Figure 1.3 shows that there are four types of factors of production. The ability of all these factors is limited in supply. Thus, these limited means are put in a constraint on the amount of goods and services that can be produced.

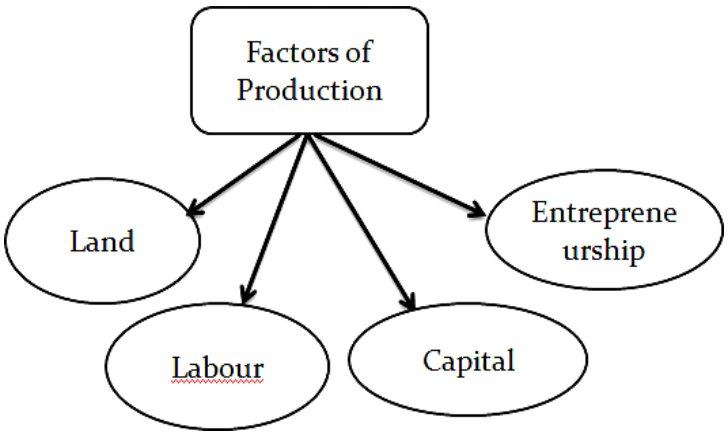

Figure 1.3 Kinds of Resources

a. **Land**: It refers to all natural resources that are a free gift from nature. It includes not only agricultural soil, but also other natural resources like minerals, water, climate and forests.
b. **Labour:** Both physical and mental skills that individuals can make available to produce goods and services are referred to as labour.
c. **Capital:** It refers to man-made resources of production. This includes machinery, factory-buildings, various tools and devices, roads, dams, transport buses and trucks etc.These are often referred to as capital goods because they help in the production of additional goods and services.
d. **Entrepreneurship:** Entrepreneurship denotes a unique human capital that possesses entrepreneurial potential. In a free market economy, entrepreneurs play an important role. By combining other tools such as labour, land and capital, he initiates and organises the production process. Entrepreneurs make a variety of corporate policy decisions and are exposed to the risk of failure as a result of their actions.

1.5 Basic Economic Problems of an Economy

As mentioned in the previous pages, a lack of resources in relation to human wants leads to various basic problems, concerns and questions that an economy must address if it is to achieve its goals. The basic economic problems are also called central problems of the economy. Many of these issues include societal decision-making. As a result, economic theory must respond to five basic questions. These are explained as follow:

1.5.1 The Problem of Allocation of Resources

The first and foremost basic problem confronting an economy is “what to produce" so as to satisfy the wants of the people. The problem of what goods are to be produced and in what quantities arises directly from the scarcity of resources. If the resources were unlimited, the problem of what goods are to be produced would not have arisen because in that case we should have been able to produce all goods we wanted and also in the desired quantities. But because resources are in fact scarce relative to human wants, an economy must choose among various goods and services. If the society decides to produce a particular good in a larger quantity, it will then have to withdraw some resources from the production of other goods and devote them to the production of the goods which are to be produced more.

1.5.2 Choice of a Production Method

It is related to the question „how to produce“ which means what technique or method will be used by society to produce goods. Here the problem is how to determine optimum combination of inputs i.e., labour and capital- so that production of goods and services is maximised. This problem too arises due to the scarcity of resources. Any quantity of labour and capital could be combined to produce a product if inputs (labour and capital) were available in unlimited amounts. Resources, on the other hand, are not available in unlimited quantities. As a result, selecting a technology that makes the most efficient use of resources becomes a necessity.

A number of alternative techniques are available with the help of which a given quantity of a commodity can be produced. As a result, the society must select between them which alternative methods should be used to produce goods. Each technology is using a different combination of resources such as labour and capital. For example, more labour and less capital is needed to produce cloth with handlooms whereas in automatic looms more capital and less labour is

needed. It means production of cloth with handlooms is a labour-intensive technique while with automatic looms is a capital-intensive technique. Thus, a society has to choose whether it wants to produce with labour intensive methods or capital-intensive methods of production. It is important to mention here that in the choice of a technique of production prices of different factors play an important role.

As a result, a society must decide whether it wants to produce the commodity by using labour-intensive or capital-intensive methods. It is important to note that prices of various factors play an important role in the selection of a technique of production.

1.5.3 The Problem of Distribution of National Product

This problem is related to the sharing of the national product. It means among the members of the society how the national product is to be distributed. Since the productive resources and the output obtained through these resources are scarce, we are unable to satisfy all the wants of all the people of a society. As a result, it should be decided by the society who should obtain how much from the total production of goods and services. Who gets how much of the national production in a free market economy is determined by the people's money income? The higher a person's money income, the more items he or she would be able to purchase from the market. As a result, people with higher incomes receive a larger share of the economy's production than those with lower incomes. More will be the equal distribution of income higher will be the possibility of equal distribution of national product.

It is important to keep in mind that an individual can earn money income in two ways. Firstly, it can be obtained by work, i.e., by selling its labour services. Income received through wages and salaries included under this. Secondly, property such as land, factories and other sources of capital can also make money income. Rent, interest and profits are all examples of income from property. In a free market economy, variations in ownership of property lead to differences in income from property.

The distribution of the national product in the economy has always been a hot topic of economics. According to Karl Marx, national product should be distributed on the basis of "from each according to his ability, to each according to his needs". Another significant viewpoint is that each individual should be compensated in proportion to his or her contribution to national production.

1.5.4 The Problem of Economic Efficiency

This is related to the problem of efficiency or welfare maximisation. Since the resources of an economy are limited, there will be no wastage of these resources. In the preceding pages, we have discussed what and how goods are produced in the economy. Apart from that we have also studied how national product is distributed. Now, the question which emerged is whether the production and distribution decisions made by an economy are efficient. If the productive resources are utilised in such a way that there will be no sacrifice of one good for producing more of another good, then we can say that production is efficient. For this, we have to do the cost benefit analysis when we are making any change. Thus, when there is a shifting of resources from one use to another use will take place in an economy then it will also involve some cost. If the involvement of cost is more than the benefits received from it then it is not worthwhile to shift the resources.

Since resources are limited, it is preferable to use them as effectively as possible.

1.5.5 The Problem of Economic Growth

If all the scarce resources of an economy are used for current consumption (for producing consumer goods) only then there will be no provision of resources for capital goods, therefore, the productive capacity of the economy will not increase in future. As a result, the living standard or income of the people will remain stagnant. To encourage economic growth, a part of resources should be allocated to the production of capital goods and for promotion of research and development activities that will bring technical advancement. The provision for capital accumulation and technological advancement, on the other hand, implies some sacrifice of current consumption. As a result, a society must decide how much saving and investment it can make for future economic progress.

From above, it is clear that when an economy's productive capacity is increasing, increasingly more goods and services will be produced, resulting in an increase in people's living standards.

Thus, we can say that it is only the scarcity of economic resources that lurks behind all of the above fundamental questions. These five questions are merely a breakdown of the basic economizing problem of scarce resources and unlimited wants. Also, the interrelation of these

questions is apparent, so they demand simultaneous treatment and we cannot treat them independently.

1.6 Methodology of Economics

Our findings must be logical, accurate and reliable based on appropriate methods of analysis to develop economics as an objective and impartial subject of research. We will discuss two methods in this section, namely the Deductive and Inductive methods.

1.6.1 Deductive Method

This approach was primarily used by classical economists. It is also known as a priori, hypothetical or an abstract approach of economic analysis. It is a method of reaching conclusions based on specified general axioms. In this method, we can derive conclusions from a collection of facts by applying logic, which establishes the relationship between causes and effects of a specific action. To be precise, deduction can be described as reasoning from general premises to specific conclusions. Premises are those statements which are assumed to be true and applicable to a particular issue. It is generally believed that right decisions will result from proper reasoning.

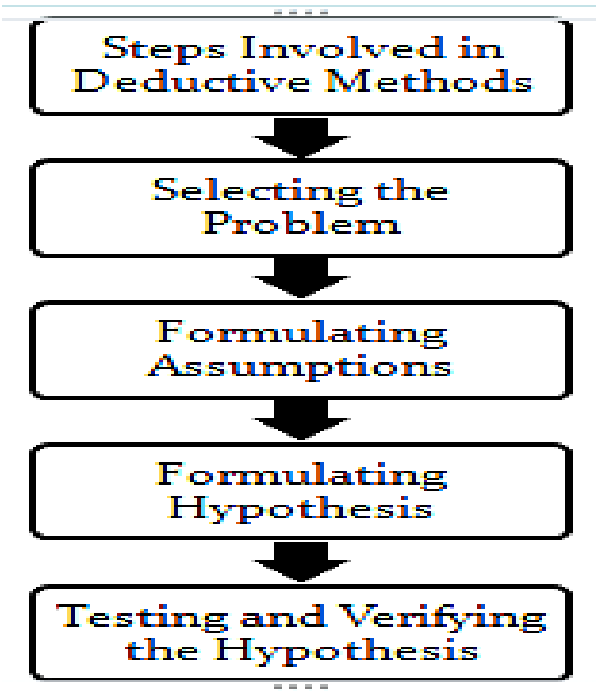

Figure 1.3

Merits of Deductive Method

The merits of the deductive method are as follows.

A. It is based on general principles, such as the law of diminishing returns; therefore, this method is useful in drawing inferences which have universal validity.
B. When used correctly, this method is the most effective technique of discovery. This approach is useful for obtaining critical outcomes.
C. Principle of logic is applied here, and the results obtained by the deductive approach are simple, accurate and well established.
D. This approach is easy to use because it does not necessitate a thorough examination of statistical evidence for a specific case. As a result, results obtained by using this approach are impartial since they are not influenced by the investigator's personal beliefs.
E. This method can be used to predict economic trends.

Demerits of Deductive Method

There are several demerits of deductive method:

A. The problem with the deductive approach becomes worse as laws based on unrealistic assumptions are assumed to be universal, since they are often based on unrealistic assumptions, such as perfect competition in the market. Thus, this method is considered as a static method.
B. It is believed by some economists that the laws based on deduction are imaginary and unreal because they do not take into account the factors like technology, political system, social customs and religion etc. which are changeable in nature and highly influencing the economic facts.
C. In economics, observation is used to verify theories, generalisations and laws. The proper observation necessitates accurate and sufficient data. Ifa hypothesis is derived from inaccurate or insufficient data, the theory will not match the fact and will be disproved.
D. The deductive approach is very abstract, and it takes a lot of expertise to make inferences from different premises. Even in the possession of an experienced economist, using this approach is problematic due to the complexities of such economic issues.

1.6.2 Inductive Method

The method of reasoning from a part to the whole, from particulars to generals, or from the entity to the universal is known as induction. It's "an ascending operation," according to Bacon, in which facts are gathered, sorted, and then general conclusions are drawn.

In economics, the inductive approach was used by the German Historical School, which aimed to improve economics entirely through historical study. The historical or inductive approach assumes that the economist is essentially an economic historian who must first collect data, draw generalisations and then test the conclusions by using them to subsequent events. It means, we are using statistical methods to find out the actual solution to any economic issue.Since we draw the conclusions only after considering the changing circumstances in detail from all angles, this approach is called concrete, logical and functional.

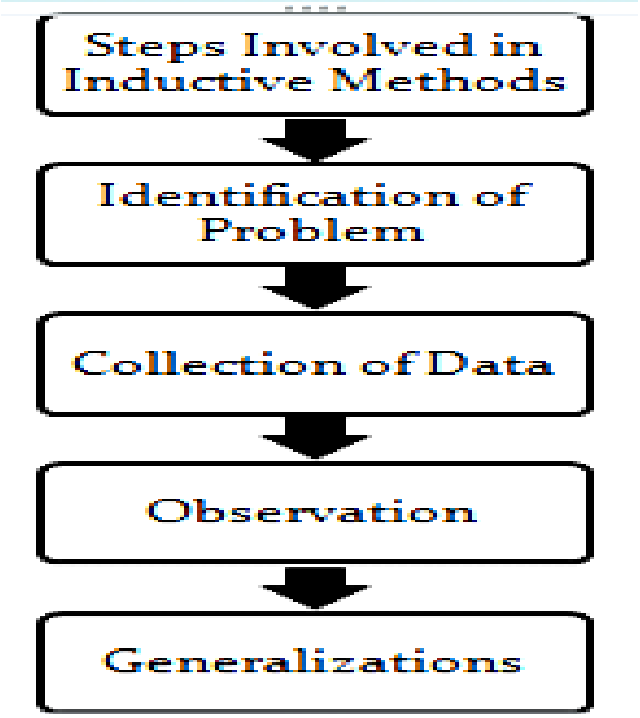

Figure 1.4

Merits of Inductive Method

Following are the merits of this method:

1) This method is considered as dynamic because in these changing economic phenomena can be analysed with proper experience, therefore, appropriate conclusions can be drawn which will be further useful to provide appropriate solutions to the economic problem.
2) As it is based on facts, so it is more realistic in nature.
3) This method is also useful in future enquiries.
4) Besides the above-mentioned merits, it is helpful for the government to formulate economic policies at the micro and macro level.

Demerits of Inductive Method

The demerits of inductive method are:

1) As compared to the deductive method, the implementation of this method is quite difficult. If a person is having adequate knowledge of statistical techniques, then he can use this method. It means vast knowledge of the investigator is needed in this method.
2) This method is very costly and time consuming.
3) To obtain precise results and make their use universal, the area of observation and experimentation must be broad, which is not the case with the inductive method.

From the above discussion, it can be said that these two methods are not contradictory to each however, to get appropriate results these two can be used as supplementary to each other. Economists use these methods singly or in combination when analysing problems, depending on the type of the problem to be analysed. As a result, inductive and deductive methods are equally important for economic analysis. Thus, a combination of both the methods will lead to true progress in economic enquiries.

Check Your Progress-II

Q.1 Scarcity is the mother of all economic problems. Discuss it.

Ans…

Q.1 Distinguish between Deductive and Inductive methods.

Ans…

1.7 Role of Assumptions in Economic Theory

In economic theory, however, the assumptions are always viewed negatively. But one cannot deny the role played by these assumptions. Let us discuss the numerous beneficial roles of these assumptions in economic theory:

1) Assumptions are a cost-effective way of describing or presenting an idea.
2) A number of people and a number of items are involved in economic analysis. Studying each and every man is a challenging task. So, after examining numerous types of men and various types of things, we form generalisations about the category as a whole. In our models, for example, we commonly state that only two items are produced. It does not imply that we

only produce two types of goods in the real world; rather, it means that we produce two types of goods such as capital goods or consumer goods. As a result, we can simplify our study by just establishing assumptions. As a result, we can conclude that assumptions result in simplification.

3) Assumptions are considered as a convenient way of stating the conditions under which the validity of a theory is tested.
4) Generally speaking, the real economic scene is not stable; it is changeable in nature. Because of this, we cannot make changes in our economic models so quickly which would make our analysis invalid. For example, in the theory of demand we take the example of „ceteris paribus" (i.e., other thing remaining the same). This would simplify our study, and its validity could be evaluated using the assumptions provided.
5) In economics, we are commonly using the assumption of rationality of an individual. It is important to mention here that different people have different tastes and preferences, their own peculiarities and their own biases. They cannot all be treated separately. To do so, we must assume that economics is concerned with the average man rather than a specific individual. Due to this, an individual is commonly assumed to be a rational being. As a result, by assuming an average and rational man, we eliminate the possibility of exceptions to the provided economic laws.

In economics, every law and generalisation are based upon some assumptions. The concern now is whether these assumptions should be realistic or not to formulate proper economic laws. According to one viewpoint, economic laws, if they are to be valid and useful, must be based upon assumptions which are realistic. As a result, drawing unrealistic assumptions and establishing laws on their basis, according to this viewpoint, will make the laws invalid. Prof. Milton Friedman, on the other hand, argues the same in his well-known paper, "The Methodology of Positive Economics". He claims that the predictions of positive economics must be checked with empirical evidence, even though the assumptions taken might be unrealistic. Assumptions, he claims, cannot be realistic since they are created solely to simplify the analysis.

1.8 Economic Models

A model is a simplistic version of a theory. In other words, a model is a part of theory that represents a cause and effect relationship in a specific economic phenomenon. Words, diagrams, and mathematical equations are often used to express these concepts. The terms model and theory are often used interchangeably since both are designed to describe the relationship

between variables. An economic model, on the other hand, is a formal statement of a theory, commonly represented as a series of equations or graphs. When economic models merely define a general relationship between variables without specifying the exact relationship, they are said to be "general." A general model of demand, for example, is one that states that as the price of a good increase, the quantity demanded decreases. Quantitative models are those that explain a quantitative relationship between variables. Models are created by economists to analyse and forecast economic events. Economists have developed mathematical methods to analyse and forecast the behaviour of an individual consumer, producer or the economy as a whole. A model is made up of several assumptions that are used to draw conclusions or consequences.

There are two points to keep in mind about the analytical economic model. Firstly, a model should always abstract from reality. Secondly, an empirical economic model is made up of a collection of equations or graphs that depict the cause-and-effect relationship. Figure 1.5 shows these two important attributes of the economic model.

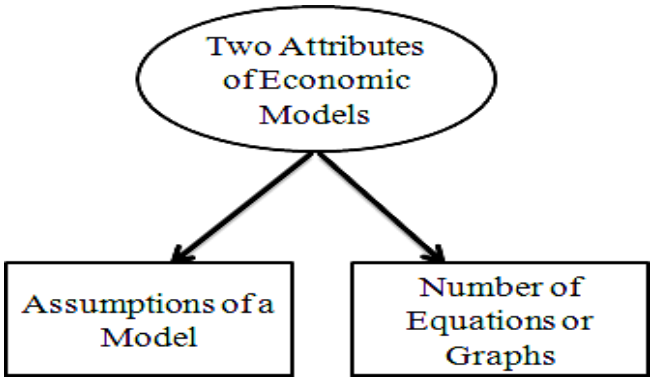

Figure1.5 Attributes of Economic Models

A. Assumptions of a Model: An economic model is often dependent on certain assumptions that do not accurately represent real-world economic conditions. While the assumptions used to construct a model must be related to the type of situation being analysed and explained, they do not have to be an exact replica of the real-world situation. Only the most important aspects of the modern economic world are represented in a model. In reality, the real world is so dynamic that understanding it necessitates abstraction and simplification. To bring out any useful and practical features of reality, one must abstract from it to some extent. However, in several respects, a model is not a total abstraction from reality in order to concentrate certain aspects of reality that are important and useful for understanding the behaviour of an economic unit, consumer or producer.

However, caution should be taken in this respect. We should avoid oversimplifying so that the model we build does not provide a skewed representation of the real-world phenomena. As a result, economic models should be built in such a manner that only irrelevant and insignificant considerations and factors are ignored

B. Equations or Graphs and Economic Models: An economic model is usually made of a series of equations or graphs that express the relationship between variables related to the problem under investigation. Each equation tries to explain the behaviour of a single variable, attempting to create a cause and effect relationship for that variable.

A key question now is why economists are interested in developing models. Economic models are created for the purpose of analysis and prediction. Analysis implies how adequately we can explain the behaviour of an economic unit, consumers or producers. Prediction, on the other hand, refers to a model's ability to predict the effects of changes in some magnitudes in the economy. A model's usefulness may be determined by its explanatory or predictive power, the realism of its assumptions or the scope of its applicability. The most critical attribute of a model, according to Milton Friedman, is its predictive ability or how well it can forecast the behaviour of an economic unit. The critical characteristics of a valid and satisfactory model, according to Paul Samuelson, are realism of assumptions and analytical power of the model to describe the behaviour of economic agents, consumers or producers.

It should be remembered that economists generally believe that the most important attribute of a model is its purpose, that is, whether the model maker wishes to use it to forecast the effect of a change in a variable or to analyse and describe the particular behaviour of an economic agent.

Check Your Progress-III

Q.1 What are economic models? Why do economists build economic models?

Ans .....

Q.2 Write a note on the importance of assumptions in economic analysis?

Ans .....

1.9 Summary

In this unit, we have learned that economic theory is concerned with the laws and principles that regulate the operation of an economy and its numerous components. The existence of an economy is based on two fundamental facts. To begin with, human desires for goods and services are unlimited and productive resources with which to produce those desires are limited. Therefore, an economist must decide how to best allocate a few resources in order to maximise the satisfaction of the members of society. There are two major branches of economics that are micro economics and macro economics. Micro economics deals with an individual unit of the economy, whereas macro economics deals with economy as a whole. It considers two aspects i.e., positive science and normative science. Positive science is a systematic knowledge relating to criteria of what it is and normative science is a systematised knowledge relating to criteria of what ought to be. Economics also consider two methods of methodology, i.e. inductive method and deductive method. Inductive method is a system of reasoning from general conclusion to specific results and deductive method is a way of reasoning from specific facts to general conclusions.

1.10 Questions for Practice

A. Short Answer Type Questions

Q1. What do you mean by economics?

Q2. Discuss the problems of allocation of resources?

Q3. Discuss the problems of choice of techniques?

Q4. Discuss the nature and scope of economics.

Q5. Distinguish between positive and normative economics.

Q6. Explain deductive methods.

Q7. Write a note on inductive methods?

Q8. Explain the role of assumptions in economic theory

B. Long Answer Type Questions

Q1. Define economics. Explain in detail the nature and scope of economics.

Q2. Discuss the five fundamental problems of any economy.

Q3. Explain inductive and deductive methods in economics. Also mention their merits and demerits.

1.11 Suggested Readings

- H. L. Ahuja, Principles of Microeconomics, S. Chand & Company Ltd. New Delhi
- D.N. Diwedi, Microeconomics, Theory and Application, Vikas Publishing House, New Delhi.
- Gregory, N. M, Principles of Microeconomics, second edition.
- Perloff, J. M, Microeconomics, Theory and Application with Calculus, Pearson Addison Wesley.
- Koutsoyiannis, A, Modern Microeconomics, The Macmillan Press Ltd.

BACHELOR OF COMMERCE (Hons.)

SEMESTER –IV

COURSE: BUSINESS ECONOMICS

UNIT 2: THEORY OF DEMAND AND ELASTICITY OF DEMAND

STRUCTURE

2.1 Learning Objectives

After completion of this, learner will be able to:

- Describe the consumer‟s behaviour towards a particular commodity
- Identify factors determining demand for a commodity
- Interpret the shifts in demand curve and movement among demand curve
- Discuss the concepts of elasticity of demand
- Explain the measurements of price elasticity of demand

2.1 Introduction

Demand is considered as the basis of all productive activities. For the determination of a firm‟s profitability demand plays a pivotal role. Therefore, estimates of future demand for a product is essential for planning production activity, its expansion and for marketing the product. Besides this, in this unit we will also study how much or to what extent the quantity demanded of a good will change in response to a change in its price. Individuals have a long list of wants. We need goods and services to fulfill these wants. This need makes us desire certain goods. In economics, however, mere desire for a product does not constitute demand. For instance, a man standing in front of a candy store may have a strong desire for the various flavors on display. However, if this man has money in his wallet and is willing to spend it on these candies, then his desire becomes demand. It is important to mention here that desire becomes demand when it is backed by the ability and willingness to pay for the things we want. A commodity is demanded because of the utility it possesses and it is paid for because it is in short supply.

2.2 Meaning of Demand

The demand for a good is the amount of it that a consumer can purchase at various given prices during a period of time. In economics, demand plays a vital role. Consumers‟ demand for goods and services is the driving force behind all economic activities. Producers tend to invest in production lines where demand for the output is not only high but also consistent so that they will make more profit.

According to Ferguson, "*Demand refers to the quantities of a commodity that the consumers are able and willing to buy at each possible price during a given period of time, other things being equal.*" According to Schiller, "*Demand is the ability and willingness to buy specific quantity of a good at alternative prices in a given time period, ceteris paribus*."

In the context of Utility and Demand, goods are in demand because they satisfy people's wants. The amount of satisfaction derived by an individual from consuming a good is referred to as utility. It means the want-satisfying power of a commodity is called utility. The utility of a good is an essential determinant of a consumer's demand for it.A person's desire for a commodity is determined by the utility he intends to derive from it. Therefore, greater the expected utility derived from a commodity, greater the desire for it. Alcohol and cigarettes, for example, can be harmful to people, but they serve a purpose for those whose wants they satisfy.

Next, it is important to distinguish between the demand for a commodity and the quantity demanded. Demand refers to the quantities of a commodity that consumers plan to purchase at different prices of a commodity during a period of time whereas quantity demanded refers to the amount of a good or service that consumers plan to buy at a specific price. It should be carefully noted here that quantity demanded is not always the amount actually purchased by consumers. The quantity demanded is often greater than the quantity of the goods available, as a result, the quantity of the good actually purchased is less than the quantity demanded of it.

It is worth mentioning that demand for a good is determined by a number of factors like tastes and preferences of the consumer for a commodity, income of the consumer and the prices of related goods, etc. If change occurred in any of the above-mentioned factors, then demand of the consumer for a good will change.

2.3 Demand Function

The demand function for a commodity describes the relationship between the quantity demanded of that commodity and the factors that affect it. Individual demand for a commodity is determined by its price, his income, the prices of related goods, his tastes and preferences and the amount of advertising expenditure made by the producer on that commodity. Thus, individual demand function for a commodity can be expressed as:

$Q_d = f(P_x, Y, P_r, T, A)$

Here, P_x= Own price of the commodity X

Y = Income of the consumer

P_r= Prices of related commodities

T = Tastes and preferences of the individual consumer

A= Advertising expenditure made by the producers on that commodity.

For several purposes in economics, it is useful to concentrate on the relationship between the

quantity demanded of a commodity and its own price while keeping other factors such as the consumer's income, the prices of other commodities and his tastes and preferences. With this, we can write an individual's demand function as follows.

$Q_d = f(P_x)$

This means that the quantity demanded for a good X is a function of its own price, when all other determinants are held constant. Therefore, there is an inverse relationship between price and quantity demanded of a commodity.

2.3.1 Demand Schedule

A demand schedule shows the various amounts of a good that a buyer is willing to purchase at various possible prices of that good at a given time. It can be studied as:

A. Individual Demand Schedule

B. Market Demand Schedule

A. Individual Demand Schedule: An individual demand schedule is a table that shows the quantities of a given commodity that an individual consumer can purchase at all possible prices at a given time. The demand schedule of an individual consumer can be explained with the help of a table.

It will be seen from this demand schedule that as the price of a commodity rises, its quantity demanded will decline. When the price of a commodity is Rs. 10, the consumer purchases 50 units of the commodity and when price goes up to Rs. 50, the consumer has reduced the quantity demanded of the product i.e., 10 units.

Table 1 Individual Demand Schedule

Price (Rs.)	Quantity Demanded (Units)
10	50
20	40
30	30
40	20
50	10

B. Market Demand Schedule: For the determination of price of a commodity the information related to the size of total market demand for the commodity is very essential. Besides the factors which are affecting an individual's demand (price of a

product, his income, prices of related commodities, and individual's taste and preferences), market demand for a commodity depends on an additional factor i.e., the number of consumers. However, the number of consumers depends on the population of a region or city who consume that commodity. Thus, in every market there are a number of consumers of a commodity. The schedule which shows the quantity demanded by all the consumers of a commodity collectively at its different prices is called market demand schedule. Market demand schedule defined byLiebhafsky as,*"Market demand schedule is defined as the quantities of a given commodity which all consumers will buy at all possible prices at a given moment of time."*

The market demand schedule of oranges can be shown with the help of a table 2. It describes that the market demand can be obtained by adding together the amounts of the commodity which individual consumers wish to buy at each price. Suppose, there are three consumers of a commodity in the market. Thus, at price Rs.5, individual A wishes to buy 100 units; individual B wishes to buy 75 units; individual C wishes to buy 25 units of the oranges. The total quantity of the oranges that the three individuals plan to buy at price Rs. 5 is therefore 100 + 75+25 = 200. Now as the price decreased to Rs. 1, individual A wishes to buy 800 units; individual B wishes to buy 450 units; and individual C wishes to buy 250 units of the oranges. Thus, the total quantity of the oranges that the three individuals plan to buy at price Rs. 1 is therefore 800+450+250 =1500. Thus, market demand of a commodity is the total demand of all the individuals towards a particular commodity.

Table 2 Market Demand Schedule of Oranges

Price(Rs.)	**Demand of A**	**Demand of B**	**Demand of C**	**Market Demand (Units) A+B+C**
5	100	75	25	200
4	200	150	50	400
3	400	200	100	700
2	550	300	150	1,000
1	800	450	250	1,500

2.3.2 Demand Curve

A demand curve is a graph that shows the relationship between various quantities demanded at various possible prices for a commodity. According to Leftwitch, *"The demand curve represents the maximum quantities per unit of time that consumers will take at various prices"*. Like demand schedule, demand curve also has two aspects: Individual Demand CurveandMarket Demand Curve

A. **Individual Demand Curve:** An individual demand curve shows various quantities of a good demanded by an individual consumer at different prices. The individual demand schedule can be shown with the help of a figure. In figure 1, on X-axis quantity demanded and on Y-axis, the price has been shown. DD is the demand curve.

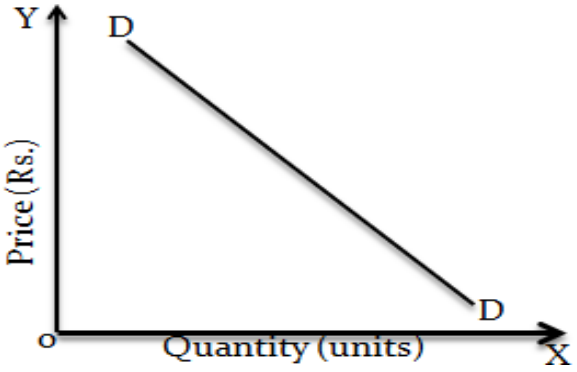

Figure 1

Each point on this demand curve shows the relationship between price and demand. The slope of the demand curve is downward sloping from left to right, which shows an inverse relationship between price and quantity demanded of the commodity.

B. **Market Demand Curve:** Market demand curve for the good can be obtained by joining all the points showing the amounts demanded of the good by all the individuals at various prices. If we assume that there are three individuals in the market for a good. Then the market demand curve can be a horizontal summation of demand curves of these three consumers. The market demand curve also slopes downward to the right. It is worth noting that when the price of a commodity falls, new consumers are more likely to join the market and will further increase the quantity demanded of the commodity.

The market demand curve can be shown with the help of a figure. In Fig. 2, quantity demanded of oranges has been shown on X-axis and price on Y-axis. Since the market demand curve is the horizontal summation of individual demand curves, italso slopes downwards.

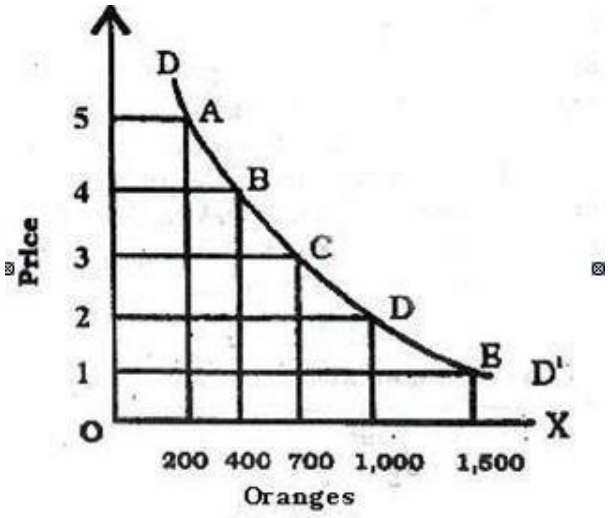

Figure 2

Check Your Progress-I

Q.1 What is the meaning of term demand in economic? How it is different from desire and quantity demanded of a commodity?

Ans: .....

.....

Q2. Define Demand Function.

Ans. .....

.....

2.4 The Law of Demand

The law of demand is the most important law of economics theory which provides important information about demand. The functional relationship between price and quantity demanded is expressed by this law of demand. According to the law of demand, other things being equal, if the price of a good falls, the quantity demanded of it will increase, and if the price of the commodity increases, its quantity demanded will decrease.As a result, the law of demand states that there is an inverse relationship between price and quantity demanded, all other things being equal. Other things that are assumed to be constant are the income of the consumer, tastes and preferences of the consumer and the prices of related goods. If any change occurred in above mentioned factors, then the inverse relationship between price and quantity demand may not hold good. The following demand function can be used to illustrate the law of demand:

$$D_x = f(P_x, P_r, Y, T, E)$$

Here, D_x= Demand for commodity-X, P_x= Own price of commodity-X,

P = Price of related commodities, Y= Income of the consumer,

T =Tastes and preferences of the consumers and E = Expectation of the consumer.

According to Prof. Samuelson, *"Law of demand states that people will buy more at lower prices and buy less at higher prices, ceteris paribus, or other things remaining the same."*According to Prof. Marshall, *"The law of demand states that the amount demanded increases with a fall in price and diminishes when price increases, other things being equal."*

2.4.1 Assumptions of Law of Demand

Law of demand holds good when "other things remain the same". It means factors influencing demand, other than the own price of the commodity are assumed to be constant.

1) No change in the price of related goods.
2) No change in the income of the consumer.
3) No change in the tastes and preferences of consumers.
4) The consumer does not expect any change in the price of the commodity in the near future.

According to the law of demand, there is an inverse relationship between a commodity's own price and its demand; however, this relationship is not proportional. It is important to note here that the law of demand

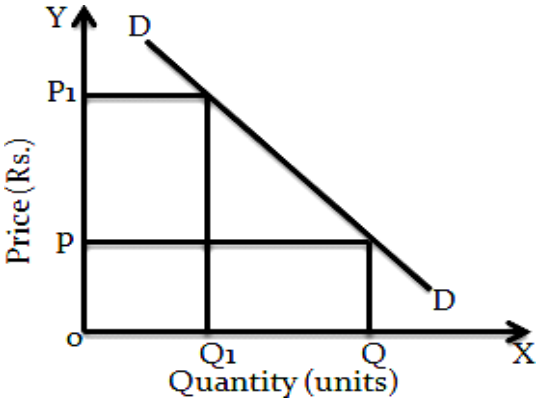

Figure 3

indicates only the direction of change in demand as a result of change in its own price. Inverse relationship between price and demand can be seen in the figure no. 3.

It is evident from the figure that on X-axis quantity demanded and on Y-axis price of the commodity has been taken. DD is the demand curve, which shows that there is an inverse relationship between price and demand. When the price of the commodity is OP, quantity demanded of the commodity is OQ. Now, as the price increased to OP1, quantity demanded has reduced to OQ1.

2.4.2 Why Does Demand Curve Slope Downward

The law of demand shows an inverse relationship between price and demand of a commodity. It means when own price of the good decreases its quantity demand will increase and when it increases its demand will decrease. Following are the reasons for this:

A. **Law of Diminishing Marginal Utility:** Every commodity which is demanded by the consumer has utility. As the consumer consumes additional units of it, in a given time, the utility derived from each successive unit diminishes. We can say that the law of diminishing marginal utility applicable to his consumption. This Law states that marginal utility of any good diminishes as more and more of that commodity is purchased by the consumer. Therefore, a consumer will purchase more of a commodity when he has to pay fewer prices for it. According to the law of diminishing marginal utility, the consumer will stop his purchase at that point where the marginal utility of the commodity is equal to the price paid for it.

B. **Income Effect:** When the price of a commodity declines, the people who have used this commodity before will demand more units of that commodity because the price has fallen. With the fall in the price of a commodity there is an increase in the consumer‟s real income therefore, the consumer will demand more of that commodity. Real income is called the purchasing power of money income. In other words, money's purchasing power has increased, which allows consumers to purchase more of the same commodity for the same amount of money they previously spent.

C. **Substitution Effect:** When the price of a commodity decreases, it means that it has become less expensive in comparison to other commodities. In comparison to alternatives whose prices have not dropped, this decrease in price makes it more appealing. As a result, people substitute it for other things. For instance, tea and coffee are substitutes for each other. If the price of tea increased, the consumers may substitute coffee for tea, although the price of coffee remains the same. Thus, demand for tea declined as it is becoming more expensive because of a rise in its price. On the other hand, if the price of tea decreases, the consumer will substitute tea for coffee as it is becoming less expensive.

Therefore, the demand for tea increased.

The substitution effect is the stronger out of the two effects because the buyer will often substitute the cheaper for the more expensive commodity. Furthermore, although the substitution effect is always positive, the income effect may be positive in some cases and negative in others. For example, the income effect is negative when the commodity is inferior. However, since a consumer spends only a small percentage of his income on a single commodity, the income effect is usually negligible, whereas the substitution effect is always so strong that the net result is positive.

2.4.3 Exceptions to the Law of Demand

It is generally believed that the law of demand is valid in most circumstances. The law of demand does, however, have several exceptions. It means that the market for certain goods grows when the price rises and contracts when the price falls. In the case of such goods, the demand curve slopes upwards from left to right.

1) When people expect that the price of a good will increase in the future, they will buy more of it, even at a higher price, in order to avoid a future price increase. This type of situation can be seen during wartime, particularly in case of basic necessities.
2) The Veblen Effect is a term used to describe a phenomenon that occurs with the name of the economist Thorstein Veblen, who proposed the theory of conspicuous consumption, is synonymous with one exception to the law of demand. According to Veblen, some consumers determine the utility of a commodity solely based on its price, i.e., the higher the price, the higher the utility. For example, the market demands for goods like diamond and jewellery, which are symbols of social status and confer a distinction on the holder, do not follow this rule. Since such goods are in high demand due to their high price, demand for them rises as their price rises.
3) Giffen goods (named after Sir Robert Giffen, a nineteenth-century economist) are inferior goods whose demand falls even though their price falls, defying the law of demand. For instance, poorer sections of society cannot afford to buy superior varieties of foodgrains such as wheat and they are forced to purchase the inferior varieties like maize. Therefore, when the price of maize falls, their real income rises. As a result, they don't buy as much maize as the law of demand will require. Rather, they will continue to demand superior varieties, such as wheat, to replace maize.
4) When something goes out of fashion, demand for it does not increase, even though the price decreases. In the opposite case, as a product's popularity grows, people will buy

more of it, even though its price rises. The rule of demand is broken in each of these situations.

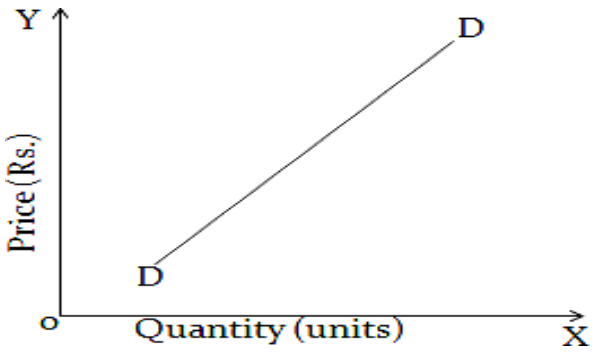

Figure 4

However, these exceptions do not invalidate the law of demand, which applies to the number of goods sold in the market. Though certain individuals do not behave in accordance with this law in some circumstances, it is noteworthy here that the law of demand operates in general.

2.5 Factors Determining Demand

Although stating the law of demand, we now come to the 'other things' that are assumed to remain constant. As a result, it is not necessary that only price will bring change in demand for a commodity. Changes in other factors, as discussed below, may have the same effect:

1) **Price of a Commodity:** The price of the commodity is the most important factor influencing the quantity demanded of that commodity. Normally, a rise in price is followed by a decrease in demand, and a decrease in price is followed by an increase in demand. The law of demand describes the functional relationship between price and demand.
2) **Change in Income:** This shift has a significant impact on demand because when a consumer's income rises, so does his willingness to pay and he can buy more goods than before. Changes in the distribution of income in favour of the poorer sections of the society increase their purchasing power, and their demand for commodities in general, and for necessities of life in particular, is bound to rise as a result.
3) **Change in Tastes and Fashion:** Demand is also affected by changes in tastes and fashions. The growing popularity of cotton clothing has decreased demand for synthetics. Tea's popularity has dwindled as coffee has grown in popularity.
4) **Change in Size and Composition of Population:** Increases in a country's population have a significant impact on demand because the greater the amount of mouths to feed,

the greater the quantity of a commodity required. Not only the size of demand, but also the composition of demand, is influenced by the population's age structure.

5) **Prices of Substitutes:** A commodity's demand is often influenced by the availability and price of substitutes. People would use a substitute for a good that is available at a lower price if the price of the former rises. This would decrease demand for the former commodity while increasing demand for the substitute. For instance, people will start drinking coffee if the price of tea increases the demand for coffee. A decrease in the price of tea, on the other hand, may reduce coffee demand.
6) **Technical Progress:** Technical advancement allows for the production of a wider range of products, which reduces the demand for out-of-date products. The invention of television, for example, lowered the demand for radios.
7) **Expectation about Future Price:** If there is a general feeling among people that prices in future will go up, there will be a greater demand for goods and everyone will buy more than his normal requirement. If prices in future are expected to go down, people will try to postpone their purchases and wait for the fall in prices. This will reduce the present demand for goods to a considerable extent.
8) **Change in Season:** The demand for some goods can fluctuate as the season changes. In the winter, for example, demand for woolen clothes increases. Similarly, during the summer, cold beverages are in high demand.

Check Your Progress -II

Q.1 Why the demand curve is downward sloping?

Ans ----------

Q.2 What are the factors which are determining the demand for a commodity?

Ans .....

2.6 Movement along a Demand Curve and Shifts in Demand Curve

A. Movement along a Demand Curve Extension and contraction in demand of a commodity is caused by change in its own price

(i) Extension of Demand: The term "extension of demand" refers to an increase in quantity demanded as a result of a decrease in the commodity's own price when all other factors remain constant. Extension in demand can be explained with the help of a figure no 5. It is evident from the figure that when price is OP_1 demand is OQ_1. Now a

decline in price from OP_1 to OP will lead to an increase in quantity demanded from OQ_1 to OQ. This is called extension in demand.

(ii) Contraction of Demand: Contraction of demand refers to a decrease in quantity demanded as a result of an increase in the commodity's own price when all other factors remain constant. In figure 5when price is OP, quantity demanded of the commodity is OQ. Now there is an increase in price from OP to OP_1, as a result, quantity demanded of the commodity will decrease from OQ to OQ_1. This is known as contraction in demand.

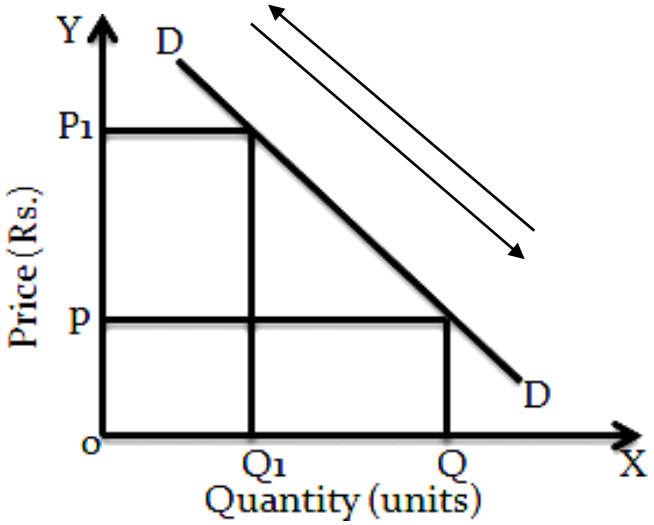

Figure 5

As we studied that demand of a commodity depends upon its price and some other factors like prices of related commodities, consumer's income and their tastes and preferences etc. When demand increases due to fall in price or decreases due to rise in price, this is called extension and contraction of demand respectively. There is a shift in the entire demand curve as demand changes due to factors other than price.

B. Shifts in Demand Curve

(i) Increase in Demand: The demand for a commodity is influenced by the consumers' incomes, as well as their tastes and preferences for the commodity. As a result, any change in these variables would result in a shift in the demand curve. For illustration, if consumers' incomes rise as a result of increase in wages and salaries, they would demand more of a good at each price. A rise in demand means that more of a good is being demanded at the same price, or the same quantity of the good is being demanded at a higher price. We are now on a new demand curve that is to the right of the old demand curve.

Causes of Increase in Demand

Following are the reasons for the same:

a. When the income of the consumer increases.
b. When the price of substitute goods rises.
c. When the price of the complementary goods decreases.
d. When tastes and preferences of the consumers shift in favor of the commodity.
e. Expectation of rise in price in the near future.
f. Increase in population.

(ii) Decrease in Demand: If the factors influencing demand change in a negative way, demand will fall, causing a shift in the demand curve to the left. For instance, if consumers‟ income declines as a result of increase in taxes, they would demand less of a commodity. A reduction in demand means that less units of a good are demanded at the same price, while more units are demanded at a lower price. We're on a new demand curve that's to the left of the old demand curve.

Causes of Decrease in Demand

Due to the following reasons the demand decreases or demand curve shifts backward

a. When the income of the consumer declines.
b. When the price of the substitute goods decreases.
c. When the price of complementary goods rises.
d. When tastes and preferences of the consumers shift against the commodity. It may be due to change in fashion or change in climate.
e. Expectation of fall in price in the near future.
f. Decrease in population.

Increase in demand and decrease in demand can be shown with the help of a figure. It will be seen from the figure 6 that at price OP, OQ quantity of a good is demanded. Curve D_1D_1 indicates an increase in demand because at the same price quantity demanded has increased from OQ to OQ_1. Curve D_2D_2 indicates decrease in demand because at the same price quantity demanded of the commodity has decreased from OQ to OQ_2.

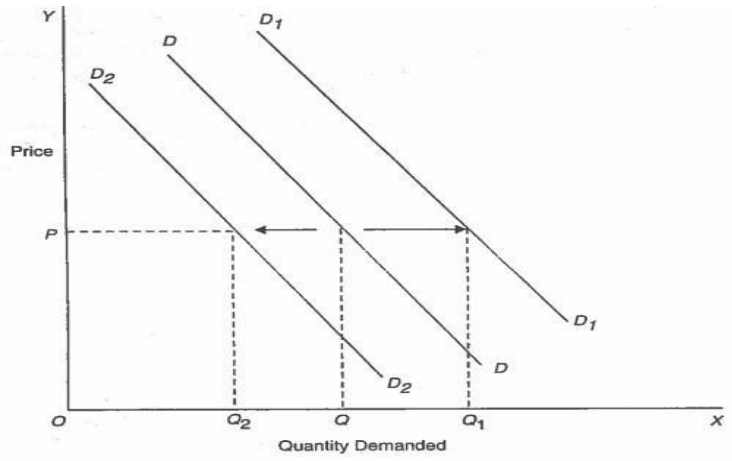

Figure 6

2.7 Elasticity of Demand

In the preceding pages, we have studied that when the price of a good falls, the quantity demanded rises and when the price rises, the quantity demanded decreases. This is referred to as the law of demand. Only the direction of change in quantity demanded of a product in response to a change in its price is indicated by this law of demand. Therefore, this law does not tell us by how much or to what extent the quantity demanded of a good will change in response to a change in its price. This information as to how much or to what extent the quantity demanded of a good will change as a result of a change in its price is provided by the concept of price elasticity of demand.

J.S. Mill and Cournot were the early economists who referred to elasticity of demand in economics. But this concept was developed by Dr. Marshall in his famous book "Principles of Economics". Elasticity of demand refers to the degree of responsiveness of quantity demanded of a commodity to a change in its price.There are three concepts of elasticity of demand: price elasticity, cross elasticity and income elasticity. The degree of responsiveness of the quantity demanded of a commodity to a change in its price is referred to as price elasticity of demand. The degree of responsiveness of a good's demand to a shift in the price of a related good, which may be a replacement or complementary to it, is referred to as cross elasticity of demand. The sensitivity of quantity demanded of a commodity to a shift in consumers' income is referred to as income elasticity of demand.

2.7.1 Types of Elasticity

There are three concepts of elasticity i.e., income elasticity, cross elasticity and price elasticity.

1. Income Elasticity of Demand

When all other factors remain constant, such as the price of the given commodity, the prices of related goods and the consumer's taste etc. the percentage change in the quantity demanded of a thing caused by a given percentage change in the consumer's income is referred to as income elasticity of demand. According to Watson, *"Income elasticity of demand means the ratio of the percentage change in the quantity demanded to the percentage change in income."*

Income elasticity can be measured by the following formula:

$$Ey = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

Income elasticity varies in accordance with the nature of commodities. The income elasticity is positive for all normal goods, because with increase in income of the consumer, his demand for normal goods will increase. On the other hand, income elasticity is negative for inferior goods or Giffen goods. In the case of inferior goods, when income of the consumer will increase then quantity demanded of these goods will decline and when income of the consumer will decrease then quantity demanded of these goods will increase.

Importance of Income Elasticity of Demand

A. **Helpful in Business Decision Making:** It is useful for both business firms and industries in making decisions. If a company's product has high income elasticity, it has a lot of potential to develop in a growing economy. It is worth noting that the market for luxuries is extremely income elastic. As a result, demand for luxuries fluctuates greatly in different phases of business cycles. Therefore, demand for luxuries increases more during boom periods and declines sharply during recessionary periods.
B. **Helpful in Designing Marketing Strategies of a Firm:** It is also useful in designing marketing strategies of the firms. We learned in demand concepts that a person's income is a significant determinant of a product's demand; as a result, firms that produce goods with high income elasticity of demand try to locate their sales outlets in cities or regions where people's income is rapidly growing.
C. **Helpful to Understand the Plight of Farmers:** This concept is very useful to

demonstrate why farmers' income will not increase in the same way as the income of urban people who are working in manufacturing industries. The major cause behind this is that the income elasticity of demand for agricultural products such as food grains is less than one; as a result, it is very difficult that farmers' income from agriculture will increase in proportion to the growing national income.

2. Cross Elasticity of Demand

Changes in price and quantity demanded of two related goods have a mutual relationship. Therefore, when the price of one good change the demand for the related good will also change. For instance, tea and coffee are two related goods. Thus, when the price of tea changes the demand for coffee will also change.

In simple words, cross elasticity of demand is a measure of change in quantity demanded of good-Y, as a result of change in the price of good-X. According to Ferguson, "The cross elasticity of demand is the proportional change in the quantity of good-X demanded resulting from a given relative change in the price of the related good-Y."

It can be measured as:

$$Ec = \frac{\text{Percentage change in quantity demanded of good}-X}{\text{Percentage change in the price of good}-Y}$$

It is important to note here that when two goods are substitutes for each other, cross-elasticity of demand among them is positive like tea and coffee. Because increase in the price of tea, increases the demand for coffee. However, the cross-elasticity of demand for complementary goods like bread and butter is negative, because increase in the price of one decreases the demand of another.

Importance of Cross Elasticity of Demand

A. **For Formulating Price Strategy:** This concept is crucial in managerial decision-making when it comes to developing a proper pricing strategy. Multiproduct firms often use this method to measure the impact of a change in one product's price on demand for other products.
B. **For Defining the Boundaries of an Industry**: It can also be used to define an industry's boundaries and measure interrelationships between industries. It is worth noting that, due

to the interdependence of firms and industries between which cross price-elasticity of demand is positive and strong; no one can increase the price of their product without losing sales to other firms in similar industries.

3. Price Elasticity of Demand

Price elasticity of demand indicates the degree of responsiveness of quantity demanded of a commodity to the change in its price, other factors such as consumers' income, prices of related commodities that determine demand are held constant. It is defined as the ratio of the percentage change in quantity demanded of a commodity to a given percentage change in price. It is expressed by minus (-) sign like:

$$e_d = (-)\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

For example, 5 per cent fall in price of a commodity will lead to 10 per cent increase in demand then elasticity of demand will be

$$e_d = (-)\frac{10\%}{-5\%} = (-) - 2 = 2$$

It is important to mention here that fall in price is indicated by minus (-) sign and due to multiplication, the negative signs turned to be positive.

According to Prof. Marshall, *"Elasticity of demand may be defined as the percentage change in the quantity demanded divided by the percentage change in the price."* According toA.L. Meyers, *"The elasticity of demand is a measure of the relative change in amount purchased in response to a relative change in price.*

2.7.2 Degrees of Price Elasticity of Demand

When it comes to the change in quantity demanded as a result of change in price, goods differ. In certain cases, this response is insignificant, while in others, it is considerable. As a result, demand elasticity ranges from 0 to infinity. However, the five most well-known categories are mentioned below.

1. **Perfectly Elastic Demand Curve:** The demand for a commodity is said to be perfectly elastic, if at the same price, buyers can purchase as much as they can, while at a slightly higher price, they will buy none at all. It means demand is infinite at the prevailing price. The demand curve in this case is parallel to the X-axis as shown in figure.7

Figure 7

2. **Perfectly Inelastic Demand**: The quantity demanded is said to be perfectly inelastic when a significant increase or decrease in price is not accompanied by any change in the quantity demanded. The demand for insulin by the diabetic patient is the perfect example of perfectly inelastic demand. As shown in fig. no. 8, the demand curve in this case is a vertical straight line parallel to the Y-axis. Elasticity of demand in this case is zero.

Figure 8

3. **Unitary Elastic Demand:** The elasticity of demand is said to be equal to unity when the percentage change in quantity demanded equals the percentage change in price. The elasticity of demand is equal to unity if the price of a good doubles and the quantity demanded is reduced to half of what it was previously demanded. Elasticity of demand in this case is one. This is depicted in figure 9.

Figure 9

4. **Greater than Unitary Elastic Demand:** The elasticity of demand is greater than one when the percentage change in quantity demanded is greater than the percentage change in price. It is important to note that when change in quantity demanded is more in response to change in own price of the commodity then total expenditure on the commodity increases and vice-versa. For example, in the case of color televisions and air conditioners a significant increase in demand has been seen in response to a modest price reduction. This is depicted in figure 10.

Figure 10

5. **Less than Unitary Elastic Demand**: The elasticity of demand is less than unity when the percentage change in quantity demanded is less than the percentage change in price. This case is prevalent in the majority of necessities of life, such as salt, wheat, rice and sugar. In this case total expenditure on the commodity decreases when price falls and increases when price increases. This is depicted in figure 11.

Figure 11

Check Your Progress -III

Q.1 Explain in detail the increase in demand and decrease in demand.

Ans

Q.2 What is meant by price elasticity of demand? What are different degrees of elasticity of demand?

Ans

2.7.3 Measurement of Price Elasticity of Demand

Elasticity of demand can be measured in various ways. The following commonly used methods are:

Figure 12

1. Total Outlay or Total Expenditure Method

Marshall first mentioned this method in his book "Principles of Economics." According to Marshall, if a decrease in price results in an increase in total outlay and increase in price results in a decrease in total outlay the elasticity of demand is more than unity. On the other hand, due to fall or rise in price, if the total outlay remains constant then the elasticity of demand is equal to unity. Apart from that, if a rise in price results in increased outlay and a fall in price results in decreased outlay, the elasticity of demand is less than unity. Note that, under this method we measure elasticity of demand by examining the change in total outlay due to change in price.

The relationship between price elasticity and total expenditure can also be explained with the help of the following table.

Table 3 Relationship between Price Elasticity and Total Expenditure

Price Change	Elasticity greater than one ($E_d > 1$)	Elasticity less than one ($E_d < 1$)	Elasticity equal to one ($E_d = 1$)
Price falls	TE increases	TE decreases	No change in TE
Price rises	TE decreases	TE increases	No change in TE

We can understand the above mentioned relationship with the help of the following figure. Consider Figure. 13. In this, total outlay is shown on X-axis and price on Y-axis. At OP price, the total outlay is PM, when price falls from OP to OP^1 the total outlay increases from PM to P_1M_1, and elasticity of demand is more than unity. When the price decreases from OP^1 and

OP^2 total outlay is P^2M^2 which is the same as P^1M^1. Therefore, elasticity of demand is equal to unity. Similarly, when the price of a commodity decreases from OP^2 to OP^3 total outlay decreases from P^2M^2 to P_3M_3. In this case, the elasticity of demand is less than unity.

Figure 13

2. Percentage Method

This is the second method for calculating elasticity. According to this method elasticity of demand is calculated as the proportional change in quantity demanded divided by the proportional change in price. According to Prof. Marshall, if a given percentage fall or rise in price results in an equal percentage rise or fall in the quantity demanded, the elasticity of demand is equal to unity or in other words, if 5% falls or rise in price results to 5 % rise or fall in the quantity demanded, elasticity of demand is equal to unity. As a result, elasticity is defined as the proportion of a change in quantity demanded to a change in price paid.

$e_d =$

$$\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

3. Point Method

We are occasionally interested in measuring elasticity of demand at a particular point since the degree of elasticity of demand can vary on different parts of a demand curve.

Figure 14

Figure 14 illustrates how to calculate elasticity of demand at a particular point on a demand curve. If P is any point on a demand curve DD. At P, a tangent is drawn to this curve, which touches the X-axis at A and Y-axis at B. The ratio PA/PB represents the elasticity of demand at P. Because PA is longer than PB, the demand elasticity at P is greater than one. The following formula is used to calculate demand elasticity at a given point:

$e_d =$

$$\frac{\text{Lower Segment}}{\text{Upper Segment}}$$

It is worth mentioning here that if there is an infinitely small change in price and quantity demanded, the percentage method to calculate demand elasticity at a given point on the demand curve can be used; however, if the changes are considerable, this formula will be of

little use.

4. Arc Elasticity Method

When using the percentage method to determine price elasticity of demand, we must decide whether to use the initial price as the base for calculating percent change in price or the initial quantity as the base for calculating percent change in quantity demanded in response to a given percent change in price. To avoid this difficulty, we calculate the percentage change in price or quantity demanded using the arc elasticity approach, which uses the midpoint of the initial and final price and quantity demanded respectively as the base. Thus, arc elasticity is the measurement of elasticity between two points on a demand curve. According to Watson, "Arc elasticity is the elasticity at the mid-point of an arc of a demand curve."

The portion of the demand curve DD shown in figure 15 between two points A and C is known as Arc. It will be seen from the figure that when price is OP, quantity demanded is OQ. When price falls to OP_1, quantity demanded will be OQ_1.

Figure 15

It should be emphasized that this method of measuring price elasticity of demand must be used for large price changes.

2.7.4 Factors Affecting Elasticity of Demand

We have studied from the above discussion that elasticity of demand is different for different goods. This is due to the following factors:

1. In general, demand for necessities of life (such as food, clothing, salt, kerosene and oil etc.) are inelastic, whereas demand for luxury products is elastic. This is due to the fact that the consumption of a certain minimum of these necessities is required for human survival. No one can live without these items, no matter how expensive they are. However, if the price of luxuries rises over a certain level, demand for them may be reduced. A necessity does not always imply a life-or-death situation. When a person becomes habituated to consuming a certain item, it becomes an indispensable part of his consumption pattern, and his demand for it becomes inelastic. For an addict, the elasticity of demand for alcohol is less than unity.
2. Elasticity of demand is also determined by the number of alternatives uses to which a given commodity can be put. A good's demand will be elastic if it has multiple uses. Coal, for example, can be utilized in workshops, railways, factories and even in the

home. If the price of coal declines, it will begin to be used in places where it was previously uneconomical to do so. It means goods which have specified use inelastic demand exists among their cases.

3. The goods in case of availability of substitutes are there, the elasticity of demand for such goods is elastic. If the price of coffee rises, for example, consumers would switch to tea, and coffee consumption will drop significantly.
4. Percentage of a consumer's income spent on the commodity also influenced the elasticity of demand. If a consumer spends only a small amount of his income on a particular commodity, a price change will have little effect on the quantity demanded. To put it another way, demand for such things is inelastic.
5. The possibility of the postponement of the use of a particular good also influenced the elasticity of demand. The demands for commodities, in case of which consumption can be postponed, have elastic demand. On the other hand, the demand for those commodities consumption of which cannot be postponed is inelastic.
6. Elasticity of demand isalso determined by the level of price of the commodity. It is low when the price level of the commodity is low because with less price of the commodity the proportionate change in demand is insignificant.
7. Elasticity of demand is also affected by the income level of the consumer. If consumers have a high income, then they will not consider the price of the commodity. Therefore, in that case elasticity of demand is very low. On the other hand, if the income level of the consumers is low, then in that case elasticity of demand will be high.

2.7.5 Importance of Elasticity of Demand

The concept of elasticity of demand has a great significance in economics as discussed below:

1. The government will use this concept to frame its taxation policies. If the government wants to raise revenue from indirect taxes because these taxes can only be levied on those goods which have inelastic demand then elasticity of demand is an important tool.
2. Elasticity of demand is really helpful to guide the producer in different market structures. Under imperfect competition and monopolistic competition this concept guides producers while fixing prices of their products. When demand for a commodity is inelastic, a monopolist will set a high price because he is almost certain that his product will sell out. It is important to mention here that a monopolist while using price discrimination first look at the elasticity of demand for his product in different markets.
3. This is also useful to determine the extent to which a particular factor of production can get its remuneration raised. For instance, if in an industry demand for a particular type of

labour is inelastic, then they can receive higher wages as compared to wages paid to other categories.

4. For the determination of terms of trade between two countries this concept is also very useful. Terms of trade will in favor of those countries whose demand for the product is comparatively more elastic.

Check Your Progress -IV

Q.1 How price elasticity of demand is measured?

Ans

Q.2 What are the determinants of price elasticity of demand?

2.8 Summary

In this unit, we discussed consumer behaviour towards a prevailing price of the commodity. It includes the individual consumer demand (which study the behaviour of individual person) as well as the market demand (which study the behaviour of two or more persons) and factors that are affecting the demand of a product. The law of demand states that there is an inverse relationship between price and quantity demanded, all other things being equal. Other things that are assumed to be constant are the income of the consumer, tastes and preferences of the consumer and the prices of related goods etc. These aspects are considered important to determine the size of the market. Besides this, we have also studied another important aspect from a pricing-decision point of view i.e., how markets react to change in price of a product. That is called elasticity of demand. Three types of elasticity of demand have been discussed in this context i.e., price elasticity of demand, income elasticity of demand and cross elasticity of demand. Under this, the different concepts of elasticity and its degrees which includes perfectly elastic, perfectly inelastic, unitary elastic, greater than unitary elastic and less than unitary elastic. Measurement of elasticity of demand with various ways like total expenditure method, percentage method, point method and arc method.

2.9 Questions for Practice

A. Short Answer Type Questions

Q1. What do you mean by demand in economics?

Q2. What are the main determinants of demand for a commodity?

Q3. With the help of a diagram explains the concepts of individual demand curve and market demand curve.

Q4. What do you understand by law of demand?

Q5. Why does demand curve slope downward?

Q6. Mention the exceptions to the law of demand.

Q7. Distinguish between extension of demand and contraction of demand.

Q8. Distinguish between increase in demand and decrease in demand.

Q9. What do you mean by elasticity of demand?

Q10. Discuss the factors which affects the elasticity of demand.

Q11. What do you mean by cross elasticity of demand?

Q12. What is arc elasticity of demand?

Q13. Discuss the concept of income elasticity of demand.

B. Long Answer Type Questions

Q1. What is meant by demand? Mention the factors which influence the demand for a commodity.

Q2. Distinguish between a demand curve and demand function. What are the factors that cause a shift in the demand curve?

Q3. Explain the law of demand. Why does the demand curve slope downwards to the right?

Q4. Explain the difference between

a. Extension of demand and contraction of demand

b. Increase in demand and decrease demand.

Q5. Critically evaluate the law of demand.

Q6. Explain „Veblen Effect" and Giffen Paradox. Does the usual law of demand apply in their case?

Q7. Explain elasticity of demand. Mention the various factors which are affecting the elasticity of demand.

Q8. What is price elasticity of demand? Explain its degrees and measurements.

Q9. What is price elasticity of demand? Explain the arc and point method of measuring the elasticity of demand.

Q10. Write a note on following:

a. Price elasticity of demand

b. Income elasticity of demand

c. Cross elasticity of demand

2.10 Suggested Reading

- H. L. Ahuja, Principles of Microeconomics, S. Chand & Company Ltd. New Delhi
- D.N. Diwedi, Microeconomics, Theory and Application, Vikas Publishing House, New Delhi.
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BACHELOR OF COMMERCE (Hons.)

SEMESTER –IV

COURSE: BUSINESS ECONOMICS

UNIT 3: CONSUMER BEHAVIOUR: CARDINAL UTILITY ANALYSIS AND INDIFFERENCE CURVE ANALYSIS

STRUCTURE

3.0 Learning Objectives

At the end of this unit, learner will be able to:

- Develop relation between total utility and marginal utility
- Differentiate between ordinal and cardinal utility analysis
- Determine the consumer‟s equilibrium with single commodity and two commodities under cardinal utility analysis
- Derive the consumer‟s equilibrium under indifference curve analysis
- Explain the superiority of indifference curve analysis over cardinal utility analysis.

3.1 Introduction

The theory of consumer behaviour examines the relationship between quantity demanded of a commodity and its price by highlighting the reasons for the establishment of the relationship. A number of theories have been put forward by various economists to analyse consumer‟s demand for a commodity. The oldest theory of demand is the cardinal utility analysis which examines consumer‟s demand for a good and provides the law of demand which highlights that there is inverse relationship quantity demanded of a commodity and its price. As per the cardinal utility, it means the level of satisfaction of the consumer. As a result of the criticism of cardinal utility analysis, various theories have been established namely Indifference Curve Analysis, Samuelson‟s Revealed Preference Theory, and Hick‟s Logical Weak Ordering Theory. In this unit, cardinal utility analysis and indifference curve analysis have been explained.

3.2 Cardinal Utility Analysis

The cardinal utility analysis for explaining the concept of consumer behaviour has been favoured by classical economists namely Adam Smith, Gossen, Walras, Dupuit, Jevons, J.S. Mill as well as neo-classical economists i.e. Marshall and Pigou. According to this analysis, consumer purchases a certain good because of its utility. Utility can be measured in cardinal numbers i.e. 1, 2, 3, etc. Fisher has put forward the term „Util‟ as a unit to measure utility. Basically, utility is that quality in a good with which our wants are fulfilled. According to Mrs. Joan Robinson, “Utility is the quality in commodities that makes individuals want to buy them.” Utility is different from satisfaction. Utility is that quality of a good which fulfils the wants and satisfaction we get after the fulfilment of our wants. There are various features of utility.

1. Utility is subjective in nature as it deals with the mental satisfaction of a consumer. Different persons derive different utility from a same commodity.
2. Utility is relative as it never remains the same and varies with time and place.
3. It is not necessary that utility is always useful. Sometimes, a good having utility is not useful e.g., drugs are harmful for the health of human beings but these have utility for an addict for fulfilling his want.
4. There is no relationship between utility and morality. Both are independent of each other. Use of cigarette is not good from moral point of view but it has utility for smoker as it fulfils his want.

There are three concepts of utility i.e., initial utility, total utility and marginal utility. Initial utility is the utility derived from the consumption of first unit of a good which is always positive. Total utility is the summation of the utilities derived from the consumption of various units of a good.

$$TU_X = f(Q_X)$$

where TU_X = Total utility from good X and Q_X = Units of good X.

Table 1: Relation between Marginal Utility and Total Utility

Units of Apples	Total Utility (in utils)	Marginal Utility (Utils)
1	12	12
2	20	8
3	24	4
4	24	0
5	20	-4

Marginal utility is the addition made to total utility by consuming one more unit of a commodity. The marginal utility can be measured as follows:

$$MU_n = TU_n - TU_{n-1}$$

where MU_n= Marginalutility of n^{th} unit,TU_n= Total utility of n unitsand TU_{n-1}= Total utility of (n-1) units.

If the total utility from 10 mangoes is 200 and from 9 mangoes is 192, then the marginal utility of the 10^{th} mango is

$$MU_n = TU_n - TU_{n-1} = 200 - 192 = 8$$

Marginal utility is the rate of change of total utility due to a unit change in the quantity of a particular good. It measures the slope of total utility curve at a given point. Marginal utility can also be measured as follows:

$$MU = d(TU) / dQ$$

The relationship between total utility and marginal utility has been put forward by Jevons. Marginal utility can be positive, negative or zero. The marginal utility will be positive as total utility increases due to the consumption of additional units of a good. The marginal utility will be zero when total utility is maximum. As total utility falls by consuming additional units of a good, then marginal utility will be negative. The table 1 shows the relation between marginal utility and total utility. As first apple is consumed total utility is 12 utils. Total utility increases to 20, when second apple is consumed. Total utility further increases to 24 by consuming third apple. As fourth apple is consumed total utiliy remains at 24 utils but declined to 20 utils, when fifth apple is consumed. Total utility goes on increasing as more and more units of a good are consumed but upto a limit. Marginal utility is positive and declining during the consumption of three apples when total utility is increasing. Marginal utility is zero during the consumption of fourth apple when total utility is maximum. By consuming fifth apple, total utility starts declining and marginal utility becomes negative i.e-4.The figure 1 shows the relationship between total utility and marginal utility, part (A)

shows total utility curve i.e. TU and part (B) shows marginal utility curve i.e. MU. In part (A) and part (B), units of good are shown on OX axis and utility on OY axis. At point F, where total utility is increasing, marginal utility is positive and declining. At point T, total utility is maximum and marginal .1 is zero. At point K, total utility is declining and marginal utility is negative.

3.2.1 Assumptions of Cardinal Utility Analysis

The cardinal utility analysis rests on some basic assumptions which are as follows:

1) The consumer is rational as he wants to maximise his satisfaction from the given income.
2) Utility can be measured in cardinal number system i.e., 1,2,3…
3) Marginal utility derived from each good is independent. Utility of a given good depends upon the quantity of that good only. The utility derived from other goods does not affect utility of the given good.
4) The marginal utility of money remains constant.
5) The marginal utility derived from the consumption of successive units of a commodity goes on diminishing.
6) Commodities are divisible into small units.
7) Consumption of different units of a good must be during the same time period.
8) The quality and size of different units of a good must be uniform.
9) There should be no change in the fashion, mental condition of consumer and price of the good or its substitutes.

3.2.2 Laws of Cardinal Utility Analysis

There are two main laws of cardinal utility analysis related to consumer behaviour. These are:

a. Law of diminishing marginal utility
b. Law of equi-marginal utility

3.2.2.1 Law of Diminishing Marginal Utility

The various economists like Gossen, Bentham, Walras, Jevons, Menger and Marshall have made significant contribution in developing Law of diminishing marginal utility. This law is also called "Gossen‟s First Law". According to Marshall, "The additional benefit which a person derives from a given stock of a thing diminishes with every increase in the stock that he already has." According to Prof. Boulding, "*As a consumer increases the consumption of*

any one commodity, keeping constant the consumption of all other commodities, the marginal utility of the variable commodity must eventually decline."

The law of diminishing marginal utility is based on the daily life experience of any consumer. The wants of human beings are unlimited but each particular want can be satisfied. The marginal utility derived from the consumption of additional units of a commodity goes on diminishing. A point comes when the consumer does not want to consume more units of a commodity as marginal utility derived from consumption of additional units of a commodity has become zero. This is the point at which consumer"s want is fully satisfied. If consumer still consumes more units of a commodity, marginal utility will become negative. According to this law, we obtain less and less utility from the successive units of a commodity as we consume more and more of it. The law of diminishing marginal utility can be explained with the help of table 2.

Table 2: Law of Diminishing Marginal Utility

Cups of Tea	Marginal Utility
1	8
2	6
3	4
4	2
5	0
6	-2

The consumption of first cup of tea gives 8 utils of marginal utility followed by 6, 4 and 2 utils from second, third and fourth cup of tea, respectively. When fifth cup is consumed, marginal utility is zero which shows a point at which consumer demand is satisfied. If consumer consumes sixth unit of the commodity, marginal utility becomes negative i.e. -2. The law of

diminishing marginal utility can be explained with the help of figure 2. The quantity i.e. cups of tea is measured on X axis and utility on Y axis. KT represents downward sloping marginal utility curve. The consumption of first cup of tea provides 8 utils of marginal utility. The second cup gives 6 utils, third cup provides 4 utils and fourth cup yields 2 utils of marginal utility. Marginal utility becomes zero with the consumption of fifth cup of tea and touches X axis. As sixth cup of tea is consumed marginal utility becomes -2 and marginal utility curve goes beyond the X axis.

There are several exceptions to the Law of Diminishing Marginal Utility. This includes rare and curious things, articles of distinction, poetry or good books, intoxicants, public goods and consumption of initial units of a commodity. The marginal utility derived from the consumption or collection of above-mentioned goods goes on increasing as their stock goes on increasing. This law has significant theoretical as well as practical importance.

This law provides the base for the three consumption laws i.e., law of demand, law of equi-marginal utility and consumer surplus. As this law states that when marginal utility derived from additional units of a commodity becomes zero, then consumer shifts to the other commodity so the producer has to produce different varieties of good. The difference between value-in-use and value-in-exchange has been explained with the help of law of diminishing marginal utility. The goods like water, air etc. have value-in-use and command low price. As these goods are available in large quantity and used on large scale, their marginal utility declines rapidly, consequently, their price also falls. The goods like diamond, gold etc. have value-in-exchange and command high price. As these goods are scarce in nature, their marginal utility declines slowly, consequently, their price remains high. This law helps consumers to attain maximum satisfaction. Consumer can purchase only that much quantity of a commodity where marginal utility is equal to the price of that commodity to get maximum satisfaction. Price determination of a commodity depends upon law of diminishing marginal utility. If seller wants to sell more units of a good, he will have to decline the price of that good because more units derive less marginal utility. Hence, consumers will buy more at less prices and vice-versa.

The law of diminishing marginal utility has been criticised on several points. Cardinal measurement of utility is not possible. The various assumptions like constant marginal utility of money and no change in the fashion, mental condition of consumer and price of the good or its substitutes are not realistic. Marginal utility can only be calculated in case of divisible commodities but in reality, most of the commodities are not divisible. Marginal utility

derived from each good is not independent rather marginal utility of a given good is affected by marginal utility derived from other goods.

3.2.2.2 Law of Equi-Marginal Utility

The second law of cardinal utility analysis is the law of equi-marginal utility. This law was first propounded by Gossen. Therefore, it is also called "Gossen"s Second Law." Different economists have given different names to this law i.e. "Law of Maximum Satisfaction", "Law of Rational Consumer", "Law of Substitution" and "Law of Economics".

According to Marshall, "If a person has a thing which he can put to several uses, he will distribute it among these uses in such a way that it has same marginal utility in all." According to Prof. Lipsey, "The household maximising utility will so allocate its expenditure between commodities that the last penny spent on each is equal." According to Prof. Samuelson, "A consumer gets maximum satisfaction when the ratio of marginal utilities of all commodities and their price is equal."

This law states that to get maximum utility from the expenditure of his limited income, the consumer purchases such amount of each commodity that the last unit of money spent on each of them affords him the same marginal utility. According to this principal, the marginal utility of expenditure of the last unit of money spent on all of the commodities must be the same. Marginal utility of expenditure of a given commodity is the ratio of marginal utility of a commodity and its price. In case of commodity A, marginal utility of expenditure can be measured as:

$$MU_E=MU_A/P_A$$

In case of commodity B, marginal utility of expenditure can be measured as:

$$MU_E= MU_B/P_B$$

Therefore, to get maximum satisfaction, consumer equilibrium will be reached when

$$MU_E=MU_A/P_A=MU_B/P_B$$

If price of both the commodities becomes equal then the above equation can be written as:

$$MU_E=MU_A=MU_B$$

where MU_E= marginal utility of expenditure, MU_A= marginal utility of commodity A, MU_B= marginal utility of commodity B, P_A= price of commodity A and P_B= price of commodity B.

Table 3: Law of Equi-Marginal Utility				
Units of Goods	**Marginal Utility of Apples (MU_A)**	**Marginal Utility of Bananas (MU_B)**	**MU_A/P_A $P_A=6$**	**MU_B/P_B $P_B=4$**
1	48	24	8	6
2	42	20	7	5
3	36	16	6	**4**
4	30	12	5	3
5	24	8	**4**	2
6	18	4	3	1

The table 3 explains the law of equi-marginal utility. The consumer has Rs. 42 to spend. It is assumed that price of commodity A is Rs. 6 and price of commodity B is Rs. 4. If consumer purchases, 5 units of commodity A and 2 units of commodity B, marginal utility of expenditure will be equal to 4.

$$MU_E=MU_A/P_A=MU_B/P_B=4$$

The law of equi-marginal utility can be explained with the help of figure 3. The part A of the figure shows marginal utility of expenditure in case of apples and part B shows, marginal utility of expenditure in case of Bananas The units of commodities and marginal utility of expenditure have been measured on X axis and Y axis, respectively. The OQ_1 units of apples and OQ_4 unitsof bananas will be purchased by the consumer where $MU_E=U_1$. Here, $MU_E=MU_A/P_A=MU_B/P_B=U_1$, so, consumer will get maximum satisfaction. If consumer purchases more quantity of apples i.e., Q_1Q_2, he will decline quantity of banana by Q_3Q_4. He will gain $Q_1Q_2K_2K_1$ amount of utility by increase the quantity of apples and will lose $Q_3Q_4T_4T_3$ amount of utility. Loss of utility is more than the gain of utility. Hence, the rearrangement of the spending of consumer will result in net loss in utility. Now, it is clear that consumer‟ssatisfaction is maximum when marginal utility of expenditure in case of all the goods is equal.

The law of equi-marginal utility is very significant in the fields of consumption, production, exchange, distribution and public finance. In case of consumption, consumer will get

maximum satisfaction when last unit of money spent on different commodities gives him equal marginal utility. In the field of production, producer will get maximum profit when marginal productivity of each factor is equal.

During exchange, consumer will go on substituting commodities having less utility with commodities having more utility till marginal utility of all commodities become equal.

The distribution of national income among the various factors of production should be such that each factor must get its share equal to its marginal productivity in the long run. In field of public finance, taxes are levied in such a manner that marginal sacrifice of all the tax payers becomes equal.

Criticisms:

1. Cardinal measurement of utility is not possible.
2. The various assumptions like constant marginal utility of money and no change in the fashion, mental condition of consumer and price of the good or its substitutes are not realistic.
3. Marginal utility can only be calculated in case of divisible commodities but in reality, most of the commodities are not divisible.
4. Marginal utility derived from each good is not independent rather marginal utility of a given good is affected by marginal utility derived from other goods.
5. This law assumes that consumer is rational in nature but consumers do not make such calculations to get maximum satisfaction in reality.
6. This law does not hold good in case of complementary goods as substitution does take place in case of these commodities.
7. This law is not applicable to durable goods.

3.2.3 Consumer's Equilibrium through Cardinal Utility Analysis

The consumer is said to be in equilibrium when he does not want to change his current expenditure as he is getting maximum satisfaction out of his limited income. According to Tiber Scitovosky, "A consumer is in equilibrium when he regards his actual behaviour as the best possible under the circumstances and feels no urge to change his behaviour as long as circumstances remain unchanged." Consumer‟s equilibrium through cardinal utility analysis can be attained under two different situations:

a. Consumer‟s equilibrium with single commodity

b. Consumer‟s equilibrium with two commodities

3.2.3.1 Consumer's Equilibrium with Single Commodity

The consumer is said to be in equilibrium if he does not want to purchase either more or less quantity of apples when whole income of the consumer is spent on single commodity i.e. apples. In case of single commodity, consumer‟s equilibrium will be attained at a point where marginal utility of commodity is equal to its price. The figure 4 explains consumer‟s equilibrium with single commodity in which units of apples are measured on X axis and price and marginal utility are measured on Y axis. TK is the marginal utility curve of apples. If price is OP, the consumer will purchase OQ_1 quantity of apples as at this point marginal utility of apples is equal to its price. Thus, marginal utility OQ_1ET derived from OQ_1 units of apples is maximum. If consumer purchases one more unit of apple, the marginal utility Y_1Q_2 is less than its price OP. So, he will reduce the quantity of apples to OQ_1. If consumer purchases one less unit of apple, the marginal utility Y_2Q_3 is more than its price. Therefore, consumer will increase the quantity of apples to OQ_1. Hence, consumer does not purchase either more or less quantity of apples than OQ_1. At point E, condition for equilibrium MU=Price is fulfilled and consumer is getting maximum satisfaction here.

3.2.3.2 Consumer's Equilibrium with Two Commodities

If consumer spends his entire income on two commodities i.e. commodity A and commodity B, he will act according to law of equi-marginal utility. The consumer will go on substituting the commodity giving low marginal utility with commodity giving high marginal utility till the marginal utilities of both the commodities become equal assuming that prices of both the commodities are same. Beyond this point, consumer does not want to make any change in his purchases. Hence, consumer‟s equilibrium is attained. If prices of both the commodities are same, equilibrium condition can be written as:

$MU_A=MU_B$

Consumer‟s equilibrium with two commodities can be explained with the help of figure 5. Units of money spent are measured on X axis and price and marginal utility are measured on Y axis. TT and KK are the marginal utility curves of commodity A and commodity B, respectively. Prices of both the commodities i.e. OP_1 and $O‟P_1$ are equal. At given prices, the equilibrium is attained where marginal utility of each commodity EM_2 is equal to its price i.e. $EM_2=OP_1=O‟P_1$. At this point of equilibrium, consumer will spend OM_2 amount of money on commodity A and $O‟M_2$ on commodity B. Hence, total marginal utility $OM_2ET+O‟M_2EK$ derived from both the commodities is the maximum. Any further change in the consumer spending will result in decline in the total utility. Suppose consumer will spend one more unit of money on commodity B and one less unit on commodity A. If consumer incurs OM_1 units of money on commodity A, it will result in loss of utility by M_1M_2EL. If consumer spends $O‟M_1$ units of money on commodity B, he will gain utility by M_1M_2EG. The loss in utility is more than the gain in utility which results in net loss of utility by LGE. Therefore, once equilibrium is reached, consumer does not want to change his spending as at the point of equilibrium, he gets maximum utility.

3.3.4. Criticism of Cardinal Utility Analysis

The cardinal utility analysis has been criticised on several grounds. These are as follows:

1) The concept of utility is subjective in nature as it relates to psychology of human beings. But the consumer‟s demand analysis is based on the fact that utility is objective.
2) The cardinal measurement of utility is not possible i.e. 1, 2, 3 etc. It is not possible for the utility derived from different units of a commodity to be added or subtracted.
3) According to cardinal utility analysis, every commodity is independent in nature but in reality, utility of given commodity is dependent on the utility of other commodities.
4) The cardinal utility analysis is based on the concept of marginal utility but marginal

utility can only be calculated in case of divisible goods. In real world, most of the commodities are non-divisible.

5) The marginal utility of money cannot be constant. If the amount of money with a person enhances, its marginal utility declines and if the amount of money declines, its marginal utility rises.
6) The various assumptions like no change in the fashion, mental condition of consumer and price of the goods or its substitutes are not realistic.
7) The cardinal utility analysis has failed to divide price effect into substitution effect and income effect. This analysis does not explain that if demand changes with change in price, then how much demand changes with change in real income and how much with substitution of cheap commodity for the expensive commodity.
8) The cardinal utility analysis has failed to explain the Giffen Paradox. This analysis does not provide any explanation that why demand rises with increase in price and why demand decreases with decline in price, in case of giffen goods.

Check Your Progress- I

Q1. Define Law of diminishing marginal utility.

Ans

Q2. Explain the Law of equi-marginal utility.

Ans.

3.3 Indifference Curve Analysis

The cardinal utility analysis is based on several assumptions which have been criticized by various economists. It is due to the shortcomings of cardinal utility analysis that ordinal utility analysis or indifference curve analysis was developed. According to ordinal utility analysis, utility can be ranked like first, second, third etc. on the basis of preference of the consumer for various commodities. Indifference curve analysis was first of all developed by Edgeworth in 1881. Later on, this concept was developed by Pareto in 1906, W.E. Johnson in 1913 and Slustky in 1915. The significant contribution has been made by Hicks and Allen towards the development of this analysis. J.R. Hicks in his book, “Value and Capital” has provided detailed analysis of ordinal utility in which he has explained behaviour of the consumer in scientific manner.

3.3.1 Assumptions of Indifference Curve Analysis

The indifference curve analysis is based on several assumptions. These are as follows:

1. The consumer is rational in nature as he wants to get maximum satisfaction out of his limited income.
2. Utility can be ranked in ordinal numbers like first, second, third etc. on the basis of preference of the consumer for various commodities.
3. This analysis is based on the assumption that marginal rate of substitution diminishes. If amount of any commodity increases with the consumer, then he will substitute that commodity with another at diminishing rate.
4. The consumer never reaches the level of satiety. He always wants more amount of a commodity to the lesser amount of it. For example, combination X includes 3 units of apples and 5 units of mangoes and combination Y includes 3 units of apples and 3 units of mangoes. The combination X is better than Y as X includes more units of mangoes.
5. This analysis is based on the assumption of consistency which means if consumer preferscombination X to Y in a given time period, he will not prefer Y to X in another time period rather will prefer X to Y only.
6. According to the assumption of transitivity of this analysis, if consumer prefers combination X to combination Y and combination Y to combination Z, he will surely prefer combination X to combination Z. Similarly, if consumer is indifferent among combinations X and Y as well as combinations Y and Z, he will surely be indifferent among combinations X and Z.
7. In this analysis, scale of preference will be independent of the income of consumer as well as price of commodity in the market. Moreover, scale of preference of one consumer will be independent of the scale of preference of another consumer.
8. Indifference curve analysis is based on the assumption of continuity. According to this assumption, indifference curve can provide various combinations of two commodities which gives equal level of satisfaction to the consumer and consumer is indifferent about these combinations.

3.3.2 Meaning of Indifference Curve

Table 4: Indifference Schedule			
Combinations	Mangoes	Kiwis	Marginal Rate of Substitution

V	1	20	-
W	2	14	6:1
X	3	9	5:1
Y	4	5	4:1
Z	5	2	3:1

An indifference curve is the locus of all those points representing various combinations of two commodities giving same level of satisfaction to the consumer. If all the combinations on given indifference curve provide same level of satisfaction to the consumer, then he will be indifferent among the available combinations. According to Leftwitch, "A single indifference curve shows the different combinations of X and Y that yield equal satisfaction to the consumer." Indifference Schedule is a table representing the various combinations of two goods which will give equal level of satisfaction to the consumer. Table 4 represents the indifference schedule in which five combinations of mangoes and kiwis have been shown. The five combinations V, W, X, Y and Z yields equal level of satisfaction to the consumer. The combination V includes 1 mango and 20 kiwis, combination W includes 2 mangoes and 14kiwis, combination X includes 3 mangoes and 9kiwis, combination Y includes 4 mangoes and 5kiwis and combination Z includes 5 mangoes and 2kiwis. Here, to get one more mango consumer is sacrificing some units of kiwi to remain at the same level of satisfaction. The figure 6 shows the indifference curve in which units of mangoes and units of kiwis have been measured on X axis and Y axis, respectively. IC is the indifference curve. The five combinations i.e., V (1 mango and 20 kiwis), W (2 mangoes and 14 kiwis), X (3 mangoes and 9 kiwis), Y (4 mangoes and 5 kiwis) and Z (5 mangoes and 2 kiwis) of mangoes and kiwis yields same level of satisfaction to the consumer. By joining these combinations,

indifference curve can be drawn. Indifference curve is downward sloping from left to right and convex to the origin.

3.3.3 Indifference Map

Indifference curve shows the various combinations which provide same level of satisfaction to the consumer. So, consumer will be indifferent among these combinations. If consumer wants to attain higher level of satisfaction, then the combination providing higher level of satisfaction than the available combinations will not lie on the same indifference curve rather it will lie on some higher indifference curve.

Similarly, if consumer wants to attain lower level of satisfaction, then the combination providing lower level of satisfaction than the available combinations will not lie on the same indifference curve rather it will lie on some lower indifference curve. Therefore, there can be different indifference curves showing different level of satisfaction. A set of indifference curves showing different levels of satisfaction obtainable from different schedules of indifference is called indifference map. Higher the indifference curve, higher will be the level of satisfaction. Lower the indifference curve, lower will be the level of satisfaction. The indifference map has been shown in figure 7.

In the figure, units of mangoes and units of kiwis have been measured on X axis and Y axis, respectively. The various indifference curves IC_A, IC_B, IC_C and IC_D represent indifference map. A straight-line OT passes through theses indifference curves. Combinations W, X, Y and Z lie on indifference curves IC_A, IC_B, IC_C and IC_D, respectively. The combination W includes OQ_1 mangoes and OP_1 kiwis as well as combination X includes OQ_2 mangoes and OP_2 kiwis. As combination X includes more quantity of mangoes and kiwis than combination W, combination X will provide higher level of satisfaction to the consumer than W. The combination Y includes OQ_3 mangoes and OP_3 kiwis as well as combination Z includes OQ_4 mangoes and OP_4 kiwis. As combination Z includes more quantity of mangoes and kiwis than combination Y, combination Z will provide higher level of satisfaction to the consumer than Y. Hence, combination on the higher indifference curve gives higher level of satisfaction and combination on the lower indifference curve provides lower level of satisfaction.

3.3.4 Marginal Rate of Substitution

The consumer can get same level of satisfaction from alternative combinations if the rise in satisfaction due to increased quantity of mangoes is offset by the decline in satisfaction due to reduced quantity of kiwis. The marginal rate of substitution of X for Y is defined as the amount of Y the consumer is just willing to give up to get one more unit of X and maintain the same level of satisfaction. J.R. Hicks has defined marginal rate of substitution of X commodity for Y commodity as "the quantity of Y which would just compensate the consumer for the loss of marginal unit of X." The table 4 explains the concept of marginal rate of substitution. The combination V (1 mango and 20 kiwis) provides same level of satisfaction as combination W (2 mangoes and 14 kiwis) gives. The consumer has substituted 6 kiwis with 1 mango. Hence, marginal rate of substitution of mangoes for kiwis will be 6:1.

There are 3 mangoes and 9 kiwis in combination X. The consumer has substituted 5 kiwis with 1 mango to remain on the same level of satisfaction as that of combination W. Therefore, the marginal rate of substitution of mangoes for kiwis will be 5:1. Similarly, marginal rate of substitution will be 4:1 and 3:1 for combinations Y and Z, respectively. Marginal rate of substitution of X for Y can be explained as the ratio of change in amount of Y to a change in amount of X.

$$MRS_{XY} = - \Delta Y/\Delta X$$

where MRS_{XY} = Marginal rate of substitution of X for Y, ΔY = Change in amount of Y and ΔX = Change in amount of X

The marginal rate of substitution is negative because the amount of Y is declined to get a marginal unit of X. The slope of indifference curve is measured by marginal rate of substitution so indifference curve slopes downwards. The figure 6 shows two combinations V and W of mangoes and kiwis on the given indifference curve IC. The consumer sacrifices VE amount of kiwis to get the marginal amount EW of mangoes.

$$MRS_{XY} = VE/EW$$

The law of diminishing marginal rate of substitution has been developed by Prof. Lerner. According to this law, the consumer will be willing to forgo smaller and smaller units of Y in order to have successive additional units of X. According to Ferguson, "The law of diminishing marginal rate of substitution states that as X is substituted for Y so as to leave the consumer on the same indifference curve, the marginal rate of substitution of X for Y diminishes." The table 4 shows that consumer sacrifices 6 kiwis to get second mango, 5 kiwis to get third mango, 4 kiwis to get fourth mango and 3 kiwis to get fifth mango. This shows that marginal rate of substitution of mangoes for kiwis goes on diminishing. In figure 6, it has

been shown that when consumer moves from combination V to W, he sacrifices 6 kiwis to get one more mango where marginal rate of substitution of mangoes for kiwis is 6:1. When consumer moves from combination W to X, he sacrifices 5 kiwis to get one more mango where marginal rate of substitution of mangoes for kiwis is 5:1. In case of two combinations i.e. Y and Z, the marginal rate of substitution of mangoes for kiwis is 4:1 and 3:1, respectively. Therefore, as consumer increases the consumption of mangoes then for getting every additional unit of mango he sacrifices less and less amount of kiwis i.e. 6:1, 5:1, 4:1 and 3:1, respectively. This is called diminishing marginal rate of substitution. The marginal rate of substitution diminishes due to two reasons. Firstly, particular want of consumer can be satisfied. As consumer has more and more units of a given good, his want to get more of its quantity becomes less intensive. So, consumer wants to sacrifice fewer units of other good to get marginal unit of a given good. Secondly, goods are imperfect substitute of each other. The marginal rate of substitution of X for Y diminishes when the amount of X is increased as goods are imperfect substitute. If goods are perfect substitute for each other, these will be regarded as same. Any change in amount of one or the other good will be regarded as the changes in the quantity of same good. So, marginal rate of substitution will remain the same. Therefore, decline in marginal rate of substitution can be attributed to the commodities being imperfect substitutes of each other. The law of diminishing marginal rate of substitution is not applicable to perfect substitutes and perfect complimentary goods.

Check Your Progress- II

Q1. Define Indifference Curve?

Ans

Q2. Explain Marginal Rate of Substitution.

Ans

3.3.5 Properties of Indifference Curve

The properties of indifference curve are as follows:

1) **An indifference Curve Slopes Downwards from Left to Right:** The various combinations which lie on the same indifference curve give same level of satisfaction. This is possible only if increase in amount of commodity A is accompanied by reduction in amount of commodity B because rise in satisfaction of commodity A is offset by decline in satisfaction of commodity B. If Indifference curve slopes downwards from left to right, all the combinations on this curve will give same level of satisfaction. If the

shape of indifference curve is a horizontal straight line, vertical straight line and upward sloping curve then compensating variations in satisfaction will not take place and consumer will not be indifferent among the various combinations lying on these curves.

In figure 8, slope of indifference curve has been analysed. In the various parts of this figure i.e. A, B, C and D, commodity A and commodity B have been measured on X axis and Y axis, respectively. In figure 8 (A), the two combinations E and F lie on the indifference curve IC. The combination E includes Oq of commodity A and Op1 of commodity B. The combination F includes Oq of commodity A and Op of commodity B. Both the combinations E and F includes same quantity of commodity A. The combination E includes more quantity of commodity B than combination F. So, combination E gives more satisfaction to the consumer and he cannot be indifferent among combinations E and F. Hence, indifference curve cannot be a vertical straight line. In figure 8 (B), the two combinations E and F lie on the indifference curve IC. The combination E includes Oq of commodity A and Op of commodity B. The combination F includes Oq1 of commodity A and Op of commodity B. Both the combinations E and F includes same quantity of commodity B. The combination F includes more quantity of commodity A than combination E. So, combination F gives more satisfaction to the consumer and he cannot be indifferent among combinations E and F. Hence, indifference curve cannot be a horizontal straight line.

In figure 8 (C), the two combinations E and F lie on the indifference curve IC. The combination E includes Oq of commodity A and Op of commodity B. The combination F includes Oq1 of commodity A and Op1 of commodity B. The combination F includes more quantity of commodity A and B than combination E. So, combination F gives more satisfaction to the consumer and he cannot be indifferent among combinations E and F. Hence, indifference curve cannot be an upward sloping curve.

In figure 8 (D), the two combinations E and F lie on the indifference curve IC. The combination E includes Oq of commodity A and Op1 of commodity B. The combination F includes Oq1 of commodity A and Op commodity B. The combination E includes more of commodity B and less of commodity A than combination F. Hence, gain in satisfaction of commodity B is offset by decline in satisfaction of commodity A. So, combinations E and F gives equal level of satisfaction to the consumer and he is indifferent among combinations E and F. Hence, indifference curve can only be a negatively sloping curve which slopes downward from left to right.

2) **An indifference is Convex to the Origin:** An Indifference curve is convex to the point of origin. This property of indifference curve is based on the law of diminishing marginal rate of substitution. According to law of diminishing marginal rate of substitution, indifference curve cannot be a straight line and concave to the origin rather it can only be convex to the origin. This property of indifference curve can be explained with the help of figure 9. In the various parts of this figure i.e. A, B and C, commodity A and commodity B have been measured on X axis and Y axis, respectively. In figure 9 (B), indifference curve IC is a straight line which shows that marginal rate of substitution of commodity A for commodity B is constant. It is because, to increase qq1 amount of commodity A, consumer is sacrificing pp1 amount of commodity B. Further, to increase q1q2 amount of commodity A, consumer is reducing p1p2 amount of commodity B. To increase the amount of commodity A, consumer is sacrificing same amount of commodity B i.e. pp1=p1p2. This is possible only in case of perfect substitutes.

In figure 9 (C), indifference curve IC is concave to the origin which shows that marginal rate of substitution of commodity A for commodity B is increasing. It is because, to increase qq1 amount of commodity A, consumer is sacrificing pp1 amount of commodity B. Further, to increase q1q2 amount of commodity A, consumer is reducing p1p2 amount of commodity B. To increase the amount of commodity A, consumer is sacrificing more amount of commodity B i.e. pp1 < p1p2. This shows that as the consumption of commodity A is increasing, its importance is also increasing which is not possible in reality. In figure 9 (A), indifference curve IC is convex to the origin which shows that marginal rate of substitution of commodity A for commodity B is diminishing. It is because, to increase qq1 amount of commodity A, consumer is sacrificing pp1 amount of commodity B. Further, to increase q1q2 amount of commodity A, consumer is reducing p1p2 amount of commodity B. To increase the amount of commodity A, consumer is sacrificing less amount of commodity B i.e. pp1>p1p2. This shows that as the consumption of commodity A is increasing, its importance is declining which perfectly fits the real world. Hence, indifference curve is convex to the origin.

3) **Higher the Indifference Curve, Higher is the Level of Satisfaction and Vice-Versa:** In Indifference map, all the combinations on higher indifference curve will provide higher level of satisfaction than the combinations on the lower indifference curve. In figure 10, commodity A is measured on X axis and commodity B on Y axis. There

are three combinations W, X and Y which lie on the different indifference curves IC_T, IC_S and IC_R, respectively. The combination W includes OQ_1 amount of commodity A and OP_1 amount of commodity B, X includes OQ_2 amount of commodity A and OP_1 amount of commodity B and Y includes OQ_3 amount of commodity A and OP_1 amount of commodity B. All the combinations have same amount of commodity B. The combination Y has more amount of commodity A than X and combination X have more quantity of commodity A than W i.e. $OQ_3 > OQ_2 > OQ_1$. Hence, Combination Y gives more satisfaction than X and X gives more satisfaction than W. So, higher the indifference curve, higher will be the level of satisfaction and vice-versa.

4) **Indifference Curves Cannot Intersect Each Other:** Each indifference curve provides different level of satisfaction. So, they cannot intersect each other. This property can be explained with the help of figure 11 in which two indifference curves are intersecting each other. The commodity A is measured on X axis and commodity B on Y axis. The combinations W and P lie on IC_S indifference curve which shows that both gives same level of satisfaction i.e. W=P. The combinations W and Q lie on IC_T indifference curve which means both gives equal level of satisfaction i.e. W=Q. Hence, combinations P and Q gives same level of satisfaction i.e. P=Q. But, it is not possible as P lies on higher indifference curve and Q lies on lower indifference curve. Therefore, indifference curves cannot intersect each other.

5) **Indifference Curve Can Neither Touch Horizontal Nor Vertical Axis:** An indifference curve can never touch X axis and Y axis. This property of indifference curve can be explained with the help of figure 12 in which commodity A is measured on X axis and

commodity B on Y axis. The indifferenc curve IC_T touches X axis at Q and at combination Q, consumer has OQ amount of commodity A and zero amount of commodity B which is not the proper combination. This shows that consumer is purchasing single commodity. So, indifference curve cannot touch X axis. The indifferenc curve IC_S touches Y axis at P and at combination P, consumer has OP amount of commodity B and zero amount of commodity A which is not the proper combination. This shows that consumer is purchasing single commodity. So, indifference curve cannot touch Y axis. Hence, indifference curve can neither touch horizontal nor vertical axis.

6) **Indifference Curves May or May Not be Parallel:** It is not necessary that indifference curves are parallel to each other rather they may or may not be parallel to each other. This property of indifference curve depends upon marginal rate of substitution of two curves. If marginal rate of substitution of different points on two curves declines at constant rate, then both the curves will be parallel to each other, otherwise, both will not be parallel.

7) **Shapes of Indifference Curves in Case of Perfect Substitutes and Perfect Compliments:** In case of perfect substitutes, indifference curve will be a downward sloping straight line from left to right and in case of perfect substitutes, indifference curve will be a right-angled curve. In figure 13 (A), indifference curve IC is a straight line which shows that marginal rate of substitution of commodity A for commodity B is constant. It is because, to purchase first unit of commodity A, consumer is sacrificing one unit of commodity B. Further, to purchase second of commodity A, consumer is sacrificing one more unit of commodity B. To increase the amount of commodity A, consumer is

   Sacrificing same amount of commodity B. This is possible only in case of perfect substitutes. In figure 14 (B), indifference curve IC is a right angled curve which shows that both the commodities A and B are purchased in fixed proportion by the consumer. At point E, consumer has fixed proportion combination of OS of commodity A and OT of

commodity B.

8) **Indifference Curve Becomes Complex in Case of More than Two Commodities**

When the consumer wants to have combinations of more than two commodities i.e., 3 commodities, 4 commodities etc., then we have to draw a three dimensional indifference curves which are very difficult to draw.

3.3.5. Price Line

Indifference curve is the locus of all those combinations of two commodities which give same level of satisfaction to the consumer. Now, the question arises whether the consumer can purchase certain combinations or not.

Table 5: Possible Combinations of A and B

Combinations	Commodity A (Rs.6)	Commodity B (Rs.3)
P	0	10
Q	1	8
R	2	6
S	3	4
T	4	2
U	5	0

This is determined by money income of the consumer as well as prices of two commodities. The price line shows all those combinations of two commodities which can be bought by the consumer with the given money income and given prices of two commodities. According to Ferguson, "The price line shows the combinations of goods that can be purchased if the entire money income is spent." The price line is also known as budget line and opportunity line. The equation of the price line can be written as follows:

$$M=P_A.A+P_B.B$$

where M = Money Income, P_A = Price of Commodity A, A = Quantity of Commodity A, P_B = Price of

Commodity B, B = Quantity of Commodity B.

The table 5 shows the possible combinations of commodities A and B which consumer can buy with given income and prices. Suppose consumer has Rs. 30 with him and the price of commodity A and B is Rs. 6 and Rs. 3, respectively. If consumer want to purchase only commodity A then he can buy 5 units, each costs Rs. 6, with entire income. Similarly, if consumer wants to purchase only commodity B then he can buy 10 units, each costs Rs. 3, with entire income. The other combinations available to consumer are Q (1 unit of commodity A + 8 units of commodity B), R (2 units of commodity A + 6 units of commodity B), S (3 units of commodity A + 4 units of commodity B) and T (4 units of commodity A + 2 units of commodity B) which he can buy with given income at given prices. Figure 14 shows the various combinations that lie on price line. The commodity A and commodity B have been measured on X axis and Y axis, respectively. PU is the price line which shows various combinations P, Q, R, S, T and U which he can buy with his given income at given prices. If there is any combination which is right to the price line, then consumer cannot buy that with given money income. If, there is any combination which is left to the price line, then consumer can buy that but his entire money income is not spent. The slope of price line refers to the ratio of prices of two commodities i.e. A and B.

Slope of Price Line = P_A/P_B

where P_A = Price of commodity A and P_B = Price of commodity B

The position and slope of price line depends upon two factors (i) income of the consumer (ii) prices of the two goods. These factors have been explained as follows:

I. **Effects of Change in Income:** If prices of the goods remain same but income of the consumer changes, it will only change the position of the price line not the slope. As income increases, the price line will shift to the right of the original price line and as income declines, price line will shift to the left of the original price line at given prices. The effects of change in income on price line has been shown in the figure 15.

The original price line is PS. With increase in income, price line will shift from PS to P_1S_1 and with decline in income, price line shifts from PS to P_2S_2.

At PS, the maximum amount that consumer can buy is OS amount of commodity A and OP amount of commodity B. At P_1S_1, the maximum amount that consumer can buy is OS_1 amount of commodity A and OP_1 amount of commodity B which is higher than the maximum amount of both the commodities on PS price line. At P_2S_2, the maximum amount that consumer can buy is OS_2 amount of commodity A and OP_2 amount of commodity B which is lower than the maximum amount of both the commodities on PS price line.

II. **Effects of change in Prices:** If the income of the consumer is given, the proportionate change in all money prices will shift the price line to left of original price line with increase in prices and to right of original price line with decrease in prices. The figure 16 (A) shows the effects of proportionate change in prices. The original price line is PS. With decrease in prices, price line will shift from PS to P_1S_1 and with increase in prices, price line shifts from PS to P_2S_2. At PS, the maximum amount that consumer can buy is OS amount of commodity A and OP amount of commodity B. At P_1S_1, the maximum amount that consumer can buy is OS_1 amount of commodity A and OP_1 amount of commodity B which is higher than the maximum amount of both the commodities on PS price line. At P_2S_2, the maximum amount that consumer can buy is OS_2 amount of commodity A and OP_2 amount of commodity B which is lower than the maximum amount of both the commodities on PS price line.

If the price of one commodity i.e. commodity A changes and price of commodity B as well as money income remain constant, the one end of price line where we measure commodity B will remain at same point and other end where we measure commodity A changes with change in price of commodity A. This can be explained with the help of figure 16 (B).

The original price line is PS. With decrease in prices, price line will shift from PS to PS_1 and with increase in prices, price line shifts from PS to PS_2. At PS_1, consumer can buy more quantity of commodity A than on price line PS i.e., $OS_1 > OS$. At PS_2, consumer can buy less quantity of commodity A than on price line PS i.e., $OS_2 < OS$. If the price of one commodity i.e. commodity B changes and price of commodity A as well as money income

remain constant, the one end of price line where we measure commodity A will remain at same point and other end where we measure commodity B changes with change in price of commodity B. This can be explained with the help of figure 16 (C). The original price line is PS. With decrease in prices, price line will shift from PS to P_1Sand with increase in prices, price line shifts from PS to P_2S. At P_1S, consumer can buy more quantity of commodity B than on price line PS i.e. $OP_1 > OP$. At P_2S, consumer can buy less quantity of commodity B than on price line PS i.e. $OP_2 < OP$. Hence, slope of price line changes with change in price of one commodity, while the price of other commodity and money income remains the same.

3.3.6. Consumer Equilibrium

The consumer is said to be in equilibrium when consumer with given income and prices buys that combination of two commodities which yields him maximum satisfaction and he does not want to make any change in his spending.

Assumptions

The various assumptions of consumer‟s equilibrium under indifference curve analysis are as follows:

1) Consumer is rational in nature as he wants to maximise his utility.
2) The prices of the commodities will remain constant.
3) The money income of the consumer will be constant.
4) Consumer has knowledge about price of all the commodities.
5) There exists perfect competition in the market.
6) Commodities are divisible.
7) Consumer has complete knowledge about indifference map.
8) Income will be spent in small quantities by consumer.

There are two main conditions to attain equilibrium of consumer under indifference curve analysis. These are

(i) The price line should be tangent to indifference curve.
(ii) The indifference curve must be convex to the origin at the point of tangency.

The first condition for consumer‟s equilibrium is that price line should be tangent to indifference curve which has been shown in figure 17.

In figure 17, VD is the price line and IC_R, IC_S and IC_T are the indifference curves. The consumer can buy any combination i.e. E, W and K but he cannot buy any combination on IC_R because it is away from price line

VD.Out of E, W and K, consumer will be in equilibrium at point E as at this point price line is tangent to the higher indifference curve IC_S. At point E, consumer will buy OQ amount of commodity A and OP amount of commodity B which yields maximum satisfaction to the consumer. At points W and K, consumer will not get maximum satisfaction as both the points lie on the lowest indifference curve IC_T.At equilibrium point E, slope of indifference curve and price line coincide. Slope of indifference curve shows marginal rate of substitution of commodity A for commodity B (MRS_{XY}) and slope of price line is the ratio of price of commodity A (P_X) and price of commodity B (P_Y). At the point of equilibrium, slope of indifference curve is equal to the slope of price line. It can be written as:

$MRS_{XY} = P_X/P_Y$

The second condition for consumer‟s equilibrium is that indifference curve should be convex to the origin at the point of tangency which has been shown in figure 18. In figure 18, VD is the price line and IC_S and IC_T are the indifference curves. The consumer can buy any combination i.e. E and E_1. At E_1, price line is tangent to indifference curve but indifference curve is concave to the origin at the point of tangency which shows that second condition for equilibrium is not fulfilled and also point E_1 lie on lower indifference curve IC_T. So, consumer will not be in equilibrium at point E_1 rather at point E. At point E, both the conditions for consumer‟s equilibrium are fulfilled. The consumer will buy OQ amount of commodity A and OP amount of commodity B which gives maximum satisfaction to the consumer.

3.3.8. Criticism of Indifference Curve Analysis

1) Indifference curve analysis is based on unrealistic assumptions i.e. rational consumer, perfect knowledge of scale, divisibility of goods and perfect competition.The spending of a consumer is generally based on habits, fashion and customs. Hence, a consumer does not always behave rationally. It is not possible that consumer has complete knowledge of his indifference map. Divisibility of goods is not possible in case of most of the goods and perfect completion is not a reality rather it‟s a myth.

2) Prof. D.H. Robertson has highlighted that the indifference curve analysis is only "An old wine in new bottle."This analysis is similar to the cardinal utility analysis as it has only given new names to old concepts. The term „utility‟ has been replaced by scale of preference, law of diminishing marginal utility has been substituted with diminishing marginal rate of substitution and the concept of cardinal numbers i.e. 1, 2, 3 etc., has been labelled as ordinal numbers i.e. I, II, III, etc.In cardinal utility analysis, consumer is in equilibrium when ratio of marginal utilities of two commodities is equal to the ratio of price of two commodities i.e.

MU of A / MU of B = PA / PB

In indifference curve analysis, consumer is in equilibrium when marginal rate of substitution of A for B is equal to the ratio of prices of two commodities i.e.

$$MRS_{AB} = P_A / P_B$$

Marginal rate of substitution is the ratio of marginal utilities of two commodities

$$\text{i.e.} MRS_{AB} = MU_A / MU_B$$

Hence, $$\text{MU of A / MU of B} = P_A / P_B$$

Therefore, conditions for consumer equilibrium are same in both the analysis.

3) According to Prof. W.E. Armstrong, a consumer is indifferent among close alternative combinations only as he cannot find the difference between the two. As the difference among various combinations rises, the difference in the satisfaction of alternative combinations become clear and, therefore, different combinations which lie on the same indifference curve do not provide equal level of satisfaction. If argument of Armstrong is considered, different combinations on same indifference curve provide different level of satisfaction. Therefore, indifference curve will become non-transitive.

4) Indifference curve analysis fails to explain, how consumer behave when he has to make a choice among alternative combinations which involve risk or uncertainty of expectation. In order to choose among uncertain combinations, quantitative measurement of utility is required to determine whether the risk is worth taking. In these situations, cardinal measurement of utility can prove to be helpful to explain consumer behaviour.

5) Indifference curve analysis is based on absurd and unrealistic combinations. When consumer considers various combinations of two commodities, then some of the combinations are meaningless and it is not possible to apply theses combinations in the real life.
6) Indifference curve analysis can easily explain consumer behaviour in respect of two commodities but when consumer considers more than two commodities, this analysis becomes complex in nature.
7) Schumpeter has said that indifference curve is not based on real life experiences rather on imaginary combinations. Every time, it is not possible for a consumer to do calculations and decide like a computer as to which combination of two commodities he would like.
8) The indifference map is considered to be hypothetical as is not based on observed market behaviour. It is not objective in nature rather subjective as it does not set up functions and curves in purely objective terms. Purely objective indifference curves can be possible only if it is possible to obtain quantitative data.The logical structure of indifference curve analysis is such that it is almost impossible to measure indifference curves in quantitative terms. Although efforts have been made to quantify indifference curve but not successful.
9) Indifference curve analysis is based on the weak ordering hypothesis i.e., a consumer can be indifferent among a large number of combinations.But, according to Prof. Samuelson, it is not possible to find many situations of indifference in real world. The weak ordering makes it subjective in nature.But ordinal analysis is certainly better than cardinal analysis as it is based on fewer assumptions.

3.4. Comparison of Cardinal Utility Analysis and Indifference Curve Analysis

The cardinal utility analysis and indifference curve analysis has many similarities as well as dissimilarities.

Similarities

1) The cardinal utility analysis as well as indifference curve analysis are based on the assumption that consumer is rational in nature as he wants to maximise his satisfaction.
2) Both the analysis are subjective in nature as these are based on the concept of utility. In cardinal utility analysis, total utility is the summation of all the marginal utilities that the consumer derives from the consumption of various units of the commodity. In indifference curve analysis, total utility derived from the consumption of a commodity is

based on the marginal utilities that the consumer derives from the consumption of various units of commodity.

3) In cardinal utility analysis, consumer is in equilibrium when ratio of marginal utilities of two commodities is equal to the ratio of price of two commodities i.e.

$$\text{MU of A / MU of B} = P_A / P_B$$

In indifference curve analysis, consumer is in equilibrium when marginal rate of substitution of A for B is equal to the ratio of prices of two commodities i.e.

$$MRS_{AB} = P_A / P_B$$

Marginal rate of substitution is the ratio of marginal utilities of two commodities i.e.

$$MRS_{AB} = MU_A / MU_B$$

$$\text{Hence MU of A / MU of B} = P_A / P_B$$

Therefore, conditions for consumer equilibrium are same in both the analysis.

4) Both the analysis are based on the law of diminishing marginal utility. In cardinal utility analysis, law of diminishing marginal utility applies. In indifference curve analysis, second condition for equilibrium is that indifference curve must be convex to the origin at the point of tangency which shows that marginal rate of substitution is diminishing at the point of equilibrium.

Dissimilarities

1) Indifference curve analysis is more realistic in nature as it is based on the ordinal measurement of utility i.e. first, second etc. Cardinal utility analysis is based on the assumption of cardinal measurement of utility i.e. 1, 2, 3 etc. which is not possible in the real world.
2) Cardinal utility analysis is based on the assumption of constant marginal utility of money which is unrealistic in nature. Indifference curve is not based on this assumption.
3) Indifference curve analysis is based on less assumptions as compared to cardinal utility analysis. Hence, indifference curve analysis becomes more realistic in nature.
4) In cardinal utility analysis, marginal utility of money is assumed to be constant so it is not possible to divide price effect into income effect and substitution effect but in indifference curve analysis, it is possible to divide price effect into income effect and substitution effect. Indifference curve analysis provides more comprehensive explanation of theory of demand.
5) The Giffen‟s Paradox has been explained in indifference curve analysis but cardinal utility analysis failed to explain this concept.
6) The cardinal utility analysis has been based on the unrealistic assumption of

independence of utilities but indifference curve analysis is free from this and has highlighted that substitute goods and complimentary goods are capable of influencing the utilities of each other.

7) Although both the analysis are based on the same equilibrium condition, yet indifference curve analysis is superior to cardinal utility analysis as it is based on less unrealistic assumptions.
8) Indifference curve analysis helps to highlight the effect of change in price on the welfare of consumer. If as a result of change in price, consumer moves from lower to higher indifference curve, his welfare is enhanced.
9) Both the analysis are subjective in nature but construction of preference schedule on the basis of changing physical quantities of two commodities and replacement of the law of diminishing marginal utility with diminishing marginal rate of substitution in case of indifference curve analysis indicates that this analysis is leading towards greater objectivity and behaviourism.

Check Your Progress -III

Q1. Why indifference curve slopes downwards from left to right?

Ans.

Q2. Give any two properties of indifference curve.

Ans.

3.6 Summary

In this lesson, the concept of consumer behaviour has been explained in respect of cardinal utility analysis as well as indifference curve analysis. In cardinal utility analysis, relation between total utility and marginal utility has been highlighted. Further, law of diminishing marginal utility and law of equi-marginal utility have been explained. In case of cardinal utility, consumer equilibrium has been analysed with single commodity as well as two commodities. The consumer is said to be in equilibrium if he does not want to purchase either more or less quantity of a commodity when entire income of the consumer is spent on single commodity. If consumer spends his entire income on two commodities, he will go on substituting the commodity giving low marginal utility with commodity giving high marginal utility till the marginal utilities of both the commodities become equal assuming that prices of both the commodities are same. In indifference curve analysis, the concepts i.e., definition of indifference curve, marginal rate of substitution, budget line and consumer equilibrium have

been examined. In indifference curve analysis, consumer is said to be in equilibrium when consumer buys that combination of two commodities which yields him maximum satisfaction with given income and prices. Moreover, he does not want to make any change in his current spending. Cardinal utility analysis as well as indifference curve analysis are of utmost importance in certain fields of real life but, at the same time, both the analysis suffers from various limitations also. According to various economists, although both the analysis has many similarities, yet indifference curve analysis is superior to cardinal utility analysis.

3.6. Questions for Practice

A. Short Answer Type Questions

Q1. Explain the relationship between total and marginal utility with the help of diagram.

Q2. List the assumptions of cardinal utility analysis.

Q3. What do you mean by Law of diminishing marginal utility?

Q4. Give example and draw a diagram for law of equi-marginal utility

Q5. Explain Consumer‟s Equilibrium with Single Commodity through example.

Q6. Discuss Consumer‟s Equilibrium of two Commodities with the help of suitable example.

Q7. What do you mean by indifference curve?

Q8. Explain the concept of Consumer Equilibrium.

Q9. What is the meaning of price line under indifference curve?

B. Long Answer Type Questions

Q1. What are the laws of cardinal utility? Give assumptions.

Q2. Discuss the consumer‟s equilibrium under cardinal utility analysis with the help of suitable diagrams.

Q3. Critically evaluate the Cardinal Utility Analysis.

Q4. Explain the effects of change in income and prices of commodities on budget line.

Q5. Explain the various properties of Indifference Curve Critically explain consumer‟s equilibrium determined under indifference curve analysis.

Q6. Why indifference curve analysis is superior to cardinal utility analysis?

3.7. Suggested Readings

- H.L. Ahuja: Advanced Economic Theory (Microeconomic Analysis).
- A. Koutsoyiannis: Modern Microeconomics.

- K.N. Verma: Micro Economic Theory.

BACHELOR OF COMMERCE (Hons.)

SEMESTER–IV

COURSE: BUSINESS ECONOMICS

UNIT 4: PRODUCTION FUNCTION: LAW OF VARIABLE PROPORTIONS AND RETURNS TO SCALE

STRUCTURE

4.0 <u>Learning Objectives</u>

After completion of this unit, learner will be able to:

- Describe the meaning of production function
- Identify different types of production function
- Differentiate between the law of variable proportion and law of returns to scale

4.1 Introduction

A product's supply depends upon its cost of production, which in turn depends upon the physical relationship between inputs and outputs as well as input prices. In deciding the cost of production, the physical relationship between inputs and outputs is crucial. Therefore, theory of production relates to the physical laws governing production of goods. The theory of production, like the theory of demand, examines how a producer or firm can use its capital effectively to maximize profit. They must make the following production decision:

(a) What should be produced by a firm?

(b) How should the firm produce?

(c) How much and at what price does the firm sell?

(d) What is the best way for the firm to market its product?

These decisions are critical in the production process because they determine the goals of the firm. In the forthcoming pages, we will thoroughly study these aspects of production.

4.2 Meaning of Production Function

Production function means transformation of physical inputs into physical outputs. The functional relationship between physical inputs and physical output of a firm is known as production function. Algebraically, it can be written as:

$$Y = f(N, K, L, E)$$

Basically, there are four factors of production i.e., land, labor, capital and entrepreneur. From the above equation it will be read as: Production (Y) is a function (*f*) of labour (N), capital (K), land (L) and entrepreneur (E). According to Koutsoyiannis, "The production is purely a technical relation which connects factor inputs and output." Watson defined production function as, "The

relation between a firm's physical production and the material factors of production is called as production function."

4.3 Types of Production Function

In economic theory, we are interested in two types of production functions. Firstly, when the quantities of some inputs are kept constant and the quantity of one input is varied. This kind of production function is called as the law of diminishing marginal returns or law of variable proportions and returns to a factor. It is important to note that returns to variable factors are relevant for the short run because in the short run some factors like, capital equipment, machines and land remained fixed and factors such as labour and raw material are increased to expand output. Secondly, the production functions with two or more than two variable factors which is called the law of returns to scale. The short run production function can be written as

$$Q = f(L, K)$$

In this, Q stands for output, L for labour and K for capital which is held constant in the short run. Thus, the concept of returns to a factor is concerned with the study of how output changes when the amount of variable factor, such as labour is increased.

To understand this, first we will study some concepts of physical products that are generally used for the study of returns to a variable factor. Regarding physical production of factors there are three concepts:

A. **Total Product (TP):** Total product of a variable factor is the amount of total output produced by a given quantity of the variable factor, keeping the quantity of other factors such as capital constant.

B. **Average Product (AP):** The average product of a variable factor (labour) is the total output divided by the amount of labour employed with a given quantity of fixed factors used to produce a commodity. Symbolically,

$$AP = \frac{Q}{L}$$

Here, AP = Average product, Q = Total output, L = Total units of variable factor (labour). It has been generally found that the average product is an indicator of productivity of the

variable factor.

Table 1 Total Product, Marginal Product, and Average Product of Labour

Labour (No. of Workers)	**Total Product (TP)**	**Average Product (AP = Q/L)**	**Marginal Product (MP = ΔQ/ΔL)**
1	20	20	20
2	36	18	16
3	48	16	12
4	56	14	8
5	60	12	4
6	60	10	0
7	56	8	-4

C. Marginal Product (MP): Marginal product of a variable factor is the addition made to the total production by the employment of an extra unit of a factor.

Symbolically,

$$MP = \frac{\Delta Q}{\Delta L}$$

MP = marginal product of labour,

ΔQ = Change in total output,

ΔL = Change in = variable factor (labour).

It is important to note that the marginal product of a factor changes at different levels of employment of the factor. It has been found that the marginal product of a factor rises in the beginning and then falls as more of it is used for production. The concepts of Total Product (TP), Marginal Product (MP) and Average Product have been explained with the help of a Table 1.

Check Your Progress-I

Q1. What is meant by production function?

Ans.

Q2. Explain the types of production function.

Ans.

4.4 Laws of Production Function

In the preceding pages, we have studied that in the short run the output can be increased by increasing the amount of the variable factor. Therefore, the response of output to changes in the amount of a variable factor, while keeping the units of fixed factors constant, is referred to as returns to a factor. Besides this, output can be increased by increasing all the factors of production in the long run. The response of output to changes in the size or scale of all the factors is called as returns to scale. Thus, there are two laws of production:

Law of Variable Proportions or Returns to a Factor and Law of Returns to Scale.

4.4.1 Law of Variable Proportions

In economic theory, the law of variable proportion occupies an important place. This law examines the production function with one factor variable, keeping the quantities of other factors constant.

When one factor's quantity is increased while the quantity of other factors remains unchanged, the proportion between fixed and variable factors changes. The law of variable proportions states that as the proportion of factors is changed, the total production at first increases more than proportionately, then equi-proportionately and finally less than proportionately. The classical economists named it the law of diminishing returns. It is now

usually called the law of variable proportions. It can also be called the law of diminishing marginal product or diminishing marginal returns.

G.J. Stigler, writes, *"As equal increments of one input are added; the inputs of other productive services being held constant, beyond a certain point the resulting increments of product will decrease, i.e., the marginal product will diminish."*

According to Leftwitch, *"The law of variable proportions states that if the input of one resource is increased by equal increments per unit of time while the inputs of other resources are held constant, total output will increase, but beyond some point the resulting output increases will become smaller and smaller."*

According to Samuelson, *"An increase in some inputs relative to other fixed inputs will, in a given state of technology, causes output to increase; but after a point the extra output resulting from the same additions of extra inputs will become less and less"*.

4.4.1.1 Assumptions of the Law

The law of variable proportions holds good under the following assumptions:

A. One of the factors is variable while all other factors are fixed.

B. All units of the variable factor are homogeneous.

C. The state of technology is assumed to be given and unchanged. If change in technology will occur then AP and MP may rise instead of diminishing.

D. This law is based upon the possibility of varying the proportions in which the various factors can be combined to produce a product. For instance, 2 hectares of land with 1 labourer; or 2 hectares of land with 4 labourers. It is important to mention here that this law does not apply to those cases where the factors must be used in fixed proportions to yield a product.

4.4.1.2 Stages of Law of Variable Proportion

When a variable quantity of one factor is combined with a fixed quantity of the other, the production process can be divided into three stages, as shown in the table below.

Table 2 Three Stages of Production

Units of Land (Hectare)	Labour (No. of Workers)	Total Product (TP)	Average Product (AP = Q/L)	Marginal Product (MP = ΔQ/ΔL)	Identification of Three Stages of Production
1	1	2	2	2	**Stage 1** Increasing Returns to a Variable Factor
1	2	5	2.5	3	
1	3	9	3	4	
1	4	12	3	3	**Stage 2** Diminishing Returns to a Variable Factor
1	5	14	2.8	2	
1	6	15	2.5	1	
1	7	15	2.1	0	**Stage 3** Negative Returns to a Variable Factor
1	8	14	1.7	-1	

It will be seen from figure 1 that the behaviour of the variable factor's total, average and marginal products in response to an increase in its amount is typically divided into three stages.

A. **Increasing Marginal Returns to a Factor (Stage 1):** Total product rises at an increasing rate to a point in this stage. During stage 1, the total product continues to rise, but its slope is decreasing, implying that from point E to G, the total product rises at a diminishing rate (the total product curve is concave downwards at this level), i.e., the marginal product falls but remains positive. The point E where the total product stops increasing at an increasing rate and starts increasing at the diminishing rate is called the point of inflection. The average product curve reaches its maximum point at the end of stage 1. It is worth noting that the marginal product in this stage initially rises and then falls, but it remains higher than the average product during stage 1, implying that the average product continues to rise.

B. Diminishing Marginal Returns to a Factor (Stage 2): Total product continues to increase at a diminishing rate in this stage until it reaches its maximum point G, where the second stage ends. The variable product's AP and MP both are diminishing at this stage, but they have remained positive. The variable factor's marginal product is zero at the end of the second level, i.e. at point C.

C. Negative Marginal Returns to a Factor (Stage 3): Total product is declining in this stage, and the total product curve is sloping downward. As a result, the variable factor's marginal product is negative, and the marginal product curve goes below the X-axis.

Figure 1

From the above figure the relationship between AP and MP can be explained.

a. AP is rising in Stage 1. MP rises at first, and then starts to fall. It's worth noting that as AP rises, MP must be greater than AP.

b. AP decreases in Stage 2. MP continues to decrease until it reaches zero at point C. MP remains below AP as long as AP is declining.

c. MP becomes negative in Stage 3. While AP continues to decline, it remains positive. It is important to remember that even if MP is negative, AP must remain positive.

The relationship between MP and TP can also be explained.

a. TP increases at an increasing rate in Stage 1 as long as MP rises. However, as MP decreases, TP increases at a decreasing rate.

b. During Stage 2, as MP begins to decline, TP rises at a diminishing rate. There is no rise in TP when MP = 0.

c. When MP is negative in Stage 3, TP begins to decline.

The Stage of Rational Decisions

A key question now is in which stage a rational producer would seek to produce. A rational producer would never try to produce in stage 3, where the variable factor's marginal product is negative. He will stop at the end of stage 2, when the variable factor's marginal product is zero. The producer will maximize the total product and thus make maximum use of the variable factor at end point C of the second stage, where the marginal product of the variable

factor is zero. According to Ferguson, "Even if units of the variable input were free, a rational producer would not employ the zero marginal products because their use entails a reduction in total output."

A rational producer will not want to produce in stage 1, where the fixed factor's marginal product is negative. It means he will not make the maximum use of the fixed factor in stage 1, and he will also not completely exploit the opportunities to increase output by raising the quantity of the variable factor, whose average product will continue to grow during stage 1. As a result, a reasonable producer will not stop at stage 1, but will expand further. From the above, it is clear that a rational producer can never be found producing in stages 1 and 3. As a result, stage 1 and 3 in the production function reflect non-economic regions. Therefore, a reasonable producer will often try to produce in stage 2, where the marginal and average product of the variable factor is decreasing.

4.4.1.2 Causes of Increasing Marginal Returns to a Variable Factor

A. **Effective utilization of the Fixed Fact**or: In the beginning, the quantity of the fixed factor is abundant relative to the quantity of the variable factor. Therefore, when more and more units of the variable factor are added to the constant quantity of the fixed factor, then the fixed factor is more intensively and effectively utilised, that is, efficiency of the fixed factor increases as additional units of the variable factor are added to it. Due to this, initially production increases at an increasing rate. On the other side, some amount of the fixed factor remains unutilised because the variable factor is relatively smaller in quantity.

B. **Increase in Efficiency of the variable factor**: As more and more units of the variable factor are employed; the possibility of division of labour and specialisation increases. Thus, greater the quantity of the variable input, the greater the scope for specialisation which will further help to increase efficiency and productivity.

C. **Better Coordination between the factors:** So long as the fixed factor remains underutilized, additional application of the variable factor tends to improve the degree of co-ordination between the fixed and variable factors. As a result, total output increases at an increasing rate.

4.4.1.4 Causes of Diminishing Marginal Returns to a Factor

This is the most important stage of the law of diminishing returns. Following are the main

causes for the operation of this law:

1) **Scarcity of the Fixed Factor:** When with the increase in the variable factor the fixed factor becomes more and more scarce in relation to the variable factor so that as the units of the variable factor are increased, they receive less and less aid from the fixed factor. Hence, marginal and average products of the variable factor decline.
2) **Imperfect Substitutability of the Factors:** Factors of production are imperfect substitutes of each other. More and more of labour, for example, cannot be continuously used in place of additional capital. Accordingly, diminishing returns to the factor becomes inevitable.
3) **Indivisibility of the Fixed Factor:** If the factors were perfectly divisible, there would have been no necessity of taking the large quantity of the fixed factor in the beginning to combine with the varying quantities of the other factor. A significant point worth mentioning is that if factors were completely divisible, the issue of differing factor proportions would not have arisen and thus the phenomenon of increasing and decreasing marginal returns to a factor would not have occurred.
4) **Poor Coordination between the factors**: Increasing the application of the variable factor along with the fixed factor(s) above a certain point crosses the ideal factor ratio limit. Consequently, the co-ordination between the fixed and the variable factor becomes poor.

4.4.1.5 Causes of Negative Marginal Returns

The total product declines and the marginal product become negative as the amount of the variable factor is increased to the constant quantity of the fixed factor. The phenomenon of negative marginal returns to the variable factor occurs when the amount of the variable factor increases too large in relation to the fixed factor, as they get in each other‟s way, causing total production to fall rather than rise. In short, just as the marginal product of the fixed factor was negative due to its abundance in the first stage, the marginal product of the variable factor is negative due to its excessiveness in the third stage.

4.4.1.6 General Applicability of the Law of Diminishing Returns

The law of diminishing returns, which states that marginal physical product ultimately diminishes, even though it increases at first, has been discussed previously. Until Marshall, it was assumed that three laws of production are distinct and different. Modern economists, on the other hand, believe that decreasing, constant and increasing returns are three phases of one

general law i.e., law of variable proportions, rather than three different laws. Furthermore, before Marshall, it was assumed that the law of diminishing returns applied to agriculture and manufacturing industries was characterized by constant or increasing returns. However, this is no longer the case; the law of diminishing returns has a wide range of applications. This law covers industries as well as agriculture. In case of application to industries Factors of production must be increased in order to maximise the output of manufactured products. Labor and capital are more important in manufacturing industries than land and capital is usually fixed in supply during the short term. As a result, increasing the number of workers is pursued to increase productivity. When more labour is used on a fixed amount of capital, the marginal product of labour must eventually decrease. Whereas in case of application to agriculture, labor and capital can be increased to the desired extent in order to increase agricultural output since these are variable factors, but not land, which is a fixed factor of production. As a result, when rising doses of labour or capital are added to a fixed amount of land, the variable factor's marginal return starts to decrease, and the law of diminishing returns becomes operative.

Causes for the Application of this Law to Agriculture Sector:

There are various reasons due to which this law is applicable to the agriculture sector.

A. In agriculture, nature plays a significant role. Natural factors such as rainfall have a significant impact on agricultural production. However, there is a lot of concern about the supply of rainwater. As a result, the law of diminishing returns kicks in quickly.
B. With continued agriculture, land fertility continues to decline. As a result, the marginal return decreases as more units of labour or capital are added to it.
C. Agricultural activities are spread out over vast areas of land, requiring less supervision. As a result, it cannot be efficiently supervised. Consequently, the cost of production rises.
D. Agriculture is considered as a seasonal occupation. The demand for labour in the agriculture sector is for some months only while the rest of the time they remain idle, which causes a rise in cost of production.
E. Due to the lower degree of division of labour and specialisation, agriculture experiences a faster application of the law of diminishing returns.
F. In addition to this, all pieces of land are not fertile in the same way. When demand for land rises, even less fertile land is cultivated. It translates to lower marginal returns and higher production costs.

Thus, the law of diminishing returns is considered universal since it applies to all fields of output.

4.4.1.7 Importance of the Law of Diminishing Marginal Returns

A. Malthus based his population theory on this law. According to him, food grain production lags behind population growth because agriculture is subject to the law of diminishing returns.

B. This law is the foundation for Ricardo's theory of rent. The first dose of labour and capital to land yields higher returns than the second. The difference between the first and second dose‟s returns is referred to as „rent.

C. This law is also considered as the basis of the theory of distribution. According to the marginal productivity theory of distribution, as more and more units of factor of production are employed its marginal productivity decreases. As a result, it‟s per unit share in total production decreases.

4.4.1.8 Postponement of the Law of Diminishing Marginal Returns

In the following two situations, the law of variable proportions can be postponed:

A. If technological advancements occur, the application of the law of variable proportions can be delayed. Because, with the advancement in technology the law of variable proportions becomes ineffective, resulting in increased efficiency and lower cost.

B. The operation of this law can also be postponed when the factors of production are perfect substitutes of each other.

Check Your Progress II

Q1. What is law of variable proportion?

Ans.

Q2. Define TP and MP.

4.4.2 Law of Returns to Scale

Next, the scale of production in the context of two factors of production means a given amount of labour and capital is used in the production process. Thus, the proportionate change in

both the factors brings about a change in the scale. The behaviour of total output when all inputs are varied by the same proportion is called returns to scale as applicable in the long run. Long run is that production function in which all the factors of production are variable. Thus, in this type of production function we try to find out the behaviour of output when it is possible to change the size of all the factors. It means we tried to explain the behaviour of output in response to changes in these scales. Any change in the scale means that all inputs or factors are changed in the same proportion. According to Koutsoyiannis, "The term returns to scale refers to the changes in output as all factors change by the same proportion."

In the long run, output can be increased by increasing all factors in the same proportion or different proportions. Ordinarily, law of returns to scale refers to increase in output as a result of increase in all factors in the same proportion. Such an increase in output is called returns to scale. In the long run output may be increased by changing all factors by the same proportion or by different proportions.

Let us start from an initial level of inputs and outputs:

$$P = f(L, K)$$

If both the factors of production, i.e., labour (L) and capital (K) are increased in the same proportion (k), then production function will be rewritten as:

$$P^* = f(kL, kK)$$

If P*, increases in the same proportion as increase in factors of production, i.e., $\frac{P_*}{P} = m$, then we say that there are constant returns to scale.

If P*, increases less than proportionate increase in factors of production, i.e., $\frac{P_*}{P} < m$, then we

have decreasing returns to scale.

If P, increases more than proportionate increase in factors of production, i.e., $\frac{P_*}{P}$ > m, we have

increasing returns to scale.

4.4.2.1 Increasing Returns to Scale

Increasing returns to scale occurs when a given percentages increase in all factor inputs causes‟ proportionately greater increase in output. For example, if 100% increase in all factor inputs (labour and capital) causes 150% increase in output then returns to scale are called increasing. From above, it can be said that when output increases at a higher rate than the increase in factors of production employed.

Causes of Increasing Returns to Scale

There are numerous reasons due to which in the initial stage the firm is having increasing returns:

A. **Indivisibility of Factors:** Some factors are available in large and lumpy units and can therefore be utilised utmost efficiency at a large level of output. Therefore, in the case of some indivisible and lumpy factors, when output is increased from a small level to a large one, indivisible factors are better utilised and therefore increasing returns are obtained.
B. **Greater Possibilities of Specialisation of Labour and Machinery:** With the increase in the scale, returns to scale can occur because the firm can introduce greater degree of specialisation of labour and machinery and also because it can install technologically more efficient machinery.

As in the large scale of production, instead of being general, workers can specialize in performing a particular task in the production process.

Thus, it can be said that as the scale of production is increased, due to indivisibility of factors such as labour, machines, division of labour and specialisation and many types of economies are available to the firm. On account of these economies, proportional increase in returns is more than the proportionate increase in factors of production. All these economies are only internal economies as these are related to the scale of production of the concerned firm.

4.4.2.2 Constant Returns to Scale

Constant returns to scale occur when a given percentage increase in all factor inputs causes equal percentage increase in output. Therefore, if we are doubling or trebling all factors then output will also respond in the same proportion. For instance, if 100% increase in all factor inputs causes 100% increase in output, it is a case of constant returns to scale. In mathematics, the case of constant returns to scale is called as linear homogeneous production function or homogeneous production function of the first degree.

Thus, constant returns to scale occurred when total output increases at the same rate at which all the factors of production are increased. This situation arises, when after reaching a certain level of production, economies of scale are counter-balanced by diseconomies of scale. This function states that if labour and capital are increased in equal proportion then output will also increase in the same proportion. Cobb and Douglas production function is based on this scale.

4.4.2.3 Decreasing Returns to Scale

Decreasing returns to scale occurs when a given percentage increase in all factor inputs causes proportionately lesser increase in output. If 100% increase in all factor inputs causes, say, only 80% increase in output, it is a case of decreasing returns to scale. The fundamental cause for the operation of decreasing returns to scale, according to some economists, is when diseconomies surpass economies of scale. For instance, indivisible factors becoming inefficient and less productive, difficulties of control and rigidities due to large managements, higher cost of skilled labour, higher price of raw material and high transport charges. Thus, as a company grows in size, its administrative structure becomes more complex. The management is likewise unable to adapt quickly to shifting demand and cost conditions. After a certain point in the expansion of the factors, diseconomies of scale occur, resulting in decreasing returns to scale. It is important to mention here that there is a difference between decreasing returns to scale and diminishing marginal returns.

Table 3 Returns to Scale

Units of all factor inputs used	Total Returns (quintals)	Average Returns (quintals)	Marginal Returns (quintals)	Scale
One	10	10	10	Increasing
Two	22	11	12	
Three	35	11.66	13	
Four	60	15	25	Constant
Five	85	17	25	
Six	102	17	17	Decreasing
Seven	114	16.28	12	

The former arises due to the increasing complexities of the organisation, while the latter is due to the application of increasing units of a variable factor to fixed factors. Table 3 explains the law of returns to scale, when the units of all factors are increased in the same proportion, the total output responds at different rates i.e., increasing, constant and decreasing.

The returns to scale can be explained with the help of a figure. It will be seen from figure 2 that when the units of factors of production are increased, the output increases at a higher scale initially.

As more and more units are put into the production process the marginal product becomes constant because the percentage increase in output is equal to the percentage increase in inputs. If we increase further the units of inputs the output will start declining**.**

In this figure, the product curve shows increasing returns from R to T, constant returns from T to K and diminishing returns from K to S.

Figure 2

From the above discussion, it is clear that when the units of all the factors are increased in the same proportion, total output increases at the different rates i.e., increasing, constant and decreasing.

Check Your Progress -III

Q.1 What is the law of returns to scale? Explain the different stages of this law.

Ans.

Q2. Which is the rational stage of production and why?

Ans.

4.5 Summary

In this unit, we discussed that the production function describes a physical relationship which must be combined with prices of inputs to determine the efficient resource combination of producing a specific level of output. There are two types of input-output relations or production functions. Firstly, the production function when the quantities of

some inputs are kept constant and the quantity of one input are varied which is called the law of variable proportion. Secondly, the input-output relation by varying all inputs proportionally is called as returns to scale. Since in the long run all factors can be varied, thus law of returns to scale relates to long-run production function. The way resources are combined in a production process, the productivity of resources in various combinations and the prices of the resources involved in the production process all have a major role in determining the cost of production of a commodity. Thus, production is the most important activity taking place in an economy because the decisions about what to produce and how to produce are important to any economic system.

4.6 Questions for Practice

A. Short Answer Type Questions

Q1. What is the production function?

Q2. Distinguish between fixed and variable factors of production?

Q3. Mention the assumptions of law of variable proportion.

Q4. Explain the law of increasing returns to a factor.

Q5. What do you understand about the law of returns to scale?

Q6. Define long run production function.

Q7. Define TP, AP and MP.

Q8. Distinguish between fixed and variable factors of production.

Q9. Mention the three stages of production.

Q10. Will a producer ever stop in stage 1^{st} and 3^{rd} of production?

Q11. Which is the rational stage of production?

Q12. What are diminishing returns and increasing returns to scale?

B. Long Answer Type Questions

Q1. Explain the law of variable proportions. Explain various stages of this law with the help of a table and a diagram.

Q2. State and explain the law of variable proportions. How does it differ from the law of returns to scale?

Q3. Explain and illustrate the three stages of production with the help of law of variable proportions. In which stage a rational producer would like to operate?

Q4. Explain and illustrate the law of diminishing returns. Why does this law operate?

Does it apply to agriculture only?

Q5. Explain the circumstances under which the increasing returns to a factor operate.

Is it always applicable to industry?

Q6. What do you understand by returns to scale? Explain the three types of returns to scale.

4.7 Suggested Readings

- L. Ahuja, Principles of Microeconomics, S. Chand & Company Ltd. New Delhi
- D.N. Diwedi, Microeconomics, Theory and Application, Vikas Publishing House, New Delhi.
- Perloff, J. M, Microeconomics, Theory and Application with Calculus, Pearson Addison Wesley.
- Koutsoyiannis, A, Modern Microeconomics, The Macmillan Press Ltd.