Introduction to Economic T

SEMESTER - I

ECONOMICS

BLOCK - 1

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Revenue, Average Revenue and Marginal Revenue;
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f Costs; Nature of Cost Curves in the Short-run: Total Variable
d Cost, Average Cost Curves, Marginal Cost Curve; Long-
a Firm: Long-run Average Cost Curve, Long-run Marginal

Ans. to Q. No. 6: Short-run is the period, when a firm cannot change all
factors of production; neither can change its plant size and scale
operation. Thus, some factors of production in the short-run are fix
while others are variable. And in the short-run, while the cost of fix
factors of production remain the same, the cost of the variable facto
of production varies according to the volume of production. On t
other hand, long-run is a period when a firm can change its pla
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
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 a
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.

*** ***** ***

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

8.8 ANSWERS TO CHECK YOUR PROGRESS

ns. 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.

ns. 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.

ns. 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.

ns. to Q. No. 4: Marginal cost is the increase in cost resulting from the production of one extra unit of output.

COURSE INTRODUCTION

This course introduces a learner to the field of Economics. Econ English Dictionary is “the branch of knowledge concerned with the produc of wealth”. Economics can be broadly subdivided into two categ Macroeconomics. Microeconomics is the branch of economics which studi human action, especially about how these decisions affect the utilizat resources. Macroeconomics studies how the aggregate economy behaves of economy-wide phenomena is examined– such as National Income, Gro in employment, etc.

This course comprises 15 units and has been divided in three bl

BLOCK INTRODUCTION

This first block of the paper ‘Introduction to Economic Theory describes the subject matter of Economics and its division into Micro an concepts of stock and flow variables. Unit II deals with the concept of e analysis, comparative static analysis and dynamic analysis. Unit III introdu understood in economics. The derivation of the demand curve is explain along the curve and shift in the curve are also dealt with. The learner i elasticity in this unit. Unit IV deals with the cardinal approach of Consum Diminishing Marginal Utility is explained along with the Law of Equi Ma come to know about the concept of Consumer’s Surplus in this Unit. Unit V to Consumer Behaviour. Here Indifference Curves and their properties Budget Line. The Price, Income and Substitution Effect of a change in price

Unit VI deals with the concepts of revenue - Total, Average and Marg between Total Revenue, Average revenue, Marginal revenue and Price e theey of production Concepts like Production decirious, production Functi are explained in details. Unit VII descibes the concepts of cost and cost run cost curues are explained

some along-side boxes to help you know some of the difficult, unseen
VITY' have been included to help you apply your own thoughts. And, at the
, you will get "CHECK YOUR PROGRESS" questions. These have been
eck your progress of study. It will be better if you solve the problems put in
iately after you go through the sections of the units and then match your
WERS TO CHECK YOUR PROGRESS" given at the end of each unit.

- The theory of cost may be approached from both short term an
  long term perspectives. In the short-run, total cost is the sum of to
  variable and total fixed cost.
- The total variable costs are those expenses of production whi
  change with the changes in total output of the firm.
- On the other hand, some components of production can not be vari
  in the short-run. They are called fixed cost.
- Average cost is derived by dividing the firm's total cost by the level
  output.
- Marginal cost is the increase in cost resulting from the production
  one extra unit of output.
- There is a direct relationship between AC and MC. When AC fa
  MC also falls but MC is below AC. When AC rises MC also rises a
  MC is above it. AC is equals to MC at the lowest point on the A
  curve.
- In the long-run, average cost curve is an envelope curve of the sho
  run average cost curve. The shape of the LAC curve is like the
  The U shape occurs due to the laws of returns to scale.
- The long-run marginal cost can be derived from the short-ru
  marginal cost curves (SMC) but it does not envelope the short-ru
  marginal cost like the LAC curve.
- The same direct relationship between average cost and margin
  cost curve which is applicable in the short is also applicable in th
  long-run.



8.7 FURTHER READING

1) Ahuja, H.L. (2006); *Modern Economics*; New Delhi: S. Chand & C
   Ltd.
2) Dewett, K.K. (2005); *Modern Economic Theory*; New Delhi: S. Cha
   & Co. Ltd.
3) Koutsoyiannis, A. (1979); *Modern Microeconomics*; New Del



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

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 abou
- 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 Approach

1.5 Macro Economic Approaches

- 1.5.1 Scope and Subject Matter of Macro Economic Approach

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 approach
- give the meaning of macro economic approaches
- explain the scope and subject matter of macroeconom approaches.

2 INTRODUCTION

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

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

3 BASIC CONCEPTS IN ECONOMICS

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

1.3.1 Subject Matter of Economics– What Economics is about?

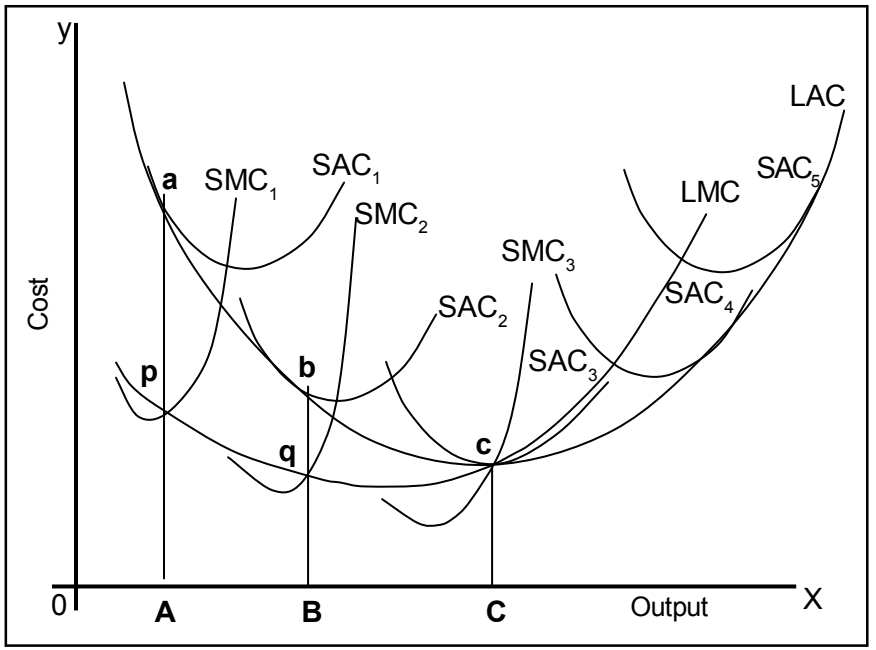
To know the subject matter of economics, we have to study the various notable definitions and their illustrations. Over these years, different economists have tried to define the subject in various contexts. We will study four Major definitions put forward by:

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

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

points of tangency of the corresponding SAC curves and the LA curve. At that level of output, the LMC must be equal to the SM curve at which the corresponding SAC curve is tangent to the LA curve.

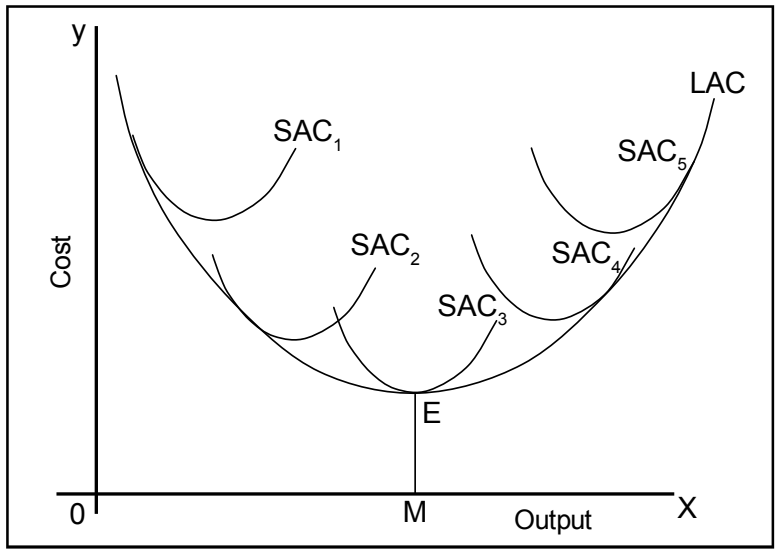
Fig. 8.5: Long-run Marginal Curve



In the above figure 8.5, let us start with the point 'a' which a point of tangency between SAC and LAC. From this point a vertic line aA is drawn on the X axis and it cuts the SMC_1 at point p. Simila 'b' and 'c' are the other two points of tangency between other tw SAC curves and the LAC curve. Corresponding to these two poin of tangency, the point of intersection between vertical lines bB a cC are q and c. After joining p, q and c we get the LMC curve. At th minimum point c, the LMC curve intersects the LAC curve. Lon run marginal cost bears direct relationship with the long-run averag cost. When both LAC and LMC fall, LMC is lower than LAC. But LAC and LMC both increase, LMC is higher than LAC. But the LM cuts the LAC at the lowest point. The same relationship between A and MC is true in the short-run as well.

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.

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

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 th was gradually replaced in general usage by the term `Economic after 1870.

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

Alfred Marshall's Definition: In his book, *Principles of Economic* 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 material goods which are related to human welfare. Another importa aspect of Marshall's definition is that it has considered Economi as a social science. Thus, according to this definition, Economi is a social science and not one which studies isolated individuals ***Robinson*** **Crusoes.**

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

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.

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.

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 a scale of organization. In the long-run all factors are variable. Now, the questi is how short is the short-run and how long is the long-run? This depends the industry and the production techniques used. The period length will va from firm to firm. If there are no transactions and no specialized inputs, th all inputs can be quickly adjusted, and the long-run is not very long.

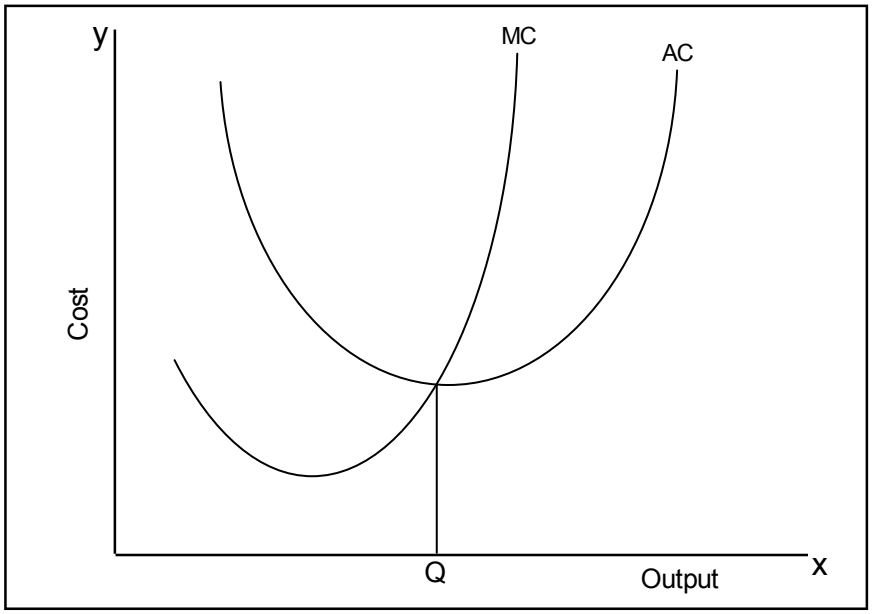
8.5.1 Long-run Average Cost Curve

Let us first discuss how average cost curve is derived in t long-run. We all know that a particular plant can produce a particul range of output. It is the lowest point of average cost curve beyo which production is not economic because of the operation of t law of diminishing returns which may occur for various reason Suppose, the demand for a firm's product increases. Now t producer will install a new plant. The firm will be making use of t newly installed plant till it reaches the lowest point on the averag cost curve. This way more new plants will be installed with t increase in demand for the firm's product.

Now we will derive the long-run average cost (LAC) cur from the short-run average cost curves by fitting a line which is tange to all SAC curves. The point of tangency must be the lowest point the short-run average cost curve because beyond that the firm w not produce in that plant.

In the following figure 8.4, LAC is the long-run average co curve. Each point on the LAC curve is a point of tangency with t corresponding short-run average cost curve. Therefore, it also call

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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context are relevant for study, individual choices can never be subject matter of Economics.

- According to Samuelson and Nordhaus, Economics is als related to the concept of efficiency. Robbins has not paid attenti to that.

Paul A. Samuelson's Definition: Paul A. Samuelson has defin Economics on the basis of the modern concept of growth. Accordi 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, mone scarce resources and production aspects. However; critics poi out that his definition has not paid due attention to the aspect human well-being, which is a very important in our lives. Again, th role played by the service sector in contemporary society has n been paid due attention.

1.3.2 Nature and Scope of Economics

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

From the discussion of the definitions of Economics we ca say that Economics studies how man and society try to utilise th limited resources which have alternative uses to solve the variou problems. Again, how an economy or the economies should follo the different developmental policies and strategies in the interest the present and future generations is also the subject matter

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.
- **Normative Economics,** also called 'Policy Economics', analyzes the outcomes of economic behaviour, evaluates them

and the AFC curve falls downward gradually. From column 6 of tab 8.1, we can see that the amount of fixed cost is falling as productio is increasing.

Average Variable Cost (AVC): Average variable cost is the to variable cost divided by the number of units of output produced. can be calculated in the following way:

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

where, Q stands for the total output produced. The average variab cost will generally fall as output increases from zero to the norm capacity output. But beyond the normal capacity of output it will ri steeply because of the operation of the law of diminishing return Average variable cost curve (AVC) is shown in the above figure 8.

8.4.3 Marginal Cost

Before discussing the concept of marginal cost, let us g back to the concept of marginal product. Marginal product is a additional output produced. For example, a producer produces 1 units. When he produces 101 units, the extra unit is called margin output. Therefore, the marginal cost is an addition to the total co incurred on the production of that additional unit. Since total fixe cost does not undergo any change in the short-run, marginal co may also be called an addition to the total variable cost in the sho run. There is a direct relationship between AC and MC. When A falls MC also falls but it is below AC. When AC rises MC is above and AC equals MC at the lowest point of AC. Let us again draw A and MC curve separately on the paper, as has been depicted in th following figure 8.3.

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

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

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

$$= AVC + AFC$$

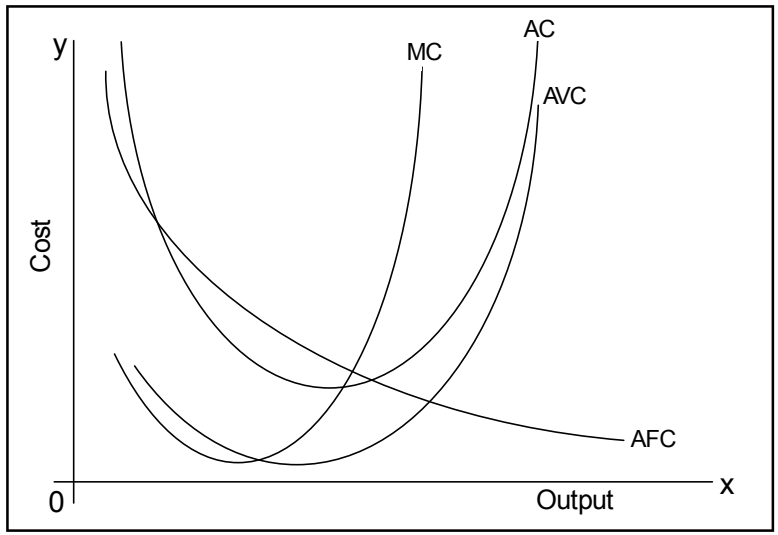
where, Q is the total output produced. It means that average cost is the sum total of average variable cost and average fixed cost. The shape of a short-run average cost curve is like U as shown in the figure 6.2.

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-

as good or bad, and may prescribe courses of action.

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

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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.

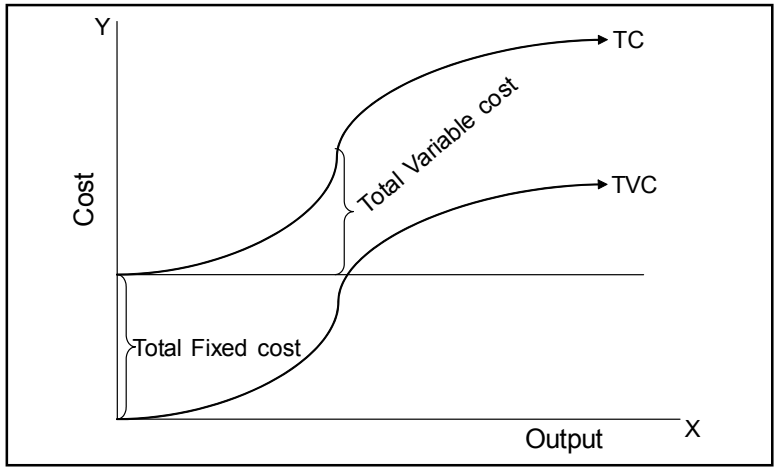
Faced with the problem of scarcity, all societies are faced with various basic economic problems which must be solved. These problems are also called central problems of an economy.

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.

constant whatever the level of output. Even if the firm does n produce anything, the producer has to bear the total fixed cost. O the other hand the total variable cost curve (TVC) will start from th origin, meaning that if there is no production TVC will be zero.

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



From the above figure 8.1 it can be seen that the TVC mov upward, showing that as output increases the total variable co increases. The vertical summation of total variable cost and tot 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 economics, the concept of cost is discussed in the context of p unit instead of total cost so that a better idea about profit is conceiv instantly. Therefore, we are going to discuss the short-run averag cost curve.

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

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.

ble 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

inputs are organised to produce the goods and services.

- **How much to produce?** How much to produce is an importa aspect for the economy. We must judiciously utilise the availab resources to meet the present demands, as well as to conser such resources for meeting the future demands.
- **For whom to produce?** For whom to produce deals with th way that the output is distributed among the members of th society.

1.3.4 Stock and Flow Variables

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



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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4 MICRO ECONOMIC APPROACHES

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



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-RU

The short-run is a period in which the firm can not change its pla equipment and the scale of organization. To increase output, it can or 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 in 'total variable' and 'total fixed' cost. The total variable costs are tho expenses of production which change with the changes in total outp of the firm. It means that they can be adjusted with the change output level. For example, a bread producer wants to increase t production of bread from 200 to 350 units. Now he will require mo wheat and more labourers. Therefore, expenditure on these tw items is called variable cost. Variable costs are also called prima cost or direct cost. Variable cost includes expenditure on labou

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

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

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

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

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

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

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

1.5 MACRO ECONOMIC APPROACHES

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

1.5.1 Scope and Subject Matter of Macro Economic Approcahes

Macroeconomics, as a study of aggregates, tries to exami

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

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

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

8.3 DIFFERENT CONCEPTS OF COSTS

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

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

Real Cost: Some elements always lie behind the money cost whi cannot be explicitly measured. The efforts and sacrifices made by th

NIT 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

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.

2 INTRODUCTION

Cost plays an important role in decision making process of a firm. ofit maximization is an important objective of a firm. Besides profit

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

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

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

In addition to this, study of public finance, international trad monetary and fiscal policies are also the subject matter of Macr 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



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 suitab diagram.

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

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

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

ns. 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.

ns. 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.

ns. 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.

ns. 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.

ns. 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.

ns. 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.

ns. 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.



1.7 FURTHER READING

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



1.8 ANSWERS TO CHECK YOUR PROGRES

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 huma behaviour as a relation between ends and scarce means whi 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 o Economic Science

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

i) 'Ends' refers to unlimited human wants.

ii) Resources for satisfying human wants are limited.

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

ns. 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.

ns. 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.

ns. 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.

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

ns. 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.

ns. 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.

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

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

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



7.11 ANSWERS TO CHECK YOU PROGRESS

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

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

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

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

- There should not be any change in the state of technology.
- Only one input will undergo change in quantity keeping all oth inputs constant.

- 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.



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 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 ov Smith's definition?

Q.5: What are the fundamental propositions of the Robbins' definition 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 macroeconom approaches. Discuss their scope and subject matter in a bri manner.

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NIT 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
2.4 Concept of Equilibrium
2.5 Market Equilibrium
2.6 Static Analysis
2.7 Comparative Static Analysis
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

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 INTRODUCTION

This Unit is concerned with familiarising you with some of the portant concepts in Economics like demand supply framework and market

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

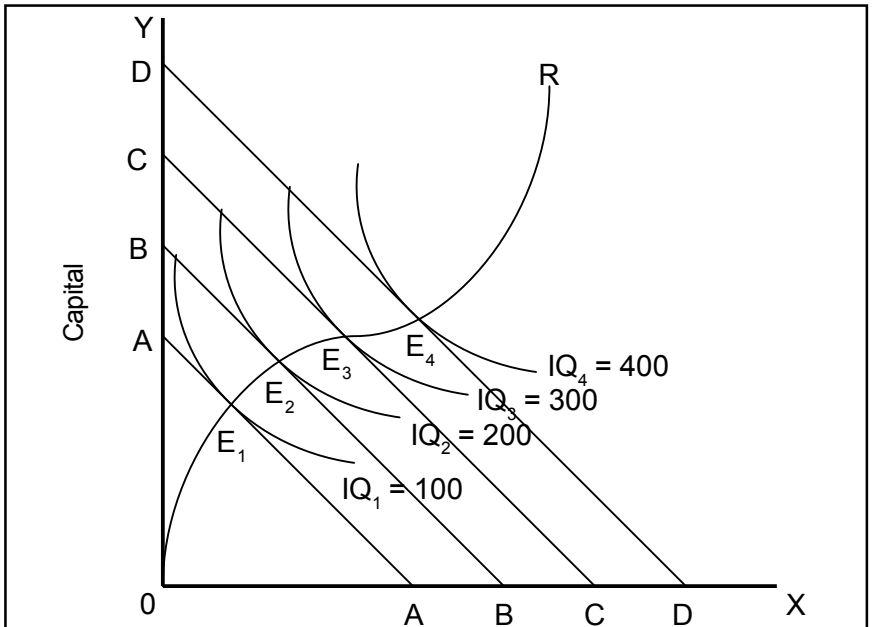
- A production function is a relation between inputs to the producti process and the resulting output.
- An iso-quant or equal product line is a curve that shows all possib combinations of inputs that yield the same output. It is also know as producer's indifference curve.
- Amount by which the quantity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

8 EXPANSION PATH

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

In figure 7.13, parallel to the iso-cost line AA, there are other three o-quants BB, CC and DD which show different levels of total cost or outlay. uppose the producer wants to produce 100 units of output. Then he will oduce at point E_1. Suppose he wants to produce 200 units of output, he l choose to produce at E_2 which is a point of tangency between iso-cost rve BB and iso-quant IQ_2. Likewise, for higher level of output 300 and 0, the firm will respectively produce at E_3 and E_4. If we join all the least st equilibrium points E_1, E_2, E_3 and E_4, we get the expansion path. Thus, pansion path may be defined as the locus of the points of tangency tween the equal product curves and iso-cost lines as the firm expands tput.

Fig. 7.13: Expansion Path



By the term 'demand' we mean the desire to purchase a good service that is backed by the purchasing power. The term 'supply' refers the amount of goods and services that are offered for sale at a price. Havi knowledge about the price mechanism makes it easy for us to discuss t concept of market equilibrium.

2.3 DEMAND SUPPLY FRAMEWORK

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



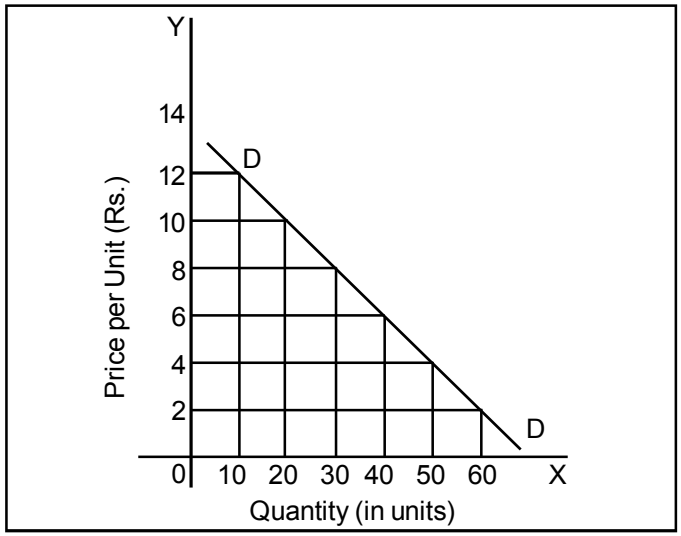
LET US KNOW

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 functio relationship between the price and the quantity of the commodity demande The law of demand or the functional relationship between price a commodity demanded is one of the best known and most important laws economic theory. According to the law of demand, other things being equa if the price of a commodity falls, the quantity demanded of it will rise and the price of the commodity rises, its quantity demanded will decline. Thu according to the law of demand, *there is an **inverse** relationship betwe*

ngs which are assumed to be constant are: the tastes or preferences of
e consumer; the income of the consumer and the prices of the related
ods. This law of demand ensures the downward slope of the demand
rve. The figure 2.1 exhibits a typical downward sloping demand curve for
individual consumer.

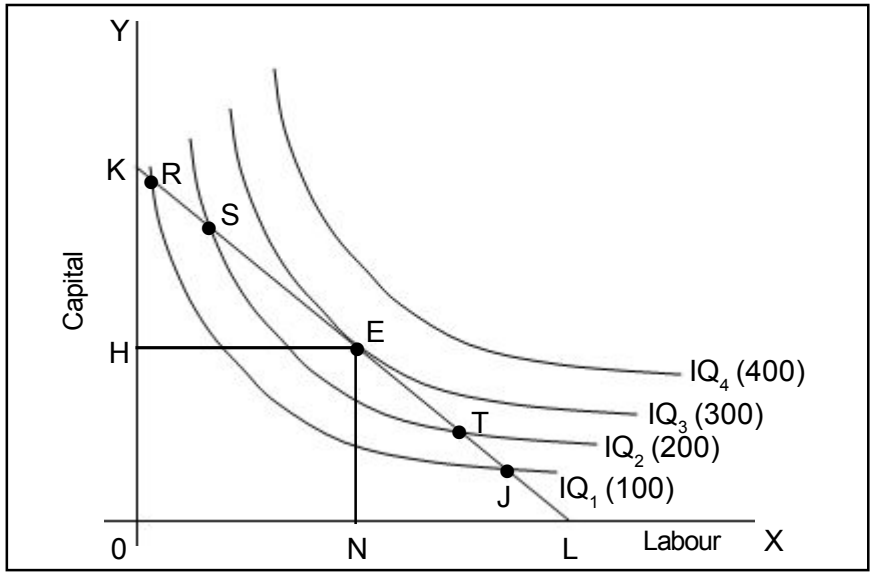
Fig. 1.1: Demand Curve of an Individual Consumer



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

Meaning of Supply: Supply is a fundamental economic concept
at describes the total amount of a specific good or service that is available
consumers. Supply can relate to the amount available at a specific price

Fig. 7.12: Output Maximisation for a Given Cost



With the given outlay, there will be a single iso-cost line. The firm w
have to choose a factor combination lying on the given iso-cost line. Th
producer will now be in equilibrium at point E where IQ_3 is tangent to I
using ON units of labour and OH units of capital. The firm has the option
producing at R, S, T and J but point E enables the firm to reach the highe
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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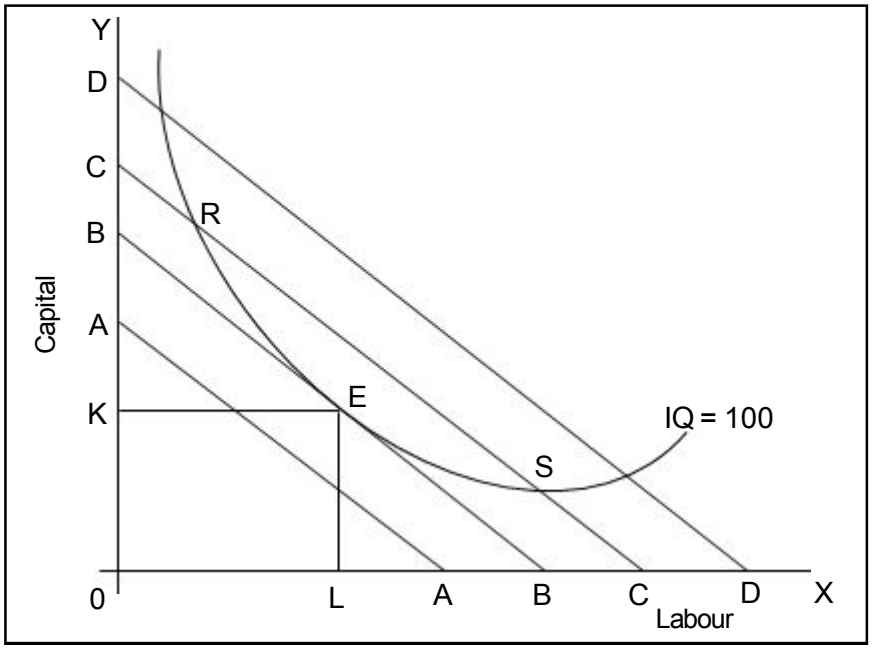
Q.10: State the conditions for producer's equilibrium. (Answer in about 40 words)

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Fig. 7.11: Equilibrium of a Firm



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

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

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

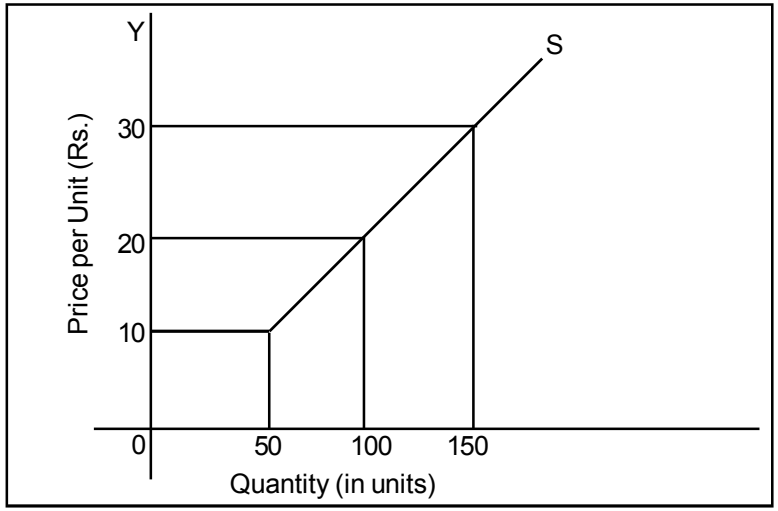
The second situation of output maximisation for a given level of cost

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

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

The supply schedule is the relationship between the quantity of goo
supplied by the producers of a good and the current market price. It is graphica
represented by the supply curve. It is commonly represented as direc
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 w
can see that when price of the commodity was Rs. 10, supply of the goo
was 50 units. When price increased to Rs. 20, supply of the good als
increased to 100. Further increase of the price to Rs. 30 resulted in th
increase in the supply of the commodity to 150 units. Thus, we can see th
in case of a nomal good, the supply curve slopes upwards to the right. Th
is because with a rise in the price of the good in question, more supply



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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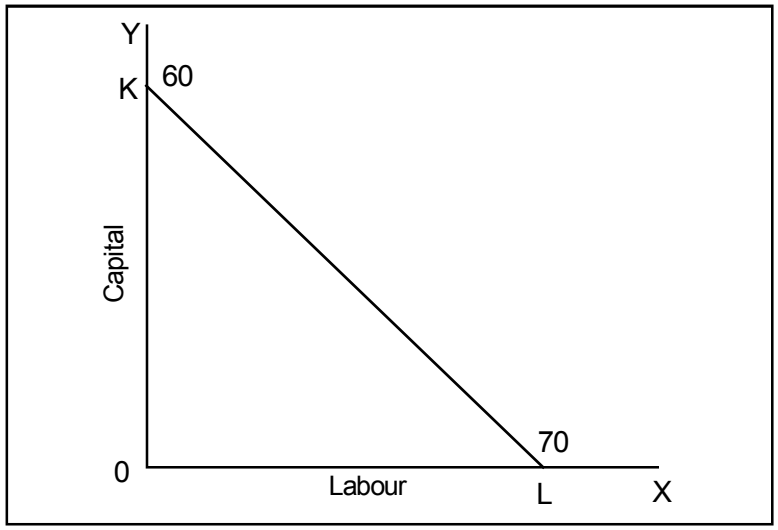
4 CONCEPT OF EQUILIBRIUM

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

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

firm can buy with Rs. 300/-. Thus, an iso-cost line can be defined as th locus of various combinations of factors which a firm can buy with a consta 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 spend on the factors changes. A greater outlay will cause the iso cost line shift to the right.

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

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

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

We have already said that the point of least cost combination factors for any level of output is where the iso-quant is ***tangent*** to an is quant. The point of tangency is the point where a straight line touches



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 EQUILIBRIUM OF A FIRM

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

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

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

2.5 MARKET EQUILIBRIUM

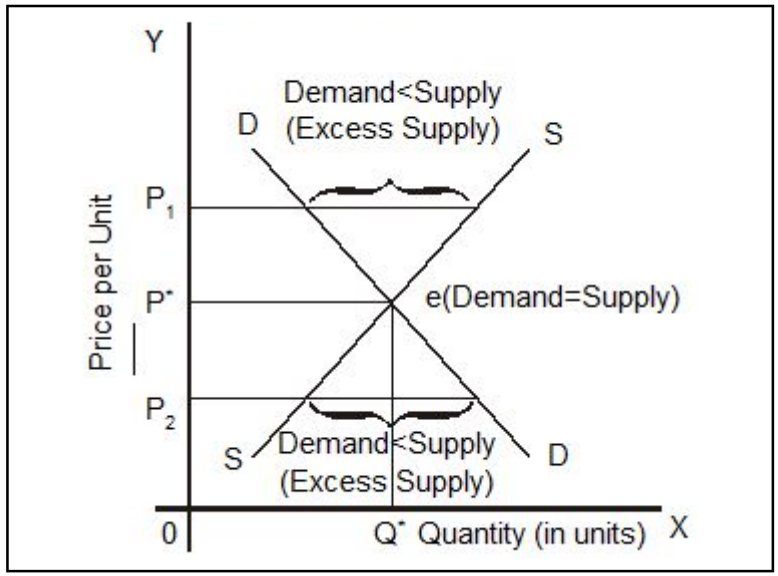
At every moment, some people are buying while others are sellin Foreign companies are opening production units in India while India companies are selling their products abroad. In the midst of all this turmo markets are constantly solving the problems of what to produce, how mu to produce, how to produce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

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

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

Thus, we have discussed that the word "equilibrium" denotes a sta of rest from where there is no tendency to change. In the following figure 2 the point 'e' describes a position of equilibrium because this is a point whe 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 ersection of the market demand (DD) and market supply curve (SS) and called the equilibrium price. Corresponding to this equilibrium price, the antity transacted Q* is called the equilibrium quantity.

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

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

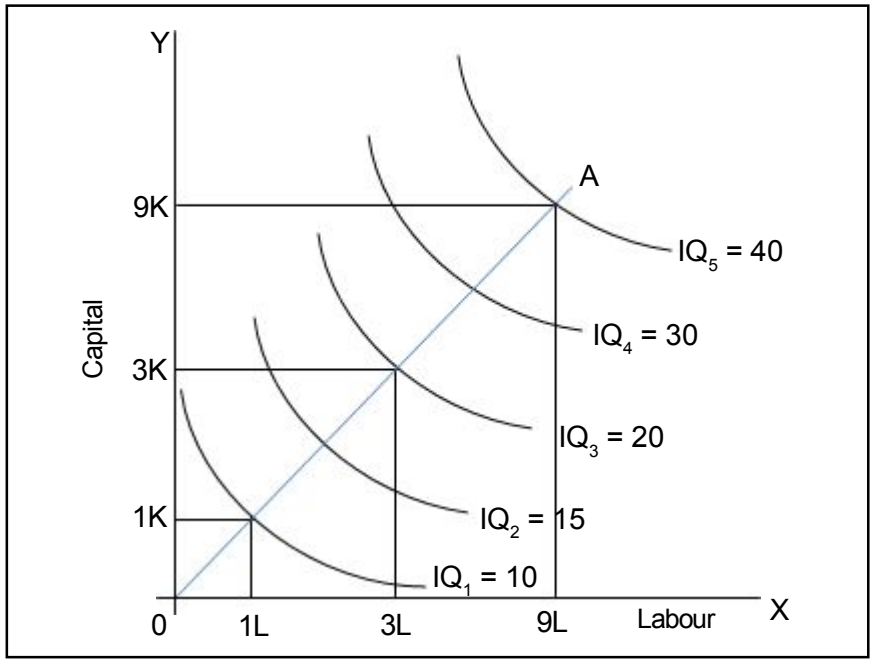
Thus, we have seen that when prices are above or below P*, the arket is in disequilibrium. The market is in equilibrium when demand is ual to supply and in the figure given above the point of equilibrium is at int e where equilibrium price is OP* and equilibrium quantity is 0Q*.

The laws of supply and demand state that the equilibrium market ce and quantity of a commodity is the intersection point of consumer's

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

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

Fig. 7.9: Decreasing Returns to Scale



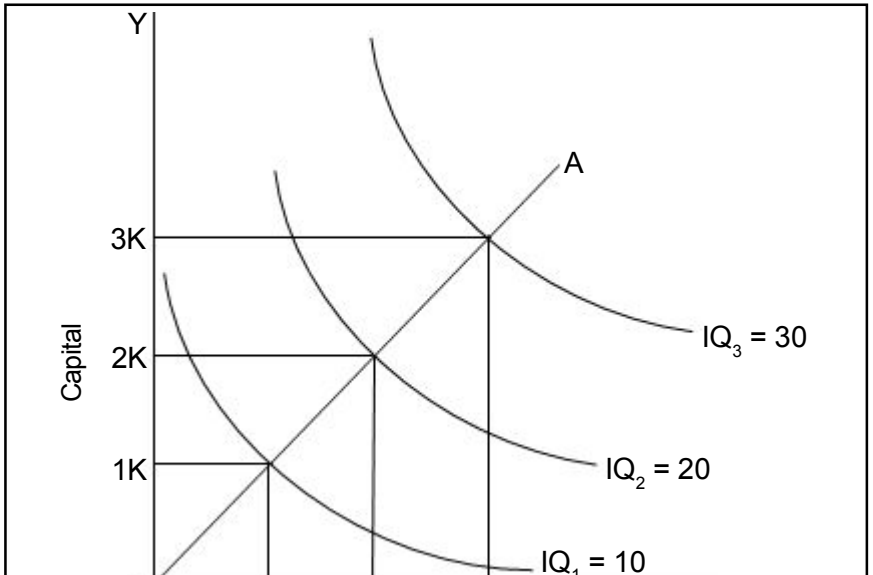
In the above figure 7.9, it can be seen that to increase output fro 10 to 20 units inputs need to be increased more than twice. Similarly, raise the level output by four times from 10 to 40 units, the firm needs employ nine times of its initial inputs, i.e., 9 units of capital and labo each.The common cause of diminishing returns to scale is diminishi returns to management. As the output grows managers are overburden and become less efficient in rendering duties. Communication betwe workers and managers can become difficult to monitor as the work pla becomes more and more impersonal. Decreasing returns to scale ma

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

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

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

Fig. 7.8: Constant Returns to Scale



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

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

When the price is above the equilibrium point there is a surplus supply; and when the price is below the equilibrium point there is a shortag in supply. Different supply curves and different demand curves have differe points of economic equilibrium. In most simple microeconomic analysis supply and demand in a market, *a static equilibrium* is observed. Sta equilibrium occurs in a stationary economy where population, technolog resources, tastes and preferences do not change. When changes take pla in such a system, the rate of change remains the same. However, econom equilibrium can be *dynamic* when the factors mentioned above such a population, technology and so on change over time. Equilibrium may als be multi-market or general, as opposed to the partial equilibrium of a sing 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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6 STATIC ANALYSIS

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

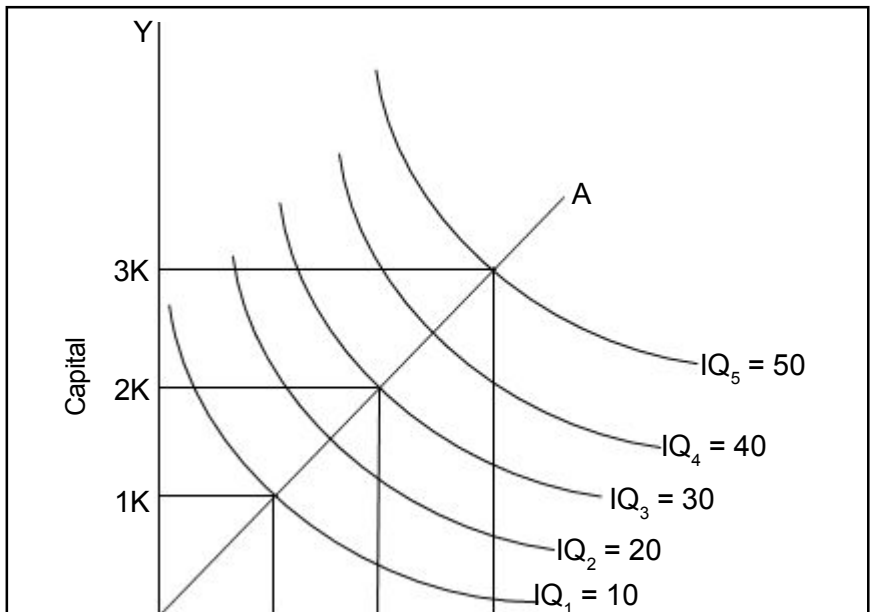
In other words, the static analysis or static theory is the study of atic relationship between relevant variables. A functional relationship tween variables is said to be static if values of the economic variables ate to the same point of time or to the same period of time. We can give rious examples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

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

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

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

Fig. 7.7: Increasing Returns to Scale



t the modern economists propound that the law is equally applicable to
dustries and other productive activities. If the law actually does not occur,
e can produce any amount of food grain in a small size of holding by using
ore and more amount of labour and capital. But in spite of the presence of
e law of variable proportions a country like India need not be pessimistic
here there is tremendous pressure of population and agricultural production
not sufficient. Productivity in the field of agriculture can be increased by
aking 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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6 RETURNS TO SCALE

Under the law of variable proportions we have known that the changes
total output as a result of change in variable factor keeping quantity of
her factors of production constant. But when all inputs are changed in a

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

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

2.7 COMPARATIVE STATIC ANALYSIS

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

Comparative statics is commonly used to study changes in supp
and demand when analyzing a single market, and to study changes
monetary or fiscal policy when analyzing the whole economy. The ter

cluding general equilibrium analysis) than to macroeconomics. omparative statics was formalized by John R. Hicks (1939) and Paul A. muelson (1947).

8 DYNAMIC ANALYSIS

Dynamic analysis is very popular in contemporary economics. conomic dynamics is a more realistic method of analysing the behaviour the economy or certain economic variables through time. It considers the ationship between relevant variables whose values belong to different ints of time. Professor Ragnar Frisch who is one of the pioneers in the e of the technique of dynamic analysis in economics defines economic namics as follows: "A system is dynamical if its behaviour over time is termined by functional equations in which variables at different points of me are involved in an essential way." He further elaborates, "We consider t only a set of magnitudes in a given point of time and study the interrelations tween them, but we consider the magnitudes of certain variables in fferent points of time, and we introduce certain equations which embrace the same time several of those magnitudes belonging to different instants. is is the essential characteristic of a dynamic theory. Only by a theory of s type we can explain how one situation grows out of the foregoing." We n give various examples of dynamic analysis from the field of micro and acroeconomics. For example, in microeconomics, if one assumes that, e supply (S) for a good in the market in the given time (t) depends upon e price that prevails in the preceding period (that is, t – 1) the relationship tween supply and price is said to be dynamic. Similarly in the acroeconomics field if it is assumed that the consumption of the economy a given period depends upon the income in the preceding period (t – 1) e shall be conceiving a dynamic relation.

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

To make the economic analysis realistic we have to incorporate the pacts of changing time in the variables. That is why, economic dynamics

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

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

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

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

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

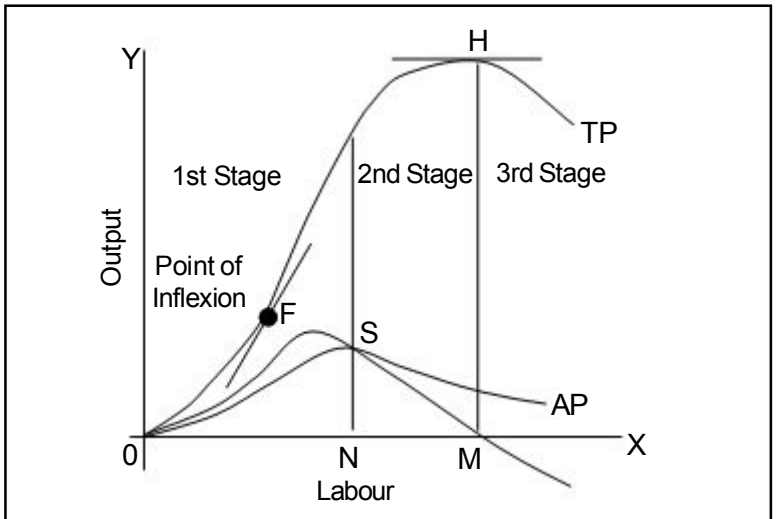
Table 7.3 : Law of Variable Proportions

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 e highest when marginal productivity of labour is zero. After this point both tal and average product fall and marginal product of labour becomes gative. We can study the rise and fall of production with diagrams in three ages.

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

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



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

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

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

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

Dynamic analysis becomes very necessary in case of grow studies. It helps in building dynamic models of optimum growth both f 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



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 tl following assumptions :

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

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



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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5 LAW OF VARIABLE PROPORTIONS

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

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



2.10 FURTHER READING

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



2.11 ANSWERS TO CHECK YOU 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 commod or service which is backed by the ability to pay. The need for commodity, doesn't mean its demand. It is called demand only wh the consumer has sufficient purchasing power to pay for it.

Ans. to Q. No. 3: The quantity of supply of a commodity is positive related to its price. This means that as price increases, quan

supplied of the commodity concerned also increases and vice versa.

ns. 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.

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

ns. 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.

ns. 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.

ns. 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.

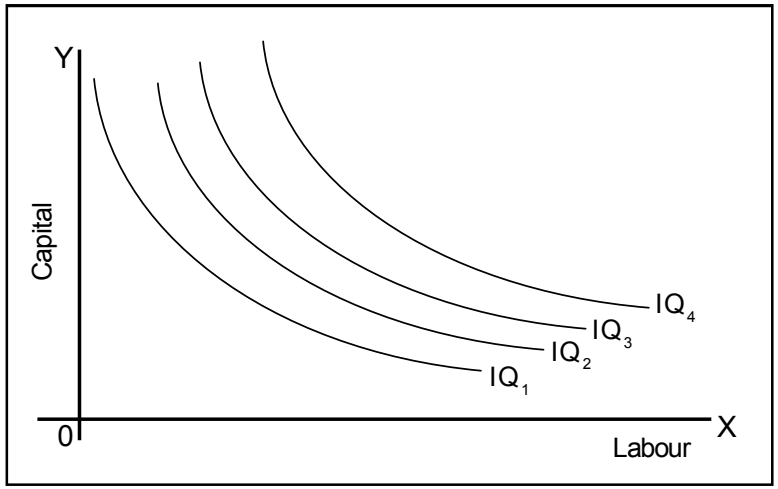
ns. to Q. No. 9: Economic dynamics is a more realistic method of analysing the behaviour of the economy or certain economic variables through time. It considers the relationship between relevant variables whose values belong to different points of time.

ns. 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

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

Fig. 7.5: Movement of Iso-quants



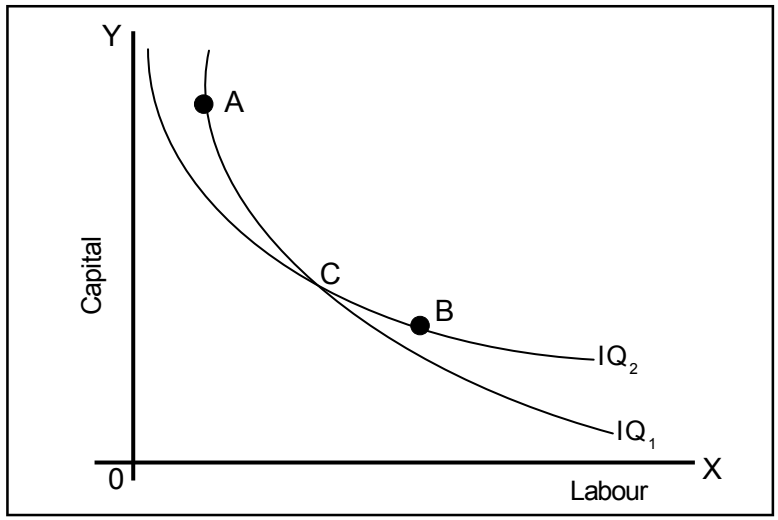
- There may be a number of iso-quants in between two iso-quant They show various levels of output that combination of two inpu can produce between any two iso-quants.

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



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 product.

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

Q.3: Give the definition of statics, comparative statics and dynam 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 mark equilibrium.

Q.3: What are the basic difference between economic statics ar 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 suitable figures.

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

*** ***** ***

NIT 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

1 LEARNING OBJECTIVES

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

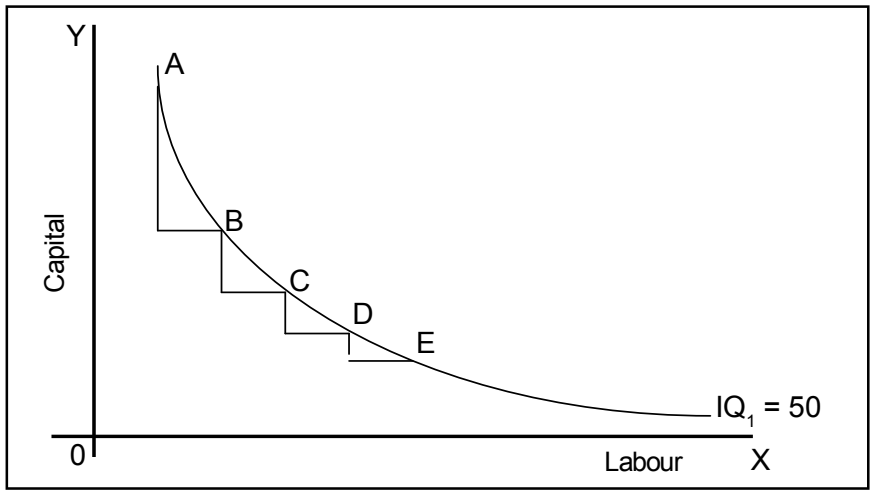
- give the definition of demand
- derive a demand curve
- explain the movement along a demand curve
- illustrate the shift in the demand curve
- state the three variants of elasticity of demand, i.e. price elasticity, income elasticity, and cross elasticity.

2 INTRODUCTION

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

- its own price

Fig. 7.3: Marginal Rate of Technical Substitution



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

Elasticity of Substitution: The degree of substitutability betwe two inputs is measured by elasticity of substitution. It is the proportiona change in the ratio of the factors divided by proportionate change in th 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. Wh two factors can not be substituted at all, Es is zero and elasticity

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

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

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

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

3.3 THE IDEA OF DEMAND AND THE DEMAND CURV

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

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

The law of demand can be illustrated by a demand schedule. A the demand schedules constitute the basis on which the demand curve

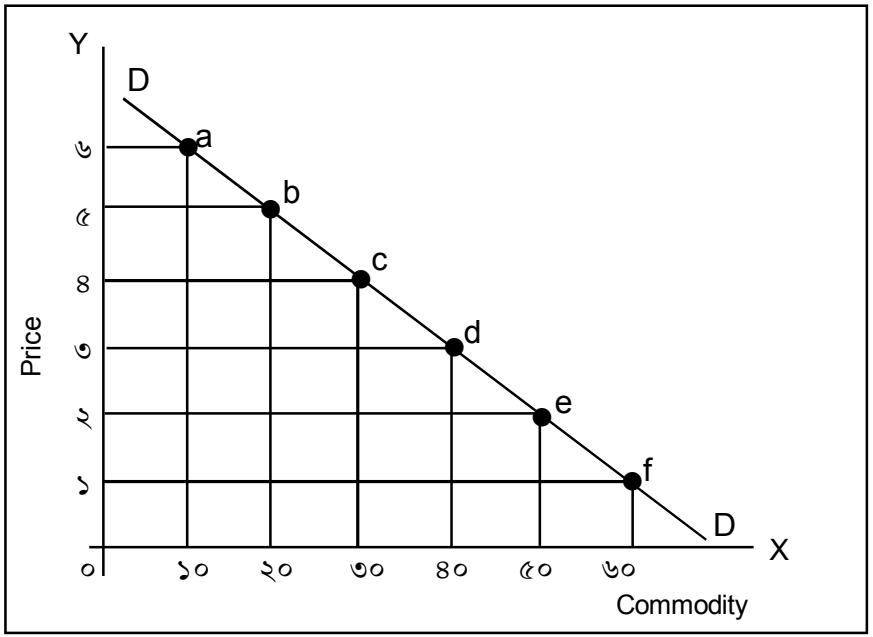
nsumer. The table shows the various quantities demanded at different
ces by the consumer. Thus, at price Rs. 6, the quantity demanded is 10
its. As the price falls successively by Re. 1, the quantity demanded
rrespondingly increases by 10 units for every decrease in the price.

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
mbinations of table 3.1 in the following figure 3.1.

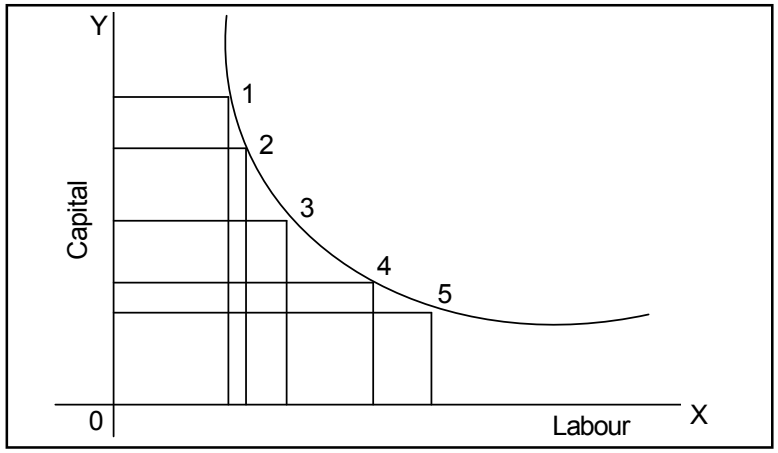
Fig. 3.1: Demand Curve of a Comsumer



By plotting the various price-quantity demanded combinations from
ble 3.1, we derive the demand curve DD in figure 3.1. Thus, the demand
rve is a graphic representation of the demand schedule and it indicates

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

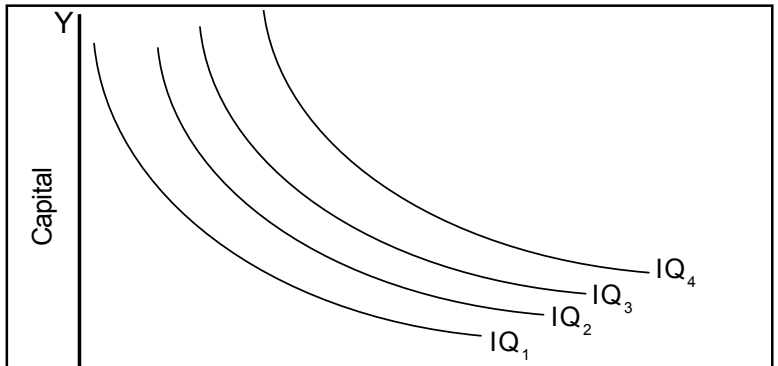
Fig. 7.1: Iso-quant



7.4.3 Iso-Product Map or Isoquant Map

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

Figure 7.2: Isoquant Map



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

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

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

By definition, individual demand indicates the quantities of a good service which the household is willing and able to purchase at various price holding other things constant. Although for some purposes it is useful examine an individual consumer's demand, it is frequently necessary analyse demand for an entire market made up of many consumers. We w now show how we derive the market demand curve from individual dema curves. Let us assume that there are only two consumers in the marke Their demands and the market demand are given below and the individu 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 dema schedules of the two individual consumers. These demand schedules ha

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

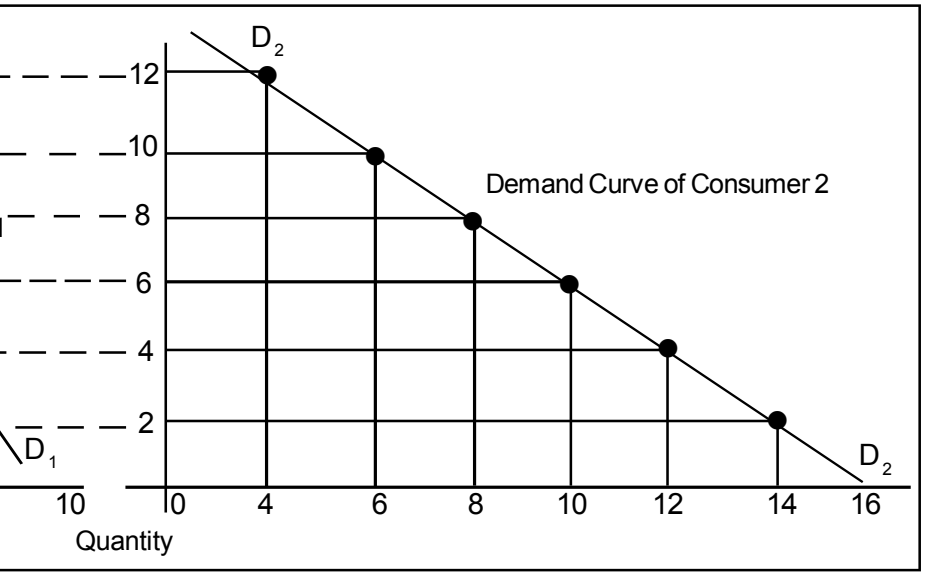
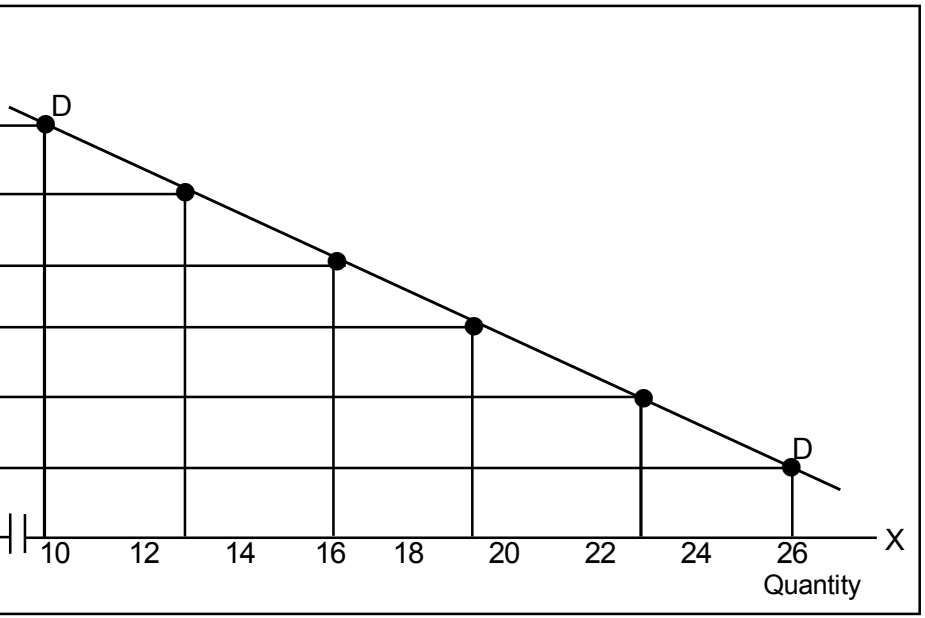


Fig. 3.2 (c): Market Demand Curve



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

Assumptions of the Law of Demand: The working of the law of

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

- **How much to produce?** The firm has also to decide its producti capacity and its production volume.
- **For whom to produce?** A firm has to decide its target populati (i.e. to whom they will serve products and/or services). Example will not be viable to produce luxurious goods for middle income low income group if they can't afford it and produce basic necess goods for rich class if they don't need it. Therefore, a firm needs 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 decisio while producing a commodity. A commodity may be produced by vario methods of production. Among the set of technically efficient processe the choice of a particular technique is a purely economic decision. T decision is based on price of factors. Another decision to be taken is determine the range of output where marginal products of factors are positi but declining.

7.4.1 Production Function

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

2 INTRODUCTION

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

3 PRODUCTION DECISIONS

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

- 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 applicab it may not hold good in certain cases. We shall discuss this in the ne 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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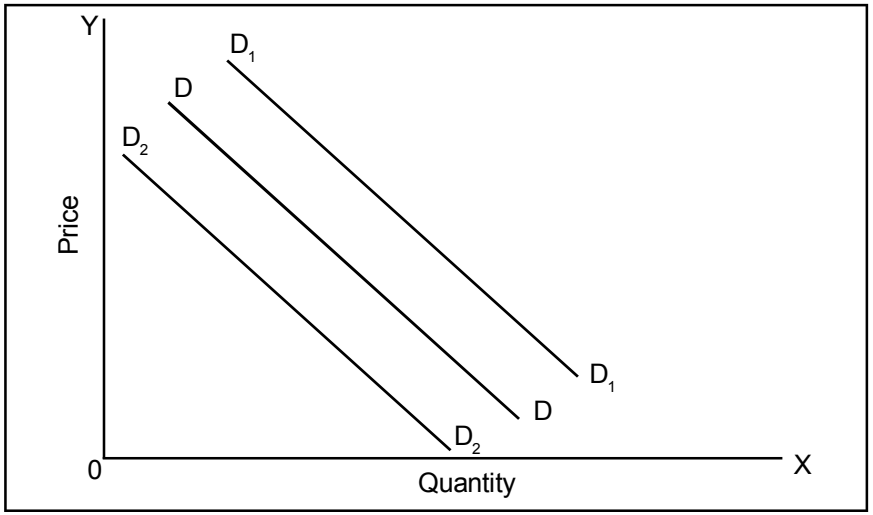
4 MOVEMENT ALONG A DEMAND CURVE

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

5 SHIFT IN THE DEMAND CURVE

Movement along a demand curve can show changes in quantity manded corresponding to various price level of a particular good or service. t for change in demand, we have to show the shift in demand curve. A ift to the left of the original demand curve will show decrease in demand d shift to the right will show increase in demand. This can be shown with e 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. D is the original demand curve. A decrease in demand is shown by wnward shift in the demand curve to the left (D_2D_2), and an increase in mand is shown by an upward shift in demand curve to D_1D_1. This shift in

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 proportio
- determine the equilibrium condition of the firm and derive th expansion path.

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

ns. 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.

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

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

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



6.9 MODEL QUESTIONS

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

1: Define the following terms:

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

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

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

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

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

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

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

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.

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

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

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

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

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



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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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 equa one.
- When the price elasticity of demand is greater than one (or positive TR tends to increase and when the price elasticity of demand less than one (or negative), TR tends to diminish.



6.7 FURTHER READING

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

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

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

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



6.8 ANSWERS TO CHECK YOUR PROGRES

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

Ans. to Q. No. 2: The shape of the total revenue curve is not same in perfe



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

3.7 ELASTICITY OF DEMAND

Elasticity of demand relates to the degree of responsiveness 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 abo three variable gives us three different concepts of elasticity of deman 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 pric of related goods).

3.7.1 Price Elasticity of Demand

Price elasticity of demand measures the responsiveness quantity demanded of a good to changes in its price, other thing remaining the same. Price elasticity of demand can be expresse 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 dema technique is used to measure the price elasticity of demand o good if the change in its price is very small.

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

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

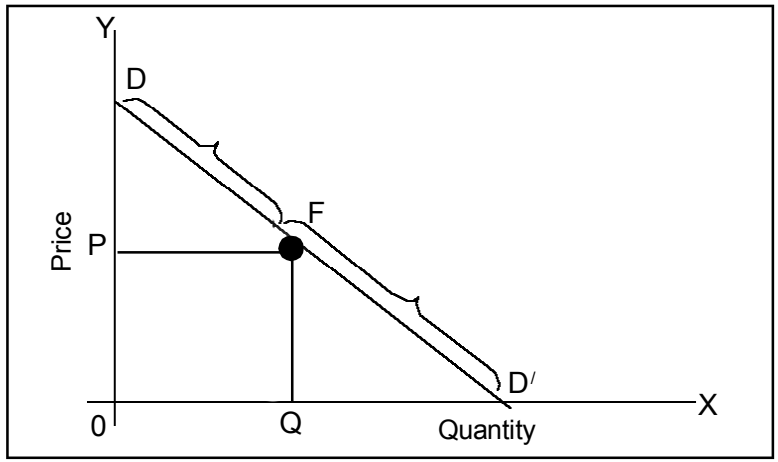
$$= \frac{\Delta Q/Q}{P/\Delta P} = \frac{P}{Q} \times \frac{\Delta Q}{\Delta P}$$

where, e_p means price elasticity, 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



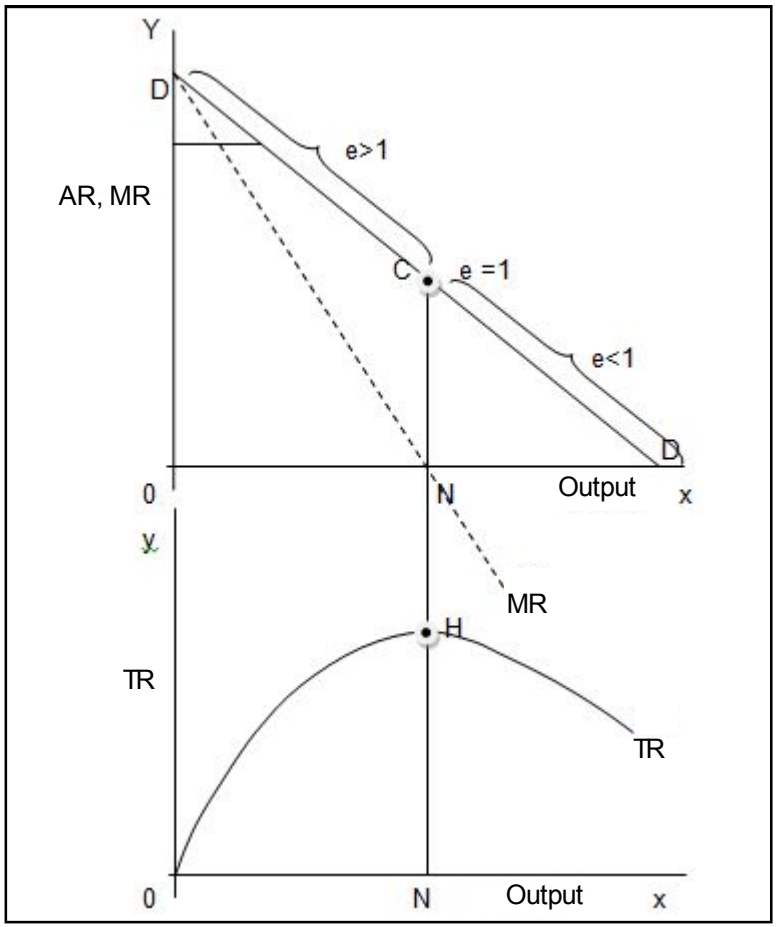
Thus, in figure 3.4 point elasticity of demand on point F of the linear demand curve DD' is measured as :

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

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.

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

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



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

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

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

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

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

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

Thus, from this formula we can know what would be the marginal venue 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:

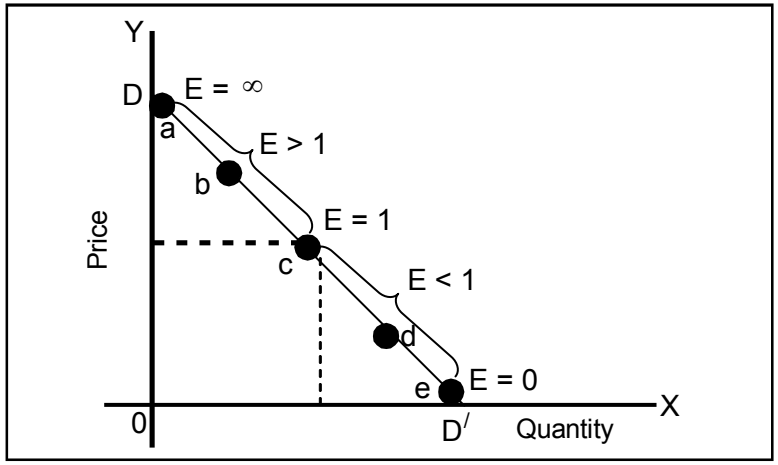
If e > 1, MR is positive, and MR<AR

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

This relationship among AR, MR, TR and price elasticity of demand n 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 venue 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 ual to zero (this is because, corresponding to C of the DD curve, the MR rve cuts the x-axis at point N). Thus, at quantity 0N, price elasticity of

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



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

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

$0 < e_p < \infty$

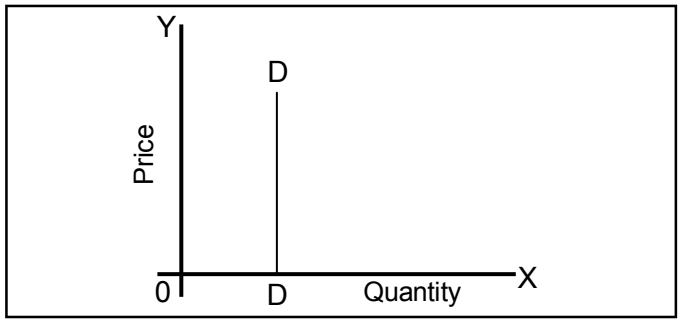
Now,

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.

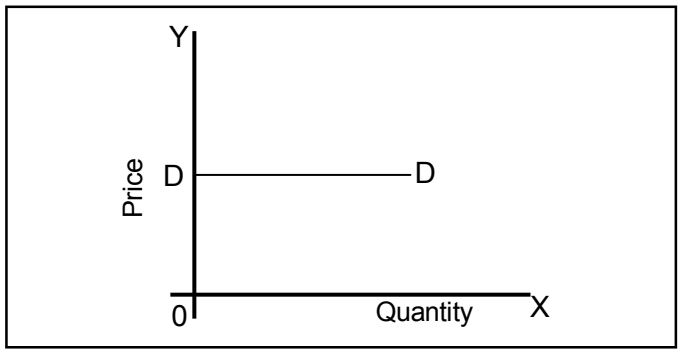
a) If e_p=0, the demand is perfectly inelastic. This implies that a proportionate change in price will have no effect on the quant demanded. A perfectly inelastic demand is indicated in figu 3.6, which is a straight perpendicular on the horizontal axis.

Fig. 3.6: Vertical Demand Curve : Perfectly Inelastic



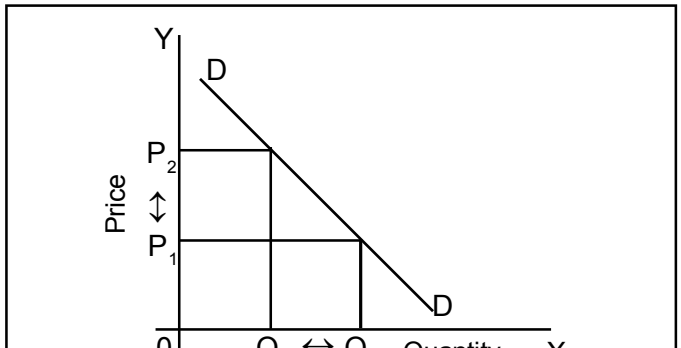
b) If $e_p=\infty$ the demand is perfectly elastic. this implies that for a small change in price there would be a infinitely large change in quantity demanded. This gives us a demand curve which is parallel to the horizontal axis as has been shown in the following figure 3.7.

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



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

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



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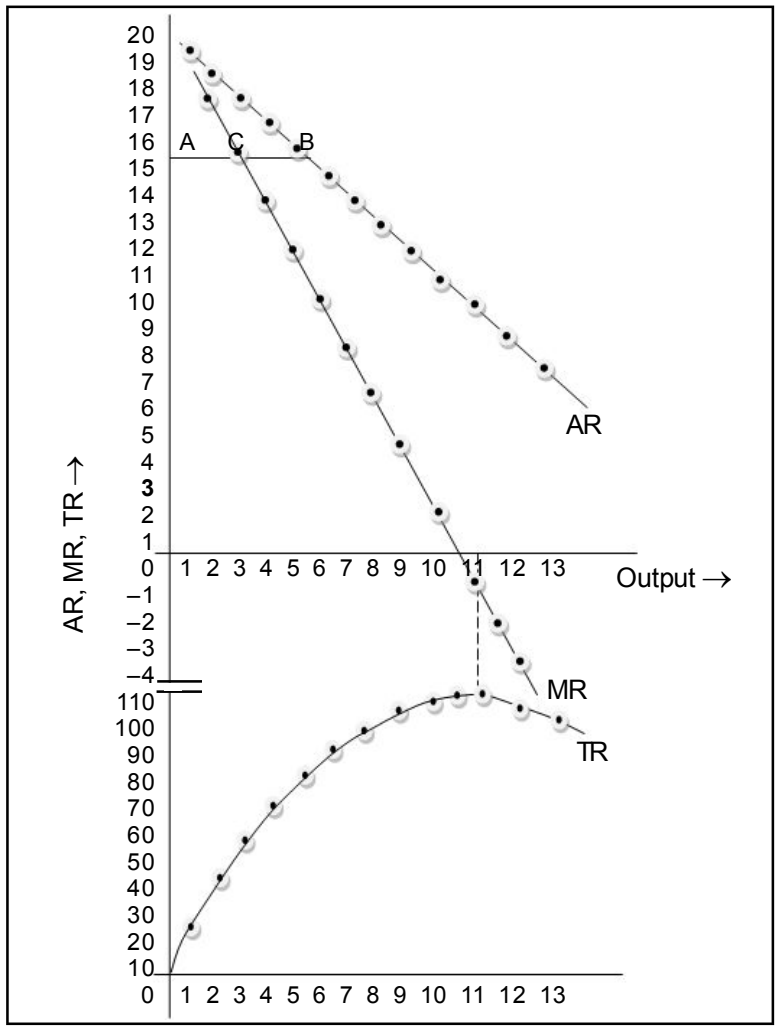
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9	12	108	4
10	11	110	2
11	10	110	0
12	9	108	– 2
13	8	104	– 4

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

g. 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 R and MR curves under imperfect competition are not the same. However,

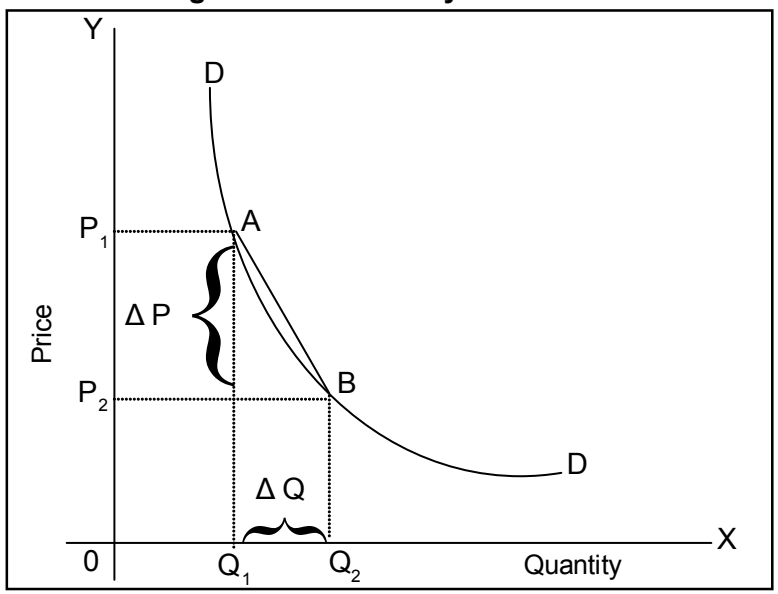
- **Arc Elasticity of Demand:** The arc elasticity of demand measures the price elasticity of demand when the change price is somewhat large. In terms of demand curve, the a elasticity measures the price elasticity of demand over an a between two points on the demand curve. In fact, it is a measu of the average elasticity, and represents the elasticity of the mi point of the chord that joins the two points (say, A and B) on th demand curve. The two points are defined by the initial and th 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 are the two quantities at the two prices P_1 and P_2 respectivel The concept of Arc elasticity of demand has been explained w 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 the demand curve DD is indicated by the arc elasticity of deman Thus, the arc elasticity of demand is average elasticity of the segme AB and is represented by the midpoint of the chord AB joining th

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.



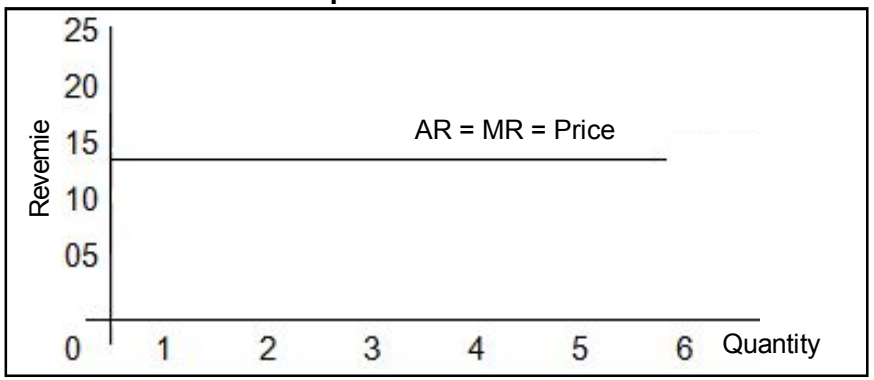
ACTIVITY 3.1

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)	ΔQ_x (in%)	ΔY (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	–	–	–	–

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

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



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

AR and MR and TR Curves of a Firm under Imperfe Competition: Unlike perfect competition, a firm under imperfect competiti does not have to sell its entire amount of the product at a fixed market pric This means that the firm can sell more units of the product as its price fal 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 Firm under Imperfect Competition

(Revenue figures in R

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

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

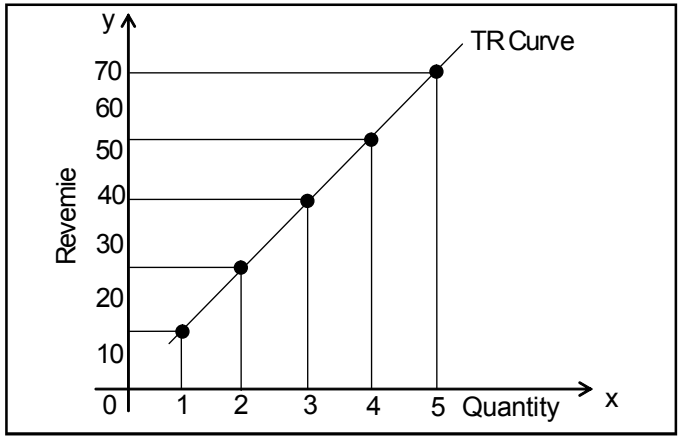
(Revenue figures in Rs.)

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 rves of a perfect competitive firm have been shown in the following sections.

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

g. 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 upward rising straight line. This curve, in fact represents the supply curve a firm.

Average Revenue and Marginal Revenue Curves: We have eady mentioned that under perfect competition, the market price for the oduct is fixed and the seller has no influence to alter the same. Again, the ller can supply any amount of the commodity at the prevailing market ce. Thus, the prevalent market price also becomes the average revenue d marginal revenue of the firm. This is clear from the above table 6.1.

3.7.3 The Cross Elasticity of Demand

When two goods are related to each other, then the chan in demand for one good in response to a change in the price of t second good is indicated by the cross elasticity of demand. T cross elasticity of demand is defined as the proportionate chan in the quantity demanded of x in response to a proportionate chan 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 Quant of the commodity X, ΔQ_x means change in quantity of X, P_y mea 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)

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

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

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

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

Marginal Revenue: Marginal revenue is the net revenue earned by lling an additional unit of the product. Thus, marginal revenue is obtained hen we calculate the changes in total revenue caused by the sale of an ditional 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, stands for total units sold, and $\triangle$ stands for change in.

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

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

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

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

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



3.9 FURTHER READING

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



3.10 ANSWERS TO CHECK YOUR PROGRES

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

Ans. to Q. No. 2: a) By definition, other things remaining same, t individual demand schedule indicates the quantities of goo and services which the household is willing to and able 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 t individual consumers who purchase the commodity in the mark

Ans. to Q. No. 3: The market demand curve can be derived from t demand curves of the individual. This is done by adding the quantiti demanded by all the consumers, at each price. Thus, we get t 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 effe 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 effe determines the relationship between the price of a commod

ns. 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.

ns. 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.

ns. 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.

ns. 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.

ns. 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:

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

on any point of the demand curve.

ns. 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.

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

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

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

From the above discussion, it seems that average revenue and pri are the same concepts. It may be, or it may not be. If the seller sells ea unit of the product at the same price, average revenue and price will be th same. If on the other hand, the seller sells the different units of the produ at different prices, average revenue will not be equal to price. Let us consid an example. Suppose our hypothetical seller sells two units of the produ to two different consumers, viz., consumer A and consumer B. Let us furth suppose that the seller sells one unit of the product to consumer A at Rs. while he sells the other unit of product to consumer B at Rs.10. Thus, th 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.1 - respectively.

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

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

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

3 CONCEPTS OF TOTAL REVENUE, AVERAGE REVENUE AND MARGINAL REVENUE

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

Total Revenue: The whole amount of money received by a seller m selling a given amount of the product is called total revenue. Let us ppose, if a seller sells 150 units of pens and each unit of pen is sold at a arket prices at Rs. 12/-. The total revenue earned by the seller is Rs. 00/- (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 ands for total quantity sold.

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

Total revenue



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 the price elasticity of demand?

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

Q.3: What is Point elasticity of demand? Derive the elasticities of dema 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. Ho can you derive the market demand curve from individual dema schedules of two consumers?

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

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

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

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

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

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

*** ***** ***

NIT 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

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.

2 INTRODUCTION

The Theory of Consumer Behavior studies how a consumer spends s income so as to attain the highest satisfaction or utility. This utility aximisation behaviour of the consumer is subject to the constraint posed by his limited income and the prices of the various commodities desires to consume. The consumer compares the different "bundles of

UNIT 6: CONCEPTS OF REVENUE

UNIT STRUCTURE

6.1 Learning Objectives
6.2 Introduction
6.3 Concepts of Total Revenue, Average Revenue and Margin Revenue
6.4 Relationship between Total Revenue, Average Revenue a Marginal Revene Curves
6.5 Relationship between Total Revenue, Average Revenue, Margin 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 margin revenue
- derive the relationships between average revenue and margin revenue curves
- explain the relationship between total revenue, average revenu marginal revenue and price elasticity of demand.

6.2 INTRODUCTION

In the previous block of the first semester, we have already discuss the nature of demand from the viewpoint of an individual consumer. In th context, we discussed that consumers demand goods and services they provide certain utility to the consumer. This means that a produ available in the market for sale bought by a consumer has a demand. Let

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

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

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

2: What is meant by cardinal utility?

3: Define the term marginal utility.

4: Explain the term total utility?

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

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

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

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

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

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

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

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

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

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

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

the bundles. And in the process, he attempts to determine the bundle th will give him the maximum satisfaction. This unit, thus, deliberates on th study of consumer behaviour. In the study of consumer behaviour, util plays an important part. It begins with the discussion of two approaches the study of utility, viz., cardinal utility and ordinal utility. The attainment of consumer's equilibrium through the use of both these approaches hav also been discussed. Finally, the concept of price effect and its breaking u 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 bu goods and services from the market? Well, the answer is obvious : the satisfy our wants. Thus, in this sense, goods and services have wan satisfying power. In Economics, we name this want-sarisfying power a 'utility'. Thus, utility may be defined as the power of a commodity or a servi to satisfy the wants of a consumer. Alternatively, utility may also be define as the satisfaction that a consumer derives by consuming a commodity a service. Utility is a subjective concept and it is formed in the mind of consumer. It is important to note that the concept of utility is not related the concepts of morality or ethics. Let us take an example : a drug addi person consumes drugs. In Economics paralance, the drug addict is consumer of drugs and drugs have utility for the person. While dealing wi the issue of utility, It is not considered if consumption of drugs will have an harmful effects on the health of the drug addict. Another important aspe of utility is that being a subjective concept, the level of satisfaction from th consumption of goods and services varies among different individua Suppose, you and one of your friends have gone to a tea stall. You may lik to take a hot samosa and tea, while your friend may not like them so muc Thus, the satisfaction you will derive from the hot samosa and the cup

e extent of desire for a commodity by an individual depends on the utility at 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.

Ans. to Q. No. 5: An indifference curve cannot be upward rising, becau in such an indifference curve, as the counsumer will move upwa the curve, he will be able to choose more quantities of both the good As such, he will not remain indifferent among the different bundl of goods available to him. This is clearly a violation of the ve 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 cur approach over the cardinal utility approach are:

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

Ans. to Q. No. 8: A budget line is defined as the various combinations two commodities (say, X and Y) that a consumer can consum given his income (M) and the price of the two commodities (P_x and P 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 its price is called as <u>price effect</u>.

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

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

Ans. to Q. No. 11: The increase in the consumption of X is brought abo by substituting the relatively cheaper X for Y. It is referred to as t

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

ns. 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.

ns. 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.

ns. 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.

4.3.2 Concepts of Total Utility and Marginal Utility

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

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

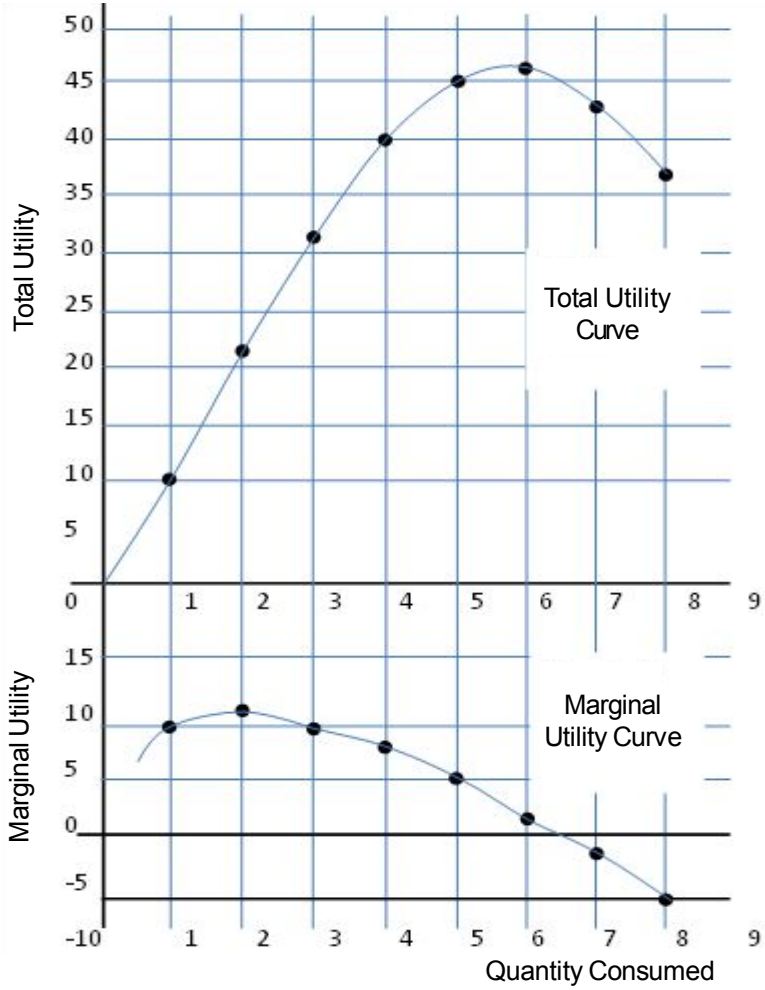
Table 4.1 : A Hypothetical Utility Schedule

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 to utility has been shown in figure 4.1.

Now, from the table 4.1 and the figure 4.1, we can see th total utility rises upto a certain limit (upto consumption of the mango). Then it tends to diminish. The marginal utility, on the oth hand first increases till second unit and then keeps on declinin And after the consumption of the 6th apple, the marginal utility of th 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

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

to point the point e_2. This is the **price effect**. However, we can break up
s overall price effect into two components, viz., the substitution effect
d the income effect. The substitution effect is considered first. The
bstitution effect has been shown by the movement of the consumer from
int e_1 to point e_3. The income effect is allowed, keeping in mind that the
bstitution effect has already taken place. The income effect has been
own 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
od increases, the real income of the consumer is adveresely affected.
, in other words, the budget line of the consumer is adveresely affected.
a result, the consumer no more remains on the same indifference curve.
ter the price effect is allowed to happen, and given his new budget line,
e consumer attains equilibrium on a lower indiference curve. In attaining
s new equilibrium, the consumer consumes less of the commodity which
relatively expensive (in our case, commodity X) and more of the
mmodity 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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he derives 12 utils. Again, from the consumption of the third unit
the good, the consumer derives 10 utils of utility. Similarly, from th
consumption of the fourth and the fifth unit, the consumer attains
and 5 utils of marginal utility respectively. Thus, the marginal util
derived from each successive unit of the good though initia
increases exhibits a declining trend as the consumer goes on
consume the successive units of the good. Total utility, on the oth
hand, keeps on increasing. However, the rate of increase in to
utility decreases with the consumption of successive units of th
good.

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

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

The principle of diminishing marginal utility however fails
work under certain circumstances. Exceptions are there when th

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.



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.

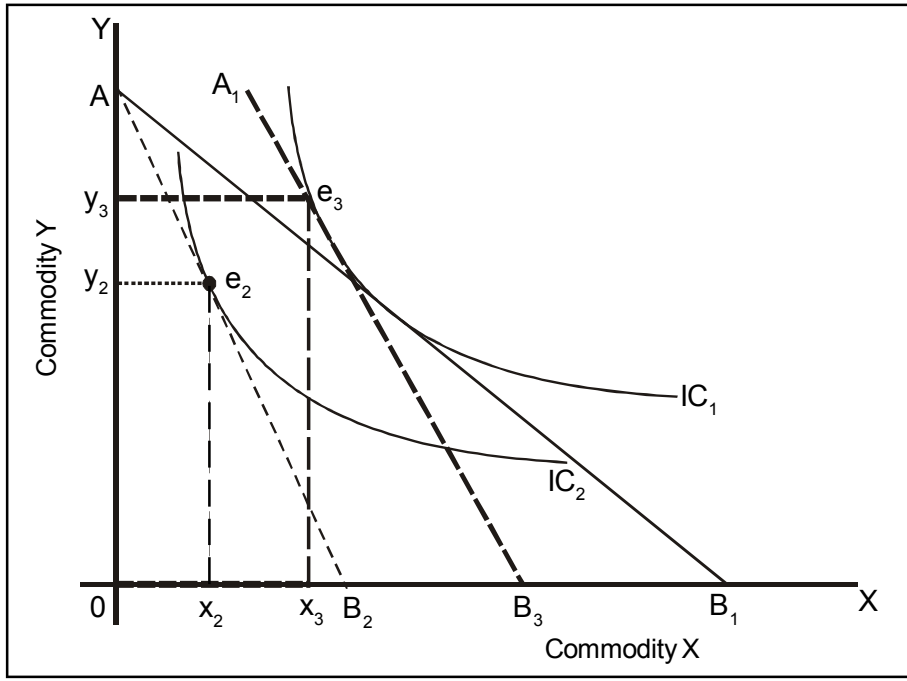
b) Gossen amd Marshall were great contributors to the cardinal approach to utility.

Q.2: Fill in the blanks:

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

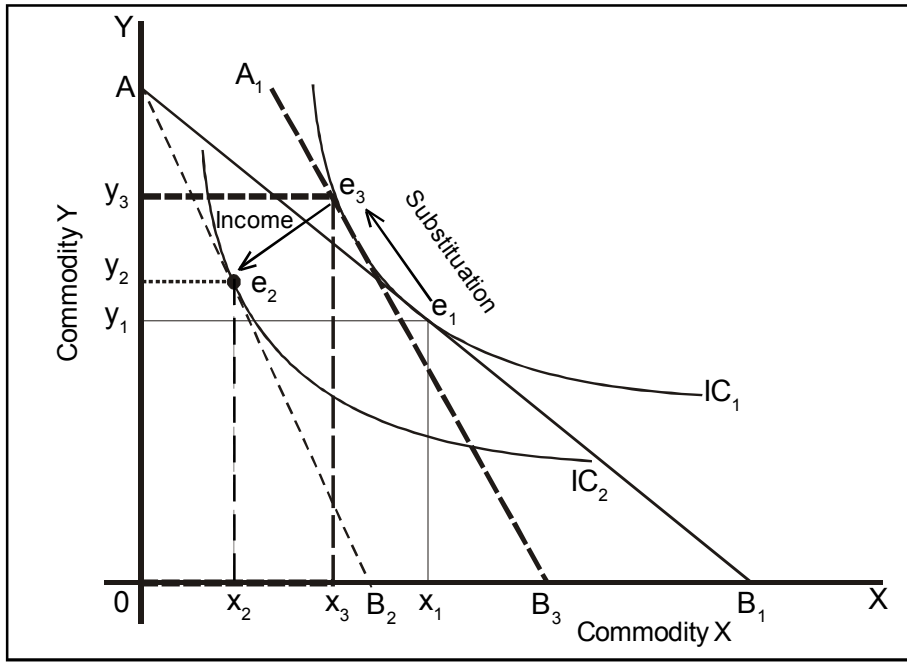
b) According to the cardinal utility approach, marginal utility of a good ..... as more and more units of the

Fig. 5.9: Income Effect



We can now summarise the whole process in a single figure. Th 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 respons to the change in the price of one commodity has been shown. As the pri

uation (or the changing relative prices of the two commodities). Thus, we
ant to analyse given the new budget constraint AB_2, how the consumer
l behave if he is allowed to choose combinations of the two commodities
his initial indifference curve IC_1. In such situations, the budget line will
ift in parrellel to the new budget line AB_2. In figure, this has been shown by
e budget line $A'B_3$ (the dark dotted line). This budget line $A'B_3$ is tangent to
e original indifference curve IC_1 at point e_3. Thus, at this equilibrium point
the consumer buys less of the commodity which is relatively expensive
X_3 instead of OX_1) and more of the commodity which is relatively cheaper
Y_3 instead of OY_1). Thus, this shows that due a change in the price, the
nsumers tends to sustitute relatively more expensive commodity for the
atively cheaper commodity. This is the **substitution effect**.

Income Effect: The income effect reveals how the consumer will
act to a change in his purchasing power given the new relative prices. For
alysing the income effect, we assume that the substitution effect has
eady taken place. Thus, here we take into consideration the behaviour of
e consumer, when given the new relative prices, the consumer faces a
wer indiference curve (as his realincome has been adversely affected, he
more remains on the same indifference curve). In such a situation, given
e new budget line and the lower indifference curve, the consumer reacts
choosing less of both the commodities, as compared to when he is
owed to remain in the same indifference curve even when taking into
nsideration the new relative prices (this is what we have considered in
se of the substitution effect). This has been explained with the help of
ure 5.9.

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

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 EQU MARGINAL UTILITY

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

- The consumer is rational in the sense that given his incon constraints, he would always attempt to maximise his utility.
- Utility is a cardinal concept and it can be measured and expresse in quantitative terms. For convenience, it is expressed in terms the monetary units that a consumer is willing to pay for the margin unit of the commodity.
- The law of diminishing marginal utility operates. This implies that a consumer increases his/her consumption of a commodity, th utility accruing from successive units of the commodity decrease In other words, the marginal utility of a commodity will keep on falli as a consumer goes on increasing its consumption (this is what w have already discussed in Table 4.1 and the subsequent figure 4.
- Marginal utility of Money is constant. That is, as one acquires mo and more money, the marginal utility of money will remain unchange This assumption is critical because money is used as a standa

- 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 nsidered to be additive. However, in the later version of the theory, this sumption has been dropped, without any effect on its basic argument.

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

Symbolically: $MU_x = P_x$, where MU_x stands for marginal utility of the mmodity 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 nsumer will attain equalibrium when the ratios of the marginal utilities of e individual commodities to their respective price are equal for all mmodities. 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.

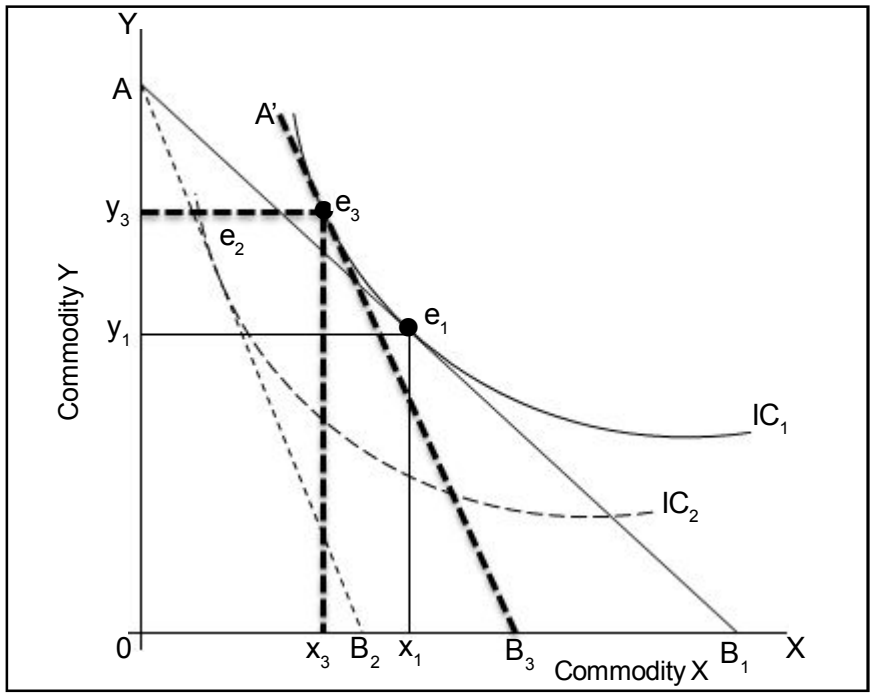
This statement is defined by the "law of equi-marginal utility", which ates that a consumer will distribute his/her money income among different mmodities in such a way that the utility derived from the last rupee spent

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

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

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

Fig. 5.8: Substitution Effect



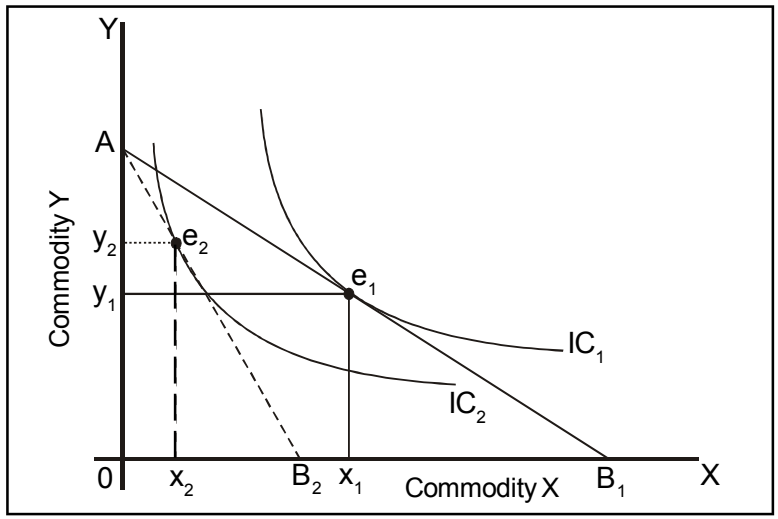
Please note that here we are trying to analyse what will happen if t consumer is allowed to close combinations of commodities in his init

together, and is termed as the price effect. Thus, the price effect reveals
w a consumer reacts to his buying habits as a result of a change in the
ces of one of the two commodities.

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

Price Effect : We have already discussed the concept of the
difference curve and the budget line and we have seen how given his/her
oney income (shown by the budget line), a consumer attains his/her
uilibrium in terms of the combination of the two commodities, viz., X and
Thus, as the price of X increases (price of Y and income of the consumer
maining the same) the budget constraint rotates clockwise about the Y
is, i.e., on the X axis, the budget line will move towards the origin point (or
wards 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
e indifference curve IC_1. His/her level of income has been depicted by the
dget line AB_1. Thus, given this budget line, the consumer attains equilibrium
point e_1, where the budget ine AB_1 is tangent to the indifference curve IC_1.
this point of equilibrium, the consumer consumes $0X_1$ of commodity X
d $0Y_1$ of commodity Y. Now let us suppose, the price of X increases. As a

Now if :

i) $\frac{MU_x}{P_x} > \frac{MU_y}{P_y}$, then the consumer will start substituting commodity

with commodity X, causing MU_x to fall and MU_y to rise. This he/sh

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 substitu

commodity X with commodity Y until the equilibrium is restored.

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

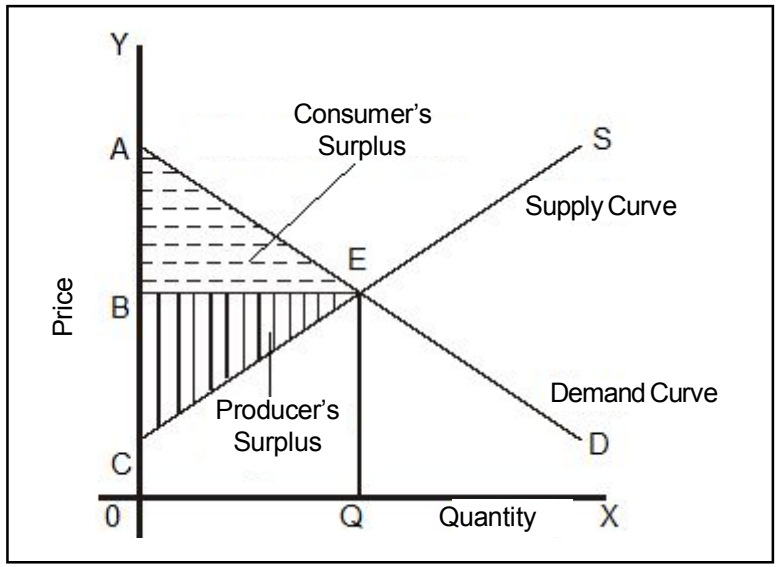
- Utility cannot be cardinally measured. Hence, the assumption th
utility derived from the consumption of various commodities can b
measured and expressed in quantitative terms is very unrealistic
- As income increases the marginal utility of money changes. Hen
the assumption of constant marginal utility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

4.5 CONSUMER'S SURPLUS

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

y that price. For example, a person is looking for a rented house. He is
ady to pay a monthly rent of Rs. 2,000/- for it. However due to competition
the market, the person gets the house at a rent of Rs. 1,500/- per month.
us, Rs. 500/- (the difference between the reservation price of the consumer
d 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
presents the supply curve. The equilibrium price is OB or QE. In the figure,
rtion ABE represents consumer's surplus. It is to be noted that ABE is the
nsumer's surplus because, the consumer was ready to pay OAEQ for
Q amount of quantities at OB price; but he actually pays OBEQ. Thus
BE (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.

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

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

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

- 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 PRICE EFFECT, SUBSTITUTION EFFECT AND THE INCOME EFFECT

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

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 h income so as to attain the highest satisfaction or utility.
- Utility is a subjective concept and its perception varies amor different individuals.
- The cardinalist school asserts that utility can be measured ar quantified, while the ordinalist school asserts that utility cannot b measured in quantitative terms.
- The law of equi-marginal utility states that a consumer will atta equilibrium when the ratios of the marginal utilities of the individu commodities to their respective prices are equal for all commoditie
- The theory has been criticised on the ground that utility cannot b measured cardinally and utility of money does not remain constar The law of diminishing marginal utility is also unrealistic as this is psychological law, and cannot be established empirically.
- Consumer's surplus is the difference between the price the consum is willing to pay (also called as 'reservation price') and the actu 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

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

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

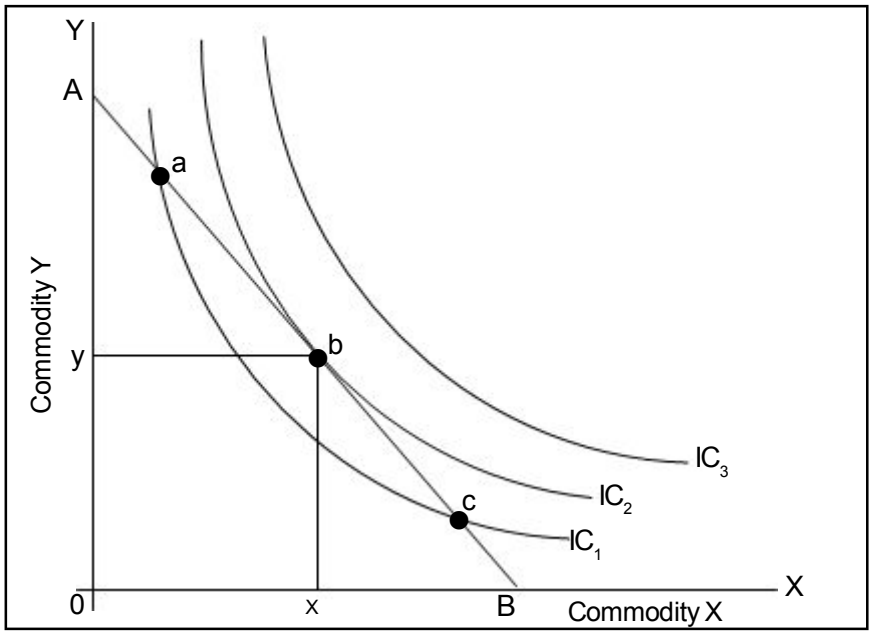
b) According to the cardinal utility approach, marginal utility of a good diminishes as more and more units of the good are consumed.

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

ns. 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.

ns. 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.

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: T indifference curve technique is considered to be surperior to the cardin utility approach on the following grounds:

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

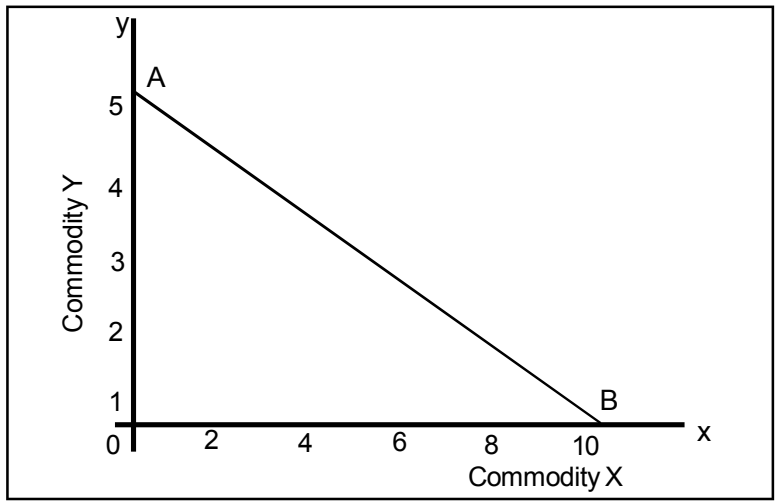
Limitations of the Indiference Curve Technique: T indifference curve technique has been crticised on the following ground

- The indifference curve technique does not tell us anything new, ar it is only “old wine in new bottle”.
- It assumes that the consumer is very familiar with his enti

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

The concept of budget line has been shown with the help of figure
5.

Fig. 5.5: Budget Line



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

The slope of the budget line is the ratio of the prices of the two
mmodities. 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
e to maximise his satisfaction by climbing on to the highest indifference
rve. 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
point b, where his budget line is ***tangent*** to the indifference curve IC_2. He
s the option of consuming at 'a' and 'c', but those combinations are rejected
they would place him on a lower indifference curve IC_1. The consumer
uld like to be on the indifference curve IC_3, but his budget line does not
ow him to do that. From figure 5.6, it can be seen that at equilibrium the
nsumer consumes 0x amount of X and 0y amount of Y.

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

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

c) According to the law of equi-marginal utility, a consumer w
distribute his money income among different commodities in su
a way that the utility derived from the last rupee spent on ea
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 thes
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 util
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. Und
what conditions does this law operate?

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

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

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

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

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NIT 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

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.

2 INTRODUCTION

This unit deliberates on the study of consumer behaviour through dinal approach. This approach states that utility is not measureable in a

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 approa can be derived using the budget line and the indifference curve of t consumer. Therefore, before discussing the equilibrium of the consum let us first discuss the concept of the budget line.

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

The Budget line can be algebraically expressed as: $M = P_xX + P$ 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 consum

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

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

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

Thus, 10x and 5y are the two extreme limits of the consume expenditures. However, he usually prefers a combination of the tw commodities within these two limits. In fact, the budget line joins the tw



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

5.3 THE INDIFFERENCE CURVE TECHNIQUE BASIC CONCEPTS

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

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

cordance with the satisfaction that he/she expects from their nsumption.

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

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.

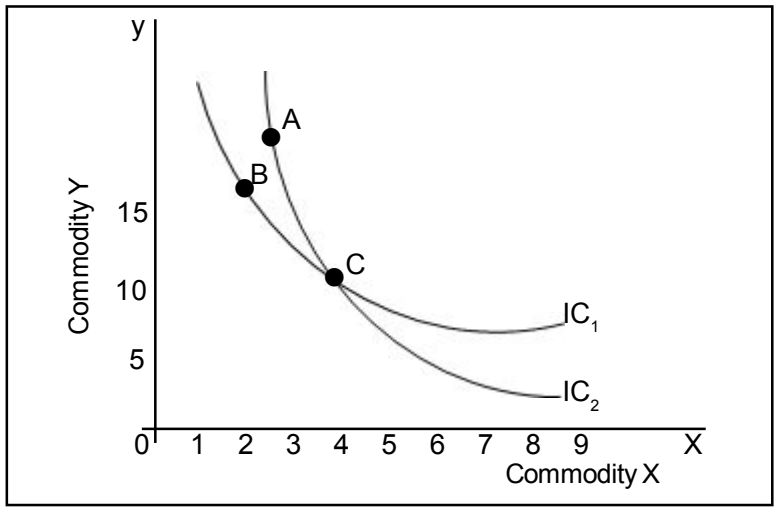
  Symbolically : If A > B, and B > C, then A > C.

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

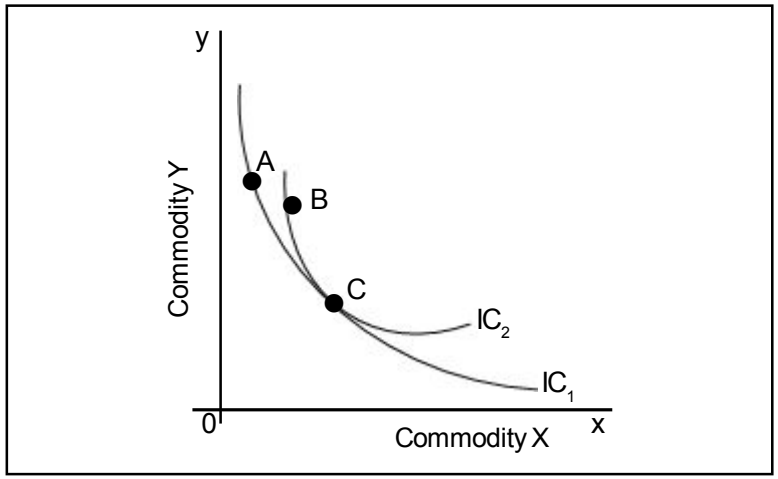
curve IC_2. Again for combinations B and C also the consum will derive the same level of satisfaction as both of them are the same indifference curve IC_1. What it means is th combinations A and B will derive the same level of satisfactio This is not at all logical to accept. Thus, two indifference curv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

Fig. 5.3: No two Indifference Curves can intersect



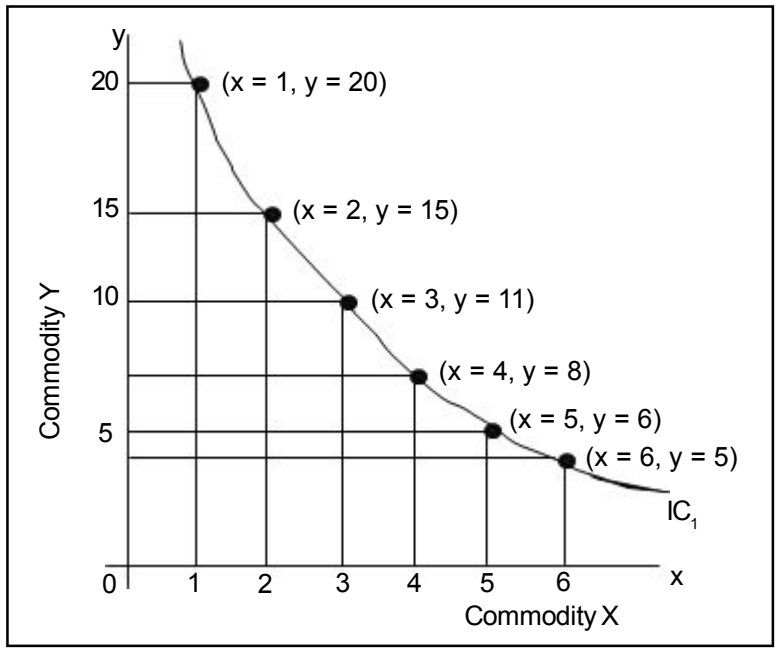
The same thing may happen if two indifference cuves tou a single common point in an indifference map as has been shown the next figure 5.4.

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



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

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

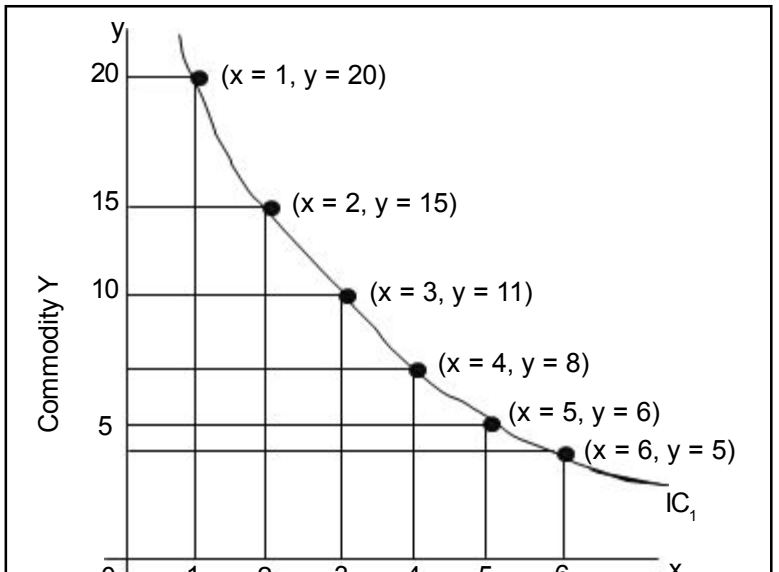
An indifference curve is based on the indifference schedu which represents the various combinations of two commodities th give the consumer the same level of satisfaction. Given below is a indifference schedule representing various combination commodity X and Y that gives the consumer the same amount 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 schedu from the above table 5.1, we obtain the IC, indifference curve a shown in figure 5.1.

Fig. 5.1 : Indifference Curve



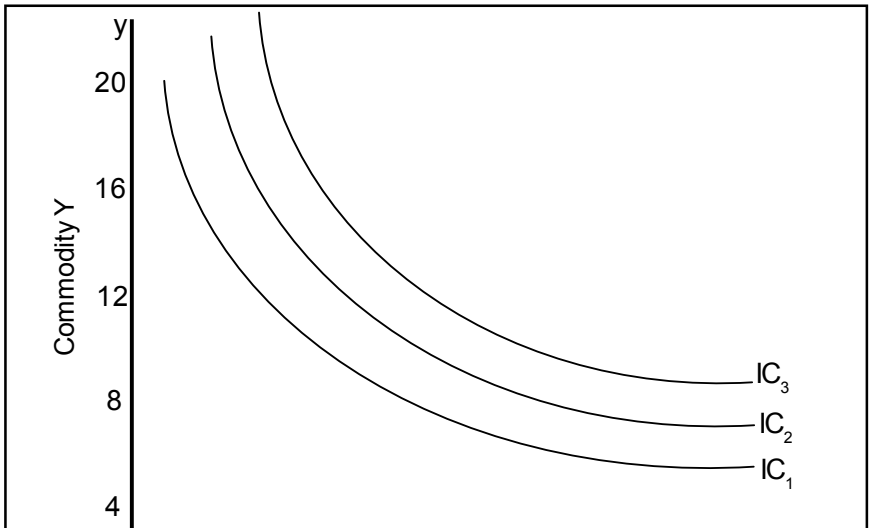
In figure 5.1, the slope of the indifference curve is indicated by the "marginal rate of substitution'. The marginal rate of substitution of X for Y is defined as the numbers of Y that has to be given up by the consumer to get an additional unit of X, so that his/her satisfaction remains unchanged. Thus, [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 consumer. It is needless to say that the rational consumer wou prefer to be on a higher indifference curve (i.e. he would prefer to on IC_2 than being IC_1 and on IC_3 than on IC_1 and IC_2) rather than 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 curve The important properties of the indifference curves are as follow

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