GEC S1 01

Introduction to Economic Theory-I

SEMESTER - I

ECONOMICS

BLOCK - 1

KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

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First Edition: May, 2017, Reprint May 2018

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Printed and published by Registrar on behalf of the Krishna Kanta Handiqui State Open University.

The university acknowledges with thanks the financial support provided by the **Distance Education Bureau, UGC**, for the preparation of this study material.

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COURSE INTRODUCTION

This course introduces a learner to the field of Economics. Economics, according to the Oxford English Dictionary is "the branch of knowledge concerned with the production, consumption and transfer of wealth". Economics can be broadly subdivided into two categories– Microeconomics and Macroeconomics. Microeconomics is the branch of economics which studies the implications of individual human action, especially about how these decisions affect the utilization and distribution of scarce resources. Macroeconomics studies how the aggregate economy behaves. In macroeconomics, a variety of economy-wide phenomena is examined– such as National Income, Gross Domestic Product, changes in employment, etc.

This course comprises 15 units and has been divided in three blocks of five units each.

BLOCK INTRODUCTION

This first block of the paper 'Introduction to Economic Theory I' comprises five units. Unit I describes the subject matter of Economics and its division into Micro and Macro. It also deals with the concepts of stock and flow variables. Unit II deals with the concept of equilibrium and describes static analysis, comparative static analysis and dynamic analysis. Unit III introduces the concept of demand as understood in economics. The derivation of the demand curve is explained and situations of movement along the curve and shift in the curve are also dealt with. The learner is introduced to the concept of elasticity in this unit. Unit IV deals with the cardinal approach of Consumer Behaviour. Here the Law of Diminishing Marginal Utility is explained along with the Law of Equi Marginal Utility. The learners also come to know about the concept of Consumer's Surplus in this Unit. Unit V explains the Ordinal Approach to Consumer Behaviour. Here Indifference Curves and their properties are explained along with the Budget Line. The Price, Income and Substitution Effect of a change in price is explained diagrammatically.

This block includes some along-side boxes to help you know some of the difficult, unseen terms. Some "ACTIVITY' have been included to help you apply your own thoughts. And, at the end of each section, you will get "CHECK YOUR PROGRESS" questions. These have been designed to self-check your progress of study. It will be better if you solve the problems put in these boxes immediately after you go through the sections of the units and then match your answers with "ANSWERS TO CHECK YOUR PROGRESS" given at the end of each unit.

UNIT 1: INTRODUCTION TO ECONOMICS

UNIT STRUCTURE

1.1 Learning Objectives

1.2 Introduction

1.3 Basic Concepts in Economics

- 1.3.1 Subject Matter of Economics– What Economics is about?
- 1.3.2 Nature and Scope of Economics
- 1.3.3 Choice as an Economic Problem
- 1.3.4 Stock and Flow Variables

1.4 Micro Economic Approaches

- 1.4.1 Scope and Subject Matter of Micro Economic Approaches

1.5 Macro Economic Approaches

- 1.5.1 Scope and Subject Matter of Macro Economic Approaches

1.6 Let Us Sum Up

1.7 Further Reading

1.8 Answers to Check Your Progress

1.9 Model Questions

1.1 LEARNING OBJECTIVES

After going through this unit, you will be able to -

- identify the basic concepts and need to study Economics
- discuss the subject matter, nature and scope of Economics
- elaborate the concept of choice as an economic problem
- identify stock and flow variables
- give the meaning of microeconomic approaches
- explain the scope and subject matter of microeconomic approaches
- give the meaning of macro economic approaches
- explain the scope and subject matter of macroeconomic approaches.

1.2 INTRODUCTION

This Unit is concerned with familiarising you with some of the important concepts in Economics. They include nature and scope of Economics, the central problems of an economy, choice as an economic problem; stock and flow variables; meaning, scope and subject matter of micro and macro economic approaches.

We shall begin with a few basic concepts in Economics, which includes subject matter of Economics, its nature and scope, choice as an economic problem, stock and flow concepts thereby moving towards two major branch of economics as Microeconomics and Macroeconomics.

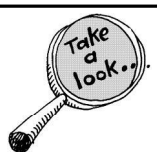
1.3 BASIC CONCEPTS IN ECONOMICS

This section deals with a few basic concepts in Economics. This section has been divided into four major sub-sections as follows:

1.3.1 Subject Matter of Economics– What Economics is about?

To know the subject matter of economics, we have to study the various notable definitions and their illustrations. Over these years, different economists have tried to define the subject in various contexts. We will study four Major definitions put forward by:

- Adam Smith
- Alfred Marshall
- Lionnel Robinns and
- P. A. Samuelson.



To know more about ***Adam Smith,*** please refer to Appendix-B at the end of the block.

Adam Smith's definition: Adam Smith, author of *The Wealth of Nations* (1776), is generally regarded as the Father of modern Economics. In this work, Smith describes the subject in these terms:

Political economy, considered as a branch of the science of a statesman or legislator, proposes two distinct objects: first, to supply a plentiful revenue or product for the people, or, more properly, to enable them to provide such a revenue or

subsistence for themselves; and secondly, to supply the state or commonwealth with a revenue sufficient for the public services, it proposes to enrich both the people and the sovereign.

Smith referred to the subject as 'Political Economy', but that was gradually replaced in general usage by the term `Economics' after 1870.

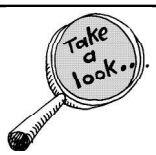
The above definition put forward by Smith has been criticised on many grounds. *First*, Smith had laid primary emphasis on wealth. It has been criticised that wealth can never be of prime importance in human life in a modern society. Wealth may be one of the means to fulfill some of the human wants, but, inheritance of wealth alone can never be the sole objective of human lives. Thus, the prime importance should be on human being or human life, and not on wealth. *Second,* all kinds of wealth does not increase human welfare. *Third, Adam* Smith's definition does not make any reference to scarcity of resources which is the main cause of all economic problems.

Alfred Marshall's Definition: In his book, *Principles of Economics,* published in 1890, Marshall states:

Economics examines that part of social and individual action which is most closely connected with the attainment and with the use of material requisites of well-being. Thus, it is on the one side, a study of wealth and on the other and more important side, a part of the study of man.

Clearly Marshall's definition underlines, the importance of material goods which are related to human welfare. Another important aspect of Marshall's definition is that it has considered Economics as a social science. Thus, according to this definition, Economics is a social science and not one which studies isolated individuals or ***Robinson*** **Crusoes.**

Although Marshall's definition is superior to Adam Smith's definition, yet it has been criticised on the following grounds. *First,*



To know more about ***Alfred Marshall,*** please refer to Appendix-B at the end of the third block.



Robinson Crusoe: refers to the character Daniel Defoe's famous novel of the same name. The character of the novel, Robinson Crusoe leads an isolated life in an uninhabited island. Hence, here it means an individual or a human being living in separation from the society.

according to this definition the subject matter of Economics is the increase in material welfare. Even when Marshall has acknowledged the prevalence of both material and immaterial wealth, yet his definition has completely ignored the role of non-material welfare in human lives. *Secondly,* the shift of emphasis from wealth to welfare is a welcome step, but it is difficult to measure welfare, since it is a subjective concept relating to the state of mind. Moreover, Marshall too has failed to address the most important problem of Economics i.e. the issue of scarcity of resources.



To know more about ***Lionel Robins,*** please refer to Appendix B at the end of the block.

Lionel Robbins' definition: In his book, *Nature and Significance of Economic Science*, Robbins defines Economics as follows: "Economics is the science which studies human behaviour as a relation between ends and scarce means which has alternative uses."

This definition emphasizes three important points:

- Here, 'ends' refer to wants. Human wants are unlimited in number. If one want is satisfied, another crops up.
- Contrary to the unlimited number of wants, the means of satisfying these wants are strictly limited.
- The limited means we have in our hands to fulfil our wants have alternative uses.

These three statements together give rise to the economic problem of choice. The study of the economic problem or the problem of choice is, thus, the subject matter of Economics.

Criticisms of Robbins' Definition: Like the earlier ones, Robbins' definition too has been criticised. The main criticisms are:

- The definition is too wide. It has made the subject matter of Economics more abstract and complex.
- The definition put forward by Robbins does not incorporate the 'growth' aspect of an economy.
- The definition ignores some of the fundamental problems of under-developed and developed nations like poverty and unemployment.

- According to Professor Cairncross, choices only in the social context are relevant for study; individual choices can never be a subject matter of Economics.
- According to Samuelson and Nordhaus, Economics is also related to the concept of efficiency. Robbins has not paid attention to that.



To know more about ***Paul A. Samuelson*** please refer to Appendix-B at the end of the block.

Paul A. Samuelson's Definition: Paul A. Samuelson has defined Economics on the basis of the modern concept of growth. According to him,

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

Samuelson's defintion takes into account men, money, scarce resources and production aspects. However; critics point out that his definition has not paid due attention to the aspect of human well-being, which is a very important in our lives. Again, the role played by the service sector in contemporary society has not been paid due attention.

1.3.2 Nature and Scope of Economics

The nature and scope of Economics are related to the basic question: What Economics is about? A study of the definitions as given in the earlier section helps us to understand the nature of Economics and to address the question: 'Is Economics the study of wealth or scarce economic resources or of human behaviour?

From the discussion of the definitions of Economics we can say that Economics studies how man and society try to utilise the limited resources which have alternative uses to solve the various problems. Again, how an economy or the economies should follow the different developmental policies and strategies in the interest

of the present and future generations is also the subject matter of Economics.

The scope of Economics is very wide. It includes the subject matter of Economics, whether it is a science or an art, and whether it is a positive science or a normative science. Economics is a social science that studies the production, distribution, and consumption of resources. By extension, Economics also studies economies, the creation and distribution of wealth, the abundance and scarcity of resource, and human welfare. The term Economics has come from the Greek words *oikos* (house) and *nomos* (custom or law), hence it means "rules of the house (hold)".

It is a general fact that production of something will not automatically lead to its consumption. The goods produced will be exchanged at the personal, national and international level. The scope of Economics, thus, includes irternal trade and international trade under its purview. Thus, the study of money, personal income, national income, monetary policy, fiscal policy, pubfic finance, Government's role in the economic development of countries, Economics of environment and Economics of weifare are all integral parts of the scope and nature of Economics.

The Scope of Economics also includes the two approaches to economic theory given below:

- **Microeconomics** is the branch of Economics that examines the behaviour of individual decision-making units– that is, business firms and households.
- **Macroeconomics** is the branch of Economics that examines the behaviour of *economic aggregates* – income, output, employment, and so on – on a national scale. It is to be noted that the terms 'micro' and 'macro' were coined by ***Ragnar Frisch.***

Economics may also be discussed as Positive or Normative.

- **Positive Economics** studies economic behaviour without making judgments. It describes what exists and how it works.



To know more about ***Ragnar Frisch*** please refer to Appendix-B at the end of the block.

- **Normative Economics,** also called 'Policy Economics', analyzes the outcomes of economic behaviour, evaluates them as good or bad, and may prescribe courses of action.

One of the uses of Economics is to explain how economies work as economic systems and what relations are there between economic players (agents) in the larger society. Method of economic analysis have been increasingly applied to fields that involve people (officials included) making choices in a social context, such as crime, education, the family, health, law, politics, religion, social institutions and war.



CHECK YOUR PROGRESS

Q.1: State whether the following statements are true or false:

a) Economics is the social science that studies the production, distribution, and consumption of resources. (True/False)

b) Robbin's definition is scarcity based. (True/False)

c) Production automatically leads to consumption.

Q.2: Who coined the terms 'Micro' and 'Macro'?

Q.3: Fill in the blanks:

a) Economics is the science which studies ..... as a relation between ..... and scarce means which has alternative uses.

b) Oikos means ..... and nomos means .....

c) *The Wealth of Nations* was written in the year .....

Q.4: Match the following set A with set B:

Set A	**Set B**
i) Adam Smith	a) Principles of Economics
ii) Alfred Marshall	b) Wealth of Nations
iii) Lionnel Robbins	c) Nature and Significance of Economic Science

Q.5: How has Lionnel Robbins defined Economics? Mention the important aspects of his definition. (Answer in about 50 words)

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1.3.3 Choice as an Economic Problem

Every nation's resources are insufficient to produce the quantities of goods and services that would be required to satisfy all the wants of the citizens. This is known as the problem of scarcity and this can be overcome by exercising choice.

Scarcity and Choice: Because of scarcity of resources an individual has many decisions or choices to make, like:

- Whether to go to college after school or start earning?
- Whether to buy a motor cycle or a small car?
- Whether to marry or remain single?

In fact our whole life is a multiple-choice problem. Similarly firms also have to make many choices, like:

- Whether to expand output or improve quality?
- Whether to close down a factory or run at a loss?
- Whether to produce output in the same state or in a neighbouring state?

All economic choices involve the allocation of scarce resources. Choices are dictated by scarcity of resources at our command.

Faced with the problem of scarcity, all societies are faced with various basic economic problems which must be solved. These problems are also called central problems of an economy.

These problems are:

- **What to produce?** It refers to which goods and services a society chooses to produce and in what quantites to produce them.

- **How to produce?** It refers to the way in which resources or inputs are organised to produce the goods and services.
- **How much to produce?** How much to produce is an important aspect for the economy. We must judiciously utilise the available resources to meet the present demands, as well as to conserve such resources for meeting the future demands.
- **For whom to produce?** For whom to produce deals with the way that the output is distributed among the members of the society.

1.3.4 Stock and Flow Variables

Economics distinguish between quantities that are stocks and those that are flows. Stock variables refers to the state of affairs at a point of time. Whereas flow refers to the rate at which something happens over a peroid of time. You can easily understand both by thinking stock as water of a pond and flow as water of a river. For example, the money supply, price level, assets of a firm or level of employment are stock concepts; whereas the national income, profits of a firm, the level of industrial production are flow concepts.



CHECK YOUR PROGRESS

Q.6: State whether the following statements are true or false:

a) The study of the economic problem or the problem of choice is the subject matter of Economics.

b) Because of scarcity of resources an individual has many decisions or choices to make.

Q.7: Define stock and flow variables with appropriate examples.

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Q.8: What are the central problems of an economy? (Answer in about 50 words)

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1.4 MICRO ECONOMIC APPROACHES

Microeconomics is a special sub branch of Economics. Here 'Micro' is a Greek word which means small. It is concerned with individual firm and individuals rather than the whole economy and in that sense it is 'micro' in nature. To be very precise, it is a branch of economics that studies the behaviour of individuals and firms in making decisions regarding the allocation of limited resources. It refers to markets where goods or services are bought and sold. Microeconomics deals in how these decisions and behaviours affect the supply and demand for goods and services, which determines prices. And later, prices determine the quantity supplied and quantity demanded. According to Prof. K. E. Boulding, "Micro Economics is the study of a particular firm, particular household, individual prices, wages, incomes, individual industries and particular commodities."

1.4.1 Scope and Subject Matter of Micro Economic Approaches

Micro economic approach is generally concerned with the following topics which can be discussed as the scope of microeconomics.

Commodity Pricing: Pricing of goods and services constitute the subject matter in micro economic analysis. Prices of individual comodities are determined by the individual forces of demand and supply. So micro economic analysis makes demand analysis (individual consumer behaviour) and supply analysis (individual producer behaviour).

Factor Pricing: You know that there are four factors of production namely land, labour, capital and organisation. These four factors contribute towards the production process. So they get rewards in the form of rent, wages, interest and profit respectively. Micro economics deals with the determination of such rewards. This is called factor pricing. It is an important scope of microeconomics. So microeconomics is also called as 'Price Theory' or 'Value Theory'.

Welfare Theory: Microeconomics also has its scope in welfare aspects. It deals with the optimum allocation of available resources to maximise social or public welfare. It provides answers of the very crucial questions of economics viz. 'What to produce?', 'How to produce?', 'For whom it is to be produced?'. So we can say that microeconomics as a branch of economics gives guidance for utilising scarce resources of economy to maximise public welfare.

1.5 MACRO ECONOMIC APPROACHES

Macroeconomics by its very name indicates that it is concerned with 'Macro' concepts which means large in contrast to 'Microeconomics'. The word 'Macro' is derived from the Greek word 'Makros' meaning large or aggregate(total). It is therefore the study of aggregates covering the entire economy such as total employment, national income, national output, total investment, total savings, total consumption, aggregate supply, aggregate demand, general price level etc. It is therefore aggregate economics as it studies the economy as a whole. Prof. J. L. Hansen says, "Macroeconomics is that branch of economics which considers the relationship between large aggregates such as the volume of employment, total amount of savings, investment, national income etc."

1.5.1 Scope and Subject Matter of Macro Economic Approcahes

Macroeconomics, as a study of aggregates, tries to examine the interrelations among various economic aggregates, their

determination and causes of fluctuations in them. It is therefore the study of aggregates covering the entire economy such as total employment, national income, national output, total investment, total savings, total consumption, aggregate supply, aggregate demand, general price level etc. The subject matter and scope of macroeconomics can be discussed as under–

- **Theory of Income and Employment:** Macro-economic analysis explains what determines the level of national income and employment, and what causes fluctuations in the level of income, output and employment. To understand how the level of income and employment is determined, we have to study the determinants of aggregate supply and aggregate demand and further we have to study consumption function and investment function. The analysis of consumption function and investment function are important subject matter of Macro-Economic Theory.

  Theory of Business Cycles is also a part and parcel of the theory of income.

  This theory also examines inter-relation between income and employment, and suggests policies to solve the problems related to these variables.

- **Theory of General Price Level and Inflation:** Macro-economic analysis shows how the general level of prices is determined and further explains what causes fluctuations in it.

  The study of general level of prices is significant on account of the problems created by inflation and depression. The problems of inflation and depression are the serious economic problems faced these days by most of the countries in the world.

- **Theory of Growth and Development:** Another important subject matter of Macro-Economics is the theory of economic growth and development. It studies the causes of under development and poverty in poor countries and suggests strategies for accelerating growth and development in them.

Growth Theory also deals with the problems of full utilization of increasing productive capacity in developed countries and explains how the higher rate of growth with stability, can be achieved in these countries.

- **Macro Theory of Distribution:** Still another important subject matter of Macro-Economics is, to explain what determines the relative shares from the total national income of the various classes, especially as workers and capitalist. Ricardo and Karl Marx propounded theories, explaining the determination of relative shares of various social classes in the total national income. Afterwards, Kalecki and Kaldor also explained determination of relative shares of wages and profits in the national income.

  Macro theory of distribution thus deals with the relative shares of rent, wages, interest and profits in the total national income.

  In addition to this, study of public finance, international trade, monetary and fiscal policies are also the subject matter of Macro-Economics.



CHECK YOUR PROGRESS

Q.9: Give the definition of microeconomics.

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Q.10: Mention briefly the scope and subject matter of microeconomics.

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Q.11: What is meant by macroeconomics?

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Q.12: What do the theories of macroeconomics generally deal with?

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1.6 LET US SUM UP

- We have discussed above the central problems of an economy, that is, what to produce, for whom to produce, how much to produce and how to produce.
- Every nation's resources are insufficient to produce the quantities of goods and services that would be required to satisfy all the wants of the citizens. This is known as the problem of scarcity and this can be overcome by exercising choice.
- Economics distinguish between quantities that are stocks and those that are flows. Stock variables refers to the state of affairs at a point of time. Whereas flow refers to the rate at which something happens over a peroid of time.
- Microeconomics is a branch of economics that studies the behaviour of individuals and firms in making decisions regarding the allocation of limited resources.
- The scope and subject matter of microeconomic approach is generally concerned with commodity pricing, factor pricing and welfare theory.
- Macroeconomics is the study of aggregates covering the entire economy such as total employment, national income, national output, total investment, total savings, total consumption, aggregate supply, aggregate demand, general price level etc.
- The scope and subject matter of macroeconomics is concerned with theory of income and employment, theory of general price level and inflation, theory of growth and development, macro theories of distribution etc.



1.7 FURTHER READING

1) Ahuja, H.L. (2006); *Modern Economics*; New Delhi: S. Chand & Co. Ltd.
2) Dewett, K.K. (2005); *Modern Economic Theory*; New Delhi: S. Chand & Co. Ltd.
3) Koutsoyiannis, A. (1979); *Modern Microeconomics*; New Delhi: Macmillan.
4) Sundharam, K.P.M. & Vaish, M.C. (1997); *Microeconomic Theory*; New Delhi: S.Chand & Co. Ltd.



1.8 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: a) True, b) True, c) False

Ans. to Q. No. 2: Ragnar Frisch.

Ans. to Q. No. 3: a) Economics is the science which studies human behaviour as a relation between ends and scarce means which has alternative uses.

b) Oikos means house and nomos means custom or law.

c) *The Wealth of Nations* was written in 1776.

Ans. to Q. No. 4:

i)	Adam Smith	b) Wealth of Nations
ii)	Alfred Marshall	a) Principles of Economics
iii)	Lionnel Robbins	c) Nature and Significance of Economic Science

Ans. to Q. No. 5: According to Lionel Robbins, "Economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses." Robins' definition emphasises the following:

i) 'Ends' refers to unlimited human wants.
ii) Resources for satisfying human wants are limited.
iii) Scarce resources can be put to alternative uses.

Ans. to Q. No. 6: a) True, b) True

Ans. to Q. No. 7: Stock variables refers to the state of affairs at a point of time. Whereas flow refers to the rate at which something happens over a peroid of time. For example, the money supply, price level, assets of a firm or level of employment are stock concepts; whereas the national income, profits of a firm, the level of industrial production are flow concepts.

Ans. to Q. No. 8: The central problem of an economy arise due to scarcity of resources. Again, these limited economic resources have altemative uses. These limited economic resources create problems of choice as what to produce, how to produce, how much to produce for whom to produce, etc. These are the certral problems of an economy.

Ans. to Q. No. 9: Microeconomics is a branch of economics that studies the behaviour of individuals and firms in making decisions regarding the allocation of limited resources.

Ans. to Q. No. 10: The scope and subject matter of microeconomic approach is generally concerned with comodity pricing, factor pricing and welfare theory.

Ans. to Q. No. 11: Macroeconomics is the study of aggregates covering the entire economy such as total employment, national income, national output, total investment, total savings, total consumption, aggregate supply, aggregate demand, general price level etc. It is therefore aggregate economics as it studies the economy as a whole.

Ans. to Q. No. 12: Macroeconomics generally deals with the theories of income and employment; theroy of general price level and inflation; theory of growth and development and macro theories of distribution.



1.9 MODEL QUESTIONS

A) Very Short Questions (Answer each question in about 75 words):

Q.1: Who authored the book *Wealth of Nations,* and in which year was it published? Why this book is remarkable?

Q.2: Define scarcity.

Q.3: What is meant by problem of choice in economics?

B) Short Questions (Answer each question in about 100-150 words):

Q.1: Discuss the subject matter of Economics.

Q.2: Discuss the scope of Economics.

Q.3: Discuss choice as an economic problem.

Q.4: How far is Marshall's definition of Economics an improvement over Smith's definition?

Q.5: What are the fundamental propositions of the Robbins' definition of Economics?

Q.6: What are the two broad approaches to the study of Economics?

C) Essay-Type Questions (Answer each question in about 300-500 words):

Q.1: Discuss briefly the subject matter of economics.

Q.2: Discuss the nature and scope of economics.

Q.3: Distinguish between microeconomic and macroeconomic approaches. Discuss their scope and subject matter in a brief manner.

*** ***** ***

UNIT 2: THE MARKET MECHANISM

UNIT STRUCTURE

2.1 Learning Objectives

2.2 Introduction

2.3 Demand Supply Framework

- 2.3.1 Meaning of Demand
- 2.3.2 Law of Demand
- 2.3.3 Meaning of Supply
- 2.3.4 Law of Supply

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2.5 Market Equilibrium

2.6 Static Analysis

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2.8 Dynamic Analysis

2.9 Let Us Sum Up

2.10 Further Reading

2.11 Answers to Check Your Progress

2.12 Model Questions

2.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- illustrate the demand supply framework
- give the concept of equilibrium
- discuss market equilibrium
- define static analysis
- define comparative static analysis
- define dynamic analysis.

2.2 INTRODUCTION

This Unit is concerned with familiarising you with some of the important concepts in Economics like demand supply framework and market equilibrium, static, comparative static and dynamic analysis etc.

By the term 'demand' we mean the desire to purchase a good or service that is backed by the purchasing power. The term 'supply' refers to the amount of goods and services that are offered for sale at a price. Having knowledge about the price mechanism makes it easy for us to discuss the concept of market equilibrium.

2.3 DEMAND SUPPLY FRAMEWORK

Meaning of Demand: The demand for a commodity is essentially consumers' attitude and reactions towards that commodity. Precisely stated, the demand for a commodity is the amount of it that a consumer will purchase or will be ready to take off from the market at the given prices in a given period of time. Thus, demand in Ecomomics implies both the desire to purchase and the ability to pay for the commodity. It is to be noted that mere desire for a commodity does not constitute demand for it, if it is not backed by the ability to pay or the purchasing power.



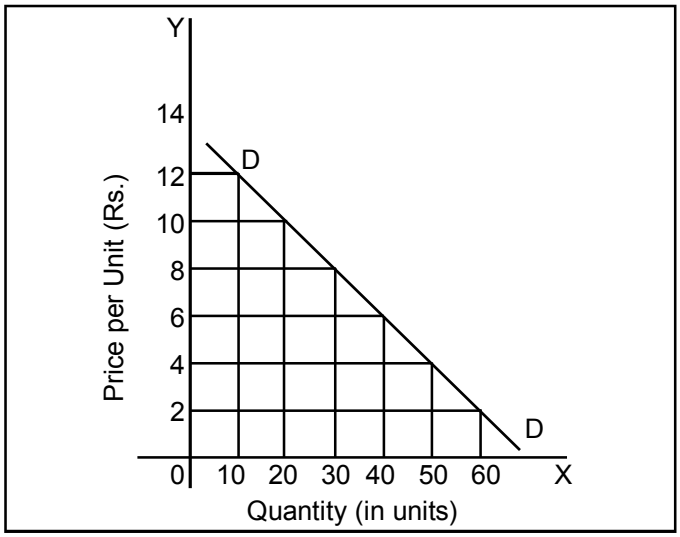
LET US KNOW

Demand for a good is determined by several factors, such as price of the good itself, tastes and habits of the consumer for a commodity, income of the consumer, the prices of related goods, prices of substitutes or complements. When there is change in any of these factors, demand of the consumer for that good also changes.

Law of Demand: The law of demand expresses the functional relationship between the price and the quantity of the commodity demanded. The law of demand or the functional relationship between price and commodity demanded is one of the best known and most important laws of economic theory. According to the law of demand, other things being equal, if the price of a commodity falls, the quantity demanded of it will rise and if the price of the commodity rises, its quantity demanded will decline. Thus, according to the law of demand, *there is an **inverse** relationship between price and quantity demanded, other things remaining*

the same. These other things which are assumed to be constant are: the tastes or preferences of the consumer; the income of the consumer and the prices of the related goods. This law of demand ensures the downward slope of the demand curve. The figure 2.1 exhibits a typical downward sloping demand curve for an individual consumer.

Fig. 1.1: Demand Curve of an Individual Consumer



In the above figure 2.1, quantity demaned is measured along the X-axis and price of the commodity is measured along the Y-axis. From the figure it can be seen that when price of the commodity was Rs 12, the demand for the commodity was 4 units only. When price fell to Rs 10, demand for the commodity increased to 8 units. And finally, when price of the commodity declined to Rs 4, demand for the commodity increased to 20 units. Thus, by plotting the various price-quantity combinations, a negatively (or downward) sloped demand curve DD is obtained. The downward slope of the demand curve indicates that when price rises, less units are demanded and when the price falls, more quantity is demanded. This negative slope arises basically because of the law of diminishing marginal utility which states that as a person takes more and more of a commodity, the utility derived from the subsequent unit falls.

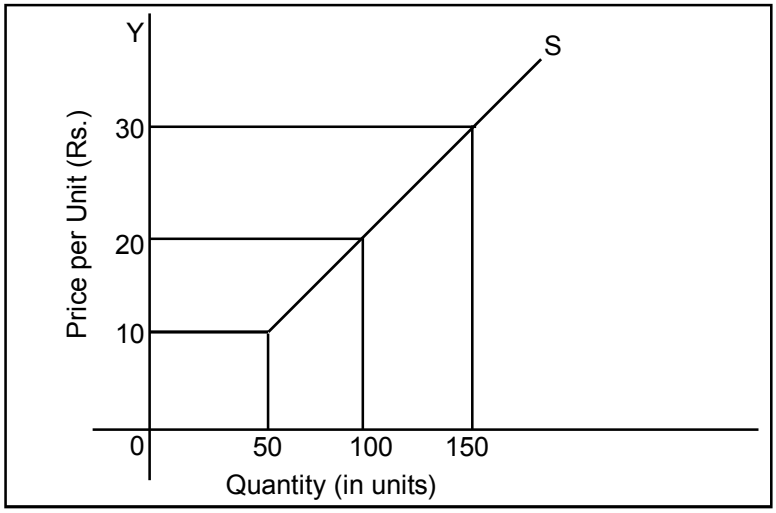
Meaning of Supply: Supply is a fundamental economic concept that describes the total amount of a specific good or service that is available to consumers. Supply can relate to the amount available at a specific price or the amount available across a range of prices if displayed on a graph. It

is the relation between the price of a good and the quantity available for sale from suppliers (such as producers) at that price. Producers are hypothesized to be profit-maximizers, meaning that they attempt to produce the amount of goods that will bring them the highest profit.

Law of Supply: The law of supply states that supply shows a direct, proportional relation between price and quantity supplied (other things unchanged). In other words, the higher the price at which the good can be sold, the more of it producers will supply. The higher price makes it profitable to increase production. At a price below equilibrium, there is a shortage of quantity supplied compared to the quantity demanded.

The supply schedule is the relationship between the quantity of goods supplied by the producers of a good and the current market price. It is graphically represented by the supply curve. It is commonly represented as directly proportional to price. This has been shown in the following figure 2.2.

Fig. 1.2: Supply Curve



The above figure depicts a normal supply curve. From the figure we can see that when price of the commodity was Rs. 10, supply of the good was 50 units. When price increased to Rs. 20, supply of the good also increased to 100. Further increase of the price to Rs. 30 resulted in the increase in the supply of the commodity to 150 units. Thus, we can see that in case of a nomal good, the supply curve slopes upwards to the right. This is because with a rise in the price of the good in question, more supply of the good is available for sale.



ACTIVITY 2.1

A fall in price always leads to rise in demand. Justify the statement with the help of an example.



CHECK YOUR PROGRESS

Q.1: State whether the following statements are True or False:

a) Every want is a demand.

b) The relationship between demand and price is positive.

c) A normal supply curve slopes upwards to the right.

Q.2: Explain the concept of demand. (Answer in about 40 words)

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Q.3: How is the quantity of supply of a commodity related to its price? (Answer in about 30 words)

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2.4 CONCEPT OF EQUILIBRIUM

In Economics, 'equilibrium' is a term used to describe a situation where ***economic agents*** or agregates of economic agents such as markets have no incentive to change their economic behaviour.

Applied to an individual agent, such as a consumer or a firm, it denotes a situation in which the agent is under no pressure or has no incentive to alter the current levels or states of economic action, because he finds that he cannot improve his position in terms of any economic criteria. When applied to markets, equilibrium denotes a situation in which

the aggregate buyers and sellers are satisfied with the current combination of prices and the quantities of goods bought or sold, and so there is no incentive to change their present actions.

2.5 MARKET EQUILIBRIUM

At every moment, some people are buying while others are selling. Foreign companies are opening production units in India while Indian companies are selling their products abroad. In the midst of all this turmoil, markets are constantly solving the problems of what to produce, how much to produce, how to produce and for whom to produce. As they balance all the forces operating in the economy, markets are finding a market equilibrium of supply and demand.



To know more about ***G. J. Stigler***, please refer to Appendix-B at the end of the third block

Thus, the term 'market equilibrium' represents a ba!ance among the different buyers and sellers. According to ***G. J. Stigler,*** "An equilibrium is a position from which there is no tendency to move."Equilibrium describes a situation where economic agents or aggregates of economic agents such as markets have no incentive to change their economic behaviour.

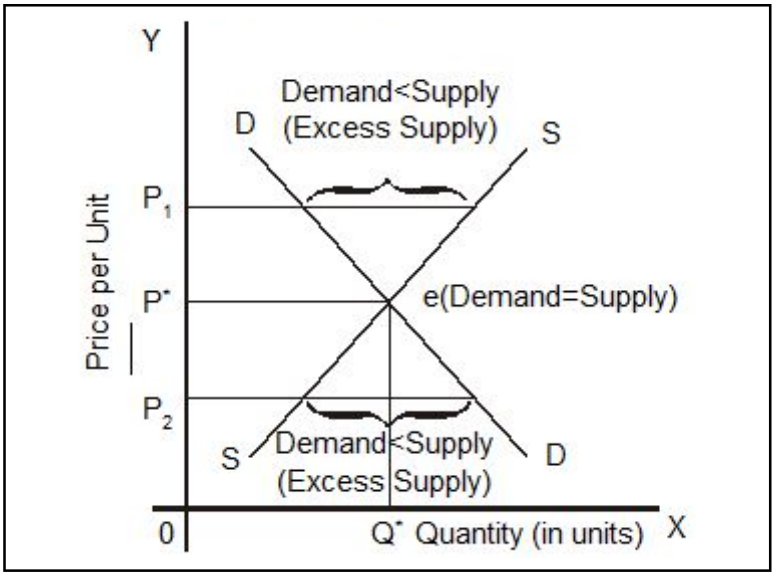


Glut: An excessively alrendant supply of something.

Depending upon the price, households and firms all want to sell or buy different quantities. The market finds the equilibrium price that simultaneously meets the desires of buyers and sellers. Too high a price would mean a ***glut*** of goods with too much output; too low a price will on the other hand lead to a deficiency of goods. Those prices for which buyers desire to buy exactly the quantity that sellers desire to sell yield an equilibrium of supply and demand.

Thus, we have discussed that the word "equilibrium" denotes a state of rest from where there is no tendency to change. In the following figure 2.3 the point 'e' describes a position of equilibrium because this is a point where all buyers and all sellers are satisfied.

Fig. 1.3: Equilibrium of a Firm



From figure 2.3 it can be seen that the price P* is determined by the intersection of the market demand (DD) and market supply curve (SS) and is called the equilibrium price. Corresponding to this equilibrium price, the quantity transacted Q* is called the equilibrium quantity.

If the price is higher than P* say P_1, then the buyers can buy what they want to buy at that price, but the seller cannot sell all they want to sell. Demand will be low. This is a situation of excess supply or surplus in the market. The suppliers are dissatisfied. This situation cannot be sustained and the market price has to come down.

Again, If the price is lower than P*, say P_2, then the sellers can sell what they want to sell at that price, but buyers cannot buy all they want to buy because supply of the good will be low. This is a situation of excess demand or shortage of supply in the market. The buyers are dissatisfied. This situation cannot, be sustained and the market price has to go up.

Thus, we have seen that when prices are above or below P*, the market is in disequilibrium. The market is in equilibrium when demand is equal to supply and in the figure given above the point of equilibrium is at point e where equilibrium price is OP* and equilibrium quantity is 0Q*.

The laws of supply and demand state that the equilibrium market price and quantity of a commodity is the intersection point of consumer's demand and producer's supply. Here the quantity supplied equals the

quantity demanded; that is, equilibrium is reached. Equilibrium implies that price and quantity will be steady.

According to the law of supply and the law of demand, a market will move from a disequilibrium point where the quantity demanded is not equal to the quantity supplied, to an equilibrium point. This is called *stable equilibrium.* Not all economic equilibria are stable. For an equilibrium to be stable, a small deviation from equilibrium leads to economic forces that returns an economic sub-system toward the original equillibrium.

When the price is above the equilibrium point there is a surplus of supply; and when the price is below the equilibrium point there is a shortage in supply. Different supply curves and different demand curves have different points of economic equilibrium. In most simple microeconomic analysis of supply and demand in a market, *a static equilibrium* is observed. Static equilibrium occurs in a stationary economy where population, technology, resources, tastes and preferences do not change. When changes take place in such a system, the rate of change remains the same. However, economic equilibrium can be *dynamic* when the factors mentioned above such as population, technology and so on change over time. Equilibrium may also be multi-market or general, as opposed to the partial equilibrium of a single market.



CHECK YOUR PROGRESS

Q.4: Who are the economic agents? (Answers in about 30 words)

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Q.5: State whether the following statements are True or False:

a) In Economic theory, all equilibria are not stable,

b) In most of the cases of simple Microeconomic analysis, dynamic equilibria are used.

c) Static equilibrium occurs in a society where population, technology, resources, tastes and preferences do not change.

Q.6 What is meant by stable equilibrium? (Answer in about 40 words)

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2.6 STATIC ANALYSIS

Static analysis ocupies an important place in economic theory and analysis. A greater part of economic theory has been formulated with the aid of the technique of economic statics. The task of economic theory is to explain the functional relationships between systems of economic variables. If a functional relationship is established between two variables whose values relate to the same point of time or to the same period of time, the analysis is said to be static analysis.

In other words, the static analysis or static theory is the study of static relationship between relevant variables. A functional relationship between variables is said to be static if values of the economic variables relate to the same point of time or to the same period of time. We can give various examples of the static relationship between economic variables and various economic laws based upon them. For example, we can refer to the law of demand. This law tries to establish the functional relationship between quantity demanded of a good and price of that good at a given moment or period of time. This law states that, other things remaining the same, the quantity demanded varies inversely with price at a given point or period of time. Similarly, the static relationship has been established between quantity supplied and price of goods, both variables relating to the same point of time. Therefore, the analysis of this relationship is a static analysis.

Till recently, the whole price theory in which we explain the determination of equilibrium prices of products and factors in different market categories were mainly static analysis, for the values of the various variables, such as demand, supply, and price were taken to be relating to the same point or period of time.

Importance of Static Analysis: The method of economic statics is very important and a large part of economic theory has been developed using the technique of economic statics. It is widely used because it makes the analysis simple and easier to handle. According to Prof. Robert Dorfman, "statics is much more important than dynamics, partly because it is the ultimate destination that counts in most human affairs, and partly because the ultimate equilibrium strongly influences the time paths that are taken to reach it, whereas the reverse influence is much weaker".

2.7 COMPARATIVE STATIC ANALYSIS

Comparative static analysis is an important tool to study and analyse economic theory and problems. Most of economic theory consists of comparative statics analysis. Comparative Statics is the determination of the changes in the endogenous variables of a model that will result from a change in the exogenous variables or parameters of that model. It is a method of study which focusses on the external force that make the equilibrium in the model change. The external force here refer to exogenous variables. You know that in economics we have two types of variables: endogenous and exogenous variables. Endogenous means any variable defined within the model whereas the exogenous variable refers to constant term or parameter where its value is defined outside the model. There are various examples of comparative static analysis. For example, we can refer to the Keynsain model of IS-LM which represents both equilibrium in goods market and money market.

Comparative statics is commonly used to study changes in supply and demand when analyzing a single market, and to study changes in monetary or fiscal policy when analyzing the whole economy. The term 'comparative statics' is more commonly used in relation to microeconomics

(including general equilibrium analysis) than to macroeconomics. Comparative statics was formalized by John R. Hicks (1939) and Paul A. Samuelson (1947).

2.8 DYNAMIC ANALYSIS

Dynamic analysis is very popular in contemporary economics. Economic dynamics is a more realistic method of analysing the behaviour of the economy or certain economic variables through time. It considers the relationship between relevant variables whose values belong to different points of time. Professor Ragnar Frisch who is one of the pioneers in the use of the technique of dynamic analysis in economics defines economic dynamics as follows: "A system is dynamical if its behaviour over time is determined by functional equations in which variables at different points of time are involved in an essential way." He further elaborates, "We consider not only a set of magnitudes in a given point of time and study the interrelations between them, but we consider the magnitudes of certain variables in different points of time, and we introduce certain equations which embrace at the same time several of those magnitudes belonging to different instants. This is the essential characteristic of a dynamic theory. Only by a theory of this type we can explain how one situation grows out of the foregoing." We can give various examples of dynamic analysis from the field of micro and macroeconomics. For example, in microeconomics, if one assumes that, the supply (S) for a good in the market in the given time (t) depends upon the price that prevails in the preceding period (that is, t – 1) the relationship between supply and price is said to be dynamic. Similarly in the macroeconomics field if it is assumed that the consumption of the economy in a given period depends upon the income in the preceding period (t – 1) we shall be conceiving a dynamic relation.

Importance of Dynamic Analysis: The importance of economic dynamics or dynamic analysis can be explained as follows–

To make the economic analysis realistic we have to incorporate the impacts of changing time in the variables. That is why, economic dynamics is very important for realistic economic analysis. In the real world, various

key variables such as prices of goods, output of goods, income of the people, investment and consumption, etc. are changing over time.

Some variables take time to respond to the change in other variable. In other words, there is a time lag in them. For example, changes in income in one period makes its influence on consumption in the next period. These can be analysed only through dynamic analysis.

The values of certain variables depend upon the rate of growth of other variables. For example, we have seen in Harrod's dynamic model of a growing economy that investment depends upon expected rate of growth in output.

In some cases where certain variables depend upon the rate of change in other variables, application of both the period analysis and the rate of change analysis of dynamic economics become essential.

Dynamic analysis becomes very necessary in case of growth studies. It helps in building dynamic models of optimum growth both for developed and developing countries of the world.



CHECK YOUR PROGRESS

Q.7: Define static analysis. What are its importance?

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Q.8: What is meant by comparative static analysis?

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Q.9: Define Economic dynamics.

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Q.10: Distinguish between static and dynamic analysis.

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2.9 LET US SUM UP

- The law of demand is one of the most important laws of economic theory. It establishes an inverse relationship between price and quantity demanded of a commodity.
- Mere desire for a commodity does not constitute demand for it, if it is not backed by purchasing power.
- The higher the price at which the good can be sold, the more of it producers will supply. On account of this, a normal supply curve slopes upwards to the right.
- A market equilibrium represents a balance among all the different buyers and sellers.
- The word “equilibrium” denotes a state of rest from where there is no tendency to change because this is a point where all buyers and all sellers are satisfied.
- Not all economic equilibria are stable.
- If a functional relationship is established between two variables whose values relate to the same point of time or to the same period of time, the analysis is said to be static analysis.
- The method of economic statics is very important and a large part of economic theory has been developed using the technique of economic statics.
- Comparative Statics is the determination of the changes in the endogenous variables of a model that will result from a change in the exogenous variables or parameters of that model.

- Comparative statics is commonly used to study changes in supply and demand when analyzing a single market, and to study changes in monetary or fiscal policy when analyzing the whole economy.
- Dynamic analysis considers the relationship between relevant variables whose values belong to different points of time.
- Economic dynamics is very important for realistic economic analysis. In the real world, various key variables such as prices of goods, output of goods, income of the people, investment and consumption, etc. are changing over time.



2.10 FURTHER READING

1) Ahuja, H.L. (2006); *Modern Economics*; New Delhi: S. Chand & Co. Ltd.
2) Dewett, K.K. (2005); *Modern Economic Theory*; New Delhi: S. Chand & Co. Ltd.
3) Koutsoyiannis, A. (1979); *Modern Microeconomics*; New Delhi: Macmillan.
4) Sundharam, K.P.M. & Vaish, M.C. (1997); *Microeconomic Theory*; New Delhi: S.Chand & Co. Ltd.



2.11 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: a) False, b) False, c) True

Ans. to Q. No. 2: Demand can be defined as a desire for a commodity or service which is backed by the ability to pay. The need for a commodity, doesn't mean its demand. It is called demand only when the consumer has sufficient purchasing power to pay for it.

Ans. to Q. No. 3: The quantity of supply of a commodity is positively related to its price. This means that as price increases, quanity supplied of the commodity concerned also increases and vice-versa.

Ans. to Q. No. 4: Economic agents can be any individual, firm, a seller or an industry that undertakes economic activity, viz, production, investment, saving, consumption etc.

Ans. to Q. No. 5: a) True, b) False, c) True

Ans. to Q. No. 6: Acccording to the law of supply and the law of demand, market will move from a disequilibrium point, where the quantity demanded is not equal to the quantity supplied, to an equilibrium point. This is called stable equilibrium.

Ans. to Q. No. 7: If a functional relationship is established between two variables whose values relate to the same point of time or to the same period of time, the analysis is said to be static analysis.

The method of economic statics is very important and a large part of economic theory has been developed using the technique of economic statics. It is widely used because it makes the analysis simple and easier to handle.

Ans. to Q. No. 8: Comparative Statics is the determination of the changes in the endogenous variables of a model that will reusult from a change in the exogenous variables or parameters of that model.

Ans. to Q. No. 9: Economic dynamics is a more realistic method of analysing the behaviour of the economy or certain economic variables through time. It considers the relationship between relevant variables whose values belong to different points of time.

Ans. to Q. No. 10: There are some basic difference between static analysis and dynamic analysis. As the name suggests, they are opposite to each other. The main point of difference between static and dynamic analysis is that- while static analysis analyzes the relationship between two variables at a particular point of time while dynamic analysis analyzes the relationship between two variables through different point of time.

In practice, dynamic analysis is more realistic and practical than the static analysis; but static analysis is easier to use for its simplicity.



2.12 MODEL QUESTIONS

A) Very Short Questions (Answer each question in about 75 words):

Q.1: State the law between the price and the quantity demanded of a product.

Q.2: Mention the law of supply in a few lines.

Q.3: Give the definition of statics, comparative statics and dynamic analysis.

B) Short Questions (Answer each question in about 100-150 words):

Q.1: Discuss the role of market mechanism in Economics.

Q.2: Give the concept of equilibrium and write a brief note on market equilibrium.

Q.3: What are the basic difference between economic statics and economic dynamics?

C) Essay-Type Questions (Answer each question in about 300-500 words):

Q.1: State and explain the laws of demand and supply with the help of suitable figures.

Q.2: What is meant by equilibrium? What are the basic conditions for market equilibrium? How is equilibrium reached? Explain with the help of suitable figure.

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UNIT 3: DEMAND ANALYSIS

UNIT STRUCTURE

3.1 Learning Objectives

3.2 Introduction

3.3 The Idea of Demand and the Demand Curve

3.4 Movement Along a Demand Curve

3.5 Shift in the Demand Curve

3.6 Exceptions to the Law of Demand

3.7 Elasticity of Demand

- 3.7.1 Price Elasticity of Demand
- 3.7.2 Income Elasticity of Demand
- 3.7.3 Cross Elasticity of Demand

3.8 Let Us Sum Up

3.9 Further Reading

3.10 Answers to Check Your Progress

3.11 Model Questions

3.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- give the definition of demand
- derive a demand curve
- explain the movement along a demand curve
- illustrate the shift in the demand curve
- state the three variants of elasticity of demand, i.e. price elasticity, income elasticity, and cross elasticity.

3.2 INTRODUCTION

The theory of demand studies the various factors that determine demand. It is traditionally accepted that four factors affect the demand for a commodity, namely:

- its own price
- consumer's income

- prices of other commodities, and
- taste of the consumers.

The basic idea of demand is the willingness to buy a commodity or to enjoy a service. But to be effective, it should be backed by purchasing power. Other things remaining constant, there exists an inverse relationship between price and quantity demanded which is stated as law of demand.

The degree of responsiveness of quantity demanded of a good due to a change in its price/income of the consumer/prices of related commodities are indicated by price/income/cross elasticity of demand respectiveiy.

3.3 THE IDEA OF DEMAND AND THE DEMAND CURVE

Demand is the amount of particular goods or services that a consumer or group of consumers will want to purchase at a given price. But as said above, merely the want of something will not constitute demand. It should be backed by purchasing power to be effective demand. Usually demand in Economics means 'effective demand'. For example, you may dream of having an aeroplane of your own; but if you don't have the purchasing power to buy it, it will not be considered as demand. On the other hand, if you have 100 rupees is your hand than you can demand the goods and services worth 100 rupees.

Demand is invariably related to price. There is an inverse relationship between price and quantity demanded known as law of demand. The law of demand expresses the functional relationship between quantity demanded of a commodity and its price. According to the law of demand, other things being equal, the quantity demanded will rise with a fall in its price. This implies that there is an ***inverse*** relationship between the quantity demanded and the price, given that other things remain the same. The other things that are assumed to remain unchanged consist of income of the consumer, prices of related goods, and the taste of the consumer.

The law of demand can be illustrated by a demand schedule. And the demand schedules constitute the basis on which the demand curve is constructed. Table 3.1 shows a hypothetical demand schedule of a

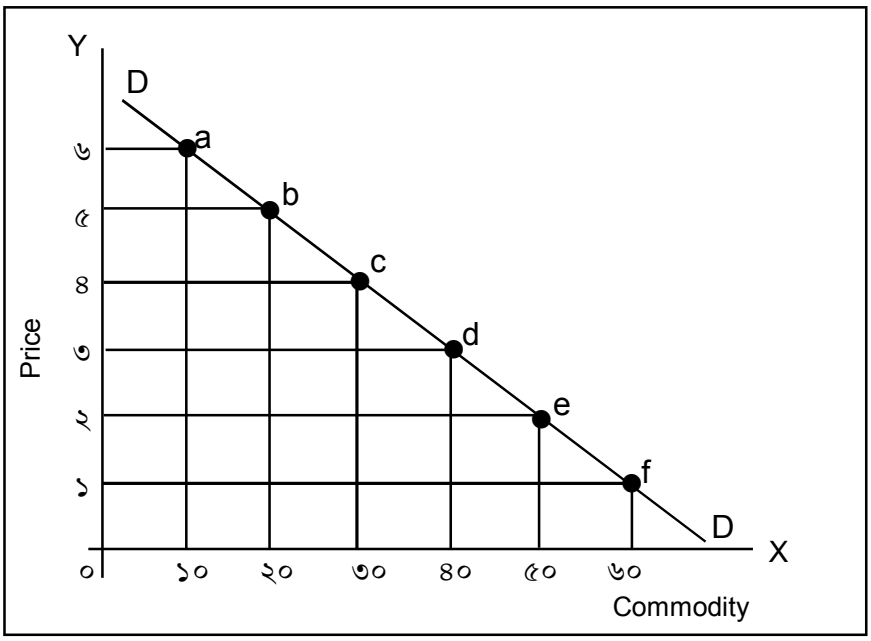
consumer. The table shows the various quantities demanded at different prices by the consumer. Thus, at price Rs. 6, the quantity demanded is 10 units. As the price falls successively by Re. 1, the quantity demanded correspondingly increases by 10 units for every decrease in the price.

Table 3.1: A Hypothetical Demand Schedule

Price (Rs)	Quantity Demanded	Price/Demand Combinations
(1)	**(2)**	**(3)**
6	10	a
5	20	b
4	30	c
3	40	d
2	50	e
1	60	f

Now, let us plot the various price and quantity demanded combinations of table 3.1 in the following figure 3.1.

Fig. 3.1: Demand Curve of a Comsumer



By plotting the various price-quantity demanded combinations from table 3.1, we derive the demand curve DD in figure 3.1. Thus, the demand curve is a graphic representation of the demand schedule and it indicates the various quantities demanded for a commodity at various prices.

The demand curve slopes downward towards the right. This is because as prices fall, the quantity demanded goes on increasing. Thus, it shows that there exists an inverse relationship between the price of a commodity and the quantity demanded for it.

Individual Demand and Market Demand: It is to be noted that demand may be distinguished as **individual consumer's demand** and **market demand**. Market demand for a good is the sum total of the demands of the individual consumers who purchase the commodity in the market.

By definition, individual demand indicates the quantities of a good or service which the household is willing and able to purchase at various prices, holding other things constant. Although for some purposes it is useful to examine an individual consumer's demand, it is frequently necessary to analyse demand for an entire market made up of many consumers. We will now show how we derive the market demand curve from individual demand curves. Let us assume that there are only two consumers in the market. Their demands and the market demand are given below and the individual demand curves and the market demand curve are shown in figure 3.2 (a), (b) and (c).

Table 3.2: Demand Schedules for two Customers and the Market Demand Schedule

Price (In Rs)	Quantity Demanded (in Kgs)		
	Consumer 1	Consumer 2	Market Demand
(1)	(2)	(3)	(4)
12	4	6	4 + 6 = 10
10	5	8	5 + 8 = 13
8	6	10	6 + 10 = 16
6	7	12	7 + 12 = 19
4	8	14	8 + 14 = 22
2	9	16	9 + 16 = 25

The market demand is in fact the summation of the demand schedules of the two individual consumers. These demand schedules have been shown with the help of the figures 3.2 (a), (b) and (c)

Fig. 3.2 (a): Demand Curve of Customer 1 **Fig. 3.2 (a): Demand Curve of Customer 2**

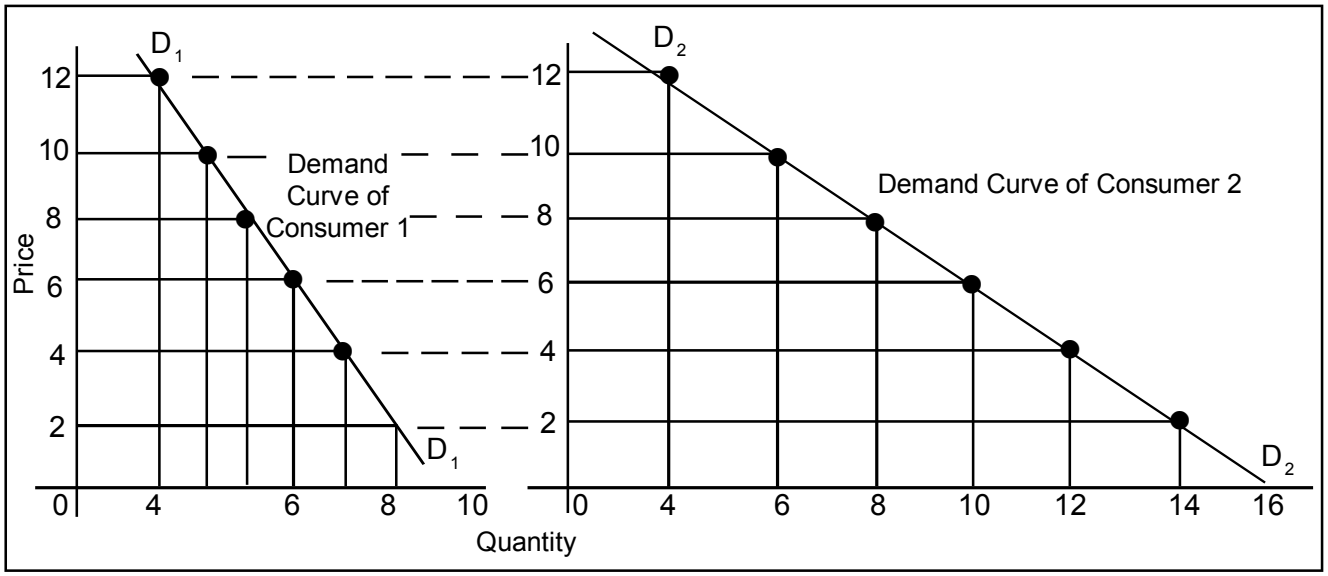
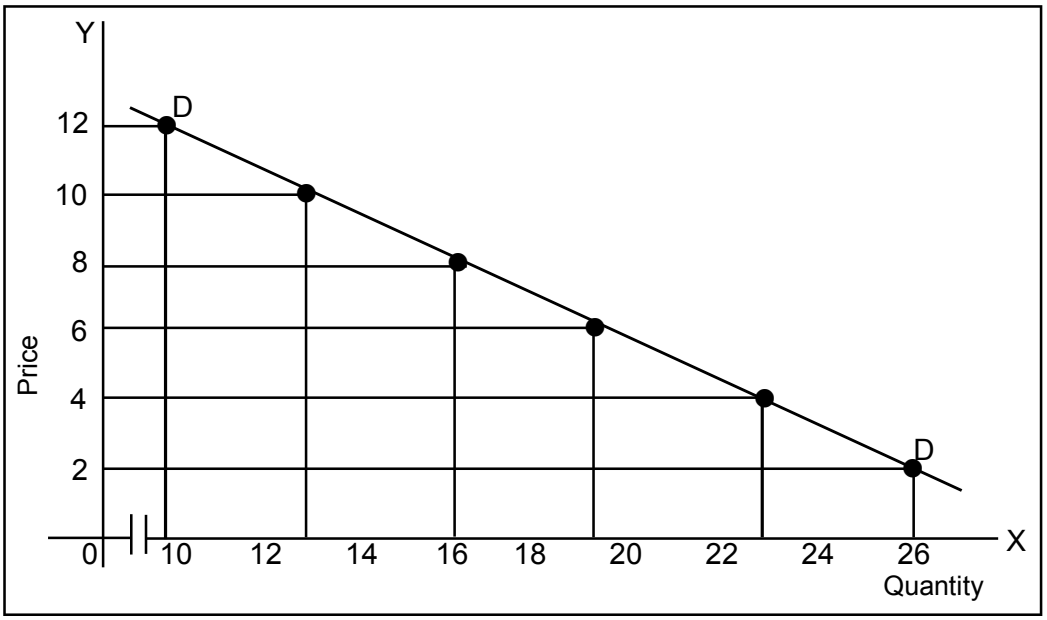


Fig. 3.2 (c): Market Demand Curve



In the above, figure 3.2 (a) represents the individual demand schedule of consumer 1, figure 3.2 (b) represents the individual demand schedule of consumer 2, while figure 3.2 (c) represents the market demand schedule. Thus, D_1D_1 represents the demand curve of consumer 1, D_2D_2 represents the demand curve of consumer 2 and DD represents the market demand curve.

Assumptions of the Law of Demand: The working of the law of demand rests on the following assumptions:

- The habits and tastes of the consumer remain the same.
- There is no change in income of the consumer.
- The prices of other related goods remain the same.

It is to be noted that while the law of demand is universally applicable, it may not hold good in certain cases. We shall discuss this in the next section.



CHECK YOUR PROGRESS

Q.1: State whether the following statements are True or False:

a) Other things remaining the same, there exists an inverse relationship between the quantity demanded and its price.

b) Change in demand occurs due to a change in the price of a commodity.

c) Market demand is the summation of individual demands of all the consumers in the market.

Q.2: Fill in the blanks:

a) By definition, other things remaining the same, ... indicates the quantities of goods or services which the household is willing to and able to purchase at various prices.

b) The demand curve slopes ..... towards the right.

c) ..... for a good is the sum total of the demand of the individual consumers who purchase the commodity in the market.

Q.3: How would you derive a market demand curve from individual demand curves? (Answer in about 30 words)

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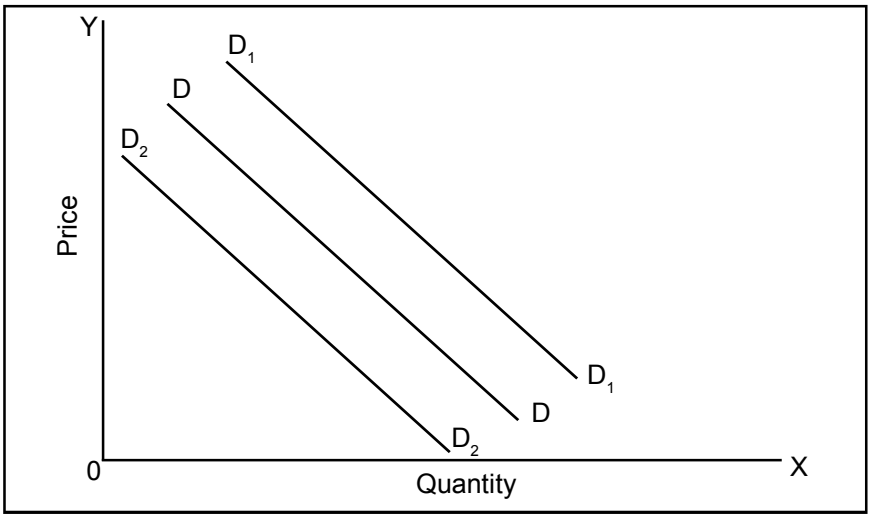
3.4 MOVEMENT ALONG A DEMAND CURVE

Movement along a demand curve means change in the quantity demanded in response to the change in price. This movement is in the same demand curve. This situation can be illustrated with the same diagram of 3.1 or 3.2(c) where the general demand curve and market demand curve has been portrayed. Here movement along different points of the demand curve corresponding to the different combination of price and quantity demanded will clearly show you the movement along a demand curve.

3.5 SHIFT IN THE DEMAND CURVE

Movement along a demand curve can show changes in quantity demanded corresponding to various price level of a particular good or service. But for change in demand, we have to show the shift in demand curve. A shift to the left of the original demand curve will show decrease in demand and shift to the right will show increase in demand. This can be shown with the help of the following diagram:

Fig. 3.3: Shift in the Demand Curve



In the above figure 3.3, shift in the demand curve has been shown. DD is the original demand curve. A decrease in demand is shown by downward shift in the demand curve to the left (D_2D_2), and an increase in demand is shown by an upward shift in demand curve to D_1D_1. This shift in

demand may be caused by some factors other than price. This change can be due to the taste and preference of the consumer, new innovation and technology etc.

3.6 EXCEPTIONS TO THE LAW OF DEMAND

For certain commodities the law of demand does not hold, and they exhibit a direct relationship between the price and quantity demanded.

The commodities that violates the 'law of demand' are mentioned below:

- **Giffen Goods:** Giffen Goods are special categories of inferior goods which do not follow the 'law of demand'. Thus, a fall in the price of such a good will result in a decrease in the quantity demanded and vice versa. ***Robert Giffen*** studied this paradox. This happens because the income effect of the price change of a Giffen good is positive and is greater than the negative substitution effect. This results in a price effect which is positive, resulting in the price and quantity demanded changing in the same direction.

  Besides Giffen Goods, the law of demand may not operate in the case of the following goods:

- **'Status Symbol' Goods:** These goods are bought because they confer a social prestige to the buyer. According to ***Torstein Veblen,*** a fall in their prices will result in the curtailment in the quantity demanded, resulting in the violation of the law of demand. This generally happens in case of luxury goods.

- **Speculative Consumption:** Speculation of further rise in prices of the very essential products may induce consumers to purchase more of a commodity as its price increases, resulting in a temporary failure of the law of demand. Suppose, the price of a very important drug/medicine has started to increase very sharply. In such a situation, in anticipation of further increase in prices in the coming days, the consumers may find it more beneficial to purchase more quantity of the drug than actually required.



To know more about ***Robert Giffen*** please refer to Appendix-'B'.



To know more about ***Torstein Veblem*** please refer to Appendix-'B'.



CHECK YOUR PROGRESS

Q.4: State whether the following statements are True or False:

a) According to the law of demand, there exists an inverse relationship between the price of a commodity and its demand.

b) The law of demand does not hold good in case of Giffen goods.

Q.5: Fill in the blanks:

a) In case of normal goods, substitution effect is .....

b) The relative strength of the two components of the price effect determines the relationship between the price of a commodity and ..... for it.

Q.6: Define the term Giffen good? (Answer in about 40 words)

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Q.7: Why is the law of demand violated in case of specultive consumption? (Answer in about 50 words).

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Q.8: Distinguish between change in quantity demanded and change in demand. (Answer in about 50 words)

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3.7 ELASTICITY OF DEMAND

Elasticity of demand relates to the degree of responsiveness of quantity demanded of a good to a change in :

- its price, or
- the consumer's income, or
- the prices of related goods.

Thus, change in quantity demanded as a response to the the above three variable gives us three different concepts of elasticity of demand, namely:

- price elasticity of demand (resulting due to a change in price)
- income elasticity of demand (resulting due to a change in income)
- cross elasticity of demand (resulting due to a change in the prices of related goods).

3.7.1 Price Elasticity of Demand

Price elasticity of demand measures the responsiveness of quantity demanded of a good to changes in its price, other things remaining the same. Price elasticity of demand can be expressed by two related measures, viz.:

- Point Elasticity of Demand, and
- Arc Elasticity of Demand.

Now, let us explain these two concepts in some detail.

- **Point Elasticity of Demand:** Point elasticity of demand technique is used to measure the price elasticity of demand of a good if the change in its price is very small.

  Hence, the point elasticity of demand is defined as the proportionate change in the quantity demanded of the product due to a very small proportionate change in price. Thus,

$$\text{Point Elasticity of demand} = \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in price}}$$

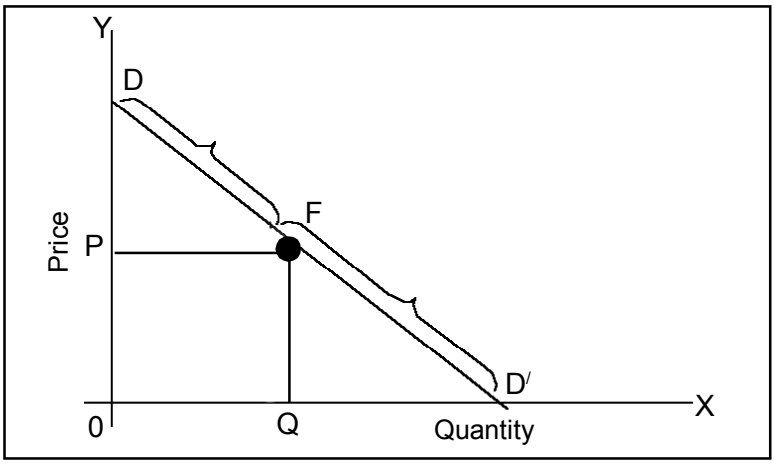
$$\text{Thus, } e_p = \frac{\Delta Q / Q}{\Delta P / P} = \frac{P}{Q} \times \frac{\Delta Q}{\Delta P}$$

wheres, e_p means price elesticity, P means price, Q means quantity, and Δ means infinitesimal (very very small) change in the variable concerned.

The price elasticity of demand is always negative due to the inverse relationship between price and quantity demanded. However, in general the negative sign is ignored in the formula.

Graphically, the point elasticity of demand in a linear demand curve is shown by the ratio of segments of the line to the right and to the left of any particular point. This has been shown in figure 3.4.

Fig. 3.4: Point Elasticity in a Linear Demand Curve

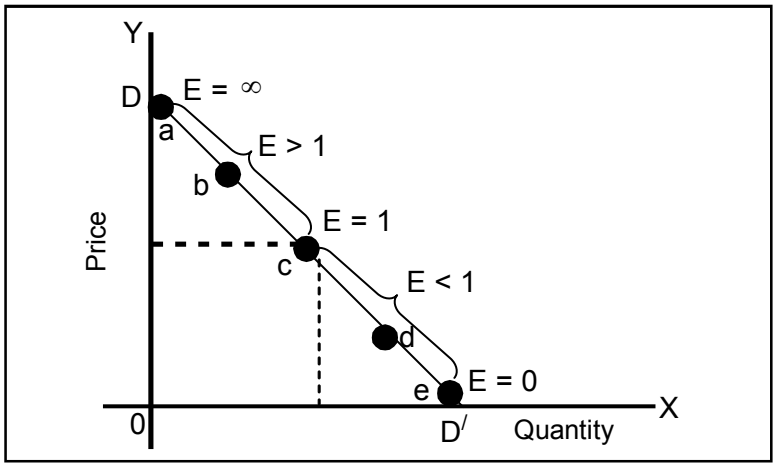


Thus, in figure 3.4 point elasticity of demand on point F of the linear demand curve DD' is measured as :

$$\frac{\text{Lower segment}}{\text{Upper segment}} = \frac{FD'}{FD}$$

Now given this graphical measurement of point elasticity, it is obvious that a linear demand curve like the one in figure 3.4, the mid-point will represent unitary elasticity of demand. This has been shown in figure 3.5.

Fig. 3.5 : Elasticities on Different Points of a Linear Demand Curve



From figure 3.5, it can be seen that at point c of the demand curve DD/, DC = D/C (i.e. the lower segment of the demand curve equals the upper segment). Thus, elasticity of demand at this point c is 1. Points above 'c' and below 'a' of the demand curve have elasticities greater than 1. Similarly, below the point 'c' and above point 'e' where the demand curve touches the horizontal axis, elasticities at various points (say at point 'd') will be less than 1. Elasticities at two extreme points of the demand curve, i.e., at points a and e will be infinite and zero respectively.

Thus, we find that the point elasticity of demand ranges between 0 and ∞,i,e,

$0 < e_p < \infty$

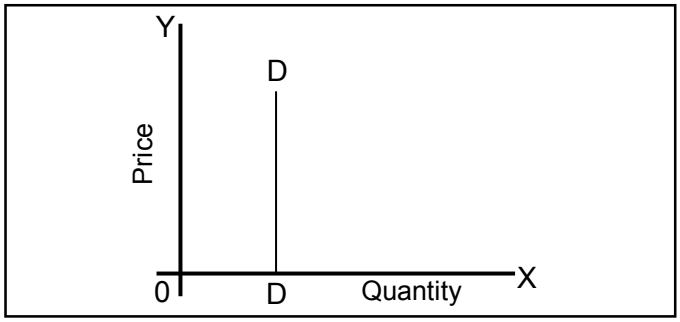
Now,

a) If $e_p = 0$, the demand is perfectly inelastic.
b) If $e_p = 1$, the demand is perfectly elastic.
c) If $e_p < 1$, the demand is relatively elastic.

Now, let us explain these situations in some detail.

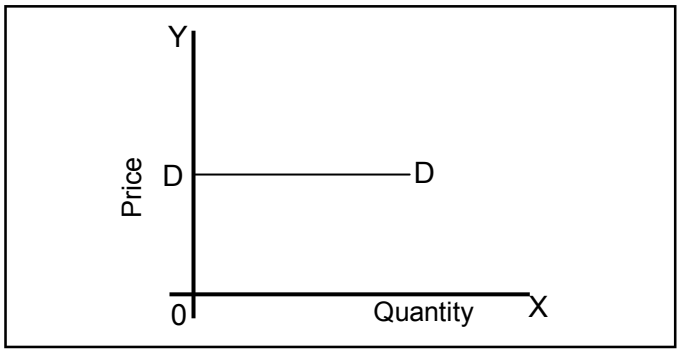
a) If $e_p=0$, the demand is perfectly inelastic. This implies that any proportionate change in price will have no effect on the quantity demanded. A perfectly inelastic demand is indicated in figure 3.6, which is a straight perpendicular on the horizontal axis.

Fig. 3.6: Vertical Demand Curve : Perfectly Inelastic



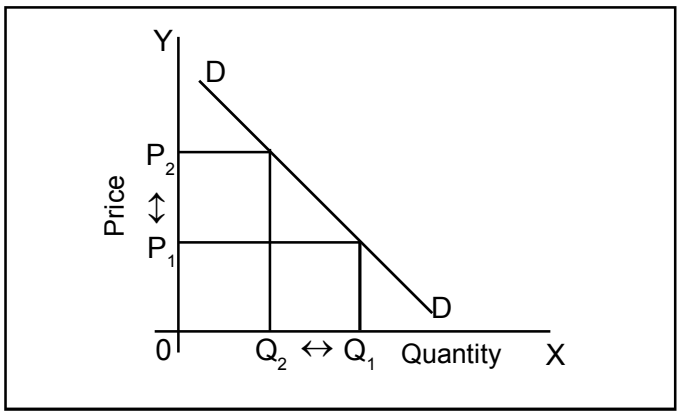
b) If $e_p=\infty$ the demand is perfectly elastic. this implies that for a small change in price there would be a infinitely large change in quantity demanded. This gives us a demand curve which is parallel to the horizontal axis as has been shown in the following figure 3.7.

Fig. 3.7: Horizontal Demand Curve : Perfectly Elastic



c) If $e_p=1$, the demand is unitarily elastic. Here, a proportionate change in the price will result in the same proportionate change in the quantity demanded. The demand curve passes through the origin as has been shown in figure 3.8.

Fig. 3.8: Proportionate change : Unitary Elastic



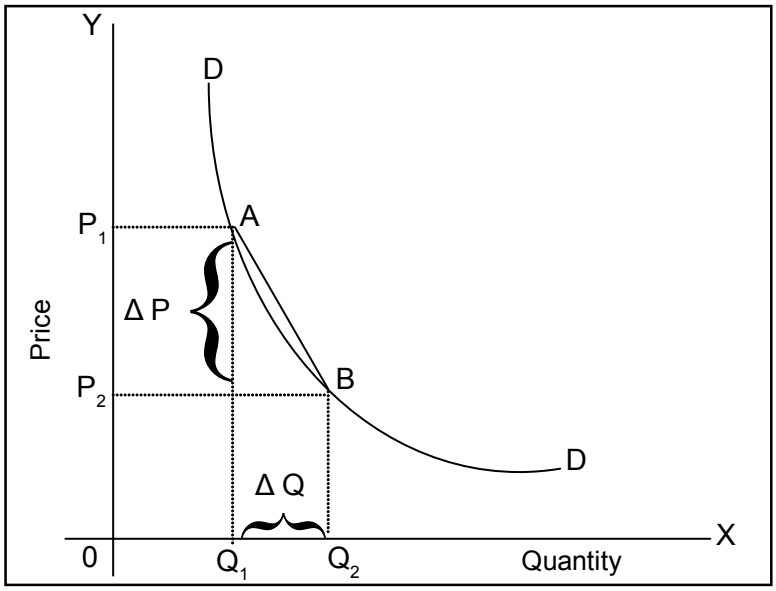
- **Arc Elasticity of Demand:** The arc elasticity of demand measures the price elasticity of demand when the change in price is somewhat large. In terms of demand curve, the arc elasticity measures the price elasticity of demand over an arc between two points on the demand curve. In fact, it is a measure of the average elasticity, and represents the elasticity of the mid-point of the chord that joins the two points (say, A and B) on the demand curve. The two points are defined by the initial and the final prices.

  Thus, the arc elasticity of demand is:

$$e_p = \frac{\Delta Q}{\Delta P} x \frac{P_1 + P_2}{Q_1 + Q_2}$$

Where, e_p=arc elasticity, $\Delta Q = Q_1 - Q_2$, $\Delta P = P_1 - P_2$, Q_1 and Q_2 are the two quantities at the two prices P_1 and P_2 respectively. The concept of Arc elasticity of demand has been explained with the help of figure 3.9.

Fig. 3.9: Arc Elasticity of Demand



In figure 3.9, the elasticity of demand in the AB segment of the demand curve DD is indicated by the arc elasticity of demand. Thus, the arc elasticity of demand is average elasticity of the segment AB and is represented by the midpoint of the chord AB joining the two points A and B of the demand curve DD.

3.7.2 The Income Elasticity of Demand

The income elasticity of demand is defined as the proportionate change in the quantity demanded due to a proportionate change in income. Thus,

Thus, $e_y = \frac{\Delta Q / Q}{\Delta Y / Y} = \frac{Y}{Q} \times \frac{\Delta Q}{\Delta Y}$

Where e_y means income elasticity, Y means income, Q means quantity, Δ means infinitesimal change.

For example, suppose income of Mr. X has increased from Rs. 5,000 to Rs. 6,000 per month, i.e., by 20 percent. As a result, expenditure of consumption of his fruit basket increases from 10 kg to 12 kg, i.e., by 20 percent. Thus, income elasticity of demand in this case will be 20/20 or 1.

The income elasticity of demand had been used by some economists to classify goods as luxuries, necessities and inferior goods. Thus:

$e_y = 0$ means: the commodity is a necessity

$e_y > 0$ means: the commodity is luxury, and

$e_y < 0$ means: the commodity is inferior.



ACTIVITY 3.1

Calculate the income elasticity of demand and indicate the range of income over which acommodity x is a luxury, a necessity or an inferior goods.

Sl No.	Income (in Rs.) (Y)	Quantity (Q_x)	$\triangle Q_x$ (in%)	$\triangle Y$ (in%)	e_y	Types of Goods
1	8,000	5				
2	12,000	10	100	50	2	Luxury
3	16,000	–	–	–	–	–
4	20,000	18	–	–	–	–
5	24,000	20	–	–	–	–
6	28,000	19	–	–	–	–
7	32,000	18	–	–	–	–

3.7.3 The Cross Elasticity of Demand

When two goods are related to each other, then the change in demand for one good in response to a change in the price of the second good is indicated by the cross elasticity of demand. The cross elasticity of demand is defined as the proportionate change in the quantity demanded of x in response to a proportionate change in the price of y.

$$\text{Thus, } e_{xy} = \frac{\Delta Q_x / Q_x}{\Delta P_y / P_y} = \frac{P_y}{Q_x} \times \frac{\Delta Q_x}{\Delta P_y}$$

Where, e_{xy} means cross elasticity of demand, Q_x means Quantity of the commodity X, ΔQ_x means change in quantity of X, P_y means Price of the commodity Y, and ΔP_y means Change in price of Y.

Now, $e_{xy} < 0$ means: x and y are complimentary goods, and

$e_{xy} > 0$ means: x and y are substitutes.



CHECK YOUR PROGRESS

Q.9: What is meant by elasticity of demand? (Answer in about 40 words)

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Q.10: How will you graphically measure the point elasticity of demand of a linear demand curve? (Answer in about 40 words)

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Q.11: Mention some of the applications of the concept of income elasticity of demand. (Answer in about 40 words)

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3.8 LET US SUM UP

- The theory of demand studies the various factors that determine demand.
- The law of demand states that, other things remaining same, there exists an inverse relationship between quantity demanded and the price.
- "Change in Demand" and the "Change in Quantity Demanded" are not the same thing.
- Demand may be distinguished as individual consumer's demand and market demand. Market demand for a good is the sum total of the demands of the individual consumers who purchase the commodity in the market.
- For certain commodities, the law of demand does not hold good.
- Income effect of a price change of a Giffen good is positive and is greater than the negative substitution effect.
- Besides Giffen Goods, the law of demand may also not operate in the case of status symbol goods and in case of speculative consumption.
- Elasticity of demand relates to the degree of responsiveness of quantity demanded of a good to a change in–
  - Its price (price elasticity)
  - The consumer's income (income elasticity)
  - The prices of related goods (cross elasticity)

- Price Elasticity of demand can be further classified as point elasticity of demand and arc elasticity of demand.



3.9 FURTHER READING

1) Ahuja, H.L. (2006); *Modern Economics*; New Delhi: S. Chand & Co. Ltd.
2) Jhingan, M.L. (1986); *Micro Economic Theory;* New Delhi: Konark Publications.
3) Koutsoyiannis, A. (1979); *Modern Microeconomics*; New Delhi: Macmillan.



3.10 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: a) True, b) False, c) True

Ans. to Q. No. 2: a) By definition, other things remaining same, the individual demand schedule indicates the quantities of goods and services which the household is willing to and able to purchase at various prices.

b) The demand curve slopes downward towards the right.

c) Market demand for a good is the sum total of the demand of the individual consumers who purchase the commodity in the market.

Ans. to Q. No. 3: The market demand curve can be derived from the demand curves of the individual. This is done by adding the quantities demanded by all the consumers, at each price. Thus, we get the aggregate demand curve for the market as a whole.

Ans. to Q. No. 4: a) True, b) True

Ans. to Q. No. 5: a) Price effect is the summation of substitution effect and the income effect.

b) In case of Giffen goods, substitution effect is negative.

c) The relative strength of the two components of the price effect determines the relationship between the price of a commodity and the demand for it.

Ans. to Q. No. 6: A Giffen Good is a special type of inferior good which does not follow the "law of demand". Thus, a fall in the price of such a good will result in a decrease in the quantity demanded whereas a rise in its price would induce an increase in the quantity demanded.

Ans. to Q. No. 7: The law of demand is violated in case of speculative consumption because, speculation of further rise in pricces may induce consumers to consume more of a commodity as its price increases, resulting in a temporary failure of the law of demand.

Ans. to Q. No. 8: A change in "quantity demanded" is an out come of a change in price, as other things remain constant. On the other hand, a change in "demand" may occur with prices remaining constant, while other factors such as income of the consumer, prices of related goods and taste of the consumer changes.

Thus, change in quantity demanded is represented by a movement along the same demand curve, while the change in demand results in an upward or downward shift in the demand curve.

Ans. to Q. No. 9: Elasticity of demand means the degree of responsiveness of quantity demanded of a good to a change in:

- its price, or
- the consumer's income, or
- the price of related goods.

Ans. to Q. No. 10: Point elasticity of demand in a linear demand curve can be shown graphically by taking the ratio of segments of the line to the right and to the left of any particular point. Thus, point elasticity of demand on a linear demand curve can be measured by:

$$\frac{\text{Lower segment}}{\text{Upper segment}} = \frac{FD'}{FD}$$

on any point of the demand curve.

Ans. to Q. No. 11: The income elasticity of demand can be used to classify goods as luxuries, necessities and inferior goods. Thus,

$e_y = 0$ means: the commodity is a necessity.

$e_y > 0$ means: the commodity is luxury, and

$e_y < 0$ means: the commodity is inferior.



3.11 MODEL QUESTIONS

A) Very Short Questions (Answer each question in about 75 words):

Q.1: Define the term elasticity of demand. What are the different types of the price elasticity of demand?

Q.2: Deduce the demand curve when the price elasticity of demand of product is zero.

Q.3: What is Point elasticity of demand? Derive the elasticities of demand on the different parts of demand curve.

B) Short Questions (Answer each question in about 100-150 words):

Q.1: Differentiate between individual demand and market demand. How can you derive the market demand curve from individual demand schedules of two consumers?

Q.2: Briefly explain how the relationship between the substitution effect and the income effect help us to derive the relationship between the price of a commodity and its demand?

Q.3: What is an Engel curve? What is its significance with regards to indicating of necessities and inferior goods?

C) Essay-Type Questions (Answer each question in about 300-500 words):

Q.1: Define “price elasticity of demand”. Distinguish between “price elasticity” and “arc elasticity”. How would you measure the two?

Q.2: State the law of demand? On its basis construct a demand schedule and derive the demand curve.

Q.3: Discuss under what conditions, the law of demand is violated. What is the consequences?

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UNIT 4: CONSUMER BEHAVIOUR-CARDINAL APPROACH

UNIT STRUCTURE

4.1 Learning Objectives

4.2 Introduction

4.3 Cardinal and Ordinal Approach to Utility: Basic Concepts

- 4.3.1 Measurement of Utility
- 4.3.2 Concepts of Total Utility and Marginal Utility
- 4.3.3 Law of Diminishing Marginal Utility

4.4 Consumer's Equilibrium: Law of equi-marginal utility

4.5 Consumer's Surplus

4.6 Let Us Sum Up

4.7 Further Reading

4.8 Answers to Check your Progress

4.9 Model Questions

4.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- appreciate the diffecence between cardinal and ordinal utility
- describe the concepts of total utility and marginal utility
- illustrate the law of diminishing marginal utility
- describe the law of equi-marginal utility
- give the concept of consumer surplus.

4.2 INTRODUCTION

The Theory of Consumer Behavior studies how a consumer spends his income so as to attain the highest satisfaction or utility. This utility maximisation behaviour of the consumer is subject to the constraint imposed by his limited income and the prices of the various commodities he desires to consume. The consumer compares the different "bundles of goods" that he can consume given his income and the price of the goods

in the bundles. And in the process, he attempts to determine the bundle that will give him the maximum satisfaction. This unit, thus, deliberates on the study of consumer behaviour. In the study of consumer behaviour, utility plays an important part. It begins with the discussion of two approaches to the study of utility, viz., cardinal utility and ordinal utility. The attainment of a consumer's equilibrium through the use of both these approaches have also been discussed. Finally, the concept of price effect and its breaking up into the substitution effect and income effect have also been discussed.

4.3 CARDINAL AND ORDINAL APPROACHES TO UTILITY : BASIC CONCEPTS

Let us ponder for a few minutes over this question : why do we buy goods and services from the market? Well, the answer is obvious : they satisfy our wants. Thus, in this sense, goods and services have want-satisfying power. In Economics, we name this want-sarisfying power as 'utility'. Thus, utility may be defined as the power of a commodity or a service to satisfy the wants of a consumer. Alternatively, utility may also be defined as the satisfaction that a consumer derives by consuming a commodity or a service. Utility is a subjective concept and it is formed in the mind of a consumer. It is important to note that the concept of utility is not related to the concepts of morality or ethics. Let us take an example : a drug addict person consumes drugs. In Economics paralance, the drug addict is a consumer of drugs and drugs have utility for the person. While dealing with the issue of utility, It is not considered if consumption of drugs will have any harmful effects on the health of the drug addict. Another important aspect of utility is that being a subjective concept, the level of satisfaction from the consumption of goods and services varies among different individuals. Suppose, you and one of your friends have gone to a tea stall. You may like to take a hot samosa and tea, while your friend may not like them so much. Thus, the satisfaction you will derive from the hot samosa and the cup of tea will differ from what your friend will derive from

the items. In fact, the extent of desire for a commodity by an individual depends on the utility that he associates it with.

4.3.1 Measurement of Utility

Having said that utility is an important concept, the next obvious question that comes to one's mind is how to measure it. In the study of utility, two prominent schools of thought exist, viz., the cardinal and the ordinal school. The cardinal utility theory was developed over the years with significant contributions from *Gossen, Jevons, Walras* and finally *Marshall*. The cardinal school of thought assumed that utility can be measured and quantified. It means, it is possible to express utility that an individual derives from consuming a commodity or service in quantitative terms. Thus, a person may express the utility he derives from consuming an apple as 10 ***utils*** or 20 ***utils***. Moreover, it allows consumers to compare and define the difference in utilities perceived in two commodities. Thus, it allows an individual to state that commodity A (accuring an utility of 20 utils) gives double the utility of commodity B (accruing an utility of 10 utils). Another assumption of the cardinalist school of thought is that total utility is a function of the individual utilities derived from each individual unit of the commodity. In an earlier version of the theory, it was assumed that utilities were additive. This meant that an individual was able to add the utilities he/she derived from the consumption of the successive units of a commodity to derive the total utility of consumption. However, additivity of utility was later on relaxed.

The assumption of the cardinalist school of thought on measurement of utilities was challenged later by ordinalist school of thought. Rather, they pointed out that utility actually should be arranged in an order of preference. Thus, according to them, utility is ordinal, and not cardinal. We begin our discussion on the cardinal approach, then will move towards the ordinal approach to utility in the next unit.

4.3.2 Concepts of Total Utility and Marginal Utility

Let us now take a hypothetical example to derive the relationship between total utility and marginal utility as discussed in the cardinal approach. Our hypothetical consumer likes to consume mangoes. Thus, the Total utility (TU) from the consumption of mangoes is the aggregate utility derived by the consumer after consuming all the available units of the commodity, i.e. mangoes. Thus, it is the sum of all the utilities accruing from each individual unit of the commodity.

Marginal utility (MU), on the other hand, is the utility derived from an aditional unit of the commodity, over and above what had been consumed. This relation can be better understood from the following table 4.1 and the figure 4.1.

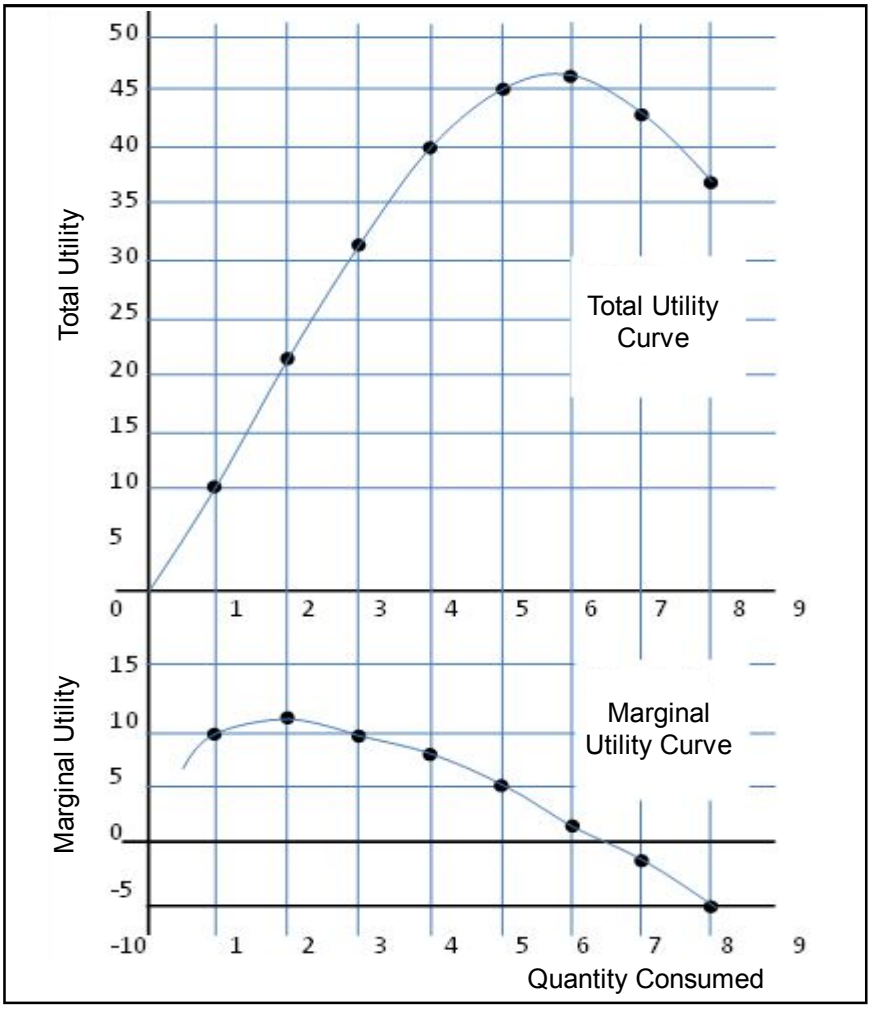
Table 4.1 : A Hypothetical Utility Schedule

Number of Mangoes	Total Utility	Marginal Utility
1	10	10
2	22	12
3	32	10
4	40	8
5	45	5
6	46	1
7	43	-3
8	38	-5

Graphically, this relation between marginal utility and total utility has been shown in figure 4.1.

Now, from the table 4.1 and the figure 4.1, we can see that total utility rises upto a certain limit (upto consumption of the 6^{th} mango). Then it tends to diminish. The marginal utility, on the other hand first increases till second unit and then keeps on declining. And after the consumption of the 6^{th} apple, the marginal utility of the consumer in fact becomes negative.

Fig. 4.1 : Total Utility & Marginal Utility Curves



4.3.3 Law of Diminishing Marginal Utility

An important aspect of the law of marginal utility as discussed in the cardinal utility approach is its nature. According to the cardinal utility approach, marginal utility of a good diminishes as more and more units of the good is consumed. Marshall has described this law in these words, "The additional benefit which a person derives from a given increase of his stock of a thing diminishes with every increase in the stock that he already has."

The law of diminishing marginal utility may be illustrated with the help of the above hypothetical utility schedule 4.1. From the schedule it can be seen that from the consumption of the first unit of the good, the consumer derives 10 utils of utility. From the

next unit, he derives 12 utils. Again, from the consumption of the third unit of the good, the consumer derives 10 utils of utility. Similarly, from the consumption of the fourth and the fifth unit, the consumer attains 8 and 5 utils of marginal utility respectively. Thus, the marginal utility derived from each successive unit of the good though initially increases exhibits a declining trend as the consumer goes on to consume the successive units of the good. Total utility, on the other hand, keeps on increasing. However, the rate of increase in total utility decreases with the consumption of successive units of the good.

This law of diminishing marginal utility rests on an important practical fact. Even when a consumer may have unlimited wants, but after a certain stage each particular want is satiable. Therefore, as the consumer consumes successive units of the same good, intensity of satisfaction from each additional unit goes on diminishing, and a point is reached when the consumer is no more interested in the consumption of the same good. Let us take an example. How many sweets can a person continuously take? It can be easily said that after a few initial units (one or two), the person will not derive the same satisfaction. However, after the consumption of a few units of the same variety of sweets, the consumer may become disinterested to consume any more sweets. Thus, the level of zero utility or even negative utility is reached.

The theory of diminishing marginal utility works under the following conditions : *first,* there is no time-gap in the consumption process. This means that consumption is a continuous process and no leisure is there in the consumption of the successive units. *Secondly,* tastes and preferences of the consumer remain unchanged during the period. And *third,* all the units of consumption are homogeneous in terms of size, quality and other attributes.

The principle of diminishing marginal utility however fails to work under certain circumstances. Exceptions are there when the law fails to operate. For example, the law tends to fail in case of

consumption of liquor. A drinker may tend to drink more and more (at least as compared to the consumption of sweets or any other thing), and thus exhibit a case of positive relationship between marginal utlity and the quantity of liquor consumed. However, even when a drinker of liquor exhibits such a positive relationship between quantity of liquor and the level of satisfaction, there is however, a limit to this habit as well. After a certain stage, the drinker of liquor has to stop consuming more liquor. Another example frequently cited as an exception to the law of diminishing marginal utility is in case of habits like ***philately*** or ***numismatics***. People with such habits will like to own/study about more and more items. As such, it seems that the law of diminishing marginal utility does not operate. However, it should be noted that the person with such habits tends to collect/ study varieties of such items, rather than a number of copies of the same item. The person, thus, finds it more pleasurable to own different varieties of the product at their kitty. The law seems to fail to operate in case of luxury and esteemed goods as well. For example, rich and affluent people tend to prefer a diamond jewellery of higher prices, rather than the lower one.



Philately is the collection or study of stamps and postal history and other related items.

Numismatics is the study or collection of currency, including coins, tokens, paper money and related objects.



CHECK YOUR PROGRESS

Q.1: State whether the following statements are True (T) or False (F):

a) Utility can be measured in proper mathematical terms.

b) Gossen amd Marshall were great contributors to the cardinal approach to utility.

Q.2: Fill in the blanks:

a) ..... utility is the utility flowing from an additional unit of the commodity.

b) According to the cardinal utility approach, marginal utility of a good ..... as more and more units of the good is consumed.

c) ..... utility is the result of utilities derived from each additional unit of the commodity.

Q.3: Define total utility. (Answer in about 30 words)

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Q.4: Define Marginal Utility. (Answer in about 30 words)

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4.4 CONSUMER'S EQUILIBRIUM: THE LAW OF EQUI MARGINAL UTILITY

Before discussing how the consumer attains equilibrium, let us discuss the assumptions on which the theory rests. The assumptions of the theory are:

- The consumer is rational in the sense that given his income constraints, he would always attempt to maximise his utility.
- Utility is a cardinal concept and it can be measured and expressed in quantitative terms. For convenience, it is expressed in terms of the monetary units that a consumer is willing to pay for the marginal unit of the commodity.
- The law of diminishing marginal utility operates. This implies that as a consumer increases his/her consumption of a commodity, the utility accruing from successive units of the commodity decreases. In other words, the marginal utility of a commodity will keep on falling as a consumer goes on increasing its consumption (this is what we have already discussed in Table 4.1 and the subsequent figure 4.1).
- Marginal utility of Money is constant. That is, as one acquires more and more money, the marginal utility of money will remain unchanged. This assumption is critical because money is used as a standard unit of measurement of utility, and, hence, cannot be elastic.

- The total utility of a 'bundle' of goods depends on the quantities of the individual commodities. Thus: $U = f(x_1, x_2, ..., ..., ..., x_n)$ where U means total utility $x_1, x_2, ..., ..., ..., x_n$ are the quantities of n number of commodities.

It is to be noted that in the earlier version of the theory, utilities were considered to be additive. However, in the later version of the theory, this assumption has been dropped, without any effect on its basic argument.

Now, let us discuss how the consumer attains equilibrium. Consumer's equilibrium in the cardinal approach to utility may be derived with the help of the law of equi-marginal utility. Initially we derive the equilibrium of the consumer when he/she spends his/her money income M on a single commodity X. Here, the consumer will be at equilibrium when the marginal utility of X is equal to its market price.

Symbolically: $MU_x = P_x$, where MU_x stands for marginal utility of the commodity X and P_x stands for price of the concerned commodity X.

Now: if

i) $MU_x > P_x$, then the consumer can increase his/her welfare by consuming more of X. He/she will continue to do that until his/her marginal utility for X falls sufficiently, to be equal with its price.

ii) $MU_x < P_x$, then the consumer can enhance his/her welfare by cutting down on his/her consumption of X. He/she will be persisting on doing this, until X falls sufficiently, to be equal with its price P_x.

If more commodities are introduced into the model, then the consumer will attain equalibrium when the ratios of the marginal utilities of the individual commodities to their respective price are equal for all commodities. That is:

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = ... \frac{MU_z}{P_z} = MU_M$$

where, x, y, ..., ..., ..., z are different commodities; and

MU_M = marginal utility of money income.

This statement is defined by the "law of equi-marginal utility", which states that a consumer will distribute his/her money income among different commodities in such a way that the utility derived from the last rupee spent on each commodity is equal.

Now if :

i) $\frac{MU_x}{P_x} > \frac{MU_y}{P_y}$, then the consumer will start substituting commodity **Y** with commodity X, causing MU_x to fall and MU_y to rise. This he/she will continue untill $\frac{MU_y}{P_y}$ equals $\frac{MU_x}{P_x}$.

ii) Conversely, if $\frac{MU_x}{P_x} < \frac{MU_y}{P_y}$, then the consumer will substitute commodity X with commodity Y until the equilibrium is restored.

Limitations of the Theory: The theory of equi marginal utility has been criticised on the ground of the following basic limitations :

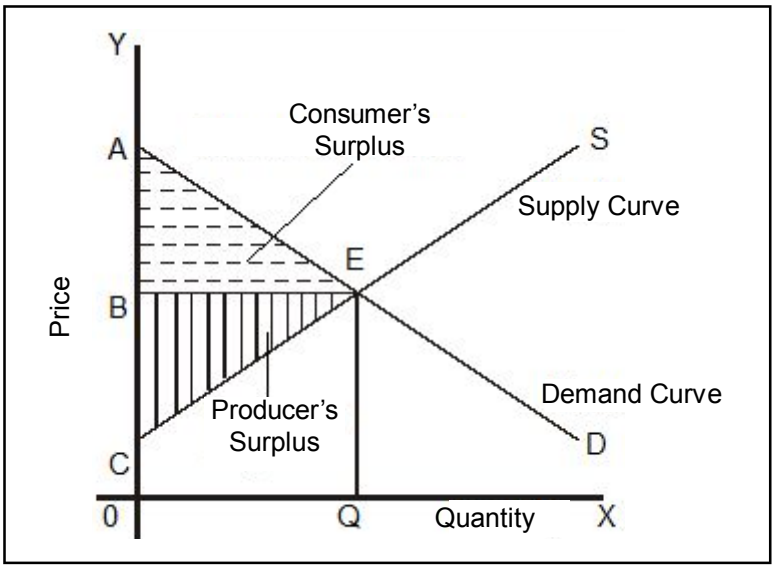
- Utility cannot be cardinally measured. Hence, the assumption that utility derived from the consumption of various commodities can be measured and expressed in quantitative terms is very unrealistic.
- As income increases the marginal utility of money changes. Hence the assumption of constant marginal utility of money is not realistic. Once we consider that trhe marginal utility of money changes, the whole theory breaks down, as the unit of measurement itself changes.
- Finally, the law of diminishing marginal utility is a psychological law, which cannot be empirically established and has to be taken for granted.

4.5 CONSUMER'S SURPLUS

The terms 'surplus' is used in Economics in various contexts. The consumer's surplus is the amount that consumers benefit by being able to purchase a product for a price that is less than they would be willing to pay. In other words, consumer's surplus is the difference between the price the consumer is willing to pay (also called as 'reservation price') and the actual price he actually pays. If someone is willing to pay more than the actual price, their benefit in a transaction is how much they saved when they

didn't pay that price. For example, a person is looking for a rented house. He is ready to pay a monthly rent of Rs. 2,000/- for it. However due to competition in the market, the person gets the house at a rent of Rs. 1,500/- per month. Thus, Rs. 500/- (the difference between the reservation price of the consumer and what he actually pays) is the consumer's surplus in this case.

Fig. 4.2: Consumer's Surplus



In the above figure 4.2, AD represents the demand curve, CS represents the supply curve. The equilibrium price is OB or QE. In the figure, portion ABE represents consumer's surplus. It is to be noted that ABE is the consumer's surplus because, the consumer was ready to pay OAEQ for OQ amount of quantities at OB price; but he actually pays OBEQ. Thus ABE (OAEQ – OBEQ) is the consumer's surplus.



CHECK YOUR PROGRESS

Q.5: State Whether the following statements are True (T) or False (F):

a) According to the cardinal utility approach, marginal utility of money does not remain constant.

b) According to the cardinal utility approach, utility can be measured in monetary terms.

Q.6: Fill in the blanks:

a) According to the critics of the cardinal utility approach, utility cannot be ..... measured.

b) Critics of the cardinal utility appraoch point out that as ..... increases, marginal utility of money changes.

c) According to the law of ..... a consumer will distribute his money income among different commodities in such a way that the utility derived from the last rupee spent on each commodity is equal.



4.6 LET US SUM UP

- Theory of consumer behaviour studies how a consumer spends his income so as to attain the highest satisfaction or utility.
- Utility is a subjective concept and its perception varies among different individuals.
- The cardinalist school asserts that utility can be measured and quantified, while the ordinalist school asserts that utility cannot be measured in quantitative terms.
- The law of equi-marginal utility states that a consumer will attain equilibrium when the ratios of the marginal utilities of the individual commodities to their respective prices are equal for all commodities.
- The theory has been criticised on the ground that utility cannot be measured cardinally and utility of money does not remain constant. The law of diminishing marginal utility is also unrealistic as this is a psychological law, and cannot be established empirically.
- Consumer's surplus is the difference between the price the consumer is willing to pay (also called as 'reservation price') and the actual price he actually pays.



4.7 FURTHER READING

1) Ahuja, H.L. (2006); *Modern Economics*; New Delhi: S. Chand & Co. Ltd.
2) Chopra, P.N. (2008); *Micro Economics*; New Delhi: Kalyani Publishers.
3) Dewett, K.K. (2005); *Modern Economic Theory*; New Delhi: S. Chand & Co. Ltd.
4) Koutsoyiannis, A. (1979); *Modern Microeconomics*; New Delhi: Macmillan.
5) Sundharam, K.P.M. & Vaish, M.C. (1997); *Microeconomic Theory*; New Delhi: S.Chand & Co. Ltd.



4.8 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: a) False, b)True

Ans. to Q. No. 2: a) Marginal utility is the utility flowing from an additional unit of the commodity.

b) According to the cardinal utility approach, marginal utility of a good diminishes as more and more units of the good are consumed.

c) Total utility is the result of utilities derived from each additional unit of the commodity.

Ans. to Q. No. 3: Total utility (TU) is the aggregate utility derived by a consumer after consuming all the available units of a commodity. Thus, it is the sum of all the utilities accruing from each individual unit of the commodity.

Ans. to Q. No. 4: Marginal utility (MU) is the utility flowing from an additional unit of a commodity, over and above what had been consumed.

Ans. to Q. No. 5: a) False, b)True

Ans. to Q. No. 6 : a) According to the critics of the cardinal utility approach, utility cannot be cardinally measured.

b) Critics of the cardinal utility approach point out that as income increases, marginal utility of money changes.

c) According to the law of equi-marginal utility, a consumer will distribute his money income among different commodities in such a way that the utility derived from the last rupee spent on each commodity is equal.



4.9 MODEL QUESTIONS

A) Very Short Questions (Answer each question in about 75 words):

Q.1: Dislinguish between cardinal and ordinal utility. Which one of these two concepts is more realistic and why?

Q.2: What is cardinal utility?

Q.3: Define the term marginal utility.

Q.4: What do you mean by the term total utility?

Q.5: State any two situations where the law of diminishing marginal utility fails to operate.

B) Short Questions (Answer each question in about 100-150 words):

Q.1: Write a short note on the concept of diminishing marginal utility. Under what conditions does this law operate?

Q.2: Discuss the assumptions of the cardinalist approach to utility. What criticisms have been raised on the assumptions of this approach?

C) Essay-Type Questions (Answer each question in about 300-500 words):

Q.1: State the law of Equi-marginal utility. How does it explain consumer's equilibrium?

Q.2: Discuss the law of diminishing marginal utility with suitable diagram. Write down its assumptions and exceptions.

*** ***** ***

UNIT 5: CONSUMER BEHAVIOUR-ORDINAL APPROACH

UNIT STRUCTURE

5.1 Learning Objectives

5.2 Introduction

5.3 The Indiference Curve Technique: Basic Concepts

- 5.3.1 Assumptions of the Indifference Curve Technique
- 5.3.2 Indifference Schedule and Indifference Curve
- 5.3.3 Indifference Map
- 5.3.4 Properties of Indifference Curves

5.4 Consumer Equilibrium through Indifference Curve Approach

5.5 Price Effect, Substitution Effect and the Income Effect

5.6 Let Us Sum Up

5.7 Further Reading

5.8 Answers to Check your Progress

5.9 Model Questions

5.1 LEARNING OBJECTIVE

After going through this unit, you will be able to:

- explain the basic concepts of indifference curve and the budget line
- derive the equilibrium of the consumer using the ordinal/indifference curve approach
- explain the price effect and split it up into substitution effect and income effect
- give the concept of giffen goods.

5.2 INTRODUCTION

This unit deliberates on the study of consumer behaviour through ordinal approach. This approach states that utility is not measureable in a cardinal way. A consumer can only give rank to his preferences or order

them. In this unit the attainment of a consumer's equilibrium ordinally through the use of indifference curve approach has been discussed. At first, the basic concepts related to indifference curve approach has been given. Finally, the concept of price effect and its breaking up into the substitution effect and income effect have also been discussed along with the idea of Giffen Goods.

5.3 THE INDIFFERENCE CURVE TECHNIQUE: BASIC CONCEPTS

The indifference curve technique was conceived as an alternative to the cardinal utility approach of the theory of consumer behaviour. A number of economist have contributed to this techique as it has evolved over the years, with the latest reflnements attributed to Slutsky, J.R. Hicks and R.G.D. Allen.

The indifference curve technique rejects the concept of cardinal utility and asserts that utility cannot be measured in quantitative terms. Instead, it adopts the principle of ordinal utility which states that, while the consumer may not be able to indicate exactly the amount of utility that he derives from the consumption of a commodity or a combination of commodities, he is perfectly capable of comparing and ranking the different levels of satisfactions that he derives from them. For example, in case of different varieties of rice, Mrs Saikia may prefer (in terms of satisfaction derived from) to consume a *joha* variety of rice over *aijung* variety of rice, and *aijung* variety of rice over *parimal* variety of rice. Interestingly, this much of information(i.e., information about the order of ranking among the different varieties of rice) is sufficient to derive the demand schedule and hence the demand curve of an individual consumer. Therefore, the questionnable assumption that consumers possess a cardinal measure of satisfaction can be dropped. Thus, the basic distinction between the two schools of thought is that the cardinal approach to the measurement of utility believes that the utility derived from the consumption of commodity can be expressed in quantitative terms. The ordinal approach, on the other hand, rejects this and states that the consumer at best can rank the various

commodities (or combination of them) in accordance with the satisfaction that he/she expects from their consumption.

Now, let us discuss some of the key concepts used in the indifference curve analysis, viz. indifference curve, indifference map and the budget line. Let us begin with the assumptions on which the theory of indifference curve rests.

5.3.1 Assumptions of the Indifference Curve Technique

The indiference curve technique is based on the following assumptions.

- **Utility can be Ordinally Measured:** The consumer can rank various commodities or combination of commodities in accordance with the satisfaction that the consumer derives from them.
- **The Consumer is Rational:** Given the market prices and the money income, a consumer will attempt to maximise his/her satisfaction when he/she undertakes consumption.
- **Additive Utilities:** The quantities of the commodities that is consumed determines the total utility of the consumer.
- **Consistency of Choices:** The choice of the consumer is consistent in the sense that if he/she chooses combination A over B in one peried, he/she will not choose B over A in another period. Symbolically : If A > B, then B < A.
- **Transitivity of Consumer Choice :** If a consumer prefers combination A to B, and prefers B to C, then, it can be concluded that he/she prefers A to C.

  Symbolically : If A > B, and B > C, then A > C.

5.3.2 Indifference Schedule and Indifference Curve

An indfference curve is defined as the locus of the various combinations of two commodities that yield the same satisfaction to the consumer, so that the consumer is indifferent to any one particular combination. In other words, all combinations of the two

commodities in the indifference curve are equally desired by the consumer.

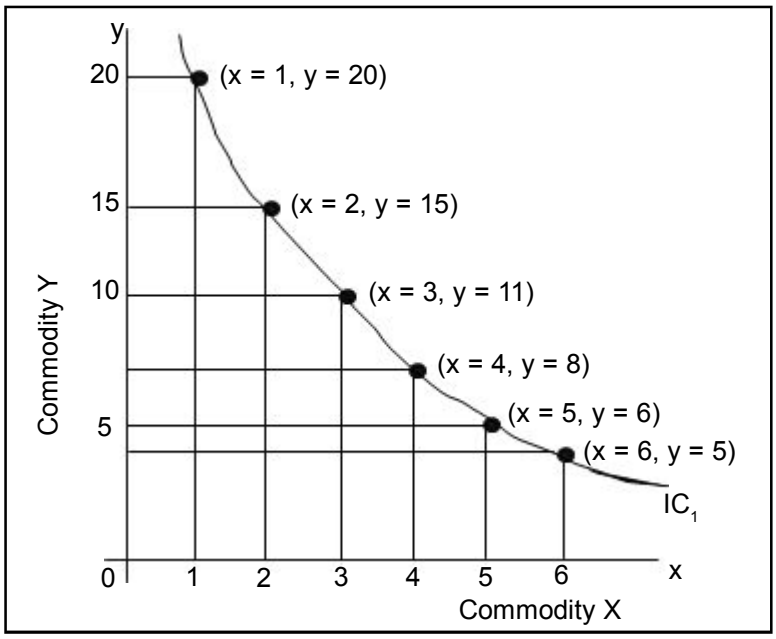
An indifference curve is based on the indifference schedule, which represents the various combinations of two commodities that give the consumer the same level of satisfaction. Given below is an indifference schedule representing various combination of commodity X and Y that gives the consumer the same amount of satisfaction.

Table 5.1 : Indifference Curve Schedule

Combination	X	Y	MRS_{xy}
1st	1	20	–
2nd	2	15	5
3rd	3	11	4
4th	4	8	3
5th	5	6	2
6th	6	5	1

Putting the various combinations of the indifference schedule from the above table 5.1, we obtain the IC, indifference curve as shown in figure 5.1.

Fig. 5.1 : Indifference Curve



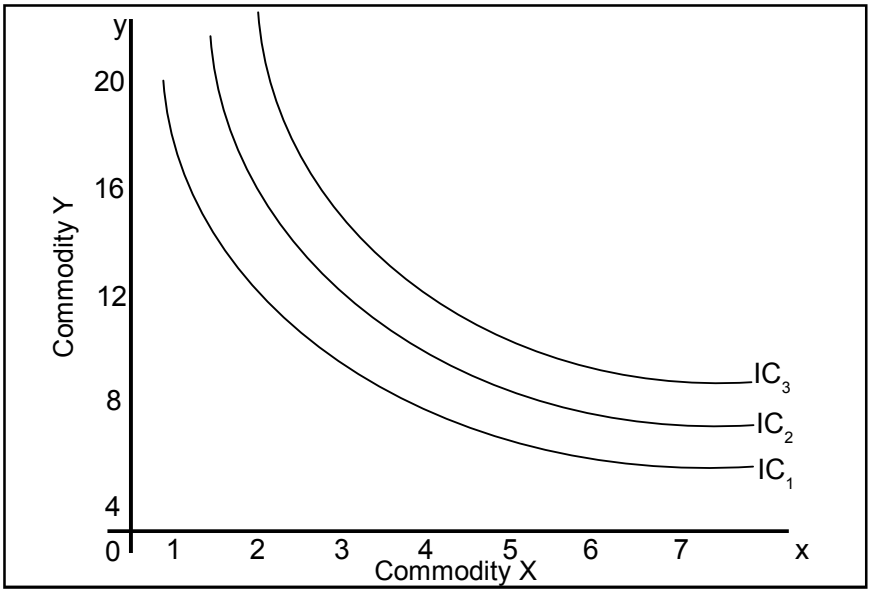
In figure 5.1, the slope of the indifference curve is indicated by the "marginal rate of substitution'. The marginal rate of substitution of X for Y is defined as the numbers of Y that has to be given up by the consumer to get an additional unit of X, so that his/her satisfaction remains unchanged. Thus, [slope of the indifference curve] = MRS_{xy}.

It can be seen from table 5.1 that as the consumer gets more and more of X, the number of X he is willing to give up for an additional unit of X successively falls. This is known as the "principle of diminishing marginal rate of substitution" which states that the marginal rate of X for Y falls as more and more of X is substituted for Y. This implies that the indifference curve always slopes downwards to the right and is convex to the origin.

5.3.3 Indifference Map

An indifference map, on the other hand, shows all the indifference curves which rank the preference of the consumer. While the combinations of commodities on the same indifference curve yield the same satisfaction, combinations on a higher indifference curve yield higher levels of satisfaction and combinations on a lower curve yield lower levels of satisfaction. In figure 5.2, an indifference map has been shown.

Fig. 5.2: An Indifference Map



In the above figure, we see an indifference map of a consumer. It is needless to say that the rational consumer would prefer to be on a higher indifference curve (i.e. he would prefer to be on IC_2 than being IC_1 and on IC_3 than on IC_1 and IC_2) rather than on the indifference cure which is positioned lower (IC_2 or IC_1).

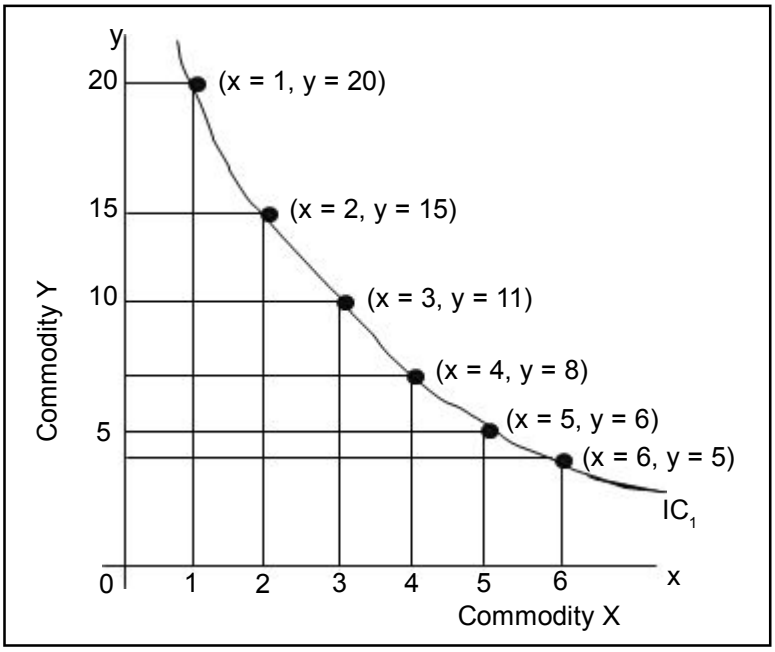
5.3.4 Properties of Indifference Curves

Let us now discuss the properties of the indifference curves. The important properties of the indifference curves are as follows:

- **Indifference Curves are Downward Sloping towards the Right:** The first important property of an indifference curve is that it slopes downward from left to right. This is also called as indifference curves are negatively sloped towards right. The basic reason for the downward slope is that as the consumer chooses to move along an indifference curve, he/she has to sacrifice some units of one good to obtain an additional unit of the other good. The sacrifices of a few units of one good for obtaining an additional unit of the other good becomes necessary so that the consumer remains in the same level of satisfaction as he/she moves along an indifference curve. Thus, we get the indifference curve of the shape as has been shown in the previous figure 5.1 or 5.2.
- **Indifference Curves are Convex to the Origin :** Another important property of an indifference curve is that an indifference curves is convex to the origin. The convexity of an indifference curve is basically due to the working of the principle of diminishing marginal rate of substitution. While discussing the concept of an indifferene curve, we have mentioned that as the consumer consumes more and more units of X, the number of units of Y he is willing to give up for an additonal unit of X begins to fall. A relook at the table 5.1 as has already been discussed would clarify this point. From the table, it can be seen that as the consumer increases consumption of X by an additional unit,

he tends to give up smaller units of Y for each additional unit of X. The indifference curve representing the table 5.1 (i.e., figure 5.1) is reprodued here.

Fig. 5.1: Indifference Curve (Reproduced)

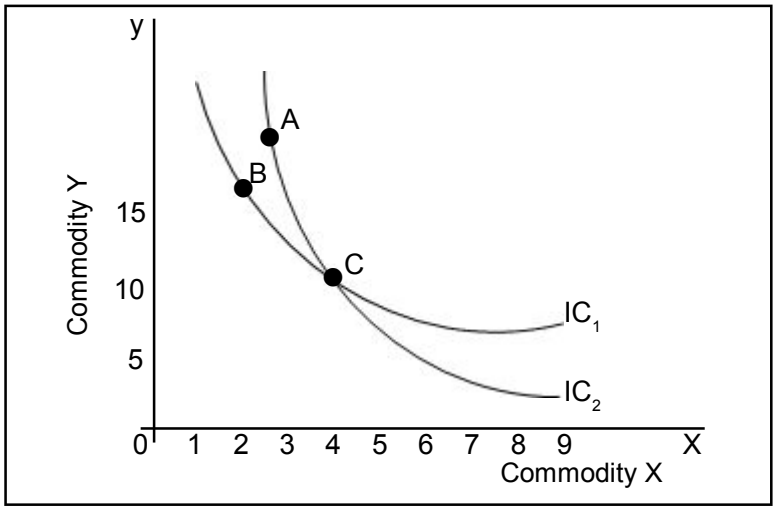


- **Indifference Curves cannot Intersect:** Another important property of an indifference curve is that no two indifference curves can intersect. This means that only one indifference curve can pass through a point in an indifference map. Figure 5.3 will make this point clear.

From the figure shown in the next page it can be seen that the indifference curve IC_2 allows the consumer to choose the combination A. Again IC_1 is another indifference curuve in his indifference map. Now, let us suppose that the consumer chooses combination B in the indifference cuve IC_1. It is obvious from the above figure that combination A would give the consumer higher level of satisfaction as it offers the consumer higher quantities of both the goods X and Y. Now, let us consider point C. This point is common to both the indifference curves. Thus, combinations A and C would give the consumer the same level of satisfaction, as both the points lie on the same

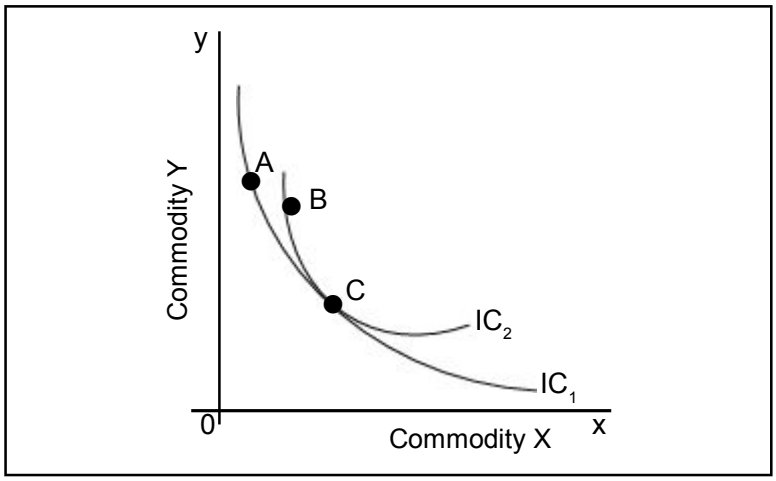
indifference curve IC_2. Again for combinations B and C also the consumer will derive the same level of satisfaction as both of them are on the same indifference curve IC_1. What it means is that combinations A and B will derive the same level of satisfaction. This is not at all logical to accept. Thus, two indifference curves can never intersect.

Fig. 5.3: No two Indifference Curves can intersect



The same thing may happen if two indifference cuves touch a single common point in an indifference map as has been shown in the next figure 5.4.

Fig. 5.4: No two Indifference Curves can touch each other





CHECK YOUR PROGRESS

Q.1: State whether the following statements are True (T) or False (F):

a) According to the indifference curve analysis, consistency of consumer choices states that if a consumer prefers combination A to B, and prefers B to C, then it implies that the consumer prefers A to C.

b) According to the indifference curve approach, utility cannot be cardinally measured, they can only be ordinally arranged.

Q.2: Fill in the blanks :

a) The slope of the indifference curve is indicated by .....

b) Two ..... cannot intersect.

c) An indifference curve is defined as the ..... of various combinations of two commodities that yield the ..... level of satisfaction to the consumer.

Q.3: What is meant by 'consistency of consumer choices' and 'transitivity of consumer choices' as discussed in the indifference curve analysis? (Answer in about 50 words).

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Q.4: What does an indifference schedule exhibit? (Answer in about 30 words)

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Q.5: Can an indifference curve be upward rising? Justify your view in about 60 words.

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5.4 EQUILIBRIUM OF A CONSUMER USING THE INDIFFERENCE CURVE APPROACH

The equilibrium of a consumer under the indifference curve approach can be derived using the budget line and the indifference curve of the consumer. Therefore, before discussing the equilibrium of the consumer, let us first discuss the concept of the budget line.

Concept of the Budget Line: The budget line is an important concept in the indifference curve technique. It is defined as the various combination of the two commodities (X and Y) that a consumer can consume, given his income(M) and the price of the two commodities (P_x and P_y).

The Budget line can be algebraically expressed as: $M = P_xX + P_yY$.

where X and Y indicate the quantities of X and Y respectively.

Now, let us suppose, M = 100, P_x = 10 and P_y = 20, then

a) If the consumer spends all his income on X, then he can consume:

$$X = \frac{M}{Px} = \frac{100}{10} = 10$$

b) and if he spends all his income on Y, then the number of units of y that he can consume is:

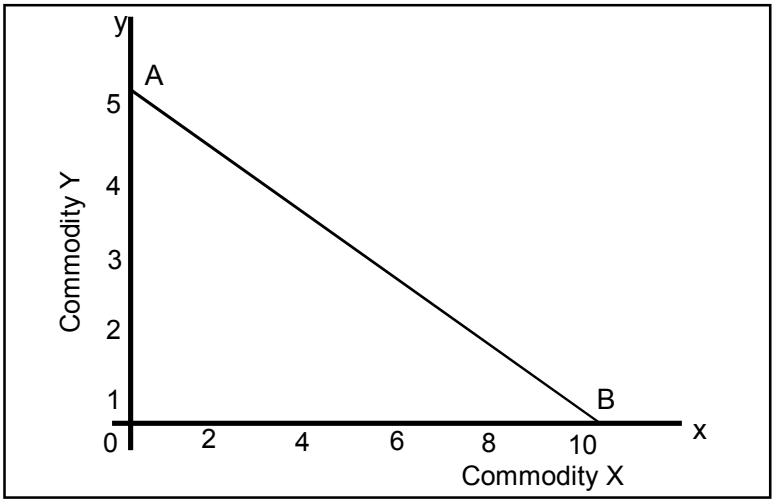
$$Y = \frac{M}{Py} = \frac{100}{20} = 5$$

Thus, 10x and 5y are the two extreme limits of the consumer's expenditures. However, he usually prefers a combination of the two commodities within these two limits. In fact, the budget line joins the two extreme consumption limits of the consumer, and the points within those

two limits indicate the combinations available to the consumer, given his income and the prices of the two commodities.

The concept of budget line has been shown with the help of figure 5.5.

Fig. 5.5: Budget Line



In the above figure 5.5, AB indicates the budget line. In this budget line AB, the consumer has the option of consuming 10x(0B) or 5y(0A) or some combination of the two.

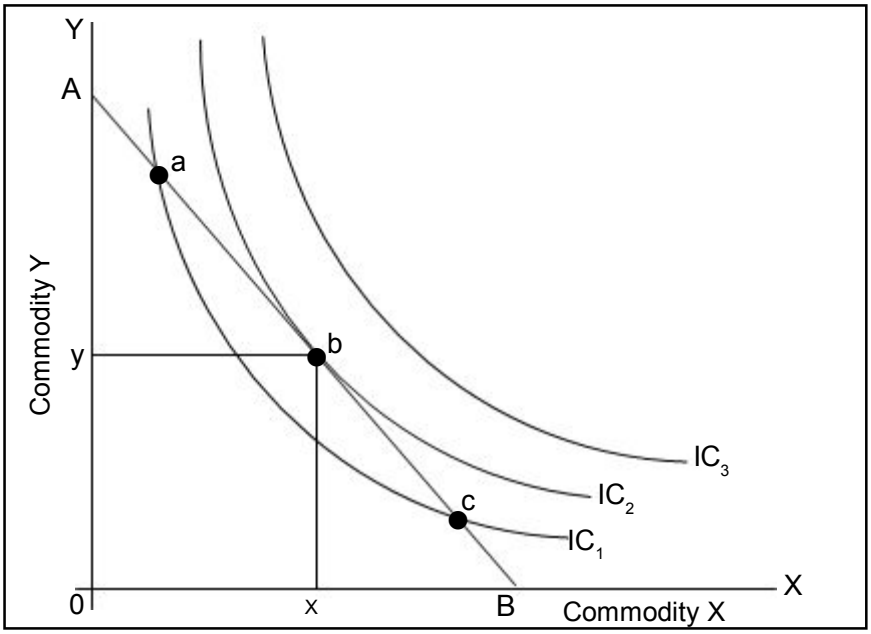
The slope of the budget line is the ratio of the prices of the two commodities. Geometrically,

$$[\text{Slope of the Budget Line}] = \frac{M/P_y}{M/P_x} = \frac{P_x}{P_y}$$

Consumer's Equilibrium: Given his budget line, a consumer would like to maximise his satisfaction by climbing on to the highest indifference curve. This has been shown in the following figure 5.6.

From the figure 5.6 it can be seen that the consumer is at equilibrium at point b, where his budget line is ***tangent*** to the indifference curve IC_2. He has the option of consuming at 'a' and 'c', but those combinations are rejected as they would place him on a lower indifference curve IC_1. The consumer would like to be on the indifference curve IC_3, but his budget line does not allow him to do that. From figure 5.6, it can be seen that at equilibrium the consumer consumes 0x amount of X and 0y amount of Y.

Fig. 5.6: Equilibrium of the Consumer



Thus, at equlibrium,

[slope of the indifference curve] = [slope of the budget line]

Symbolically, it can be expressed as :

$$MRS_{xy} = \frac{P_x}{P_y}$$

Indifference Curve Technique vs Cardinal UtilityAnalysis: The indifference curve technique is considered to be surperior to the cardinal utility approach on the following grounds:

- It avoids the unrealistic assumption of cardinal utility and instead adopts the concept of ordinal utility.
- It can be used to split the price effect into substitution effect and income effect.
- It is not based on the unrealistic assumption of constant marginal utility of money.

Limitations of the Indiference Curve Technique: The indifference curve technique has been crticised on the following grounds:

- The indifference curve technique does not tell us anything new, and it is only “old wine in new bottle”.
- It assumes that the consumer is very familiar with his entire preference schedule, which is not the case in actual life.

- The technique can be efficiently applied only to two commodities. Once more than two commodities are introduced, the analyais become very complicated to illustrate.



CHECK YOUR PROGRESS

Q.6: State whether the following statements are True (T) or False (F):

a) The indifference curve approach avoids the unrealistic assumption of constant marginal utility of money.

b) The budget line of the consumers are the same.

Q.7: Mention any two superiorities of the ordinal approach over the cardinal aproach. (Answer in about 50 words).

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Q.8: What is a budget line? Derive the algebraic expression of the budget line. (Answer in about 50 words).

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5.5 PRICE EFFECT, SUBSTITUTION EFFECT AND THE INCOME EFFECT

While discussing the law of demand, we have seen that as the price of good changes, quantity demanded for that good also changes in the opposite direction. Thus, if the price of a good rises, quantity demanded of that good falls, and vice versa.

Let us consider this question: why it so happens? Two factors may be held responsible for this. *First,* suppose our hypothetical consumer consumes two commodities, kachori and tea. Now, let us further suppose that the price of kachori increases, while price of tea remains constant. Thus, in such a situation, the ***real income*** of the consumer decreases. Thus, the purchasing power of the consumer decreases, and as such, even when the income of the consumer has not changed, his budget for consumption has decreased. This is similar to the situation, when the income of the consumer decreases. Thus, the response of the consumer to the change in the prices, i.e., his response as a matter of decline in his purchasing powers is referred to as the **income effect**.



Real Income: Income which is available for spending after tax and other contribution have been deducted corrected for inflation.

The *second* factor is that, when the price of kachori increases, and purchasing power of the consumer remaining the same, amount of tea that the consumer must give up for obtaining an extra unit of kachori increases. Let us take this example. Suppose, the price of a kachori is Rs. 4/- while the price of a cup of tea is Rs. 2/-. Thus, a cup of tea is relatively cheaper (or less expensive) compared to the other good, i.e., kachori. This means that to obtain a kachori, the consumer has to give up 2 cups of tea. Or, to obtain a cup of tea, the consumer has to give up half of one kachori. Thus, the relative price of a good shows its cost in terms of the other good in question.

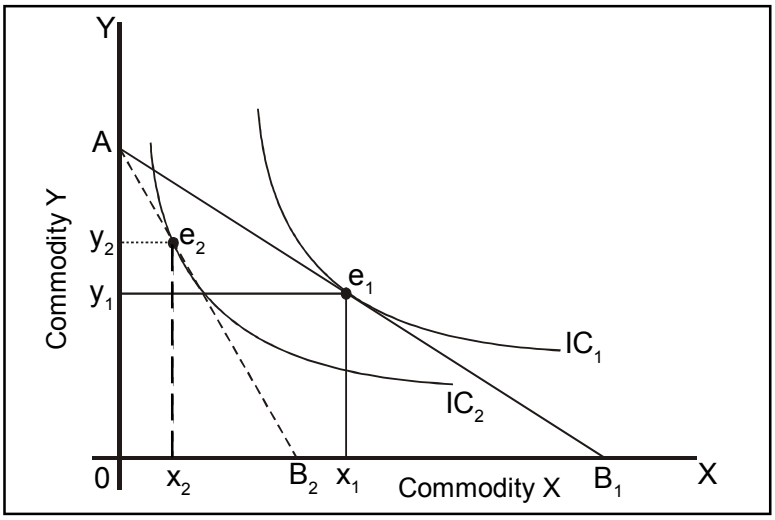
Now, suppose the price of tea increases to Rs. 4/-. The consumer must now give up one kachori for a cup of tea. Thus, compared to the earlier case, tea has become more expensive. Please note that the consumer had to give up only half of a kachori to obtain a cup of tea, but now he needs to give up a full piece of kachori for the same cup of tea. Again, to obtain a kachori, the consumer has to give up one cup of tea. Thus, compared to the earlier case, kachori has become relatively cheaper. Please note that earlier, the consumer had to give up two cups of tea for one kachori, but now, he needs to give up only one cup of tea. Thus, the response of the consumer in making choices between the two goods while taking into consideration the changes in their relative prices is known as the **substitution effect.** These two effects viz., the income effect and the

substitution effect can be summed up together, and is termed as the price effect. Thus, the price effect reveals how a consumer reacts to his buying habits as a result of a change in the prices of one of the two commodities.

The price effect and its two components, i.e., the substitution effect and the income effect can be explained with the help of the indifference cuve analysis. Let us first discuss the price effect. Then we shall explain how to decompose the price effect into substitution effect and income effect.

Price Effect : We have already discussed the concept of the indifference curve and the budget line and we have seen how given his/her money income (shown by the budget line), a consumer attains his/her equilibrium in terms of the combination of the two commodities, viz., X and Y. Thus, as the price of X increases (price of Y and income of the consumer remaining the same) the budget constraint rotates clockwise about the Y axis, i.e., on the X axis, the budget line will move towards the origin point (or towards the left). This has been shown with the help of figure 5.7.

Fig. 5.7: Price Effect



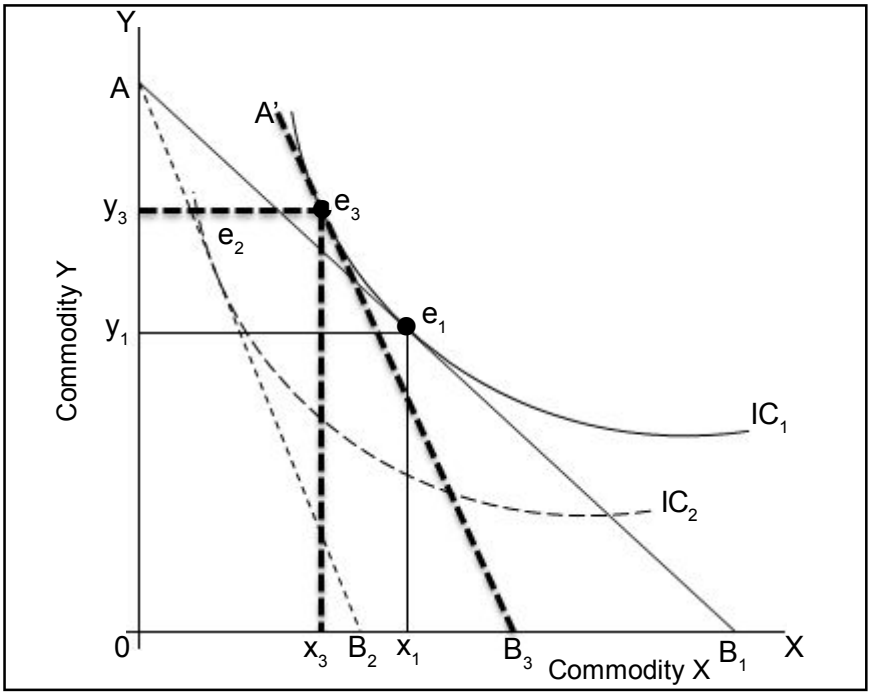
From Figure 5.7 it can be seen that the consumer originally faces the indifference curve IC_1. His/her level of income has been depicted by the budget line AB_1. Thus, given this budget line, the consumer attains equilibrium at point e_1, where the budget ine AB_1 is tangent to the indifference curve IC_1. In this point of equilibrium, the consumer consumes $0X_1$ of commodity X and $0Y_1$ of commodity Y. Now let us suppose, the price of X increases. As a result, the real income of the consumer will be

adversely affected. As a result, the budget line of the consumer shifts clockwise about Y axis, i.e., it moves towards the left of origin of the axes (towards point 0). The new budget line of the consumer is AB_2. In this changing situation, the consumer no more remains on the same indifference curve. The new indifference curve of the consumer is IC_2. Thus, given the budget line AB_2, the consumer attains equilibrium at point e_2. The movement from e_1 to e_2 represents the **price effect**.

Now, let us explain how this price effect can be decomposed as the substitution effect and the income effect. We shall first discuss the substitution effect.

Substitution Effect: The substitution effect seeks to reply to the theoretical question. "What will happen if the consumer only faced the new relative price but could still attain the old level of utility. How would the consumer switch between the two goods?" The substitution effect replies to this question. The substitution effect has been explained with the help of figure 5.8.

Fig. 5.8: Substitution Effect



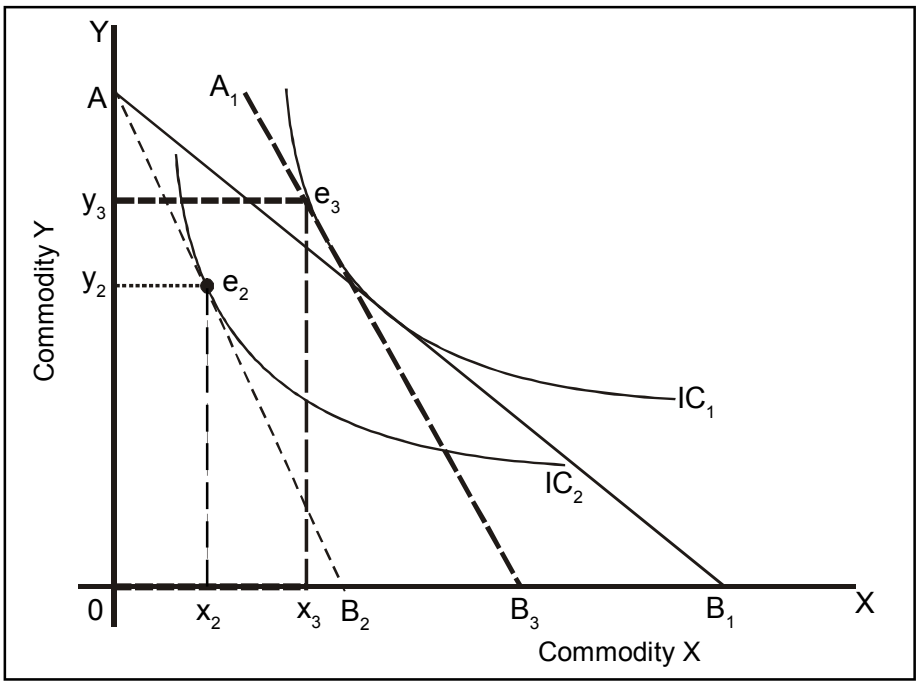
Please note that here we are trying to analyse what will happen if the consumer is allowed to close combinations of commodities in his initial indifference curve IC_1, if we take into consideration the changing budget

situation (or the changing relative prices of the two commodities). Thus, we want to analyse given the new budget constraint AB_2, how the consumer will behave if he is allowed to choose combinations of the two commodities in his initial indifference curve IC_1. In such situations, the budget line will shift in parrellel to the new budget line AB_2. In figure, this has been shown by the budget line $A'B_3$ (the dark dotted line). This budget line $A'B_3$ is tangent to the original indifference curve IC_1 at point e_3. Thus, at this equilibrium point e_3, the consumer buys less of the commodity which is relatively expensive (OX_3 instead of OX_1) and more of the commodity which is relatively cheaper (OY_3 instead of OY_1). Thus, this shows that due a change in the price, the consumers tends to sustitute relatively more expensive commodity for the relatively cheaper commodity. This is the **substitution effect**.

Income Effect: The income effect reveals how the consumer will react to a change in his purchasing power given the new relative prices. For analysing the income effect, we assume that the substitution effect has already taken place. Thus, here we take into consideration the behaviour of the consumer, when given the new relative prices, the consumer faces a lower indiference curve (as his realincome has been adversely affected, he no more remains on the same indifference curve). In such a situation, given the new budget line and the lower indifference curve, the consumer reacts by choosing less of both the commodities, as compared to when he is allowed to remain in the same indifference curve even when taking into consideration the new relative prices (this is what we have considered in case of the substitution effect). This has been explained with the help of figure 5.9.

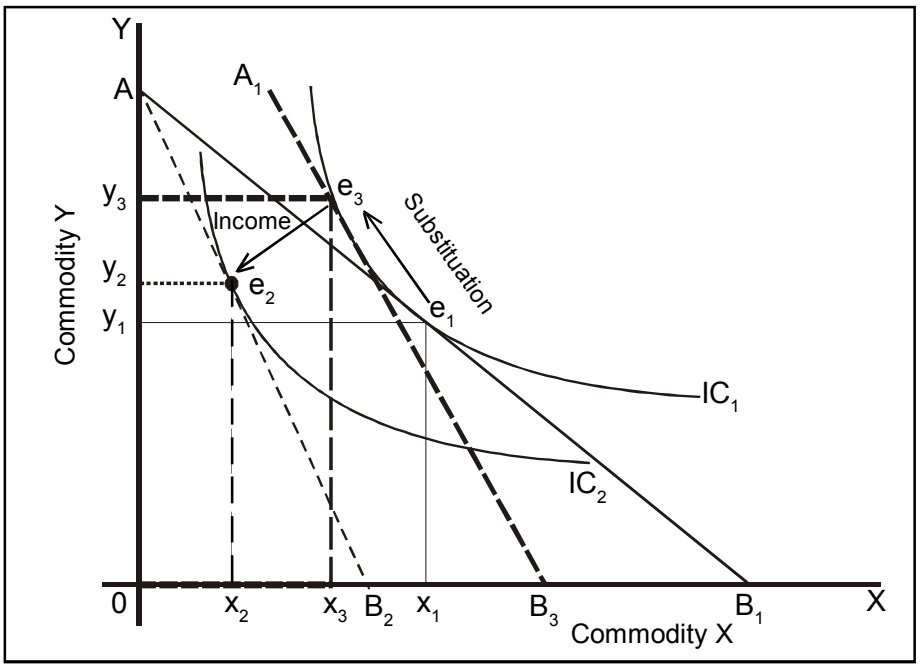
From figure 5.9, it can be seen that with the subsitution effect already in action the consumer buys less of both the commodities X and Y. The income effect has been shown by the movement of the consumer from e_3 to e_2.

Fig. 5.9: Income Effect



We can now summarise the whole process in a single figure. This has been shown with the help of figure 5.10.

Fig. 5.10: Price Effect and its Two Components



In figure 5.10, the overall behaviour of the consumer as a response to the change in the price of one commodity has been shown. As the price of the X commodity increases, on overall, the consumer moves from point

e_1 to point the point e_2. This is the **price effect**. However, we can break up this overall price effect into two components, viz., the substitution effect and the income effect. The substitution effect is considered first. The substitution effect has been shown by the movement of the consumer from point e_1 to point e_3. The income effect is allowed, keeping in mind that the substitution effect has already taken place. The income effect has been shown with the help of movement of the consumer from point e_3 to point e_2.

Thus, on the overall, we can summarise that as the price of one good increases, the real income of the consumer is adveresely affected. Or, in other words, the budget line of the consumer is adveresely affected. As a result, the consumer no more remains on the same indifference curve. After the price effect is allowed to happen, and given his new budget line, the consumer attains equilibrium on a lower indiference curve. In attaining this new equilibrium, the consumer consumes less of the commodity which is relatively expensive (in our case, commodity X) and more of the commodity which is relatively cheaper (commodity Y).



CHECK YOUR PROGRESS

Q.9: Fill in the blanks:

a) Price effect has ..... components.

b) The increase in the consumption of a commodity due to a fall in its price is called .....

c) To discuss the price effect, the ..... was used by Hicks, while the cost-difference method was used by .....

Q.10: What is meant by the price effect? (Answer in about 50 words).

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Q.11: Explain the concept of substitution effect? (Answer in about 50 words).

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5.6 LET US SUM UP

- Theory of consumer behaviour studies how a consumer spends his income so as to attain the highest satisfaction or utility.
- An indifference curve is the locus of the various combination of two commodities that yield the same satisfaction to the consumer, so that he is indifferent to any one particular combination.
- An indifference map shows all the indifference curves which rank the preference of the consumer. While combinations of commodities on the same indifference curve yield the same satisfaction, combinations on a higher indifference curve yield greater satisfaction and combinations on a lower curve yield less satisfaction.
- A consumer is in equilibrium at the point where his budget line is tangent to the indifference curve. Symbolically: $MRS_{xy} = P_x / P_y$
- The substitution effect and the income effect are the two components of the price effect.
- These two components can be derived using either the Hicksian compensating variation method or the Slutsky's cost - difference method.



5.7 FURTHER READING

1) Ahuja, H.L. (2006); *Modern Economics*; New Delhi: S. Chand & Co. Ltd.
2) Chopra, P.N. (2008); *Micro Economics*; New Delhi: Kalyani Publishers.
3) Dewett, K.K. (2005); *Modern Economic Theory*; New Delhi: S. Chand & Co. Ltd.
4) Koutsoyiannis, A. (1979); *Modern Microeconomics*; New Delhi: Macmillan.
5) Sundharam, K.P.M. & Vaish, M.C. (1997); *Microeconomic Theory*; New Delhi: S.Chand & Co. Ltd.



5.8 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: a) False, b) True

Ans. to Q. No. 2: a) The slope of the indifference curve is indicated by marginal rate of substitution.

b) Two indifference curves cannot intersect.

c) An indifference curve is defined as the locus of various combinations of two commodities that yield the same level of satisfaction to the consumer.

Ans. to Q. No. 3: Consistency of choices means that the choice of the consumer is consistent in the sense that if he chooses combination A over B in one period, he will not choose B over A in another period.

Again, transitivity of consumer choice means that if a consumer prefers combination A to B, and prefers B to C, then, it can be concluded that he prefers A to C.

Ans. to Q. No. 4: An indifference schedule represents the various combinations of two commodities that give the consumer the same level of satisfaction. An indifference curve is drawn based on an indifference schedule.

Ans. to Q. No. 5: An indifference curve cannot be upward rising, because in such an indifference curve, as the counsumer will move upward the curve, he will be able to choose more quantities of both the goods. As such, he will not remain indifferent among the different bundles of goods available to him. This is clearly a violation of the very definition of an indiffernce curve.

Ans. to Q. No. 6 : a) True, b) True

Ans. to Q. No. 7 : Two important superiorities of the indifference curve approach over the cardinal utility approach are:

- Indifference curve approach avoids the unrealistic assumption of cardinal utility and instead adopts the concept of ordinal utility.
- It can be used to split the price effect into substitution effect and income effect.

Ans. to Q. No. 8: A budget line is defined as the various combinations of two commodities (say, X and Y) that a consumer can consume, given his income (M) and the price of the two commodities (P_x and P_y). Thus, a Budget line can be algebraically expressed as:

$$M = P_xX + P_yY.$$

Where X and Y indicates the quantities of x and y respectively.

Ans. to Q. No. 9: a) Price effect has <u>two</u> components.

b) The increase in the consumption of a commodity due to a fall in its price is called as <u>price effect</u>.

c) To discuss the price effect, the <u>compensating variation method</u> was used by Hicks, while the cost-difference method was used by <u>Slutsky</u>.

Ans. to Q. No. 10: If a consumer consumes two commodities X and Y, and given the price of Y, the price of X falls then the real income of the consumer increases. This is because he can now consume more of X with his given income. The increase in the consumption of a commodity due to a fall in its price is referred to as the 'Price Effect'.

Ans. to Q. No. 11: The increase in the consumption of X is brought about by substituting the relatively cheaper X for Y. It is referred to as the substitution effect. Hence, the 'substitution effect' takes place when

the relative prices of the two commodities change is such a manner that the consumer concerned is neither better nor worse of than he was before, but is obliged to rearrange his purchases in accordance with the new relative prices.



5.9 MODEL QUESTIONS

A) Very Short Questions (Answer each question in about 75 words):

Q.1: Dislinguish between cardinal and ordinal utility. Which one of these two concepts is more realistic and why?

Q.2: What is meant by cardinal utility?

Q.3: Define the term marginal utility.

Q.4: Explain the term total utility?

Q.5: State any two situations where the law of diminishing marginal utility fails to operate.

B) Short Questions (Answer each question in about 100-150 words):

Q.1: Write a short note on the concept of diminishing marginal utility. Under what conditions does this law operate?

Q.2: Discuss the assumptions of the cardinalist approach to utility. What criticisms have been raised on the assumptions of this approach?

Q.3: What is meant by an indifference map? Why does an indifference curve take the shape of a downward sloping convex curve?

Q.4: With the help of a suitable figure discuss the concept of a budget line.

C) Essay-Type Questions (Answer each question in about 300-500 words):

Q.1: State the law of Equi-marginal utility. How does it explain consumer's equilibrium?

Q.2: What is meant by an indifference curve? Discuss the properties of indifference cuves.

Q.3: Derive the consumer's equilibrium using the indifference map and the budget line as your tools.

Q.4: Derive the "Price Effect" of a price fall. Distintegrate the price effect into substitution effect and income effect.

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UNIT 6: CONCEPTS OF REVENUE

UNIT STRUCTURE

6.1 Learning Objectives

6.2 Introduction

6.3 Concepts of Total Revenue, Average Revenue and Marginal Revenue

6.4 Relationship between Total Revenue, Average Revenue and Marginal Revene Curves

6.5 Relationship between Total Revenue, Average Revenue, Marginal Revenue and Price Elasticity of Demand

6.6 Let Us Sum Up

6.7 Further Reading

6.8 Answers to Check Your Progress

6.9 Model Questions

6.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- discuss the concepts of total revenue, average revenue and marginal revenue
- derive the relationships between average revenue and marginal revenue curves
- explain the relationship between total revenue, average revenue, marginal revenue and price elasticity of demand.

6.2 INTRODUCTION

In the previous block of the first semester, we have already discussed the nature of demand from the viewpoint of an individual consumer. In that context, we discussed that consumers demand goods and services as they provide certain utility to the consumer. This means that a product available in the market for sale bought by a consumer has a demand. Let us now consider the matter from the viewpoint of a seller. A

seller will be very much concerned with the nature of demand for his product. This is because the monetary value of demand of a consumer for the product constitutes his revenue. Thus, the more the demand, the greater will be the volume of revenue earned by the seller. The concept of revenue when viewed from the viewpoint of a seller is classified into three types: average revenue, marginal revenue and total revenue. In this unit, we shall discuss these three concepts and their inter-relationships. Apart from this, we shall also relate these concepts with the concept of price elasticity we have already discussed in the previous block.

6.3 CONCEPTS OF TOTAL REVENUE, AVERAGE REVENUE AND MARGINAL REVENUE

We have already mentioned, the price paid by a consumer for a product constitutes revenue for the seller. It is, therefore, quite obvious that the more the seller sells, the greater will be the volume of his revenue. As such, the *total revenue* of a seller depends on two basic things; first, the price of a unit of the product, and the sales volume. The price per unit earned gives us *average revenue*. And the revenue earned by selling an additional unit is called the *marginal revenue*. Let us discuss these concepts in detail.

Total Revenue: The whole amount of money received by a seller from selling a given amount of the product is called total revenue. Let us suppose, if a seller sells 150 units of pens and each unit of pen is sold at a market prices at Rs. 12/-. The total revenue earned by the seller is Rs. 1800/- (Rs.12 x 150 units). Thus, by definition,

Total Revenue = Market price X total quantity sold.

Symbolically, TR = P X Q.

where, TR stands for total revenue, P stands for market price and Q stands for total quantity sold.

Average Revenue: Average revenue is defined as the average value of total revenue with respect ot the number of units sold. Average revenue can be obtained by dividing total revenue by the number of units sold. Thus,

$$\text{Average Revenue} = \frac{\text{Total revenue}}{\text{Total quantity sold}}$$

Symbolically, $AR = \frac{TR}{Q}$

where, AR stands for average revenue, TR stands for total revenue and Q stands for quantity.

With reference to the previous example, the average revenue of Rs. 12/- is obtained by dividing total revenue (Rs. 1800/-) by total quantity sold (150 units).

From the above discussion, it seems that average revenue and price are the same concepts. It may be, or it may not be. If the seller sells each unit of the product at the same price, average revenue and price will be the same. If on the other hand, the seller sells the different units of the product at different prices, average revenue will not be equal to price. Let us consider an example. Suppose our hypothetical seller sells two units of the product to two different consumers, viz., consumer A and consumer B. Let us further suppose that the seller sells one unit of the product to consumer A at Rs.12 while he sells the other unit of product to consumer B at Rs.10. Thus, the average revenue earned by the seller comes out to be Rs.(12 + 10)/2 = Rs.11/- while prices of the two units of the product were Rs.12/- and Rs.10/- respectively.

In practice, we find that the seller sells the individual unit of the product at the same price at a particular point of time. This is because, if an individual seller tends to charge higher prices for the product, consumers will move away from him and will purchase the product from other seller who sells at a lower price. As against this, he cannot lower the price of the product at his will. This is because, if the seller tries to sell the product at a lower price, the other sellers will follow him and he will face competition in the market. Ultimately, a single price will prevail in the market. As such, in economics average revenue is taken as equivalent to the price of the product except when we discuss the case of price discrimination. We shall discuss this in detail later in the next block.

Another important point to be noted here is that as we have already mentioned, the money value of demand of the consumer constitutes

revenue for the seller. As such, the demand curve of the consumer is same as the total revenue curve of the seller.

Marginal Revenue: Marginal revenue is the net revenue earned by selling an additional unit of the product. Thus, marginal revenue is obtained when we calculate the changes in total revenue caused by the sale of an additional unit of the product.

Thus, marginal revenue is represented as:

$$\text{Marginal Revenue} = \frac{\text{Change in total revenue}}{\text{Change in total units sold}}$$

Symbolically, it is represented as: $MR = \frac{\Delta TR}{\Delta Q}$

where, MR stands for marginal revenue, TR stands for total revenue, Q stands for total units sold, and $\triangle$ stands for change in.

Let us consider the case of marginal revenue in the context of our hypothetical seller who sells all units of pens at Rs.12/-. Suppose the seller increase his sales from 150 units to 151 units. In this case, the total revenue earning of the sellers will be Rs.1812/-. Thus, marginal revenue will be (Rs. 1812 – 1800) = Rs.12/-; this is same as average revenue.

However, if price charged in the extra unit of the product is different from the price charged in the earlier units, marginal revenue will be different from average revenue. For example, let us suppose that our hypothetical seller sales the 151st unit at Rs.11.50/- while he sold all the previous units at Rs. 12/-. Thus, the total revenue earned by the seller is Rs.1811.50/- and marginal revenue is (Rs.1811.50 – 1800) = Rs.11.50/-.

6.4 RELATIONSHIP BETWEEN TOTAL REVENUE, AVERAGE REVENUE AND MARGINAL REVNUE CURVES

From the above discussion, we are already familiar with the concepts of average revenue, marginal revenue and total revenue. In this section, we shall discuss the inter-relationships between these revenue concepts in more detail. In doing this, we shall first have to deduce the graphical shapes of the average revenue, marginal revenue and total revenue curves.

Before going to discuss the relationship between these revenue concepts, let us make a point clear here. These revenue concepts have a direct relation with the market structure under which the firm is operating in. Thus, the structure of the market affects the shapes of the revenue curves. We shall discuss the different forms of market structures later. For the time being, let us consider that there are two broad classifications of markets, viz., *perfect competition* and *imperfect competition*. Perfect competition is described as the market where there are large number of buyers and sellers and no individual participant is large enough to have the market power to set the price of a homogeneous product. As such, the seller can supply any amount of the product at the existing market price and the buyer also can buy any amount of the product. However, no seller/buyer can individually influence the market price. Again, the products of the different sellers are homogeneous; no differences among the products exist. The absence of perfect competition implies that the market is imperfect. In an imperfectly competitive market, the seller may have control over the market price. Thus, a seller under imperfect competition may have absolute control over the market price or a limited control over it only. However, there exists many forms of imperfect competition, and the degree of control of the seller over the market price depends on the form of the market the seller operates in.

Let us now analyse the shapes of the Total Revenue, Average Revenue and the Marginal Revenue Curves under the two broad market forms of perfect competition and imperfect competition.

Total Revenue, Average Revenue and Marginal Revenue Curves of a Firm under Perfect Competition: As we have already mentioned, a firm under perfect competition has to accept the prevailing market price and can sell any amount of output in the market at that price (we shall discuss perfect competition in detail later). Thus, a firm under perfect competition will earn AR, TR and MR similar to the following table 6.1.

Table 6.1: Total, Average and Marginal Revenue Schedules under perfect competition

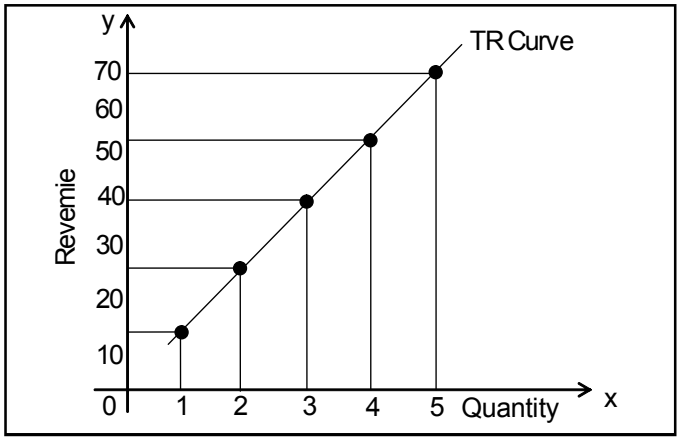
(Revenue figures in Rs.)

No. of units sold (Q)	Price (AR)	TR(AR x Q)	MR
1	14	14	14
2	14	28	14
3	14	42	14
4	14	56	14
5	14	70	14

Based on the above schedule 6.1, the shapes of TR, AR and MR curves of a perfect competitive firm have been shown in the following sections.

Total Revenue Curve: The following figure 6.1 portrays the shape of the Total Revenue Curve of a firm under perfect competition.

Fig. 6.1: Total Revenue Curve of a Firm under Perfect Competition

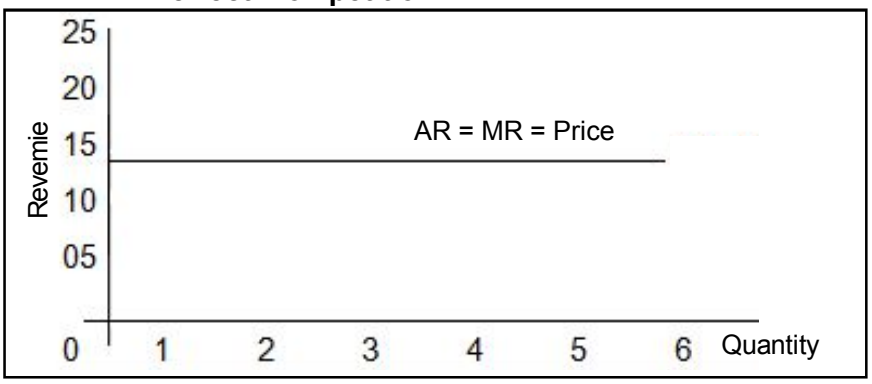


From the figure it is obvious that the total revenue curve of the firm is an upward rising straight line. This curve, in fact represents the supply curve of a firm.

Average Revenue and Marginal Revenue Curves: We have already mentioned that under perfect competition, the market price for the product is fixed and the seller has no influence to alter the same. Again, the seller can supply any amount of the commodity at the prevailing market price. Thus, the prevalent market price also becomes the average revenue and marginal revenue of the firm. This is clear from the above table 6.1. From the table it is clear that the prevalent market price, i.e., Rs.14 is also

the average revenue and marginal revenue of the firm. Thus, the shape of average revenue curve and the marginal revenue curve will be the same. This has been shown with the help of the following figure 6.2.

Fig. 6.2: Average Revenue and Marginal Revenue Curve under Perfect Competition



It can be seen from figure 6.2 that the firm's AR and MR curves are the same. The slope of the curves is horizontal.

AR and MR and TR Curves of a Firm under Imperfect Competition: Unlike perfect competition, a firm under imperfect competition does not have to sell its entire amount of the product at a fixed market price. This means that the firm can sell more units of the product as its price falls. We have shown a hypothetical schedule of AR, TR and MR in table 6.2.

Table 6.2: Total, Average and Marginal Revenue Schedules of a Firm under Imperfect Competition

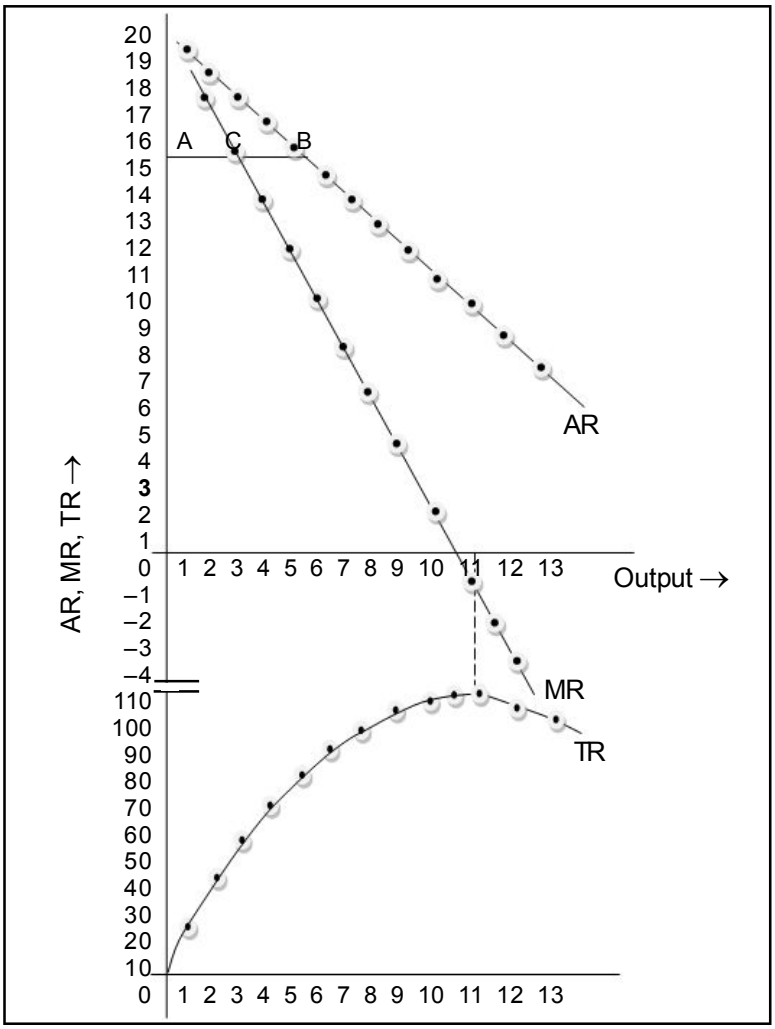
(Revenue figures in Rs.*)*

Number of units sold (Q)	Price or Average Revenue (AR)	Total Revenue (AR x Q)	Marginal Revenue
1	20	20	20
2	19	38	18
3	18	54	16
4	17	68	14
5	16	80	12
6	15	90	10
7	14	98	8
8	13	104	6

9	12	108	4
10	11	110	2
11	10	110	0
12	9	108	– 2
13	8	104	– 4

From the above table it can be seen that as AR declines by one rupee with the number of units sold being raised by one unit, MR declines by Rs. 2/-. Again, TR is the maximum when MR equals 0. After that MR becomes negative, and TR tends to decline. This has been shown in figure 6.3.

Fig. 6.3: AR, MR and TR curves of a Firm under imperfect competition



From figure 6.3 it can be seen that unlike perfect competition, firm's AR and MR curves under imperfect competition are not the same. However, both the curves are downward sloping. Again, the slope of the marginal

revenue curve is twice as much steeper as that of the average revenue curve. This is because it can be seen from the above table 6.2 that as sale increases by one unit, average revenue falls by one rupee while marginal revenue falls by two rupees. Thus if we draw a ***perpendicular*** line on the y-axis from any point of the AR curve, say AB as shown in the figure, the MR curve will cut it in the middle. Thus, AC = half of AB.

Again, it can be seen that total revenue (TR) continues to rise until MR equals zero. Thereafter, as MR tends to become negative, TR tends to decline. Thus, the shape of the TR curve under imperfect completion is different from that of perfect competition.



A line is said to be ***perpendicular*** to another line if the two lines intersect at a right angle, i.e., if the two lines create a 90^0 angle.

CHECK YOUR PROGRESS

Q.1: Why are the AR and MR curves same under perfect competition? (Answer in about 40 words)

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Q.2: Is the shape of the total revenue curve same in case of both perfect competition and imperfect competition? (Justify your view in about 40 words)

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Q.3: How will you derive average revenue from total revenue?

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6.5 RELATIONSHIP BETWEEN TR, AR, MR AND PRICE ELASTICITY OF DEMAND

We had already discussed that price elasticity of demand in a horizontal demand curve (which is found in case of perfect competition) is infinite. Again, we also discussed that the price elasticity of demand varies at different point in a linear demand curve. The linear demand curve (which is found in case of imperfect competition) can be utilized in deriving a relationship between the shapes of the AR, MR and TR curves and price elasticity of demand.

The relationship between price elasticity of demand and the revenue concepts, viz., AR, MR is expressed as:

$$MR = AR\left[\frac{e-1}{e}\right]$$

where, MR = marginal revenue, AR = average revenue and e = price elasticity of demand.

Thus, from this formula we can know what would be the marginal revenue if elasticity and AR are given to us.

Let us take the case when price elasticity of demand is 1.

Thus, $MR = AR\left[\frac{1-1}{1}\right]$

Thus, MR = AR X 0 = 0.

Again, from this formula we can find:

If e > 1, MR is positive, and MR<AR

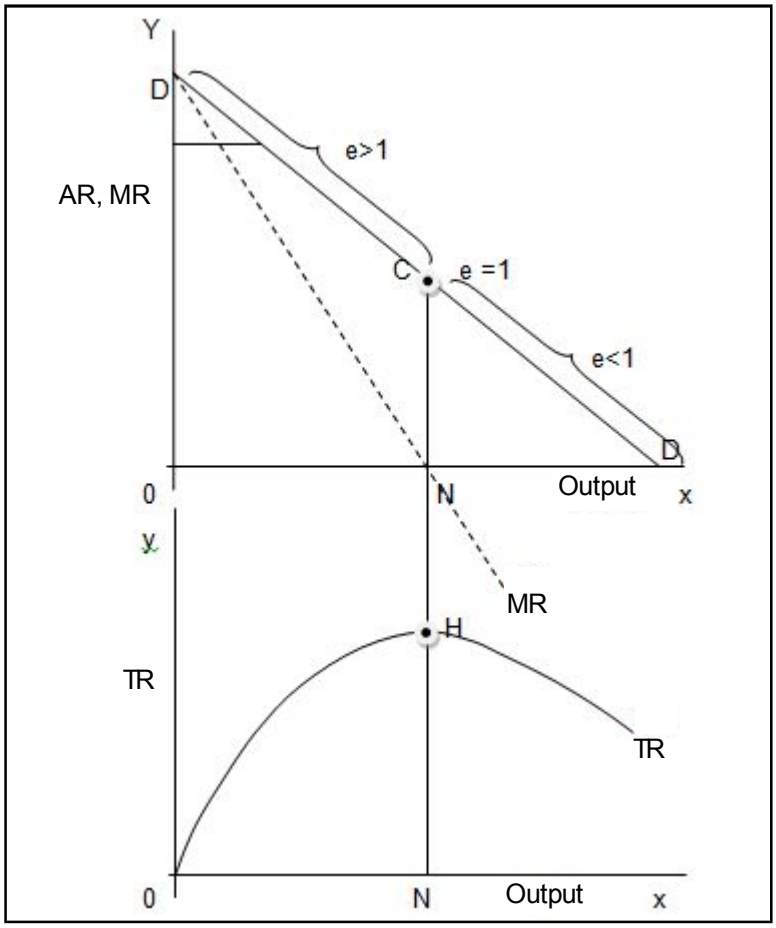
If e < 1, MR is negative, and MR>AR.

This relationship among AR, MR, TR and price elasticity of demand can also be shown graphically in figure 6.4.

From figure 6.4 it can be seen that C is the middle point of the average revenue curve DD. At this point C price elasticity of demand is equal to one . Corresponding to this point C of the DD curve, we can find that MR is equal to zero (this is because, corresponding to C of the DD curve, the MR curve cuts the x-axis at point N). Thus, at quantity 0N, price elasticity of demand is 1, while MR is zero. At a quantity less than 0N, price elasticity of

demand is greater than 1 (or positive) and at a quantity less than 0N, price elasticity of demand is less than 1 (or negative). It has also be seen that when the marginal revenue is positive, price elasticity of demand is also positive and when marginal revenue is negative, price elasticity of demand also becomes negative.

Fig. 6.4: Relationship between AR,MR, TR and price elasticity of Demand



Again, from the bottom panel of the figure it can be seen that total revenue is maximum when price elasticity of demand equals one. It can be further noticed that when the price elasticity of demand is greater than one (or positive), TR tends to increase and when the price elasticity of demand is less than one (or negative), TR tends to diminish.



CHECK YOUR PROGRESS

Q.4: What is the price elasticity of demand in case of a horizontal demand curve?

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Q.5: What happens to marginal revenue when price elasticity of demand equals one?

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Q.6: What happens to total revenue when price elasticity of demand is less than one?

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6.6 LET US SUM UP

- The whole income received by a seller from selling a given amount of the product is called total revenue.
- Average revenue can be obtained by dividing total revenue by the number of units sold.
- Marginal revenue is the net revenue earned by selling an additional unit of the product.
- In case of perfect competition, the shape of average revenue curve and the marginal revenue curve are the same.
- Unlike perfect competition, firm's AR and MR curves under imperfect competition are not the same.
- Under imperfect competition, the slope of the marginal revenue curve is twice as much steeper as that of the average revenue curve.
- Price elasticity of demand in terms of the revenue concepts, viz., AR, MR is given as: $MR = AR\left[\frac{e-1}{e}\right]$

where, MR = marginal revenue, AR = average revenue and e= price elasticity of demand.

- If e = 1, MR is zero.
  If e > 1, MR is positive, and
  If e < 1, MR is negative.
- Total revenue is maximum when price elasticity of demand equals one.
- When the price elasticity of demand is greater than one (or positive), TR tends to increase and when the price elasticity of demand is less than one (or negative), TR tends to diminish.



6.7 FURTHER READING

1) Ahuja, H.L. (2006); *Modern Economics*; New Delhi: S. Chand & Co. Ltd.
2) Dewett, K.K. (2005); *Modern Economic Theory*; New Delhi: S. Chand & Co. Ltd.
3) Koutsoyiannis, A. (1979); *Modern Microeconomics*; New Delhi: Macmillan.
4) Sundharam, K.P.M. & Vaish, M.C. (1997); *Microeconomic Theory*; New Delhi: S.Chand & Co. Ltd.



6.8 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: Under perfect competition, the market price for the product is fixed and the seller has no influence to alter the same. However, the seller can supply any amount of the commodity at the prevailing market price. As a result, the prevalent market price also represents the average revenue curve and marginal revenue of the firm. Hence, both the curves are same.

Ans. to Q. No. 2: The shape of the total revenue curve is not same in perfect competition and imperfect competition. This is because price

of a product remains fixed under perfect competition, while under imperfect competition, price of a product may change.

Ans. to Q. No. 3: Average revenue can be derived from total revenue by dividing it by the number of units sold. Thus, average revenue = total revenue / no. of units sold.

Ans. to Q. No. 4: Price elasticity of demand in case of a horizontal demand curve is infinite.

Ans. to Q. No. 5: Marginal revenue becomes zero when price elasticity demand equals one.

Ans. to Q. No. 6: When price elasticity is less than one, total revenue tends to diminish from its maximum point.



6.9 MODEL QUESTIONS

A) Very Short Questions (Answer each question in about 75 words):

Q.1: Define the following terms:

a) Marginal Revenue b) Average revenue c) Total revenue

Q.2: How would you derive marginal revenue from total revenue?

Q.3: Why under imperfect competition, the MR curve is twice as much steeper than the AR curve?

B) Short Questions (Answer each question in about 100-150 words):

Q.1: Derive the total revenue curve of a firm in a perfectly competitive market.

Q.2: Show the relationship between average revenue and marginal revenue under imperfect competition.

C) Essay-Type Questions (Answer each question in about 300-500 words):

Q.1: Show the relationship between average revenue, marginal revenue and total revenue in a perfectly competitive market. Based on the relationship, derive the AR, MR and TR curves.

Q.2: Derive the relationship between AR,MR, TR and the price elasticity of demand under imperfect competition.

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UNIT 7: THEORY OF PRODUCTION

UNIT STRUCTURE

7.1 Learning Objectives

7.2 Introduction

7.3 Production Decisions

7.4 Concepts in Production

- 7.4.1 Production Function
- 7.4.2 Iso-quant
- 7.4.3 Isoquant Map
- 7.4.4 Marginal Rate of Technical Substitution (MRTS) (Factor Substitution)

7.5 Law of Variable Proportions

7.6 Returns to Scale

7.7 Equilibrium of a Firm

7.8 Expansion path

7.9 Let Us Sum Up

7.10 Further Reading

7.11 Answers to Check Your Progress

7.12 Model Questions

7.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- know about production and production decisions
- what is iso-quant and how to construct it
- understand what is factor substitution
- explain the law of variable proportions
- compare the laws of returns to scale with law of variable proportions
- determine the equilibrium condition of the firm and derive the expansion path.

7.2 INTRODUCTION

While studying consumer behaviour, we have found that a consumer always tries to maximize his utility given his budget constraint. There are strong similarities between the behaviour of a producer and a consumer. In this unit, we will discuss the behaviour of a producer. With a given production function, a producer always tries to reach the optimum output. The process of transformation of inputs into output is called production and the physical relation between inputs and output is called production function. A particular level of output can be produced by using inputs in various combinations. An iso-quant shows all possible combinations of inputs that yield the same output. Then the behaviour of production function keeping all inputs constant except one is studied with the help of the law of variable proportions. Returns to scale has also been studied by varying all inputs. The condition of equilibrium of a firm to reach the optimum output has also been discussed here. When a firm increases output, it moves from one equilibrium position to another. Finally, we study the expansion path which shows the movement of equilibrium condition from one position to another.

7.3 PRODUCTION DECISIONS

Just as a consumer has to take certain decision regarding the basket of consumption, time, and use of resources etc., a producer or a firm also has to undertaken certain decisions. Production decision of a firm relates to four basic questions the firm faces: what to produce, how to produce, how much to produce and for whom to produce.

- **What to produce?** A firm will produce according to its perception of the customer demand. It can either produce consumer goods like food, clothing etc. (which are for consumption purpose) or it can produce capital goods like machinery etc. (which are for investment purposes).
- **How to produce?** After a firm decides what it will produce, the next question it faces is how to produce. We have already discussed that there are four factors of production, viz., land, labour, capital

and entrepreneurship. Of these four factors, supply of land may be considered given. The role of entreperneurship is undertaken by the firm itself. As such, out of the four factors, labour and capital are of special interest for the firm. Thus, the firm has the option of producing goods by labour intensive technique and capital intensive technique. Labour intensive technique is the one in which manual labour is used to produce goods. Capital intensive technique is the one in which machineries are used to produce goods.

- **How much to produce?** The firm has also to decide its production capacity and its production volume.
- **For whom to produce?** A firm has to decide its target population (i.e. to whom they will serve products and/or services). Example, it will not be viable to produce luxurious goods for middle income or low income group if they can't afford it and produce basic necessity goods for rich class if they don't need it. Therefore, a firm needs to match its produce according to the target population it is serving.

7.4 CONCEPTS IN PRODUCTION

We have already mentioned that a firm has to take several decisions while producing a commodity. A commodity may be produced by various methods of production. Among the set of technically efficient processes, the choice of a particular technique is a purely economic decision. The decision is based on price of factors. Another decision to be taken is to determine the range of output where marginal products of factors are positive but declining.

7.4.1 Production Function

A production function is a relation between inputs to the production process and the resulting output. A production function shows the highest output that a firm can produce for every specified combination of inputs. Let us assume that there are two inputs (factors of production) labour and capital. Now the production function can be written as:

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

where, Q is a dependent variable which represents output; and both labour (L) and capital (K) are independent variables.

This relation simply states that output depends on inputs. To get output Q, inputs can be combined in various proportions. But as technology improves the same inputs can give more and more output and the same output can be obtained by less and less input. In our production function, there are only two variables. But there may be other variables in the production function.

7.4.2 Iso-quant

An iso-quant or equal product line is a curve showing all possible combinations of inputs that yield the same level of output. This concept is analogous to consumer's indifference curve. Therefore, it is also known as producer's indifference curve. Let us explain the concept with the help of a production function which uses both labour and capital and produces 50 units.

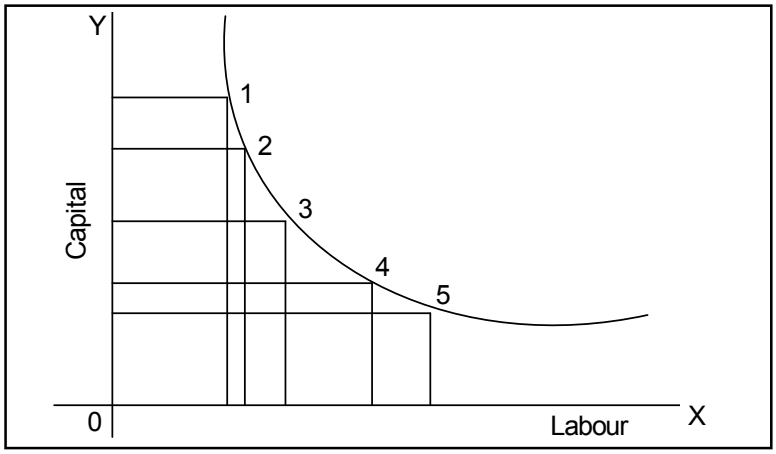
Table 7.1: Combination of Labour and Capital to Produce Output

Combination of Labour and Capital	Units of Labour	Units of Capital	Output
1	1	13	50
2	2	9	50
3	3	6	50
4	4	4	50
5	5	3	50

In this example, the producer can produce 50 units of output with 1 unit of labour + 13 units of capital, 2 units of labour + 9 units of capital, 3 units of labour+ 6 units of capital, 4 units of labour + 4 units of capital or 5 units of labour + 3 units of capital. When these points are plotted on graph paper and joined, they form an iso-quant. In other words, an iso-quant is a locus of points showing alternative combinations of labour and capital which produce same level of output.

The above table has been shown graphically in the following figure 7.1. In the figure IQ_1 represents the Iso-quant curve. Capital has been depicted in the y-axis while the labour has been shown in the x-axis. Point 1 on the IQ_1 curve represents the capital-labour combination 1, which represents 13 units of capital and 1 unit of labour. Other combinations 2,3,4 and 5 thus represent different units of capital labour of the iso-quant.

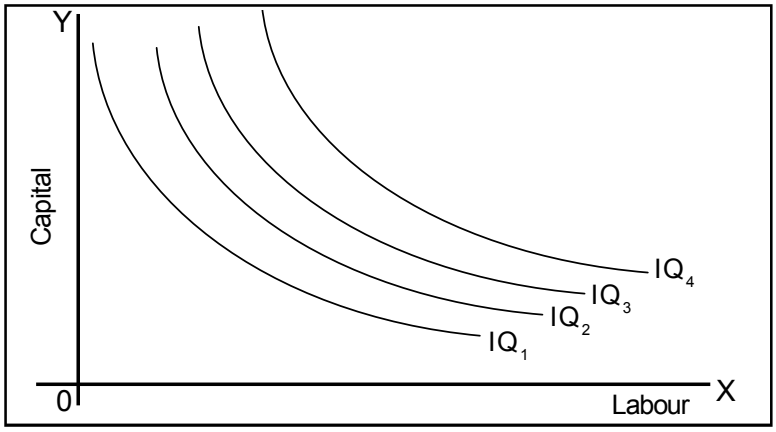
Fig. 7.1: Iso-quant



7.4.3 Iso-Product Map or Isoquant Map

The Iso-Product Map, like the Indifference Curve Map shows a set of iso-product curves. A higher iso product curve shows a higher level of output and a lower iso-product curve represents a lower level of output. Figure 7.2 is an isoquant map. The points on the same IQ shows an equal level of output whereas an IQ to the right represents a larger amount of output.

Figure 7.2: Isoquant Map



7.4.4 Marginal Rate of Technical Substitution

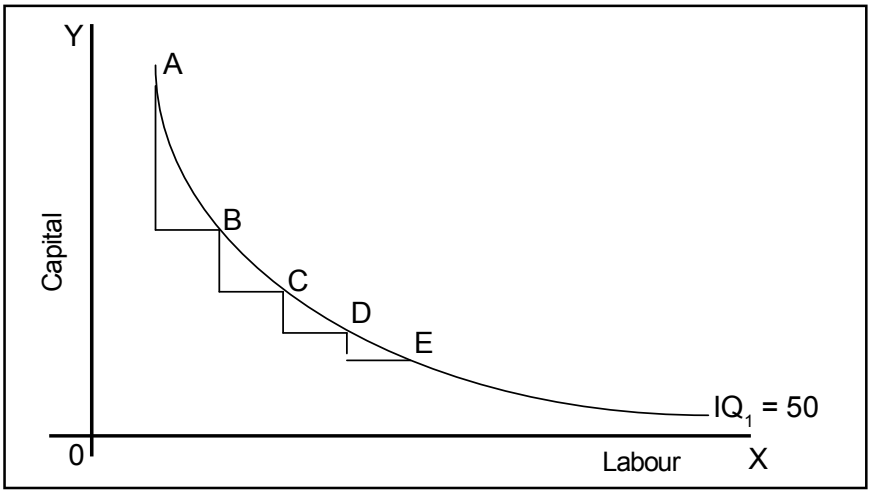
The concept of Marginal Rate of Technical Substitution ($MRTS_{LK}$) between labour and capital can be explained with the help of the following schedule.

Table 7.2: Combinations of Labour and Capital

Combinations of labour and capital	Units of labour (L)	Units of capital (K)	Output	$MRTS_{lk}$
A	1	15	50	–
B	2	11	50	4
C	3	8	50	3
D	4	6	50	2
E	5	5	50	1

As can be seen from the table (Table 7.2), 50 units of output can be produced by using 1 unit of labour and 15 units of capital. The same output can be produced by combination of B which uses 2 units of labour and 11 units of capital. Same amount of output can be produced by combination of C, D and E which uses more and more units of labour but lesser and lesser units of capital. That is, in the different combinations of inputs labour can be substituted for capital and yet we have the same amount of output. The rate at which one additional unit of a factor of production can be subsituted for the other to obtain the same amount of output is known as the 'marginal rate of technical substitution' (MRTS). In other words, MRTS of labour for capital is the number of units of capital which can be replaced by one unit of labour, the quantity of output remaining the same. MRTS is the slope of the isoquant or the amount of one input (K) that a firm is able to give up in return for an additional unit of another input (L) with no change in total output. Another characteristics of $MRTS_{LK}$ is that MRTS has a diminishing tendency. In other words, as the amount of labour units is increasing in the succeeding combinations, less and less units of capital are sacrificed to obtain the same output.

Fig. 7.3: Marginal Rate of Technical Substitution



The above figure 7.3 shows that iso-quant IQ_1 represents output level 50. As we move downward from A to B, AB_1 units of capital is substituted by BB_1 units of labour. Similarly, B to C, BC_1 units of capital is substituted by CC_1. Again if we come down from point C to D, CD_1 units of capital is foregone to obtain EE_1 units of capital. It is clear that for the same quantity of labour (represented by $BB_1 = CC_1 = DD_1 = EE_1$), we are sacrificing less and less of capital (represented by $AB_1 > BC_1 > CD_1 > DE_1$). When more units of labour are used to compensate for the loss of the units of capital to maintain constant output, the ***marginal physical productivity*** of labour diminishes and the marginal physical productivity of capital increases. Therefore, MRTS diminishes as labour is substituted for capital. It makes the iso-quant convex to the origin.

Marginal Physical Productivity of Labour and Capital: it is the additional output obtained from an additional unit of labour or capital i.e. the additional output per unit of labour or capital.

Elasticity of Substitution: The degree of substitutability between two inputs is measured by elasticity of substitution. It is the proportionate change in the ratio of the factors divided by proportionate change in the MRTS.

Therefore :

$$Es = \frac{\text{proportionate change in the ratio of the factors}}{\text{proportionate change in the MRTS}}$$

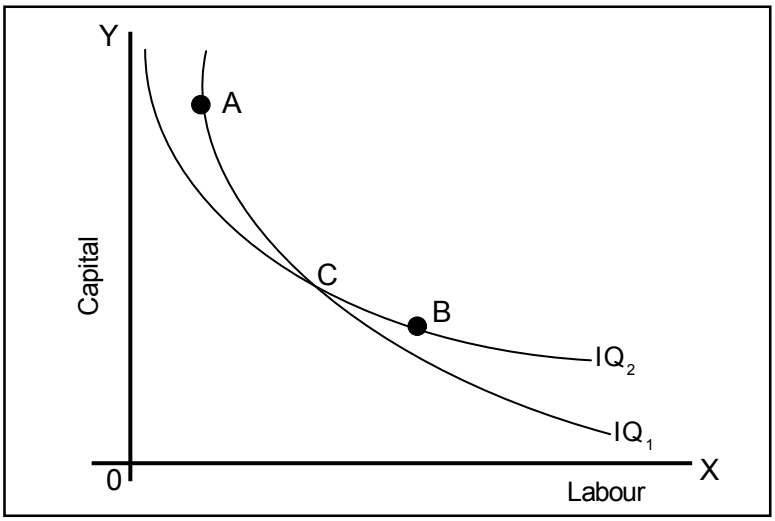
Es (Elasticity of substitution) varies between zero and infinity. When two factors can not be substituted at all, Es is zero and elasticity of substitution is infinite when the factors are perfect substitutes i. e, E_s is 1.

7.4.5 Properties of Iso-quant

An iso-quant has the following properties:

- An iso-quant slopes downward from left to the right. It happens because when quantity of labour is increased, the quantity of capital must be reduced so that there is no change in quantity of output produced.
- Two iso-quants can not intersect each other. If they intersect each other, there will be common factor combination for two different levels of output. This has been explained with the help of the following figure 7.4.

Fig. 7.4 : Iso-quants do not intersect each other



In the above figure 7.4, IQ_1 and IQ_2 intersect at point C. Thus, the point C lies on IQ_1. Again, point A also lies on IQ_1. Therefore, it means that at both the points (A and C) the level of output is the same. On the other hand, point C lies on IQ_2 meaning same level of output at point C and point B on the iso-quant.

Thus, we found that:

Output level at point A = Output level at point C.

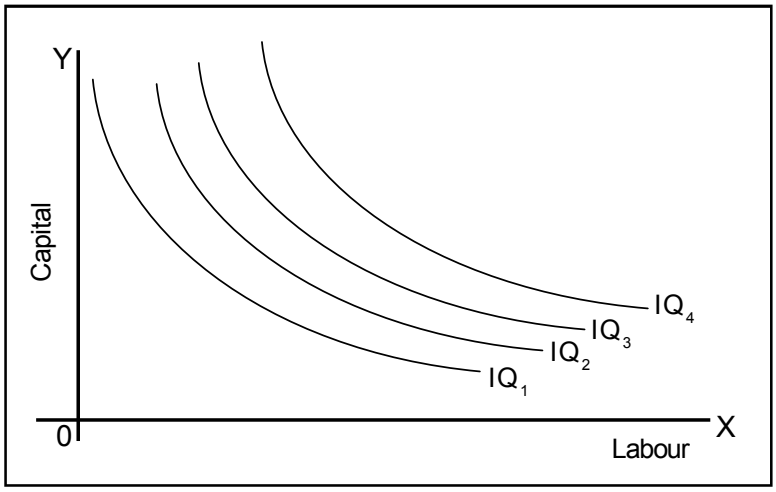
Output level at point B = Output level at point C.

Thus, Output level at point A = Output level at point B. This is completely ridiculous. So, it can be said that two iso-quants can not intersect.

- Every iso-quant is ***convex*** to the origin. The convexity property of an iso-quant means that as we move down on the curve less and less of capital is required to be substituted by a given increament of labour so as to keep the level of output constant. In other words, the convexity is due to the diminishing marginal rate of technical substitution (MRTS). The degree of convexity of the iso-quant depends on the rate at which the MRTS diminishes. If the iso-quants are concave to the origin, it would mean that the marginal rate of technical substitution is increasing and more capital is replaced to get one additional unit of labour.
- As an iso-quant moves upward to the right, it represents higher levels of output. In the following figure 7.5, IQ_2 is higher than IQ_1 and it represents higher level of output. Similarly, IQ_3 is higher than IQ_2 representing higher level of output.

Convex Curve: A curve is said to be convex as the slope or gradient of the curve increases as we go down along the curve. But it can not touch any of the axis. (Refer to Appendix A for more detail.)

Fig. 7.5: Movement of Iso-quants



- There may be a number of iso-quants in between two iso-quants. They show various levels of output that combination of two inputs can produce between any two iso-quants.



CHECK YOUR PROGRESS

Q.1: What is an iso-quant? (Answer in about 30 words)

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Q.2: What is meant by elasticity of substitution? (Answer in about 30 words)

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Q.3: What is meant by convexity of an iso-quant? (Answer in about 30 words)

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7.5 LAW OF VARIABLE PROPORTIONS

The law of variable proportions occupies an important place in the field of production. This law studies the changes in the quantity of production when one input is variable and all other inputs used in production are kept constant. In other words, it shows how output changes with changes in the quantity of one input while other inputs are kept constant. The law of variable proportions is the new name for the famous "Law of Diminishing Returns" of ***classical economics***.



Classical Economics: The economic thought which evolved in UK during the period mid eighteenth century to mid-nineteenth century. Its principal contributors were : Smith, Malthus, Say, Senior and J. S. Mill.



LET US KNOW

The Law of Diminishing Returns: it is a classical law of economics. But very often the law of variable proportions is also called the law of diminishing returns. But actually the law of diminishing returns exactly refers to production that takes place between the first and the third stage. This is the only stage where production is feasible and possible. At this stage total product increases but average and marginal products decline. Throughout this stage, marginal product is below average product.

Assumptions: The law of variable proportions is based on the following assumptions :

- There should not be any change in the state of technology.
- Only one input will undergo change in quantity keeping all other inputs constant.
- All the units of the variable factor are homogenous.
- It is possible to change the proportions in which the various inputs are combined.

Let us now go back to our previous example of the producer who uses both labour and capital in the process of production. To study the law of variable proportions let us assume that the producer will keep capital constant and increases the units of labour. From the following table 7.3 it is clear that with the successive increase in the units of labour, the marginal product of labour (MP_L) increases for some time. But with the increase of successive units, MP_L starts declining. In this way when total product is maximum, MP_L becomes zero and AP_L starts declining.

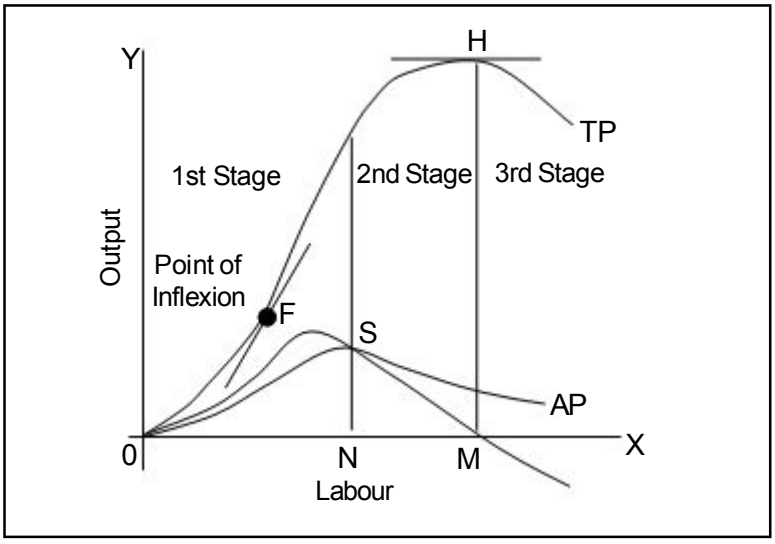
Table 7.3 : Law of Variable Proportions

Units of Labour	Total Products	Marginal Product of Labour (MP_L)	Average Product of Labour (AP_L)
1	50	50	50
2	120	70	60
3	190	70	63.3
4	270	80	65
5	345	75	69
6	395	50	65.8
7	395	0	56.4
8	360	–35	45

Again, it can be seen from the above table 7.3 that total product is the highest when marginal productivity of labour is zero. After this point both total and average product fall and marginal product of labour becomes negative. We can study the rise and fall of production with diagrams in three stages.

Three Stages of the Law of Variable Proportions: From the above table 7.3 we see the behaviour of output with varying quantity of labour and fixed quantity of capital. The rise and fall of output can be divided into three stages as has been shown in the following figure 7.6.

Fig. 7.6: The Three Stages of Law of Variable Proportions



Stage One: In the first stage the total output to a point increases at an increasing rate. In the above figure 7.6 it can be seen that the total output increases rapidly up to point F. This point is called **'the point of inflexion'**. From this point onwards in stage one, total output increases but at a slower rate. Therefore, the slope of the curve starts to fall slightly. Stage one ends at the point where average product is the maximum. In this stage, the quantity of the fixed factor (capital) is too much relative to the quantity of the variable factor (labour) so that if some of the fixed factor is withdrawn, the total product will increase. Stage one is known as the stage of *increasing returns*.

Stage Two: In stage two, the total product continues to increase at a diminishing rate until it reaches its maximum point H (figure 7.6) where the second stage ends. At the end of second stage marginal product becomes zero. This stage is known as the stage of *decreasing returns* as both the average and marginal products of the variable factor continuously fall during this stage.

Stage Three: In stage three the marginal product becomes negative. Therefore, both total product and average product declines. In this stage, total product curve and average product curve slope downward and marginal product curve goes below the X-axis. This is the opposite of first stage. In stage three, variable factor (labour) is too much in relation to fixed factor (capital). This stage is called the stage of *negative returns.*

A rational producer will always like to produce in stage two. The producer will not choose stage one where marginal product of fixed factor is negative. If he chooses this stage, he will not be utilizing completely the opportunity of production by increasing variable factor. A rational producer will never choose stage three also. Because, in this stage, he can always increase output by reducing the quantity of variable factor whose quantity is excess in proportion of fixed factor. Even when the variable factor is free, the rational producer will stop at the end of second stage.

Significance of the Law of Variable Proportions: The law of variable proportions is very important in the field of economics. Till Marshall it was believed that the law was applicable in the field of agriculture only.

But the modern economists propound that the law is equally applicable to industries and other productive activities. If the law actually does not occur, we can produce any amount of food grain in a small size of holding by using more and more amount of labour and capital. But in spite of the presence of the law of variable proportions a country like India need not be pessimistic where there is tremendous pressure of population and agricultural production is not sufficient. Productivity in the field of agriculture can be increased by making advancement in technology to avoid food crisis.



CHECK YOUR PROGRESS

Q.4: Mention the assumptions of law of variable proportions. (Answer within 40 words)

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Q.5: What is 'point of inflexion'? (Answer within 40 words)

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Q.6: Which stage is known as the stage of diminishing returns and why? (Answer within 40 words)

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7.6 RETURNS TO SCALE

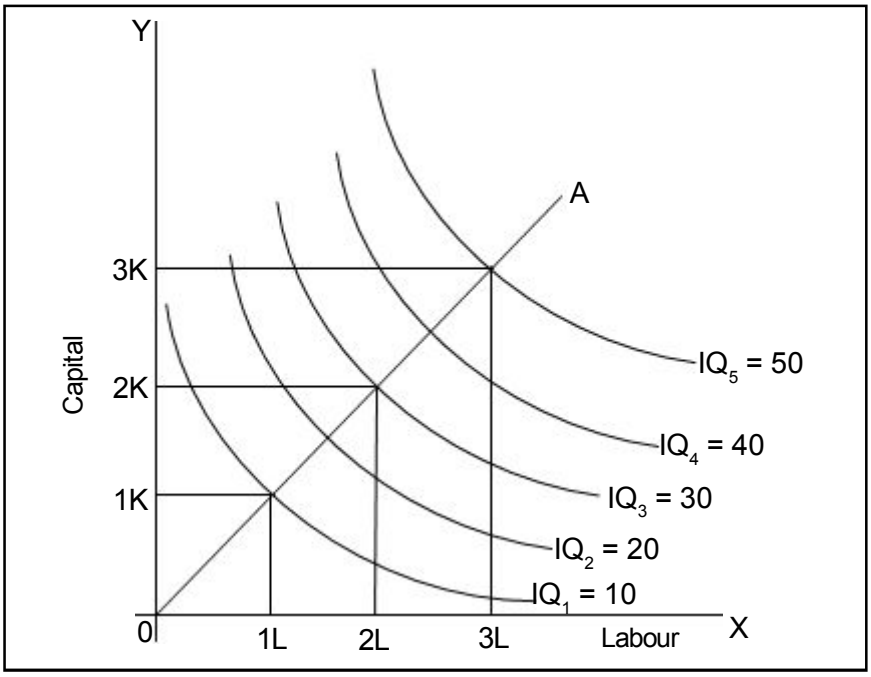
Under the law of variable proportions we have known that the changes in total output as a result of change in variable factor keeping quantity of other factors of production constant. But when all inputs are changed in a fixed proportion, there is change in the scale of production. The study of

changes in output as a consequence of changes in the scale is the subject matter of "returns to scale". Let us make the distinction between 'the law of variable proportions' and 'returns to scale' clearer with the help of the producer who uses both labour and capital in the process of production. When the producer changes the quantity of labour and keeps capital constant, the law of variable proportions or the law of diminishing returns occurs. But if the producer changes both labour and capital in the same proportion and the changes in total production are studied, it refers to returns to scale. It is called so because there is change in the scale of production. In other words, returns to scale is the rate at which output increases as inputs are increased proportionately.

The concept of returns to scale can be explained with the help of iso-quant. Returns to scale may be increasing, decreasing or constant. These concepts have been discussed below.

Increasing Returns to Scale: If output more than doubles when inputs is doubled, there is increasing returns to scale. For example, if inputs are increased by 2 percent and consequent increase in output is 3 percent, then it is a case of increasing returns to scale. This has been shown with the help of the following figure 7.7.

Fig. 7.7: Increasing Returns to Scale

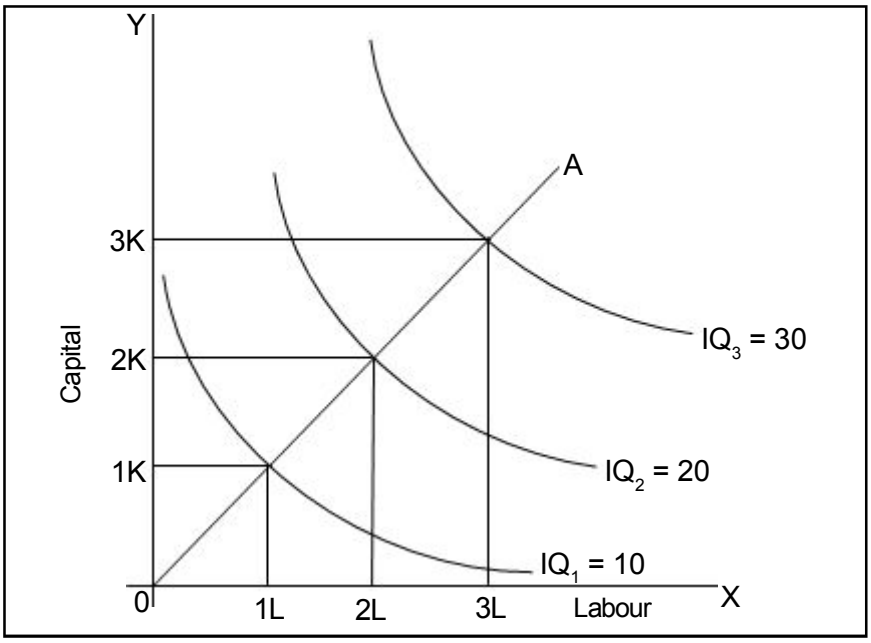


In the above figure 7.7, the firm's production function exhibits increasing returns to scale. The line 0A originating from the origin describes a production process in which labour and capital are used as inputs to produce various levels of output. As the iso-quants move upward along the line 0A, they become closer. As a result, less than twice the amount of both inputs is needed to increase production from 10 to 20 units. When inputs are doubled, output increases to 30 units as shown by IQ_3.

The increasing returns to scale may be due to technical or managerial expertise. Large scale production process cannot be halved and when used for production they are more efficient. Such large scale operation allows managers and workers to specialize in their tasks and uses more sophisticated large scale factories and equipments.

Constant Returns to Scale: If output increases in the same proportion as the increase in inputs, returns to scale is said to be constant. With constant returns to scale, the size of the firm's operation does not affect the productivity of its factors : one firm using a particular production process can easily be duplicated so that two plants produce twice as much output. For example, a large travel agency might provide the same service per client and use the same ratio of capital and labour as a small agency that services fewer clients.

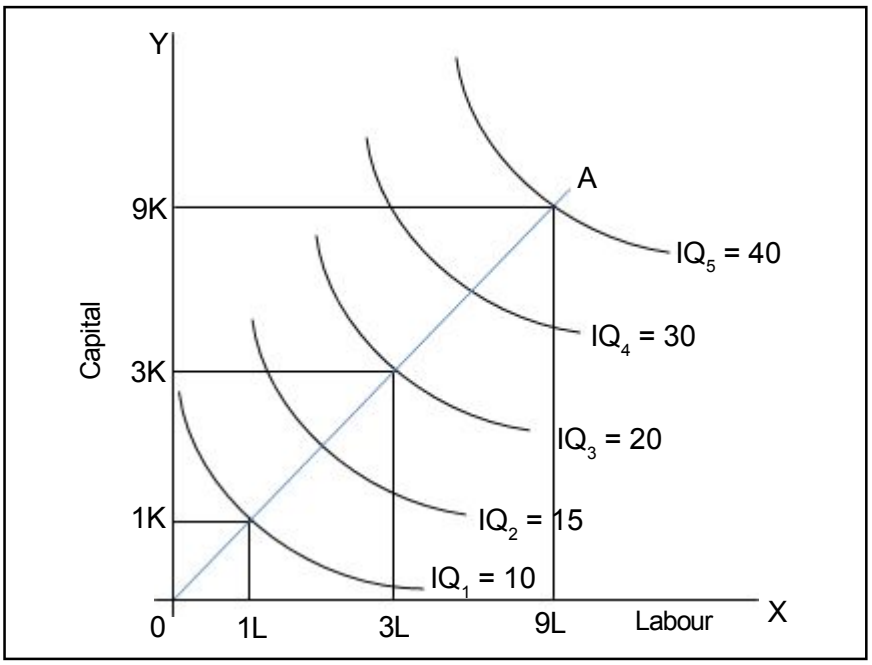
Fig. 7.8: Constant Returns to Scale



In the above figure 7.8, the firm's production function represents constant returns to scale. When 1 unit of labour hour and one hour of machine time are used, an output of 10 units is produced. When both inputs are doubled, output doubles from 10 to 20 units; when both inputs triple, output triples from 10 to 30 units.

Decreasing Returns to Scale: When the rate of increase in output is smaller than the proportion of increase in inputs, decreasing returns to scale is said to exist in the production process. It means that output may be less than double when all inputs are doubled.

Fig. 7.9: Decreasing Returns to Scale



In the above figure 7.9, it can be seen that to increase output from 10 to 20 units inputs need to be increased more than twice. Similarly, to raise the level output by four times from 10 to 40 units, the firm needs to employ nine times of its initial inputs, i.e., 9 units of capital and labour each.The common cause of diminishing returns to scale is diminishing returns to management. As the output grows managers are overburdened and become less efficient in rendering duties. Communication between workers and managers can become difficult to monitor as the work place becomes more and more impersonal. Decreasing returns to scale may also arise due to exhaustible nature of natural resources.



CHECK YOUR PROGRESS

Q.7: What do you mean by returns to scale? (Answer in about 40 words)

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Q.8: Distinguish between returns to scale and law of variable proportions. (Answer in about 40 words)

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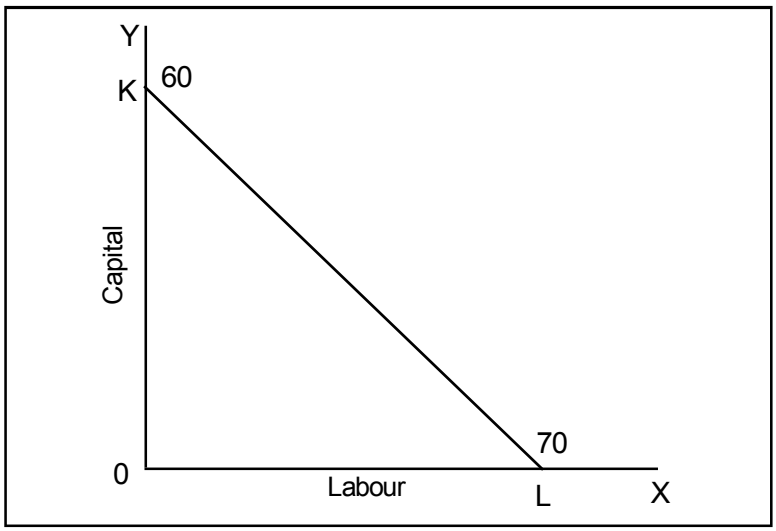
7.7 EQUILIBRIUM OF A FIRM

The concept of equilibrium of a firm can be explained with the help of iso-quants and iso-cost lines. An iso-quant map represents the various factor combinations which can yield various levels of output.

Let us now introduce the concept of the iso cost line. The prices of factors are represented by the iso-cost line. The iso-cost line determines what combination of factors the firm will choose for production. An iso-cost line shows various combinations of two factors that the firm can buy with a given outlay. Figure 7.10 shows an iso-cost line where units of labour are measured on the X-axis and units of capital are measured on the Y-axis. We assume that the prices of factors are given and constant for the firm. If the firm can spend Rs. 300/- with labour cost at Rs. 4 per labour hour and capital cost at Rs. 5 per machine hour, then the producer can buy 75 units of labour or 60 units of capital if the entire amount of Rs. 300/- is spent on labour or capital respectively. Let OL represent 75 units of labour and OK represents 60 units of capital. Joining points K and L, we get the iso cost line which passes through all combinations of labour and capital which the

firm can buy with Rs. 300/-. Thus, an iso-cost line can be defined as the locus of various combinations of factors which a firm can buy with a constant outlay. The iso- cost line is also called the price line or outlay line.

Fig. 7.10: Iso-cost Line



The iso cost line shifts when the total outlay which the firm wants to spend on the factors changes. A greater outlay will cause the iso cost line to shift to the right.

The equilibrium condition of the firm depends on its objectives. As mentioned earlier, an isoquant map given the various factor combinations which can yield various levels of output, every isoquant showing those factor combinations which can produce a specified level of output. A family of iso-cost line represents the various levels of total cost or outlay, given the prices of two factors.

The entrepreneur may– i) minimise cost subject to a given output or ii) maximise output for a given cost.

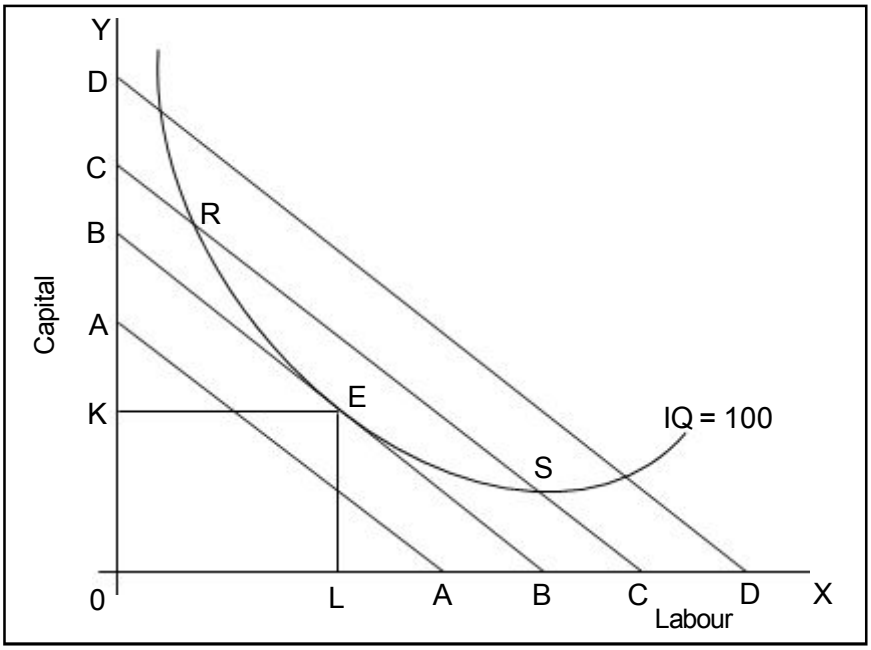
If the entrepreneur has already decided about the level of output, he/she will choose the combinations of factors which minimises the cost of production, i. e. he/she will choose the least cost combination of factors.

We have already said that the point of least cost combination of factors for any level of output is where the iso-quant is ***tangent*** to an iso-quant. The point of tangency is the point where a straight line touches a curve. This has been explained with the help of the following figure 7.11.



Tangent : a tangent is a straight line which touches a curve at a single point. The point where the straight line touches the curve is called the point of tangency.

Fig. 7.11: Equilibrium of a Firm



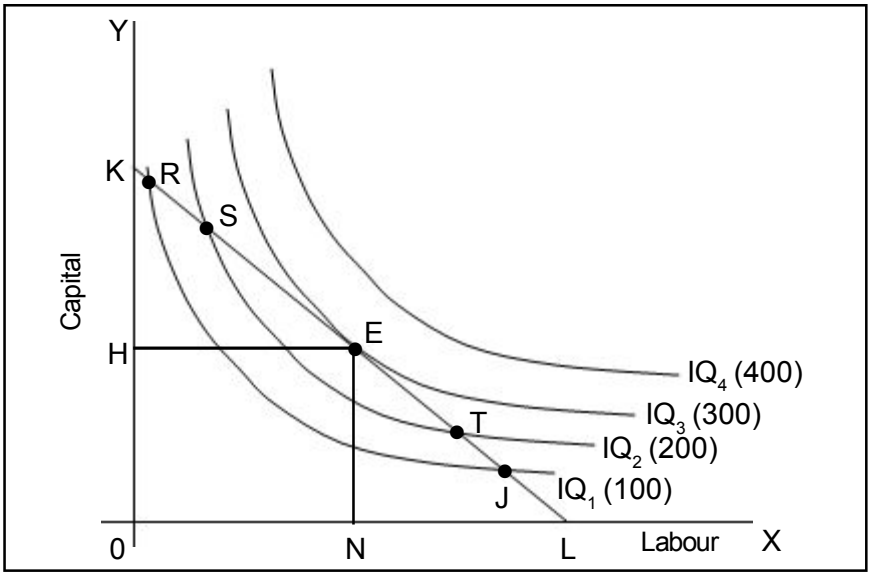
In the above figure 7.11, AA, BB, CC and DD are different iso-cost lines. They show different levels of cost at which production can take place. An important point to note here is that iso-cost lines are always parallel to each other. The producer wants to produce 100 units of output and he has to decide which level of cost will maximize his profit.

Profit will be maximum at point E where the iso-quant IQ touches the iso-cost line BB. At this point the producer uses 0L amount of labour and 0K amount of capital. Points other than E can not be point of equilibrium as other points cannot fulfil the condition of tangency. If we consider the point R, cost is beyond the reach of the producer. Therefore, the producer will not choose a combination other than E which is the least cost factor combination for producing 100 units of output.

It should be remembered that the point of tangency between the iso-cost and the iso-quant is not a necessary condition for producer's equilibrium. At the point of tangency, the iso-quant must be convex to the origin. In other words, marginal rate of technical substitution of labour for capital must be diminishing.

The second situation of output maximisation for a given level of cost can be explained with the help of the following diagram.

Fig. 7.12: Output Maximisation for a Given Cost



With the given outlay, there will be a single iso-cost line. The firm will have to choose a factor combination lying on the given iso-cost line. The producer will now be in equilibrium at point E where IQ_3 is tangent to KL using ON units of labour and OH units of capital. The firm has the option of producing at R, S, T and J but point E enables the firm to reach the highest possible isoquant IQ_3 producing 300 units of output.



CHECK YOUR PROGRESS

Q.9: What are the options available to a producer to attain equilibrium of a flim? (Answer in about 40 words)

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Q.10: State the conditions for producer's equilibrium. (Answer in about 40 words)

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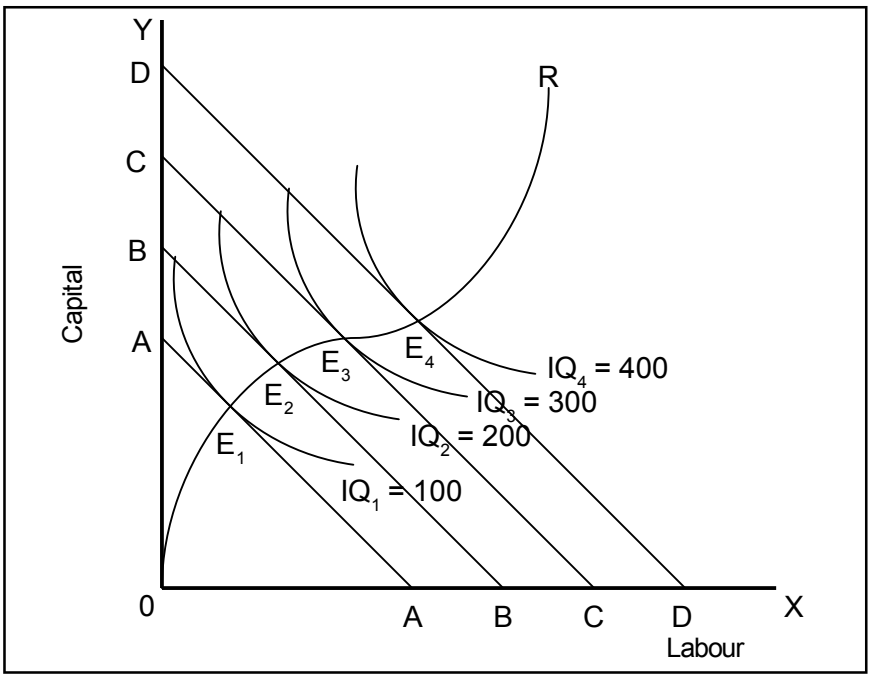
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7.8 EXPANSION PATH

After discussing how a producer reaches equilibrium, we are now in a position to study how a producer will change his factor combination as he expands output with given factor prices. We can study how he will proceed with the help of iso-cost and iso-quant. Suppose, the producer uses labour and capital and their prices are represented by the iso-cost line AA which is shown in the next page.

In figure 7.13, parallel to the iso-cost line AA, there are other three iso-quants BB, CC and DD which show different levels of total cost or outlay. Suppose the producer wants to produce 100 units of output. Then he will produce at point E_1. Suppose he wants to produce 200 units of output, he will choose to produce at E_2 which is a point of tangency between iso-cost curve BB and iso-quant IQ_2. Likewise, for higher level of output 300 and 400, the firm will respectively produce at E_3 and E_4. If we join all the least cost equilibrium points E_1, E_2, E_3 and E_4, we get the expansion path. Thus, expansion path may be defined as the locus of the points of tangency between the equal product curves and iso-cost lines as the firm expands output.

Fig. 7.13: Expansion Path



The expansion path may have different shape depending upon the relative prices of the productive factors used and the shape of the iso-quant. Since expansion path represents minimum cost combinations for various levels of output, it shows the cheapest way of producing each output given the relative prices of the factors.



CHECK YOUR PROGRESS

Q.11: What does the expansion path exhibit? (Answer in about 40 words)

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7.9 LET US SUM UP

- A production function is a relation between inputs to the production process and the resulting output.
- An iso-quant or equal product line is a curve that shows all possible combinations of inputs that yield the same output. It is also known as producer's indifference curve.
- Amount by which the quantity of one input can be reduced when one extra unit of another input is added without any change in output is called marginal rate of technical substitution (MRTS).
- The degree of substitutability between two inputs is measured by elasticity of substitution. It is the proportionate change in the ratio of the factors divided by proportionate change in the MRTS.
- The law of variable proportions shows the changes in the quantity of one input while other inputs are kept constant.
- There are three stages in the law of variable proportions. A rational producer will always like to produce in stage two.

- It was first believed that the law was applicable in the field of agriculture only. But the modern economists propound that the law is equally applicable to industries and other productive activities.
- The study of changes in output as a consequence of changes in the scale is the subject matter of returns to scale.
- Returns to scale may be constant, increasing or decreasing. Returns to scale vary among different production functions. Normally returns to scale is greater in the production function associated with larger firms.
- The law of variable proportions shows how output changes with changes in the quantity of one input while other inputs are kept constant. But in case of returns to scale, all inputs are changed in a fixed proportion.
- The condition of equilibrium is determined at the point of tangency between iso-cost line and iso-quant. Iso-cost is a straight line which shows various combinations of two factors that the firm can buy with a given outlay.
- It should be remembered that the point of tangency between the iso-cost line and the iso-quant is not a necessary condition for producer's equilibrium. At the point of tangency, the iso-quant must be convex to the origin. In other words, marginal rate of technical substitution of labour for capital must be diminishing.
- When a firm increases output, it moves from one equilibrium point to another. Such change of equilibrium position form one to the other is captured by expansion path.
- Expansion path is the locus of the points of tangency between the equal product curves and iso-cost lines as the firm expands output. In other words, it is the locus of least cost combination points.



7.10 FURTHER READING

1) Ahuja, H.L. (2006); *Modern Economics*; New Delhi: S. Chand & Co. Ltd.

2) Dewett, K.K. (2005); *Modern Economic Theory*; New Delhi: S. Chand & Co. Ltd.

3) Koutsoyiannis, A. (1979); *Modern Microeconomics*; New Delhi: Macmillan.

4) Sundharam, K.P.M. & Vaish, M.C. (1997); *Microeconomic Theory*; New Delhi: S.Chand & Co. Ltd.



7.11 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: An iso-quant or equal product line is a curve showing all possible combinations of inputs that yield the same level of output. This concept is analogous to consumer's indifference curve. Therefore, it is also known as producer's indifference curve.

Ans. to Q. No. 2: The degree of substitutability between two inputs is measured by elasticity of substitution. It is the proportionate change in the ratio of the factors divided by proportionate change in the MRTS. Therefore:

$$Es = \frac{\text{proportionate change in the ratio of the factors}}{\text{proportionate change in the MRTS}}$$

where, Es = elasticity of substitution, MRTS = marginal rate of technical substitution.

Ans. to Q. No. 3 : The convexity property of an iso-quant means that as we move down on the curve less and less of capital is required to be substituted by a given increment of labour so as to keep the level of output constant. The degree of convexity of an iso-quant depends on the rate at which the MRTS diminishes.

Ans. to Q. No. 4 : The law of variable proportions is based on the following assumptions–

- There should not be any change in the state of technology.
- Only one input will undergo change in quantity keeping all other inputs constant.
- All the units of the variable factor are homogenous.

- It is possible to change the proportion in which the various inputs are combined.

Ans. to Q. No. 5: In the first stage of production, total output increases at an increasing rate upto a certain point. This point is called the point of inflexion.

Ans. to Q. No. 6: The third stage is known as the stage of diminishing returns as both the average and marginal products of the variable factor continuously fall during this stage.

Ans. to Q. No. 7: When the producer changes both labour and capital in the same proportion and the changes in total production are studied, it refers to returns to scale. It is called so because there is change in the scale of production.

Ans. to Q. No. 8: The law of variable proportions shows how output changes with changes in the quantity of one input while other inputs are kept constant. But in case of returns to scale, all inputs are changed in a fixed proportion.

Ans. to Q. No. 9: The two options a firm will have to attain equilibrium are:

- maximizing output for a given cost, or
- minimizing cost subject to a given output.

Ans. to Q. No. 10: The following two conditions must be fulfilled for the equilibrium of a firm:

- The iso-cost line should be tangent to the iso-quant.
- At the point of tangency, the iso-quant must be convex to the origin.

Ans. to Q. No. 11: Since expansion path represents minimum cost combinations for various levels of output, it shows the cheapest way of producing each output given the relative prices of the factors.



7.12 MODEL QUESTIONS

A) Very Short Questions (Answer each question in about 75 words):

Q.1: Describe the significance of the law of variable proportions.

Q.2: Write a short note on the concept of expansion path.

Q.3: Write a short notes on:

a) Constant returns to scale

b) Decreasing returns to scale

c) Increasing returns to scale

B) Short Questions (Answer each question in about 100-150 words):

Q.1: Explain the law of variable proportions with the help of suitable diagram.

Q.2: What do you mean by returns to scale? Discuss its various types with the help of suitable diagrams.

Q.3: Discuss the equilibrium of a firm using iso-quant and iso-cost lines.

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UNIT 8: COST OF PRODUCTION AND COST CURVES

UNIT STRUCTURE

8.1 Learning Objectives

8.2 Introduction

8.3 Different Concepts of Costs

8.4 Nature of Cost Curves in the Short-run

- 8.4.1 Total Variable Cost and Total Fixed Cost
- 8.4.2 Average Cost Curves
- 8.4.3 Marginal Cost Curve

8.5 Long-Run Cost Curves of a Firm

- 8.5.1 Long-Run Average Cost Curve
- 8.5.2 Long-Run Marginal Cost Curve

8.6 Let Us Sum Up

8.7 Further Reading

8.8 Answers to Check Your Progress

8.9 Model Questions

8.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- know various frequently applied concepts of costs
- distinguish between total variable cost and total fixed cost in the short-run
- know about average cost curves and marginal cost curves in the short-run
- derive long-run average cost curve
- derive long-run marginal cost curve.

8.2 INTRODUCTION

Cost plays an important role in decision making process of a firm. Profit maximization is an important objective of a firm. Besides profit maximization, costs determine whether a new product is to be introduced

or not, whether there should be new acquisition and so on. In the language of a layman, the sum of all expenditures incurred in the process of production is called cost. The term 'cost of production' may be used in several senses. We will discuss all of them.

The costs incurred on the production process may be studied in both short-run and long-run. In the short-run, fixed cost cannot be changed. Output can be increased only by varying the quantities of variable cost. The short-run average cost curve has direct relationship with the short-run marginal cost curve. But in the long-run there is hardly any fixed cost. A period is called 'long-run' if all inputs can be changed with change in output. In this unit, we will discuss how long-run average and long-run marginal costs are derived. But the concept of cost discussed in this unit falls within the purview of traditional theory of costs.

8.3 DIFFERENT CONCEPTS OF COSTS

Cost plays an important role in taking any production decision. Cost of production is the most powerful force governing the supply of a product which also may influence the price of the commodity. A cost function is a derived function. Because it is derived from the production function. The relation between cost and output is known as 'cost function', i.e. it relates the cost of production to the firm's level of output. For a better explanation of production decision and price theory, it is necessary to know the various frequently applied concepts of costs.

Money Costs: Money costs are the total money expenses incurred by a firm for purchasing the inputs, together with certain other items. The other items include wages and salaries of workers, cost of raw materials, expenditures on capital equipments, ***depreciation*** cost, rent on buildings, interest on capital invested and borrowed, advertisement and transportation cost, insurance charge, taxes and so on. It is also called nominal cost or expenses of production.



Depreciation: a reduction in value, writing down the capital value of an asset over a period of time in the company's accounts.

Real Cost: Some elements always lie behind the money cost which cannot be explicitly measured. The efforts and sacrifices made by the capitalists to save and invest, the foregone leisure by the workers are

some examples of real cost. ***Marshall*** defined such expenditure as 'real cost'. An unpleasant work does not always carry high wage and a pleasant work does not carry low wage. Thus, it can be said that money cost and real cost do not correspond to each other.

Accounting Cost and Economic Cost: The concept of cost as conceived by an accountant is different from the idea conceived by an economist. When an entrepreneur undertakes an act of production he has to pay prices to the factors of production. For example, he pays wages to workers employed, buys raw material, pays rent and interest on money borrowed etc. All these are included in the cost of production and are termed as accounting costs.

Economic cost include the return on capital invested by the entrepreneur himself in his own business plus the salary/wages the entrepreneur could have earned if the services had been employed somewhere else and the monetary reward for all factors employed by him. Thus, economic cost takes into acount not only the accounting cost but also the amount the entrepreneur could have earned in the next best alternative employment.

Opportunity Cost or Alternative Cost: The opportunity cost of any good is the next best alternative good that is sacrificed. Since resources are scarce, they cannot be put to uses simultaneously. If they are used to produce one thing they have to be withdrawn from other uses. For example, a plot of land can be used to produce either rice or wheat and it is employed to produce rice. It means that we have sacrificed the quantity of wheat for rice. The 'opportunity cost' is the cost incurred in production of rice instead of wheat.

Sunk Costs: Sunk cost is an expenditure that has been made and cannot be recovered. For example, let us take the case of a producer who buys a specialized equipment designed for a particular purpose. That equipment can be used to do only what it was originally designed for and can not be converted for original use. It has no alternative use and, therefore, its opportunity cost is zero. The expenditure on this equipment is called sunk cost.



CHECK YOUR PROGRESS

Q.1: What are the money costs? (Answer in about 40 words)

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Q.2: What is an alternative cost? (Answer in about 40 words)

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8.4 NATURE OF COST CURVES IN THE SHORT-RUN

The short-run is a period in which the firm can not change its plant, equipment and the scale of organization. To increase output, it can only employ more variable factors with the same quantity of fixed factor.

8.4.1 Total Variable Cost and Total Fixed Cost

The total cost in the short-run may further be subdivided into 'total variable' and 'total fixed' cost. The total variable costs are those expenses of production which change with the changes in total output of the firm. It means that they can be adjusted with the change in output level. For example, a bread producer wants to increase the production of bread from 200 to 350 units. Now he will require more wheat and more labourers. Therefore, expenditure on these two items is called variable cost. Variable costs are also called primary cost or direct cost. Variable cost includes expenditure on labour, raw materials, power, fuel, etc.

On the other hand, some components of production cannot be varied in the short-run. For example, our bread producer cannot increase its plant size quickly in the short-run. He has to collect capital and order the equipment for purchasing. Such expenditure on capital equipment, building, top management personnel, contractual rent, insurance fee, interest on capital invested, maintenance cost, tax etc are called fixed cost. It is called so because it can not be adjusted in the short-run. Fixed cost is the cost which does not vary with the level of output. Fixed costs are known as over-head cost. Both total fixed costs (TFC) and total variable cost (TVC) together constitute total cost (TC).

Thus, TC = TVC + TFC

Let us explain the concept with the help of the following table 8.1, which corresponds to short-run. When the firm produces nothing, the total fixed cost is 150. In the short-run, total fixed cost remains the same although there is increase in output. Total variable cost is zero when the firm produces nothing.

Table 8.1: Total Fixed Cost, Total Variable Cost and Total Cost in the Short-run

OUTPUT	TFC	TVC	TC	MC	AFC	AVC	ATC
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0	150	0	150	—	—	—	—
1	150	50	200	50	150.0	50.0	200.0
2	150	80	230	30	75.0	40.0	165.0
3	150	100	250	20	50.0	33.3	83.3
4	150	110	260	10	37.5	27.5	65.0
5	150	115	265	5	30.0	23.0	53.0
6	150	130	280	15	25.0	21.6	46.6
7	150	155	305	25	21.4	22.1	43.5
8	150	190	340	35	18.7	23.7	42.5

The distinction between fixed and variable cost will be clear from the following figure 8.1. In the figure, the total fixed cost curve (TFC) is parallel to the X axis because in the short-run it will remain

In the table,

TFC = Fixed for all output levels.

$TVC_i = MC_i + TVC_{i-1}$

Thus, TVC at the Output level 3 is : MC at output level 3+TVC at output level 2.

TC = TFC + TVC

= Columns(2+3)

$MC = TVC_i - TVC_{i-1}$

$AFC = \frac{TFC}{Output}$

$= \frac{Column\ (2)}{Column\ (1)}$

$AVC = \frac{TVC}{Output}$

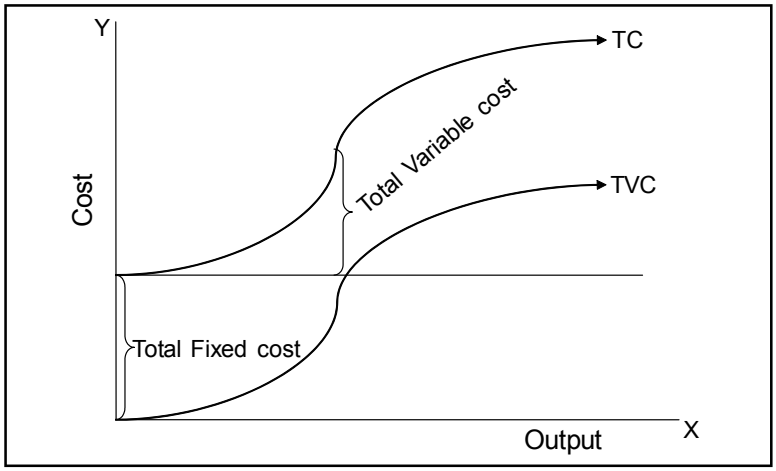
$= \frac{Column\ (3)}{Column\ (1)}$

$ATC = \frac{TC}{Output}$

$= \frac{Column\ (4)}{Column\ (1)}$

constant whatever the level of output. Even if the firm does not produce anything, the producer has to bear the total fixed cost. On the other hand the total variable cost curve (TVC) will start from the origin, meaning that if there is no production TVC will be zero.

Fig. 8.1: Shapes of Fixed Cost, Variable Cost and Total Cost Curves



From the above figure 8.1 it can be seen that the TVC moves upward, showing that as output increases the total variable cost increases. The vertical summation of total variable cost and total fixed cost gives the total cost of the firm.

8.4.2 Average Cost Curves

We have discussed total variable and total fixed cost. But in economics, the concept of cost is discussed in the context of per unit instead of total cost so that a better idea about profit is conceived instantly. Therefore, we are going to discuss the short-run average cost curve.

Average Total Cost (ATC) or Average Cost: The average total cost is also called 'average cost'. It is derived by dividing the total cost by the quantity produced. We have already studied that total cost (TC) is nothing but the sum of total fixed cost and total variable cost.

$$ATC = \frac{TC}{Q}$$

$$\text{Or,} \quad ATC = \frac{TVC + TFC}{Q}$$

$$= \frac{TVC}{Q} + \frac{TFC}{Q}$$

$$= AVC + AFC$$

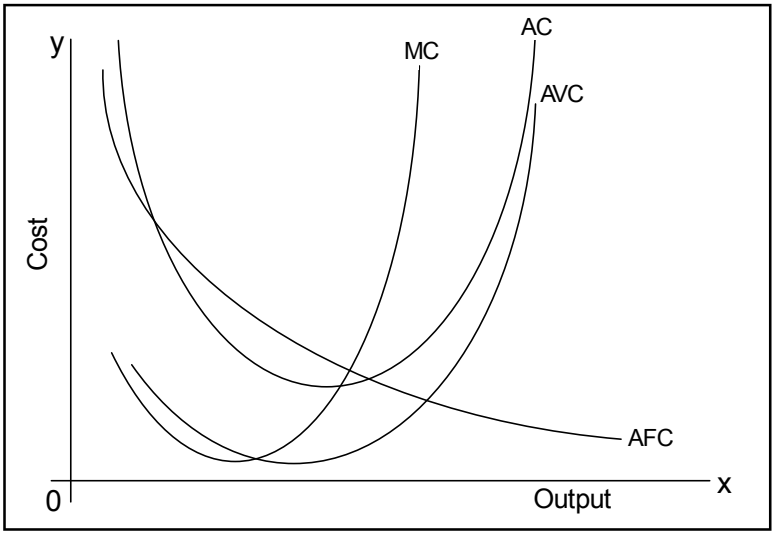
where, Q is the total output produced. It means that average cost is the sum total of average variable cost and average fixed cost. The shape of a short-run average cost curve is like U as shown in the figure 6.2.

Average Fixed Cost: If the total fixed cost is divided by the total number of units of output produced, we can arrive at average fixed cost–

$$AFC = \frac{TFC}{Q}$$

where, Q is the number of total output produced. The shape of the average fixed cost curve is shown in figure 8.2.

Fig. 8.2: Shapes of Various Cost Curves



From the above figure 8.2 as shown in the above, it is clear that AFC curve gradually falls down as more and more output is produced. We know that the fixed cost does not change in the short-run. Therefore, an increase in output produced reduces the AFC

and the AFC curve falls downward gradually. From column 6 of table 8.1, we can see that the amount of fixed cost is falling as production is increasing.

Average Variable Cost (AVC): Average variable cost is the total variable cost divided by the number of units of output produced. It can be calculated in the following way:

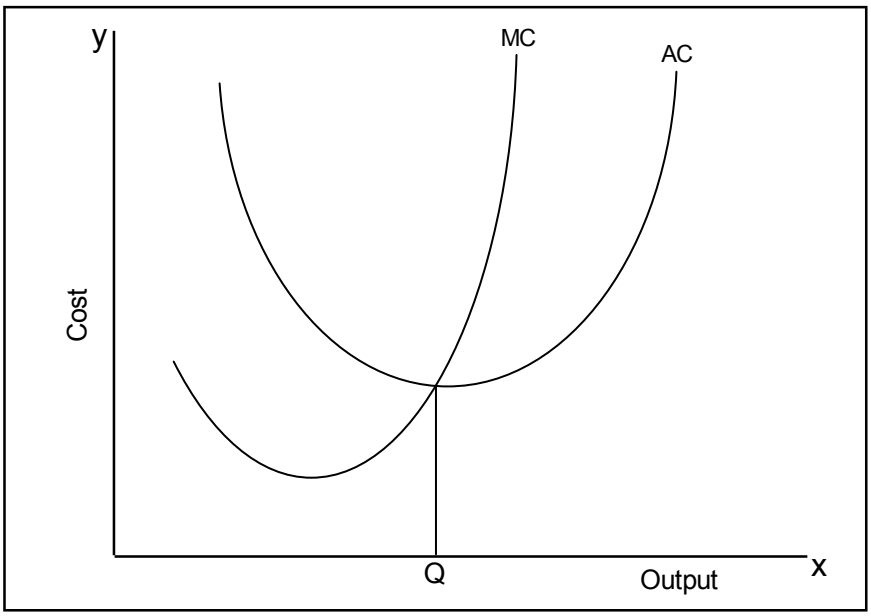
$$AVC = \frac{TVC}{Q}$$

where, Q stands for the total output produced. The average variable cost will generally fall as output increases from zero to the normal capacity output. But beyond the normal capacity of output it will rise steeply because of the operation of the law of diminishing returns. Average variable cost curve (AVC) is shown in the above figure 8.2.

8.4.3 Marginal Cost

Before discussing the concept of marginal cost, let us go back to the concept of marginal product. Marginal product is an additional output produced. For example, a producer produces 100 units. When he produces 101 units, the extra unit is called marginal output. Therefore, the marginal cost is an addition to the total cost incurred on the production of that additional unit. Since total fixed cost does not undergo any change in the short-run, marginal cost may also be called an addition to the total variable cost in the short-run. There is a direct relationship between AC and MC. When AC falls MC also falls but it is below AC. When AC rises MC is above it and AC equals MC at the lowest point of AC. Let us again draw AC and MC curve separately on the paper, as has been depicted in the following figure 8.3.

Fig. 8.3: AC and MC Curves



From the above figure 8.3, it is clear that to the right of output Q, MC is higher than AC and to the left of Q, MC is lower than AC. But at output level Q, MC = AC. Thus, we find that:

- If MC < AC, then AC will be falling as output increases.
- If MC > AC, then AC will be rising as output increases.
- At point Q where AC is minimum, we have AC = MC.



CHECK YOUR PROGRESS

Q.3: Distinguish between fixed and variable cost. (Answer in about 40 words)

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Q.4: What is marginal cost? (Answer in about 40 words)

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Q.5: What will be the variable cost when the output is zero? (Answer in about 50 words)

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8.5 LONG-RUN COST CURVES OF A FIRM

Long-run is the period when a firm can change its plant size and scale of organization. In the long-run all factors are variable. Now, the question is how short is the short-run and how long is the long-run? This depends on the industry and the production techniques used. The period length will vary from firm to firm. If there are no transactions and no specialized inputs, then all inputs can be quickly adjusted, and the long-run is not very long.

8.5.1 Long-run Average Cost Curve

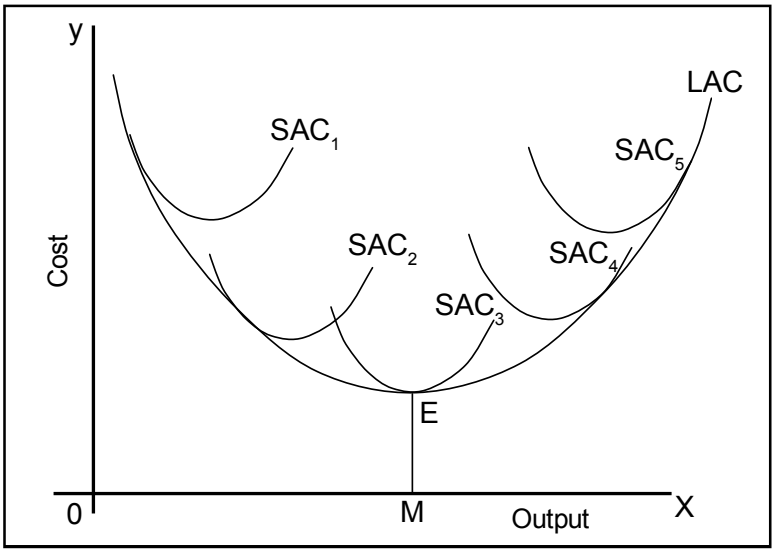
Let us first discuss how average cost curve is derived in the long-run. We all know that a particular plant can produce a particular range of output. It is the lowest point of average cost curve beyond which production is not economic because of the operation of the law of diminishing returns which may occur for various reasons. Suppose, the demand for a firm's product increases. Now the producer will install a new plant. The firm will be making use of the newly installed plant till it reaches the lowest point on the average cost curve. This way more new plants will be installed with the increase in demand for the firm's product.

Now we will derive the long-run average cost (LAC) curve from the short-run average cost curves by fitting a line which is tangent to all SAC curves. The point of tangency must be the lowest point on the short-run average cost curve because beyond that the firm will not produce in that plant.

In the following figure 8.4, LAC is the long-run average cost curve. Each point on the LAC curve is a point of tangency with the corresponding short-run average cost curve. Therefore, it also called

'Envelope Curve'. The firm will produce 0M amount of output at the minimum point E on the LAC curve. If the firm produces less than 0M, it is not reaping fully the economies of production and if it produces beyond 0M, the firm's profit will fall. In both the cases, the average cost of production will be higher.

Fig. 8.4: Shapes of SAC Curves and the LAC Curve



The shape of the long-run average cost curve is like U. This shape reflects the ***law of returns to scale***. According to this law, the unit costs of production decreases as plant size increases, due to the ***economies of scale,*** which the large plant sizes make possible. It has been assumed that this plant is completely inflexible. There is no reserve capacity, not even to meet the temporary rise in demand. If this plant size increases further than this optimum size there are diseconomies of scale. The turning up of the LAC curve is due to managerial diseconomies of scale when output is increased beyond the optimum size.

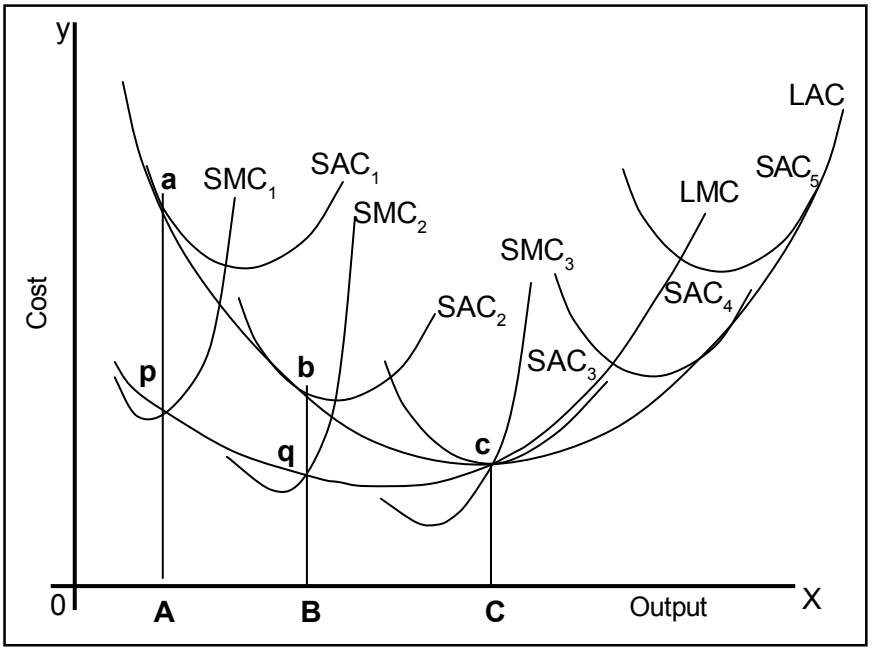
Law of Returns to Scale: This law explains the rate at which output changes as the quantities of all inputs are varied. Three laws of returns to scale exist: Suppose, we increase all the inputs of production twice. Now, consequently: if output also increases twice, then we can say that constant returns to scale exists; 2) if output increases by less than twice, then we can say that decreasing returns to scale exists; and finally 3) if output also increases by more than twice, then we can say that increasing returns to scale exists.

8.5.2 Long-Run Marginal Cost Curve

The long-run marginal cost can be derived from the short-run marginal cost curves (SMC) but it does not envelope them like the LAC curve. The LMC curve is formed from the point of intersection of the SMC curves with vertical lines to the X axis drawn from the

points of tangency of the corresponding SAC curves and the LAC curve. At that level of output, the LMC must be equal to the SMC curve at which the corresponding SAC curve is tangent to the LAC curve.

Fig. 8.5: Long-run Marginal Curve



In the above figure 8.5, let us start with the point 'a' which is a point of tangency between SAC and LAC. From this point a vertical line aA is drawn on the X axis and it cuts the SMC_1 at point p. Similarly 'b' and 'c' are the other two points of tangency between other two SAC curves and the LAC curve. Corresponding to these two points of tangency, the point of intersection between vertical lines bB and cC are q and c. After joining p, q and c we get the LMC curve. At this minimum point c, the LMC curve intersects the LAC curve. Long-run marginal cost bears direct relationship with the long-run average cost. When both LAC and LMC fall, LMC is lower than LAC. But as LAC and LMC both increase, LMC is higher than LAC. But the LMC cuts the LAC at the lowest point. The same relationship between AC and MC is true in the short-run as well.

Economies of Scale: In the long-run, it may be the firm's interest to change the input proportions as the level of output changes. When input proportions undergo changes, the concept of returns to scale no longer applies. Rather, we can say that a firm enjoys economies of scale when it doubles its output for less than twice the cost. Conversely, there are diseconomies of scale when a doubling of output requires more than twice the cost.



CHECK YOUR PROGRESS

Q.6: Distinguish between short-run and long-run period. (Answer in about 40 words)

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Q.7: Why does the LAC look like U? Explain. (Answer in about 40 words)

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8.6 LET US SUM UP

- Concept of cost can be approached from several perspectives. The first one we have discussed is money cost. Money cost can be explicitly measured in terms of money.
- Real costs can not be directly measured. Money costs are total money expenses incurred by a firm in producing a commodity whereas the efforts and sacrifices of the factor or the entrepreneur is called real cost of production.
- Accounting costs are concerned with firm's financial statements and is concerned with a firm's past performance. On the other hand, economic cost is concerned with allocation of scarce resources and is forward looking.
- The opportunity cost of any good is the next best alternative good that is sacrificed.
- Sunk cost is an expenditure that has been made and can not be recovered.

- The theory of cost may be approached from both short term and long term perspectives. In the short-run, total cost is the sum of total variable and total fixed cost.
- The total variable costs are those expenses of production which change with the changes in total output of the firm.
- On the other hand, some components of production can not be varied in the short-run. They are called fixed cost.
- Average cost is derived by dividing the firm's total cost by the level of output.
- Marginal cost is the increase in cost resulting from the production of one extra unit of output.
- There is a direct relationship between AC and MC. When AC falls MC also falls but MC is below AC. When AC rises MC also rises and MC is above it. AC is equals to MC at the lowest point on the AC curve.
- In the long-run, average cost curve is an envelope curve of the short-run average cost curve. The shape of the LAC curve is like the U. The U shape occurs due to the laws of returns to scale.
- The long-run marginal cost can be derived from the short-run marginal cost curves (SMC) but it does not envelope the short-run marginal cost like the LAC curve.
- The same direct relationship between average cost and marginal cost curve which is applicable in the short is also applicable in the long-run.



8.7 FURTHER READING

1) Ahuja, H.L. (2006); *Modern Economics*; New Delhi: S. Chand & Co. Ltd.
2) Dewett, K.K. (2005); *Modern Economic Theory*; New Delhi: S. Chand & Co. Ltd.
3) Koutsoyiannis, A. (1979); *Modern Microeconomics*; New Delhi: Macmillan.

4) Sundharam, K.P.M. & Vaish, M.C. (1997); *Microeconomic Theory*; New Delhi: S.Chand & Co. Ltd.



8.8 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: Money costs are total money expenses incurred by a firm for purchasing the inputs, together with certain other items. The other items include wages and salaries of workers, cost of raw materials, expenditures on capital equipment, depreciation cost, rent on buildings, interest on capital invested and borrowed, advertisement and transportation cost, insurance charge, taxes and so on.

Ans. to Q. No. 2: Alternative cost of any good is the next best alternative good that is sacrificed. Since resources are scarce, they can not be put into all uses simultaneously. If they are used to produce one thing they have to be withdrawn from other uses. For example, a plot of land can be used to produce either rice or wheat and it is employed to produce rice. Thus, the opportunity cost is the cost incurred in the production of rice instead of wheat.

Ans. to Q. No. 3: Variable costs are those expenses of production which change with the changes in total output of the firm. It means that they can be adjusted with the change in output level. Variable cost includes expenditure on labour, raw materials, power, fuel, etc.

On the other hand, some expenditure such as: expenditures on capital equipment, building, top management personnel, contractual rent, insurance fee, interest on capital invested, maintenance cost, tax etc remain fixed irrespective of the volume or time period of production. So, they are called fixed cost. Such costs can not be adjusted in the short-run.

Ans. to Q. No. 4: Marginal cost is the increase in cost resulting from the production of one extra unit of output.

Ans. to Q. No. 5: Variable cost will be zero when output of the firm is zero.

Ans. to Q. No. 6: Short-run is the period, when a firm cannot change all its factors of production; neither can change its plant size and scale of operation. Thus, some factors of production in the short-run are fixed while others are variable. And in the short-run, while the cost of fixed factors of production remain the same, the cost of the variable factors of production varies according to the volume of production. On the other hand, long-run is a period when a firm can change its plant size and scale of operation. In the long-run all factors are variable.

Ans. to Q. No. 7: The LAC looks like the shape of 'U', because the laws of returns to scale operate in the long-run.



8.9 MODEL QUESTIONS

A) Very Short Questions (Answer each question in about 75 words):

Q.1: Differentiate between accounting cost and economic cost.

Q.2: Differentiate between money cost and real cost.

Q.3: Define the following terms:

a) Sunk cost

b) Opportunity cost

c) Real cost

B) Short Questions (Answer each question in about 100-150 words):

Q.1: Discuss the different concepts of costs.

Q.2: Show the relations among Total Fixed Cost, Total Variable Cost and Total Cost.

C) Long Questions (Answer each question in about 300-500 words) :

Q.1: How is Marginal Cost is related to Average Cost and Total Cost.

Q.2: Show the relations between different cost curves.

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