Bachelor of Commerce

BCOM 102

MICRO ECONOMICS

Directorate of Distance Education
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Business Economics – Meaning, Nature, Scope and Significance

STRUCTURE

1.0 Learning Objectives

1.1 Introduction

1.2 Meaning of Business Economics

1.2.1 Nature and Scope of Business Economics

1.2.2 Significance of Business Economics

1.3 Check Your Progress

1.4 Summary

1.5 Keywords

1.6 Self-Assessment Tests

1.7 Answers to Check Your Progress

1.8 References/Suggested Readings

1.0 LEARNING OBJECTIVES

After studying this lesson, you should be able to-

Appreciate the need for a conceptual framework of Business Economics.

Explain the nature and scope of Business Economics.

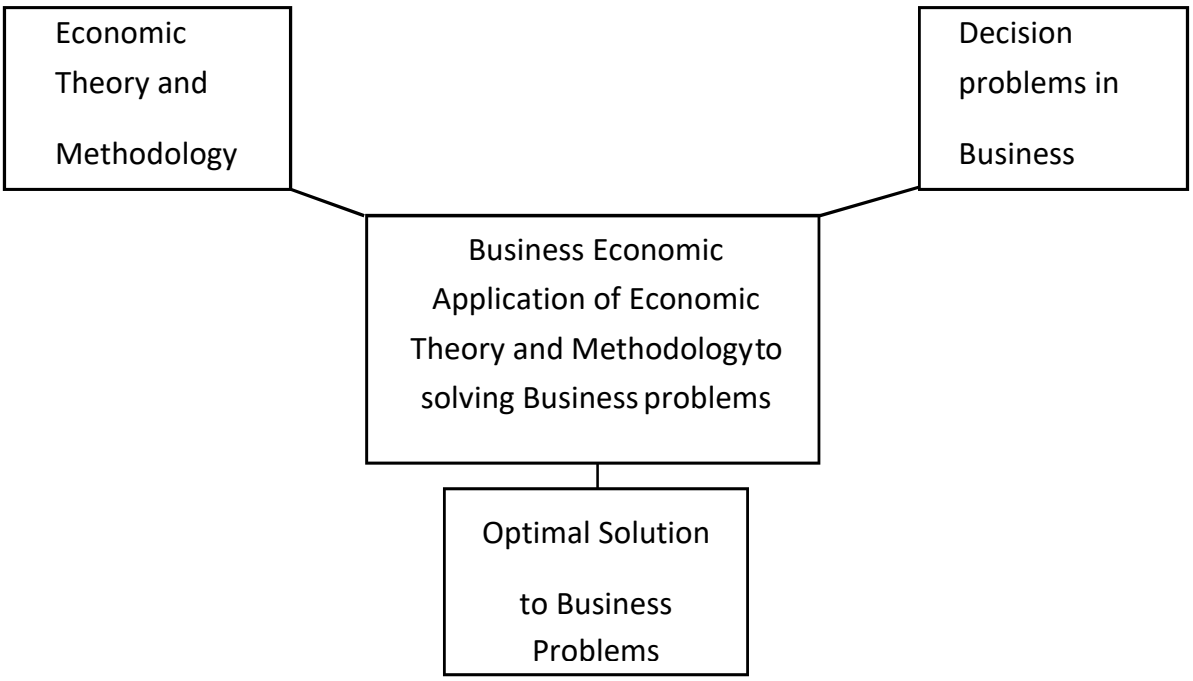
Know the importance of Business Economics.

1.1 INTRODUCTION

Business Economics, also called Managerial Economics, is the application of economic theory and methodology to business. Business involves decision- making. Decision making means the process of selecting one out of two or more alternative courses of action. The question of choice arises because the basic resources such as capital, land, labour and management are limited and can be employed in alternative uses. The decision-making function thus becomes one of making choice and taking decisions that will provide the most efficient means of attaining a desired end, say, profit maximation.

Different aspects of business need attention of the chief executive. He may be called upon to choose a single option among the many that may be available to him. It would he in the interest of the business to reach an optimal decision- the one that promotes the goal of the business firm. A scientific formulation of the business problem and finding its optimals solution requires that the business firm is he equipped with a rational methodology and appropriate tools.

Business economic meets these needs of the business firm. This is illustrated in the following presentation.



it may be that business economics serves as a bridge between economic theory and decision-making in the context of business.

1.2 MEANING OF BUSINESS ECONOMICS

According to Mc Nair and Meriam, "Business economic consists of the use of economic modes of thought to analyse business situations."

Siegel man has defined managerial economic (or business economic) as "the integration of economic theory with business practice for the purpose of facilitating decision-making and forward planning by management."

We may, therefore, define business economic as that discipline which deals with the application of economic theory to business management. Business economic thus lies on the borderline between economic and business management and serves as a bridge between the two disciplines.

1.2.1 NATURE AND SCOPE OF BUSINESS ECONOMICS:

Nature of Business Economics

Traditional economic theory has developed along two lines; viz., normative and positive. Normative focuses on prescriptive statements, and help establish rules aimed at attaining the specified goals of business. Positive, on the other hand, focuses on description it aims at describing the manner in which the economic system operates without staffing how they should operate.

The emphasis in business economics is on normative theory. Business economic seeks to establish rules which help business firms attain their goals, which indeed is also the essence of the word normative. However, if the firms are to establish valid decision rules, they must thoroughly understand their environment. This requires the study of positive or descriptive theory. Thus, Business economics combines the essentials of the normative and positive economic theory, the emphasis being more on the former than the latter.

Scope of Business Economics:

As regards the scope of business economics, no uniformity of views exists among various authors. However, the following aspects are said to generally fall under business economics.

Demand Analysis and Forecasting

Cost and production Analysis.

Pricing Decisions, policies and practices.

Profit Management.

Capital Management.

These various aspects are also considered to be comprising the subject matter of business economic.

Demand Analysis and Forecasting:

A business firm is an economic organisation which transform productive resources into goods to be sold in the market. A major part of business decision making depends on accurate estimates of demand. A demand forecast can serve as a guide to management for maintaining and strengthening market position and enlarging profits. Demands analysis helps identify the various factors influencing the product demand and thus provides guidelines for manipulating demand.

Demand analysis and forecasting provided the essential basis for business planning and occupies a strategic place in managerial economic. The main topics covered are: Demand Determinants, Demand Distinctions and Demand Forecasting.

Cost and Production Analysis:

A study of economic costs, combined with the data drawn from the firm's accounting records, can yield significant cost estimates which are useful for management decisions. An element of cost uncertainty exists because all the factors determining costs are not known and controllable. Discovering economic costs and the ability to measure them are the necessary steps for more effective profit planning, cost control and sound pricing practices.

Production analysis is narrower, in scope than cost analysis. Production analysis frequently proceeds in physical terms while cost analysis proceeds in monetary terms. The main topics covered under cost and production analysis are: Cost concepts and classification, Cost-output Relationships, Economics and Diseconomics of scale, Production function and Cost control.

Pricing Decisions, Policies and Practices:

Pricing is an important area of business economic. In fact, price is the genesis of a firms revenue and as such its success largely depends on how correctly the pricing decisions are taken. The important aspects dealt with under pricing include. Price Determination in Various Market Forms, Pricing Method, Differential Pricing, Product-line Pricing and Price Forecasting.

Profit Management:

Business firms are generally organised for purpose of making profits and in the long run profits earned are taken as an important measure of the firms success. If knowledge about the future were perfect, profit analysis would have been a very easy task. However, in a world of uncertainty, expectations are not always realised so that profit planning and measurement constitute a difficult area of business economic. The important aspects covered under this area are : Nature and Measurement of profit, Profit policies and Technique of Profit Planning like Break- Even Analysis.

Capital Management:

Among the various types business problems, the most complex and troublesome for the business manager are those relating to a firm's capital investments. Relatively large sums are involved and the problems are so complex that their solution requires considerable time and labour. Often the decision involving capital management are taken by the top management. Briefly Capital management implies planning and control of capital expenditure. The main topics dealt with are: Cost of capital Rate of Return and Selection of Projects.

Conclusion:

The various aspects outlined above represent major uncertainties which a business firm has to reckon with viz., demand uncertainty, cost uncertainty, price uncertainty, profit uncertainty and capital uncertainty. We can therefore, conclude that the subject matter of business economic consists of applying economic principles and concepts to dea1 with various uncertainties faced by a business firm.

1.2.2 SIGNIFICANCE OF BUSINESS ECONOMICS:

The significance of business economics can be discussed as under:

Business Economics is concerned with those aspects of traditional economics which are relevant for business decision making in real life. These are adapted or modified with a view to enable the manager

take better decisions. Thus, business economic accomplishes the objective of building a suitable tool kit from traditional economics.

It also incorporates useful ideas from other disciplines such as psychology, sociology, etc. If they are found relevant to decision making. In fact, business economics takes the help of other disciplines having a bearing on the business decisions in relation various explicit and implicit constraints subject to which resource allocation is to be optimized.

Business economics helps in reaching a variety of business decisions in a complicated environment. Certain examples are :

What products and services should be produced?

What input and production technique should be used?

How much output should be produced and at what prices it should be sold?

What are the best sizes and locations of new plants?

When should equipment be replaced?

How should the available capital be allocated?

Business economics makes a manager a more competent model builder. It helps him appreciate the essential relationship Characterising a given situation.

At the level of the firm. Where its operations are conducted though known focus functional areas, such as finance, marketing, personnel and production, business economics serves as an integrating agent by coordinating the activities in these different areas.

Business economics takes cognizance of the interaction between the firm and society, and accomplishes the key role of an agent in achieving the its social and economic welfare goals. It has come to be realised that a business, apart from its obligations to shareholders, has certain social obligations. Business economics focuses attention on these social obligations as constraints subject to which business decisions are taken. It serves as an instrument in furthering the economic welfare of the society through socially oriented business decisions.

1.3 CHECK YOUR PROGRESS

Answer the following fill up on the basis of your knowledge regarding this chapter:

1- The last stage in the five step decision process described in the text is to_____.

2- Which subject studies the behaviour of the firm in theory and practice_____.

3- Any activity aimed at earning or spending money is called_____.

4- The economic term for the costs associated with negotiating and enforcing the contract is _____.

5- _____is known as father of economics.

1.4 SUMMARY

The usefulness of business economics lies in borrowing and adopting the toolkit from economic theory, incorporating relevant ideas from other disciplines to take better business decisions, serving as a catalytic agent in the process of decision making by different functional departments at the firm's level, and finally accomplishing a social purpose by orienting business decisions towards social obligations.

1.5 KEYWORDS

Cost-benefit analysis- It weighs the gains and losses to different individuals and suggests carrying out changes that provides greater benefits than harm.

Equilibrium- It refers to a condition where the pressure for higher prices is exactly balanced by a pressure for lower prices, and thus that the current state of exchange between buyers and sellers can be expected to persist.

Surplus- When the price is such that the quantity supplied of a good or service exceeds the quantity demanded, some sellers are unable to sell because fewer units are purchased than are offered. This condition is called a *surplus*.

Shortage- When the price is low enough that the quantity demanded exceeds the quantity supplied, a *shortage* exists.

1.6 SELF-ASSESSMENT TEST

1. "Economics may be defined as the study of the allocation of scarce resources among competing ends." Examine the statement.
2. Discuss and illustrate the different concepts of economics that are essentials in decision making process.
3. "The objective of economic analysis is not merely to discover the truth but also to assist in the solution of concrete problems." Comment.

1.7 ANSWERS TO CHECK YOUR PROGRESS

1. Implement the decision.
2. Micro Economics.
3. Economic activity.
4. Transaction cost.
5. Adam Smith.

1.8 REFERENCES/SUGGESTED READINGS

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Demand and Elasticity of Demand

Structure

2.0 Learning Objectives

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2.2 Demands for a Commodity

2.2.1 Determinants of Individual Demand

2.2.2 Demand Function

2.2.3 The Law of Demand

2.2.4 The Market Demand for a Commodity

2.3 Changes in Demand

2.4 Types of Elasticity Demand

2.4.1 Price Elasticity of Demand

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2.4.3 Income Elasticity of Demand

2.5 Check Your Progress

2.6 Summary

2.7 Keywords

2.8 Self-Assessment Test

2.9 Answer to Check Your Progress

2.10 References/Suggested Readings

2.0 LEARNING OBJECTIVE

The overall objective of this lesson is to give you an understanding of the Law of Demand; there by enabling the students to understand the factors and forces that determine the demand. Further, this lesson will provide the students an understanding of the different elasticity of demand, thereby enabling them to appreciate the need and use of elasticity of demand for managerial decision-making.

2.1 INTRODUCTION

Business firms may have different objectives – profit maximisation, sales maximisation, output maximisation, security profits, satisfaction maximisation, utility maximisation, growth maximization or satisfying. But the basic business activity of all firms is same – *they all produce and sell goods and services that are in "demand"*. Demand is the basis of all productive activities, rightly termed as *"mother of production"*. It is, therefore, necessary for business managers to have clear understanding of …

- What are the sources of demand?
- What are the determinants of demand?
- How do buyers decide the quantity of a product to be purchased?
- How do buyers respond to the change in a product price; their income; prices of other goods or services; and change in other determinants of demand?
- How can total or market demand for a product be assessed or forecast?

In a free market economy it is the price-mechanism that settles its fundamental problems of *what, how and for whom*. The price of any commodity in the market is determined by the general interaction of the forces of demand and supply. In this lesson, we will deal with the concepts of demand. Before proceeding further, we may define the term 'commodity' and 'market'.

A ***commodity*** is any goods produced for sale in the market. By this definition, food produced in the home kitchen for consumption of the family is not a commodity. But the same food prepared by a hotel for its customers' consumption is a commodity.

Market in Economics is more than a geographical area or a 'mandi' where goods are bought and sold. It means all the areas in which buyers and sellers are in contact with each other for the purchase and sale of the commodity. Thus, a commodity may have a local market, a regional market, a national market or even an international market.

Demand is a function of its determinants. It changes in response to any change in any of its determinants. However, knowing alone the nature of relationship between demand and its determinants is not sufficient. What is more important is to know the extent of relationship or how responsive the demand is to the changes in its determinants. The concept of elasticity of demand is extremely useful in this reference. It plays an important role in business decision-making. For example 'raising the price' of the product will prove beneficial or not depends on:

a. The price elasticity of demand for the product and

b. The price elasticity of demand for its substitutes.

Therefore, it is obvious that the understanding of different elasticities of demand is the basic prerequisite whenever a business manger is considering "price change" for his or her product. In general terms, the elasticity of demand is a measure of the responsiveness or sensitiveness of demand for a commodity to the change in its determinants. There are as many elasticities of the demand as its determinants. The most important of these elasticities are (a) the price elasticity, (b) the income elasticity, and (c) the cross elasticity of demand.

2.2 DEMAND FOR A COMMODITY

In any market, there are a vast number of individual purchasers of a commodity. The basic unit of consumption being the individual household, "how much of a commodity would an individual household be willing to buy?" - is the demand for the commodity. We may define

The demand for a commodity of the individual household is the quantity of the commodity that he is willing to buy in the market in a given period of time at a given price.

Thus, a want with three attributes – *'desire to buy', 'willingness to pay'* and *'ability to pay'* – becomes effective demand. Demand for a commodity has always a reference to *'a price', 'a period of time'* and *'a place'*. For this reason, "demand for apples in 5" carries no meaning for a business decision.

2.2.1 DETERMINANTS OF INDIVIDUAL DEMAND

Knowledge of different factors and forces that determine the demand for a commodity and the nature of relationship between the demand and its determinants are very helpful in analyzing and estimating demand. The demand for a commodity of the individual household depends upon a number of factors - some are quantifiable while some are not quantifiable. These factors are:

a. Price of the commodity

b. The money income of the individual household

c. The tastes and preferences of the individual household

d. The prices of other commodities

2.2.2 DEMAND FUNCTION

A function is a symbolic statement of relationship between the dependent and the independent variables, *i.e.*

Dependent Variable = *f* (Independent Variables)

Thus, the relationship of quantity demanded of a commodity to the factors that determine it may be expressed in the form of a function that is called ***demand function***.

So Demand = *f* (Determinants of the Demand)

Or $Qd_x = f(P_x, P_1 \ldots\ldots P_n, I, T)$

Where Qd_x is the individual household's demand for commodity X,

P_x is the price of the commodity X,

$P_1 \ldots\ldots P_n$ are the prices of all other commodities (other than X),

I is the income of the household, and

T stands for tastes and preferences of the members of the household.

This lesson is concerned with the relationship between quantity demanded of a commodity and its price, while all the other determinants of demand are assumed to remain unchanged. In real life they do change. Before we discuss the relationship between the price of a commodity and the quantity demanded of it, let us first have some rudimentary idea of how the other variables affect demand for a commodity.

1. Income of the Household

Demands for goods of different nature have different kinds of relationship with income of different categories of consumers (see Figure 2.1).

a. In case of normal goods, a rise in income is generally associated with increase in their demand, and a fall in income with a decrease in their demand. In other words, both income and demand for commodities move in the same direction.

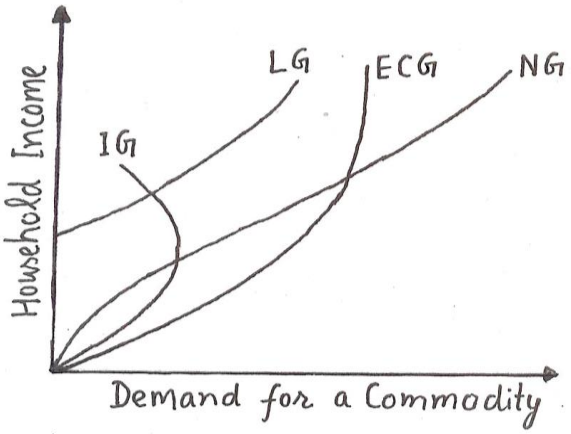

Figure 2.1 Household Income and Demand for a Commodity

b. In case of essential consumer goods, an increase in income may have no effect on their demand. For example, in case of salt, even with a rise in income, the demand for salt is likely to remain unaffected.

c. In case of inferior goods, a rise in income may actually lead to a decrease in their demand. For example, the household may be consuming toned milk. A rise in income may induce it to consume whole milk and its demand for toned milk may go down.

d. In case of luxury and prestige goods, their demand starts after a particular level of income and may have positive relationship with income after that level.

2. Prices of Other Commodities

The relationship between the demand for a commodity and prices of other commodities can be one of the following types:

a. The relationship may be the positive one. In other words, a fall (rise) in the price of other commodities reduces (increases) the household demand for a particular commodity. This is the case of substitute goods. If tea and coffee are substitutes, the individual household's demand for tea, among other things, depend upon the price of tea. A fall in the price of coffee would divert demand from tea to coffee and a rise in the price of coffee would divert demand from coffee to tea and increase the demand for tea (see Figure 5.1*a*).

b. The relationship may be the inverse one. In other words, a fall (rise) in the price of other commodities increases (reduces) the household demand for a particular commodity. This is the case of complementary goods. If bread and butter go together, a fall in the price of butter may expand its demand and increase the demand of bread (see Figure 2.1*b*).

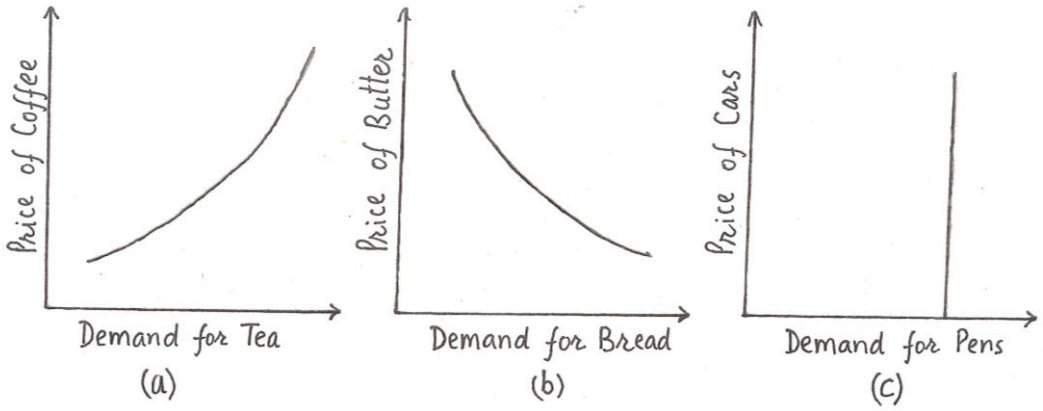

Figure 2.2 Prices of Other Commodities and Demand for a Commodity

c. There may be no relationship. This is the case of unrelated goods. A gall or rise in the price of cars may leave the demand for ball pens unaffected (see Figure 2.1*c*).

3. Taste or Preferences of the Household

Tastes and preferences of individual households influence their demand for a commodity. Tastes and preferences generally depends on the changing life-style, fashion, social customers, religious value, habit, the general level of the living of the society, age etc. If tastes and preferences change in response to these factors, or as a result of advertisement, or are simply the desire to imitate neighbors, demand for commodities may change. Households may reduce or give up consumption of some goods and add new ones in their consumption pattern. For example, advertisement may induce households to change the preference for a particular brand of soap.

2.2.3 THE LAW OF DEMAND

When all factors affecting the demand for a commodity, other than its price, are assumed to remain unchanged, the demand for a commodity is the function of its price.

$$Qd_x = f(P_x) \qquad I°, P_1°\ldots\ldots P_n°, T°$$

The relationship between demand and price may be expressed in the form of the Law of Demand in the following words:

The quantity demanded of a commodity varies inversely with its price, other determinants of demand remaining unchanged.

The inverse relationship between quantity demanded and price may be of

a. Linear form: $Qd_x = a - bP_x$ or (see Figure 2.2a).

b. Non-linear or Curvilinear form: The most common form of a non-linear demand function is $Qd_x = a\,P_x^{-b}$ (see Figure 2.2b).

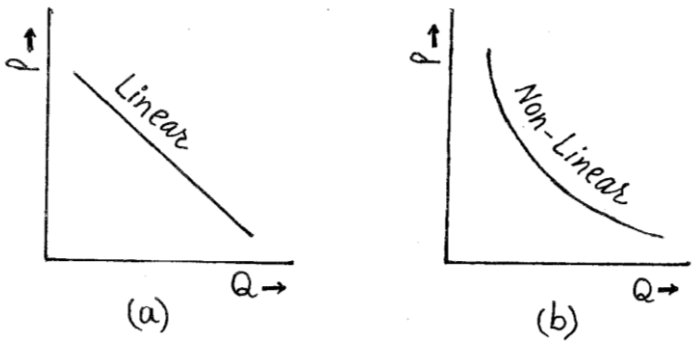

Figure 2.2 Demand Curves: (a) Linear (b) Non-linear or Curvilinear

HOUSEHOLD DEMAND SCHEDULE AND DEMAND CURVE

An individual household's demand refers to the quantities of a commodity demanded by him at various prices, other things remaining unchanged. An individual household's demand for a commodity is shown on the demand schedule and on the demand curve. *A demand schedule is a list of prices and corresponding quantities demanded and its graphic representation is a demand curve.*

Let us illustrate the law of demand by drawing a hypothetical household demand function $Qd_e = 65 - \frac{1}{5}P_e$ for eggs. The demand schedule is shown in Table 2.1. In the first column are given alternate prices per egg and in the second column against each price is shown quantity demanded of eggs, during, say a week.

Price per Egg (Paise)	Quantity Demanded of Eggs
300	5
250	15
200	25
150	35
100	45
50	55

Table 2.1 Individual Household Demand Schedule of Eggs

The demand schedule represented on a graph gives the demand curve for eggs of the household. On the *Y*-axis is shown the independent variable, price per egg and on the *X*-axis is given the dependent variable, the quantity of eggs demanded at each price. Each point A, B, C, D, E, F represents a pair of values; price of an egg and the demand for egg of the household at that price. By joining these points, we get the demand curve AF for eggs of the household, for the given period.

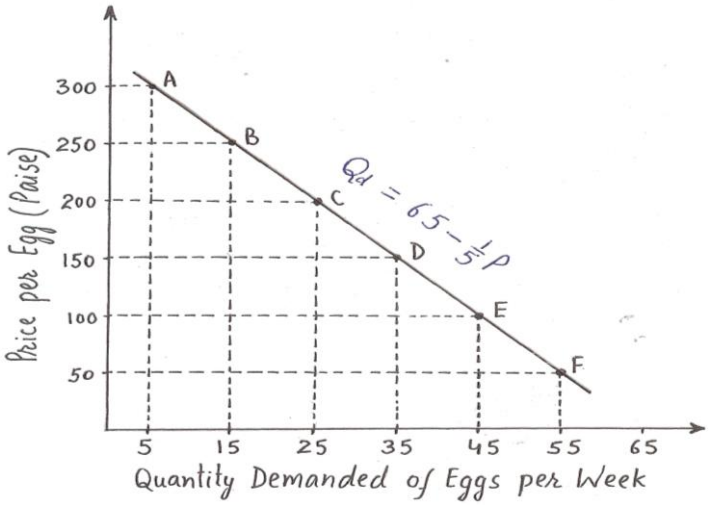

Figure 2.3 Individual Household Demand Curve for Eggs

The demand curve depicts the relationship between the price of the commodity and an estimate of the quantity demanded of it for the given period at any point of time. The demand curve slopes downward from left to right. A demand curve sloping downward from left to right is also called a negatively sloped demand curve because the rate of change in *Q* in response to change in *P* is denoted by negative value *i.e.* $\frac{dQ}{dP}$ is negative.

Why the Demand Curve Slopes Downward?

It is a matter of empirical observation that households behave in this fashion for most of the commodities. They buy more of the goods at lower prices than at higher prices. But the question is why do they behave in this fashion? An explanation of this may be found in the theories of consumer behaviour: the **Marginal Utility Theory** of Professor **Marshall**, the **Indifference Curves Approach** of **Professor Hicks**, and the theory of **Revealed Preferences** of **Professor Samualson**. The reason for the negative slope of demand curve can be found in *income* and *substitution effects* of the price change:

Income Effect: When the price of commodity falls, less has to be spend on the purchase of the same quantity of the commodity. This has the effect of increasing the purchasing power of the given money. This is the *income effect* of a fall in the price of the commodity. With this increase in real

income, the household buys more of the commodity in question. The effects operate in reverse when the price of the commodity rises.

Substitution Effect: When the price of a commodity falls, it becomes cheaper relative to other commodities. This leads to substitution of other commodities (which are now relatively more expensive). This is called the *substitution effect* and the demand for the cheaper commodity rises in consequence. When the price of the commodity rises, this effect operates in reverse.

Thus, Income effect and substitution effect together explain the behaviour of individual household in the form of law of demand.

Giffen Paradox: The Positively Sloped Demand Curve

If the commodity in question is an inferior good, the increase in real income resulting from the reduction in its price will lead the consumer to purchase less, not more, of the commodity. Thus, the income effect will be negative while the substitution effect continues to be positive to lead the consumer to purchase more of the commodity when its price falls. For most of the inferior goods, the positive substitution effect will more than offset the negative income effect so that he demand curve is negatively sloped.

However, in the very rare case when the consumer spends so much on the inferior commodity that the strong negative income effect overwhelms the positive substitution effect the quantity demanded of the commodity will fall when its price falls and rise when its price rises. In other words, the demand curve in this case will be positively sloped. The commodity in question is then called a ***Giffen*** good, after the nineteenth century English economist **Robert Giffen**, who first discussed it. This is what is called ***Giffen Paradox*** that makes the demand curve to have a positive slope.

2.2.4. THE MARKET DEMAND FOR THE COMMODITY

So far we have considered only the demand of the individual household. What about the market demand for a commodity? The market demand may be defined as the estimates of quantity demanded of the commodity per time period at various alternate prices, by all the individual households in the market.

Geometrically, the market demand curve is obtained by a horizontal summation of the individual household demand curves in the market.

This will become clear form the following hypothetical example. Let us say, there are three households in the market for eggs. The demand functions of the households are:

Household H_1 : $Qd_e = 40 - \frac{1}{10} P_e$

Household H_2 : $Qd_e = 65 - \frac{1}{5} P_e$

Household H_3 : $Qd_e = 50 - \frac{1}{10} P_e$

The demand for eggs at different prices of these three households is given in the schedule (Table 2.4). By adding the quantity demanded by each household against the given price, we get the market demand for eggs per unit of time, a week in our example.

By plotting quantities demanded by households against alternate prices, we get the demand curves for eggs of the three households, in the market, marked H_1, H_2 and H_3. By summing up quantities demanded by the three households against each price along the horizontal (*0X*) axis, we get the market demand curve for eggs. This is done is Figure 2.5.

Price per Egg (Paise)	**Quantity Demanded of Eggs**			
	Household H_1	**Household H_2**	**Household H_3**	**Market Demand**
300	10	5	20	35
250	15	15	25	55
200	20	25	30	75
150	25	35	35	95
100	30	45	40	115
50	35	55	45	135

Table 2.4 Demand Schedules of Eggs

At each price demand by each household is added up to obtain the market demand for eggs per week. Thus, geometrically, the market demand curve for a commodity is obtained by a horizontal summation of the demand curves of the households comprising the market.

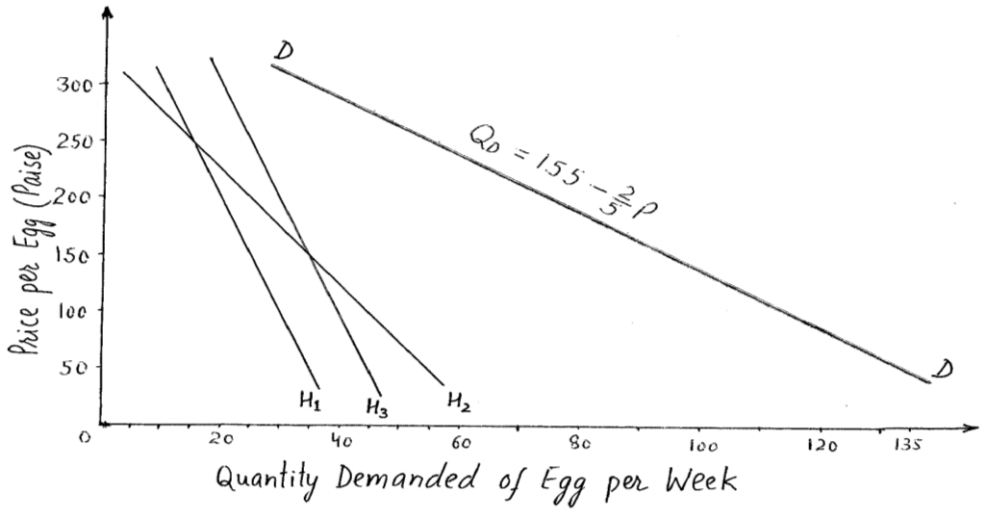

Figure 2.5 Market Demand Curve for Eggs

The market demand curve for a commodity shows the various quantities of the commodity demanded in the market per time period at various alternative prices of the commodity while holding every other factor constant. Just as an individual's demand curve, the market demand curve for a commodity is negatively sloped; indicating that price and quantity demanded is inversely related.

The various factors held constant in drawing the market demand curve for a commodity are:

- The number of the households in the markets
- Households' income
- The price of other commodities
- The tastes and preferences of the households
- Consumers' expectations about future price and supply position

Thus the general market demand function for commodity X is

$$QD_x = f(P_x, N, I, P_1 \ldots\ldots P_n, T, E_{p,s})$$

The market demand function for eggs is

$$QD_e = 155 - \frac{2}{5}P_e$$

2.3 CHANGES IN DEMAND

Demand does not remain constant. It changes in response to change in any, some or all of its determinants. Whenever demand changes, there is either.

a. A movement along the demand curve, or

b. A shift of the entire demand curve

We use different expressions for the two types of changes in demand.

(a) Movement along the Demand Curve

A demand curve relates quantity demanded of a commodity to its prices. At higher prices less of the commodity is demanded, and at lower prices more of the commodity is demanded. As we move from higher prices to lower prices, we move down the demand curve, and as we move from lower prices to higher prices, we move up the demand curve. In other words, a change in the price of the commodity means a movement along the demand curve.

In Figure 2.6, a rise in price from P to P_1 and a fall in price from P to P_2 bring about changes in quantity demanded from PA to P_1B and P_2C. The movement from point A to B or C is a movement along the demand curve, DD.

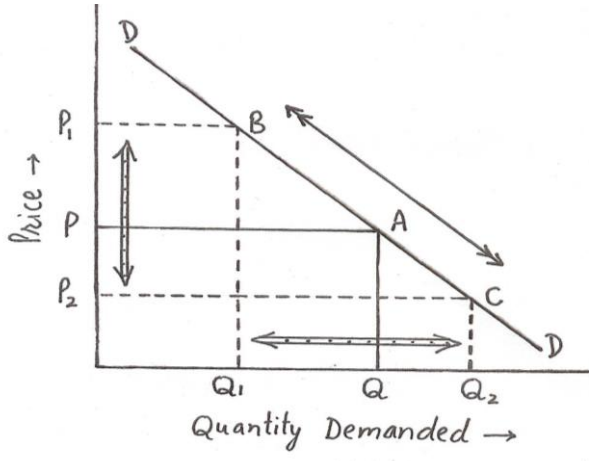

Figure 2.6 Movements along the Demand Curve

For these changes in demand due to change in price alone, we use the expressions *expansion* and *contraction* of demand to denote movement along the demand curve. Thus

Expansion of demand means a rise in demand that result from a decrease in price (movement down the demand curve).

Contraction of demand means a fall in demand that results from an increase in price (movement up the demand curve).

(b) Shift of the Demand Curve

But when the demand for a commodity changes not on account of a change in its price but due to changes in the other determinants of demand – income of the household, their tastes and preferences and prices of close substitutes – the demand curve may shift in accordance with the direction of the change.

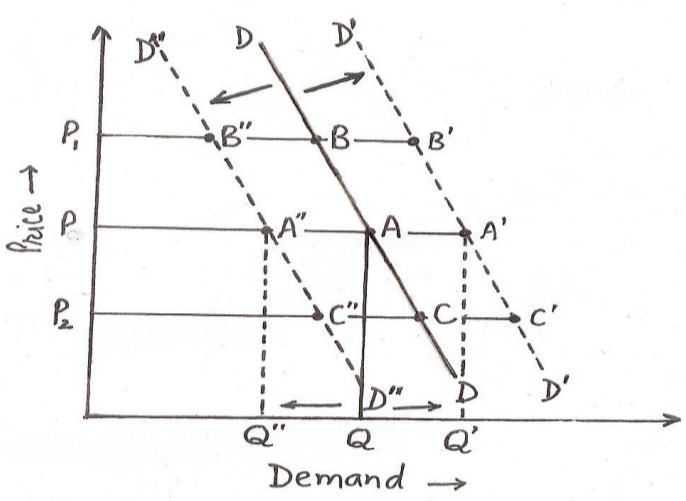

Figure 2.7 Shift of the Demand Curve

In Figure 2.7, at the same price P, the quantity demanded increases to point A' when the demand curve has shifted rightwards and the quantity demanded decreases to point A'' when the demand curve has shifted leftwards. Due to changes in demand brought about by factors other than price, the demand curve DD has shifted to the right to D'D' or to the left to D''D''.

For these changes in demand due to change in determinants other than price, we use the expressions *increase* and *decrease* of demand to denote the shift of demand curve. Thus

Increase in demand means a rightward shift of the demand curve – the demand for the commodity at the same price has increased.

Decrease in demand means a leftward shift of the demand curve – the demand for the commodity at the same price has decreased.

Figure 2.8 shows the change in demand for a commodity from initial demand Q_1 to final demand Q_3. Here Q_1Q_2 is the expansion of demand (due to decrease in price from P_1 to P_2) and Q_2Q_3 is the increase in demand due to rightward shift of the demand curve because of, say, household income increase.

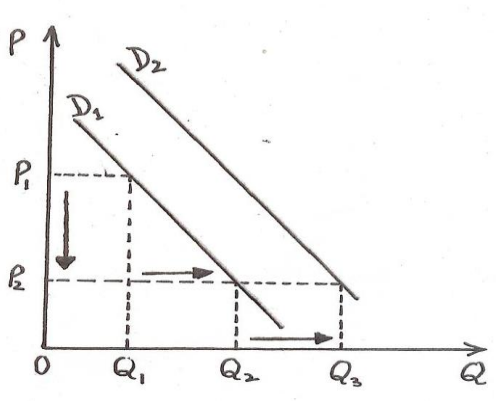

Fig. 2.8 Movements along the Demand Curve & Shift of the Demand Curve

2.4 TYPES OF ELASTICITY DEMAND

There are as many elasticity of the demand as its determinants. The most important type of elasticity is (a) the price elasticity, (b) the income elasticity, and (c) the cross elasticity of demand. These are explained as under:

2.4.1 PRICE ELASTICITY OF DEMAND

Consider the two demand curves A and B, given in the Figure 2.9. Curve A represents the demand for goods in market A. Curve B represent the demand for the same goods in market B. At price P_1, the demand in market A is $0Q_A$; while in market B, it is $0Q_B$. When the price falls from P_1 to P_2, the demand in market A expands from $0Q_A$ to $0Q_{A'}$ that is, by $Q_AQ_{A'}$. In case of market B, the same fall in price

leads to an expansion of demand by $Q_BQ_{B'}$. The expansion in demand in market B is greater than in market A. We describe this situation roughly by saying that the price elasticity of demand for the goods in market B is greater than that in market A.

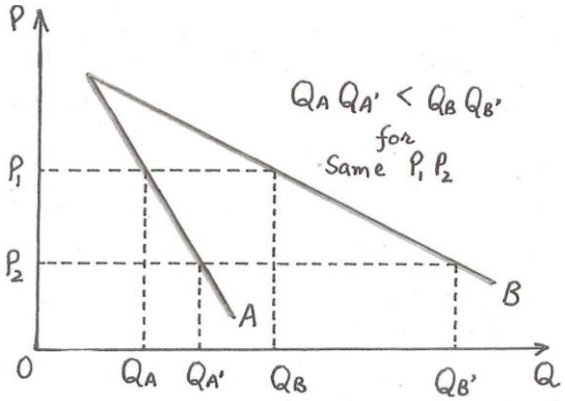

Figure 2.9 Demand Curves With different Price Elasticities

Therefore, price elasticity of demand is the measure of the degree of responsiveness of the demand for the commodity to the changes in its own price. *It measures the percentage change in the quantity demanded as a result of one percent change in its price, holding constant all other variables in the demand function.* That is:

$$e_p = \frac{\%\Delta Q}{\%\Delta P} \qquad \textit{ceteris peribus}$$

$$= \frac{\frac{\Delta Q}{Q} x100}{\frac{\Delta P}{P} x100}$$

$$= \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \qquad \ldots\ldots(2.1)$$

Where P and Q are initial price and quantity demanded respectively. ΔP and ΔQ refer, respectively, to the change in price and change in quantity.

$\Delta Q/\Delta P$ is negative, making the price elasticity always negative. This is because of inverse relationship between P and Q implied by the Law of Demand. However, we generally omit the negative sign when writing the formula of the elasticity. We can measure the price elasticity of demand.

- On a point on demand curve, and call it *point price elasticity of demand*
- Between two points on a demand curve, and call it *arc price elasticity of demand*

Point Price Elasticity of Demand

When the changes in price are very small, we use *the point elasticity* of demand as a measure of the responsiveness of demand. Thus *point elasticity of demand is defined as the proportionate change in the quantity demanded resulting from a very small proportionate change in price.*

If we consider very small changes in P and Q, then $\Delta P \approx \partial P$ and $\Delta Q \approx \partial Q$

That is $$e_p = \frac{\partial Q}{\partial P}.\frac{P}{Q} \qquad \ldots\ldots\ldots(2.2)$$

If the demand curve is linear

$$Q = a - bP$$

Then $\frac{\partial Q}{\partial P} = b$, so we have

$$e_p = b.\frac{P}{Q} \qquad \ldots\ldots\ldots(2.3)$$

Here b is the reciprocal of the slope of the demand curve.

Eq.(2.2) and *Eq.(2.3)* imply that the point price elasticity changes at the various points of the linear demand curve. This is because of the change in P/Q along the demand curve.

Example 2.1

Consider the demand function for a commodity X

$Q = 300\text{-}50P$ *ceteris peribus*

Calculate the price elasticity at the price of Rs2.

Solution: At $P = 2$, we have

$$Q = 300 - 50(2) = 200$$

So price elasticity at $P = 2$,

$$e_p = b.\frac{P}{Q} = 50.\frac{2}{200} = \frac{1}{2}$$

It means, at price $P = 2$; a 1 percent change in price results in 0.5 percent opposite change in quantity demanded, *ceteris peribus*.

Graphic Measure of Point Price Elasticity of Demand

We can obtain a graphic measure of the point price elasticity of demand by manipulating *Eq.(2.3).*

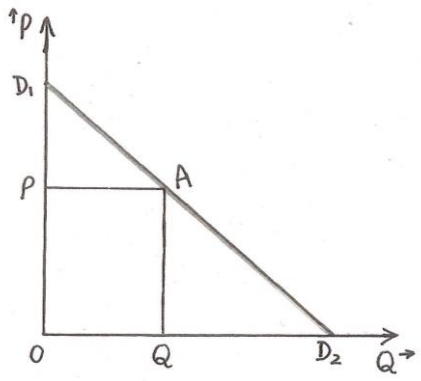

Figure 2.10 Point Price Elasticity

We have

$e_p = b.\frac{P}{Q}$, From Figure 4.2, we see that $b = \frac{QD_2}{AQ}$, $P = 0P$ and $Q = 0Q$

So $e_p = \frac{QD_2}{AQ}.\frac{0P}{0Q} = \frac{QD_2}{0Q}$ [as $AQ = 0P$]

$= \frac{PA.\frac{AD_2}{D_1A}}{0Q}$ [as ΔD_1PA and ΔAQD_2 are similar, so $\frac{QD_2}{PA} = \frac{AD_2}{D_1A}$ or

$QD_2 = PA.\frac{AD_2}{D_1A}] = \frac{AD_2}{D_1A}$ [as $PA = 0Q$]

$= \frac{\text{Lower Segment of the Demand Curve}}{\text{Upper Segment of the Demand Curve}}$ ……*(2.4)*

So we can obtain the point price elasticity of demand graphically by the ratio of the segments of the demand curve to the right and to the left of the particular point. We can also have another form of graphic measure of point price elasticity of demand.

We have

$$e_p = \frac{AD_2}{D_1A} = \frac{AQ}{D_1P} \quad [\text{as } \Delta AQD_2 \text{ and } \Delta D_1PA \text{ are similar, so } \frac{AD_2}{D_1A} = \frac{AQ}{D_1P}]$$

$$= \frac{0P}{0D_1 - 0P} \quad [\text{as } AQ = 0P \text{ and } D_1P = 0D_1 - 0P] = \frac{P}{P_0 - P} \qquad \ldots\ldots\ldots\ldots(2.5)$$

In other words, the point price elasticity of demand can also be obtained geometrically by dividing the price of the commodity (P) at the particular point by $P_0 - P$, where P_0 is the price at which the quantity demanded is zero (*i.e.* the price at which the demand curve crosses the vertical axis).

Point Price elasticity on a Curvilinear Demand Curve

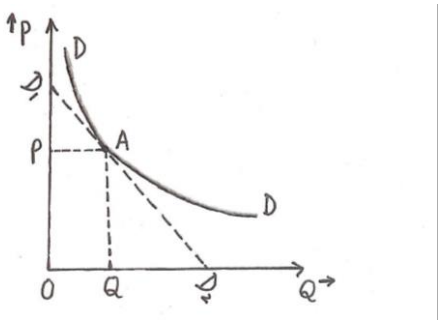

Figure 2.11 Point Price Elasticity on a Curvilinear Demand Curve

For a curvilinear (non-linear) demand curve, we draw a tangent to the demand curve at the point at which we want to measure the elasticity and then proceed as if we were dealing with a linear demand curve.

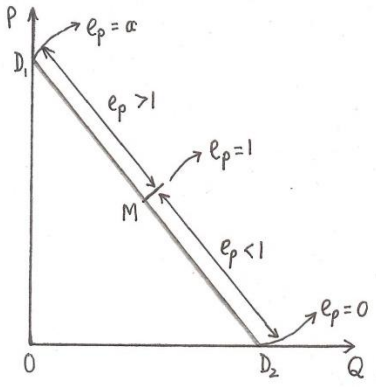

Figure 2.12 Point Price Elasticity

From the graphical measurement of the point price elasticity of demand, it is obvious that at mid-point of the linear demand curve $e_p = 1$ (point M in Figure 2.12). At any point to the right of M, $e_p < 1$; and at any point to the left of M, $e_p > 1$. At point D_1 the $e_p = \alpha$, while at point D_2 the $e_p = 0$.

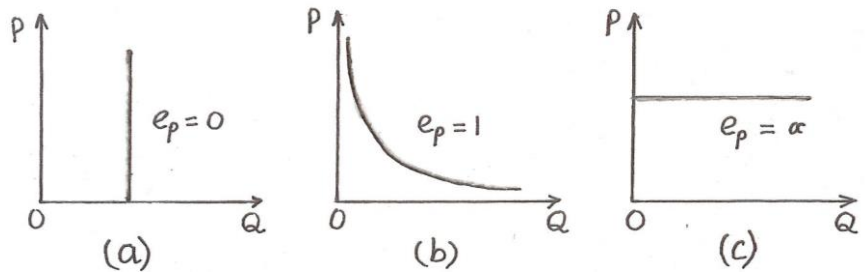

Figure 2.13 Demand Curves With different Price Elasticities

Thus, the range of values of the elasticity is

$$0 \leq e_p \leq \alpha$$

- If $e_p = 0$, the demand is perfectly inelastic (Figure 2.13*a*).
- If $e_p = 1$, the demand has unitary elasticity (Figure 2.13*b*).
- If $e_p = \alpha$, the demand is perfectly elastic (Figure 2.13*c*).
- If $0 < e_p < 1$, we say that the demand is inelastic.
- If $1 < e_p < \alpha$, we say that the demand is elastic.

Are Price Elasticity of Demand

When the changes in price are not small, we use the *arc elasticity* of demand as a measure of the responsiveness of demand. Arc elasticity measures the elasticity of demand between two points on the demand curve. However, if we use the *Eq.* $e_p = \frac{\Delta Q}{\Delta P}.\frac{P}{Q}$, we will get different results depending on whether the price rose or fell. This is because of the different values of the initial price (P) and initial quantity (Q) for the rise and fall of the price. Therefore, we use the average of the two prices and the

average of the two quantities in the calculations and use the following formula for the arc price elasticity of demand:

$$e_p = \frac{\Delta Q}{\Delta P} \cdot \frac{\frac{P_1 + P_2}{2}}{\frac{Q_1 + Q_2}{2}} \qquad \textit{ceteris peribus}$$

$$= \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_1 + P_2}{Q_1 + Q_2} \qquad \ldots\ldots\ldots\ldots(2.6)$$

Where the subscripts *1* and *2* refer to the original and to the new values, respectively, of price and quantity.

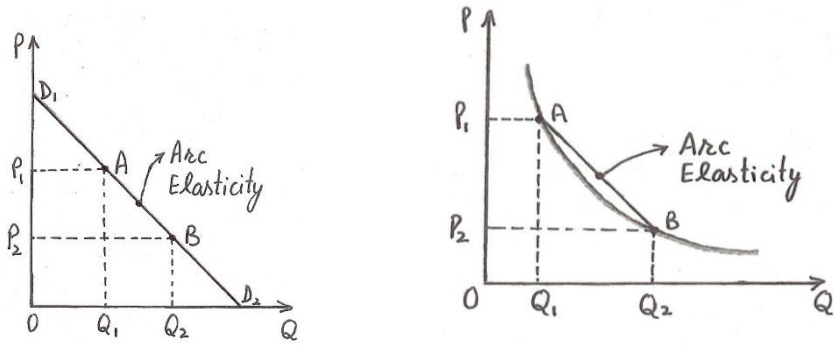

Figure 2.14 Arc Elasticity

Example 2.2

Consider the demand schedule for men's Levi's jeans in a store:

Price	1000	950	900	850	800	750	700
Quantity Demanded	50	60	68	78	90	105	125

Calculate the price elasticity between an original price of Rs950 and new price of Rs850.

Solution: We have

Original values of price and quantity demanded: $P_1 = 950$, $Q_1 = 60$

New values of price and quantity demanded: $P_2 = 850$, $Q_2 = 78$

So $e_p = \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_1 + P_2}{Q_1 + Q_2} = \frac{78-60}{850-950} \cdot \frac{850+950}{78+60} = -\frac{18}{100} \cdot \frac{1800}{138}$

$= -2.34$

This means that in the price range (850-950), a 1 percent change in price results, on the overage, in a 2.34 percent opposite change in the demand for Levi's jeans.

With the helps of price elasticity of demand, we can compute a price that would have to be charged to achieve a particular level of sales. Consider Example 2.3

Example 2.3

Nike sells 10500 pains (at price Rs2500) of a particular brand of football shoes before a price cut by its major competitor Adidas. After this the sales declined to 8500 pairs. From its part experience Nike has estimated the $e_p = -2$ in this price-quantity range. What price should Nike charge to maintain the sales level of 10500 pairs?

Solution: We have, $P_1 = 2500$ $Q_1 = 8500$ $Q_2 = 10500$ $e_p = -2$

We can find P_2 from the relation $e_p = \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_2 + P_1}{Q_2 + Q_1}$

i.e. $-2 = \frac{10500-8500}{P_2 - 2500} \cdot \frac{P_2 + 2500}{10500+8500}$

By solving for P_2 we get, $P_2 = 2250$

So Nike should reduce the price to Rs2250, to maintain the sales level of 10500 pairs. The arc elasticity is a measure of the average elasticity, that is, the elasticity at the mid point of the chord that connects the two points (A and B) on the demand curve defined by the initial and new price levels (Figure 2.13). It should be clear that the measure of the arc elasticity is an approximation of the true elasticity of the section AB of the demand curve, which is used when we know only the two points A and B from the demand curve, but not the intermediate ones.

Price Elasticity, Total Revenue and Marginal Revenue

The price elasticity of demand bears an important relationship with the total revenue and marginal revenue. Total revenue (*TR*) is equal to price (*P*) times quantity (*Q*), while marginal revenue (*MR*) is the change in total revenue per unit change in output or sales (quantity demanded) that is

$$TR = P.Q$$

$$MR = \frac{d(TR)}{dQ} = \frac{d(PQ)}{dQ} = P + Q\frac{dP}{dQ} = P\left(1 + \frac{dP}{dQ}.\frac{Q}{P}\right)$$

Now $\frac{dP}{dQ}.\frac{Q}{P} = -\frac{1}{e_p}$

So $$MR = P\left(1 - \frac{1}{e_p}\right) \qquad \ldots\ldots\ldots(2.7)$$

From the relationship between e_p and *MR* in *Eq (2.7)*, it is clear that

- When $e_p > 1$, $MR > 0$

In other words, when demand is elastic, total revenue increases with a decline in price and decreases with a rise in price. This is because when demand is elastic, a price change leads to a proportionately larger opposite change in quantity demanded that results an increase in total revenue when price declines and a decrease in total revenue when price rises.

- When $e_p = 1$, $MR = 0$

That is, when demand is unitary elastic, the total revenue remains unchanged with a decline or rise in price. The reason for this is that when demand is unitary elastic, a change in price leads to an equal proportionate opposite change in quantity demanded thereby leaving the total revenue unchanged.

- When $e_p < 1$, $MR < 1$

That is, if demand is inelastic, a change in price leads to a smaller proportionate opposite change in quantity demanded. This results a decrease in the total revenue when price declines and an increase when price rises.

Chart 2.1 e_p, *MR* and *TR*

$e_p > 1$	$MR > 0$	$P \uparrow \approx TR \downarrow$ $P \downarrow \approx TR \uparrow$
$e_p = 1$	$MR = 0$	$P \uparrow \approx TR \rightarrow$ $P \uparrow \approx TR \rightarrow$
$e_p < 1$	$MR < 1$	$P \uparrow \approx TR \uparrow$ $P \downarrow \approx TR \downarrow$

A linear-demand curve is elastic above the midpoint, unitary elastic at the midpoint, and inelastic below the midpoint. So a reduction in price leads to an increase in *TR* (*MR* is positive) down to the midpoint of the demand curve (where *TR* is maximum and *MR* is zero) and to a decline thereafter (*MR* is negative). We can summarize the above discussion in Chart 2.1.

Example 2.4

Consider the demand function of a commodity X

$Q = 300 - 50P$ *ceteris peribus*

a. Analyze the relationship between price, quantity demanded, marginal revenue, total revenue and price elasticity of demand.

b. At present the firm is charging a price of Rs4 for the commodity X. Is it beneficial for the firm to raise the price?

Solution: The relationship between price (*P*), quantity demanded (*Q*), marginal revenue (*MR*), total revenue (*TR*) and price elasticity of demand (e_p) is shown in Table 2.1 and Figure 2.14.

Table 2.1 The Relationship between *P, Q, MR, TR* and e_p

P	Q	$e_p = \frac{d(TR)}{dQ}$	$TR = PQ$	$MR = 6 - \frac{Q}{25}$
6	0	∞	0	--
5	50	5	250	4

4	100	2	400	2
3	150	1	450	0
2	200	½	400	-2
1	250	1/5	250	-4
0	300	0	0	-6

We have, $Q = 300\text{-}50P$; So, $P = 6\text{-}\frac{Q}{50}$

Now $TR = PQ = 6Q\text{-}\frac{Q^2}{50}$, $MR = \frac{d(TR)}{dQ} = 6\text{-}\frac{Q}{25}$

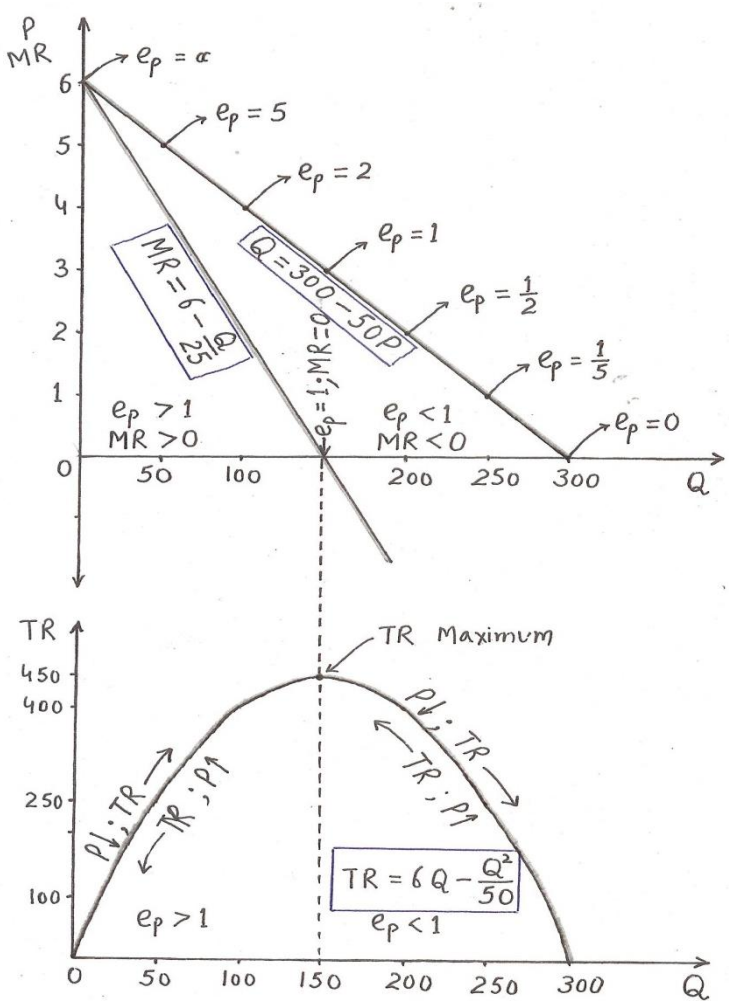

Figure 2.14 The Relationship between *P, Q, MR, TR* and e_p

As long as demand is price elastic (*i.e.* up to Q =150), a price reduction (increase) increases (reduces) total revenue (*TR*), and marginal revenue (*MR*) is positive, At Q =150, demand is unitary price elastic, *TR* is maximum, and *MR* = 0. When demand is price inelastic (*i.e*. for Q >150) a price reduction (increase) reduces (increase) *TR*, and *MR* is negative.

(b) At P = 4, e_p >1 *i.e*. *MR* > 0. So it is not beneficial for the firm to raise the price as it will result in a fall in total revenue (*TR*). In fact, a reduction up to P = 3 is beneficial for the firm to increase its total revenue.

Factors Affecting the Price Elasticity of Demand

The basic determinants of the price elasticity of demand for a commodity are:

- ✓ Availability and closeness of substitutes; demand for a commodity is more elastic if there are close substitutes for it.
- ✓ Nature of the commodity; in general the demand for necessities is less elastic, for comforts are moderately elastic and for luxuries is more elastic. Demand for prestige goods is price inelastic. Also the demand for durables is more price elastic than that for non-durables.
- ✓ Time frame of analysis; demand is more elastic in the long run than in short run.
- ✓ Variety of uses of the commodity; the more the possible uses of a commodity the greater its price elasticity will be.
- ✓ The proportion of income spent; in general the demand for commodities which entail a large proportion of the income of the consumer is more elastic than that of commodities with a small proportion of income.
- ✓ Level of prices; the demand for commodities is elastic when price level is high and is less elastic when price level is low.

2.4.2 CROSS PRICE ELASTICITY OF DEMAND

The demand for a commodity also depends on the price of other commodities, and changes in response to any change in the price of other commodities. The cross price elasticity of demand measures the

responsiveness of the demand for commodity X to a change in the price of commodity Y. Thus, *cross-price elasticity of demand is the ratio of the percentage change in the demand for commodity X to the percentage change in the price of commodity Y, assuming all other factors influencing demand remain unchanged*

i.e. $e_{xy} = \frac{\%\Delta Q_x}{\%\Delta P_y}$ *ceteris peribus*

$$= \frac{\frac{\Delta Q_x}{Q_x} x100}{\frac{\Delta P_y}{P_y} x100}$$

$$= \frac{\Delta Q_x}{\Delta P_y} . \frac{P_y}{Q_x} \qquad \ldots\ldots\ldots (2.8)$$

Point Cross-Price Elasticity of Demand

Point cross-price elasticity of demand for commodity X provides a measure of the responsiveness at a specific point P_y over the demand function. It is measured as:

$$e_{xy} = \frac{\partial Q_x}{\partial P_y} . \frac{P_y}{Q_x} \quad \text{ceteris peribus} \qquad \ldots\ldots\ldots (2.9)$$

Example 2.5

Consider the demand function of a commodity X

$$Q_x = 300 - 50P_x - 25\,P_y$$

Calculate the cross-price elasticity at $P_y = 2$ when $P_x = 3$ remains constant.

Solution: At $P_y = 2$ and $P_x = 3$, we have

$$Q_x = 300 - 50(3) - 25(2)$$

$$= 200$$

Also $\frac{\partial Q_x}{\partial P_y} = 25$ when P_x remains constant.

So the cross-price elasticity at $P_y = 2$

$$e_{xy} = \frac{\partial Q_x}{\partial P_y} \cdot \frac{P_y}{Q_x}$$

$$= 25.\frac{2}{200}$$

$$= 1/4$$

Thus from the price $P_y = 2$ of commodity Y, we can expect demand for commodity X to change (in the same direction) by 0.25% for each 1% change in the price of commodity Y, *ceteris peribus.*

Are Cross-Price Elasticity of Demand

Arc cross-price elasticity of demand for commodity X is a technique for computing cross-price elasticity between two price levels of commodity Y. It is measured as:

$$e_{xy} = \frac{\Delta Q_x}{\Delta P_y} \cdot \frac{\frac{P_y^2 + P_y^1}{2}}{\frac{Q_x^2 + Q_x^1}{2}}$$

$$= \frac{Q_x^2 - Q_x^1}{P_y^2 - P_y^1} \cdot \frac{P_y^2 + P_y^1}{Q_x^2 + Q_x^1} \qquad \textit{ceteris peribus} \qquad \ldots\ldots\ldots\ldots(2.10)$$

Example 2.6

The quantity demanded for coffee increases from 500 to 600 units as a result of an increase in the price of tea from Rs80 to Rs90 per Kg. Find the cross-price elasticity of demand for coffee over this price change of tea.

Solution: We have

$Q_c^1 = 500$ $Q_c^2 = 600$

$P_t^1 = 80$ $P_i^2 = 90$

So, $e_{ct} = \frac{Q_c^2 - Q_c^1}{P_t^2 - P_t^1} \cdot \frac{P_t^2 + P_t^1}{Q_c^2 + Q_c^1}$

$= \frac{600 - 500}{90 - 80} \cdot \frac{90 + 80}{600 + 500}$

$= 1.64$

This means that a 1 percent change in price of tea in the price range (80-90); results, on the overage, in a 1.64 percent same change in the demand for coffee.

Interpreting Cross Price Elasticity of Demand

The cross price elasticity of demand for a commodity X, tells us about the nature of other commodities. If the cross price elasticity between X and Y

- $e_{xy} > 0$; X and Y are substitutes and higher the value of e_{xy}, the closer the substitutes (high degree of substitutability).
- $e_{xy} < 0$; X and Y are complements and higher the value of e_{xy}, the closer the compliments (high degree of complementarity).
- $e_{xy} = 0$; X and Y are unrelated commodities.

The cross-price elasticity of demand is a very important concept in managerial decision-making. Firms often use this concept to measure the effect of changing price of a product they sell on the demand of other related products that the firm also sells.

2.4.3 INCOME ELASTICITY OF DEMAND

The level of consumer's income is also a very important determinant of demand. We can measure the responsiveness of the demand for a commodity to a change in consumers' income by the income elasticity of demand. *It is measured as the ratio of the percentage change in demand for the commodity to the percentage change in consumers' income, assuming that all the other factors influencing demand remain unchanged.*

So $e_i = \frac{\%\Delta Q}{\%\Delta I}$ *ceteris peribus*

$$= \frac{\frac{\Delta Q}{Q} x100}{\frac{\Delta I}{I} x100}$$

$$= \frac{\Delta Q}{\Delta I} . \frac{I}{Q} \qquad \ldots\ldots\ldots (2.11)$$

Point Income Elasticity of Demand

Point income elasticity provides a measure of the responsiveness of demand for a commodity at a specific income level over the demand function. It is measured as:

$$e_i = \frac{\partial Q}{\partial I} . \frac{I}{Q} \qquad \text{ceteris peribus} \qquad \ldots\ldots\ldots (2.12)$$

Example 2.7

Consider the demand function of a commodity X

$$Q_x = 15000 - 2500P_x - 2.50\, I$$

Calculate the income elasticity at the income level $I = 6000$ when $P_x = 8$ remains constant.

Solution: At $I = 2$ and $P_x = 8$, we have

$$Q_x = 15000 - 2500(8) - 2.50(6000)$$

$$= 10000$$

Also $\frac{\partial Q}{\partial I} = 2.50$ when P_x remains constant.

So the income elasticity at $I = 6000$

$$e_i = \frac{\partial Q}{\partial I} . \frac{I}{Q}$$

$$= 2.50.\frac{6000}{10000}$$

$$= 1.50$$

Thus from the income level of Rs 6000, we can expect demand for commodity X to change (in the same direction) by 1.50% for each 1% change in the consumers' income, *ceteris peribus.*

Are Income Elasticity of Demand

Arc income elasticity of demand for a commodity is a technique for computing income elasticity between two income levels of the consumers. It is measured as:

$$e_i = \frac{\Delta Q}{\Delta I}.\frac{\frac{I_2 + I_1}{2}}{\frac{Q_2 + Q_1}{2}}$$

$$= \frac{Q_2 - Q_1}{I_2 - I_1}.\frac{I_2 + I_1}{Q_2 + Q_1} \qquad \textit{ceteris peribus} \qquad \ldots\ldots\ldots(2.13)$$

Example 2.8

Assume that an increase in the disposable income in Haryana from Rs1.00 billion to Rs1.10 billion is associated with an increase in car sales in the state from 6000 to 7000 units. Calculate the income elasticity of demand for cars over this change of income.

Solution: We have

$Q_1 = 6000$ $Q_2 = 7000$

$I_1 = 1.00$ $I_2 = 1.10$

So $e_i = \frac{Q_2 - Q_1}{I_2 - I_1}.\frac{I_2 + I_1}{Q_2 + Q_1}$

$$= \frac{7000 - 6000}{1.10 - 1.00}.\frac{1.10 + 1.00}{7000 + 6000}$$

$$= 1.615$$

This means that a 1 percent change in the disposable income in the range (1.00-1.10); will result, on an average, in a 1.615 percent same change in the sales for cars.

Interpreting Income Elasticity of Demand

The income elasticity of demand tells about the nature of the commodity.

- $e_i > 0$ for most normal or income superior goods.
- $e_i < 0$ for inferior goods.
- $0 < e_i < 1$ (*i.e.* low income elasticity)for necessities (or perceived as necessities).
- $e_i > 1$ (*i.e.* high income elasticity) for luxuries and prestige items.

The income elasticity of demand is of a great significance in production planning and management in the long-run. It is use in forecasting the change in demand for the commodity that a firm sells under different economic conditions.

Other Demand Elasticity Measures

Price, cross and income elasticities are the most important application of the elasticity concept of demand analysis. Two other important elasticities of demand are:

Advertisement Elasticity of Sales: It measures the responsiveness of sales to the changes in advertisement expenditure and is very helpful in determining the optimum level of advertisement expenditure.

Elasticity of Price Expectations: During the period of Price fluctuations, consumers' price expectations play a much more important role in determining demand than any other factor. The concept of elasticity of price expectation is extremely useful for demand analysis during the period of price fluctuations.

2.5 CHECK YOUR PROGRESS

1- Normally a demand curve will have the shape_____.

2- Law of demand shows relation between_____.

3- The movement along a demand curve is due to_____.

4- Price and demand are positively correlated in case of_____.

5- Demand is a function of_____.

6- Other things equal, if a good has more substitutes, its price elasticity of demand is_____.

7- If quantity demanded is completely unresponsive to changes in price, demand is_____.

8- Price of a product falls by 10% and its demand rises by 30%. The elasticity of demand is-_____.

9- When demand is perfectly inelastic, an increase in price will result in_____.

10- If price and total revenue move in the same direction, then demand is_____.

2.6 SUMMARY

The demand for a commodity of the individual household is the quantity of the commodity that he is willing to buy in the market in a given period of time at a given price. Knowledge of different factors and forces that determine the demand for a commodity and the nature of relationship between the demand and its determinants are very helpful in analyzing and estimating demand. It is a matter of empirical observation that households behave in this fashion for most of the commodities. They buy more of the goods at lower prices than at higher prices. Society follow the rule of law of demand because increase in prices leads to decrease in demand and decrease in prices leads to increase in demand. It the human nature to follow the inverse relationship of price and demand but still, this rule is not followed sometimes due to various factors affecting demand. Similarly, there are various other factors which are responsible for the movement of demand curve.

Demand changes in response to any change in any of its determinants. However, knowing alone the nature of relationship between demand and its determinants is not sufficient. What is more important is to know the extent of relationship or how responsive the demand is to the changes in its determinants. The concept of elasticity of demand is extremely useful in this reference. It plays an important role in business decision-making. Therefore, it is obvious that the understanding of different elasticity of demand is the basic prerequisite whenever a business manager is considering "price change" for his or her product. In general terms, the elasticity of demand is a measure of the responsiveness or sensitiveness of demand for a commodity to the change in its determinants. A firm can usually set the

prices of the commodity it sells and decide on the level of its expenditures on advertising, product quality and customer service. However, it has no control over the level and growth of consumers' income, consumers' price expectations, competitors' policies regarding price, expenditures on advertisement, product quality and customer service. The analysis of all these factors and reliable estimates of their quantitative effect on sales are essential for the firm to determine the optimal operational policies, and plans for its growth, and for responding most effectively to competitors' policies.

2.7 KEYWORDS

Demand - The demand for a commodity of the individual household is the quantity of the commodity that he is willing to buy in the market in a given period of time at a given price.

Demand Function - The relationship of quantity demanded of a commodity to the factors that determine it may be expressed in the form of a function that is called ***demand function***.

Demand Curve - The demand curve depicts the relationship between the price of the commodity and an estimate of the quantity demanded of it for the given period at any point of time.

Law of Demand - The quantity demanded of a commodity varies inversely with its price, other determinants of demand remaining unchanged, is known as Law of Demand.

Increase in Demand - Increase in demand means a rightward shift of the demand curve – the demand for the commodity at the same price has increased.

Elasticity of Demand- The elasticity of demand is a measure of the responsiveness or sensitiveness of demand for a commodity to the change in its determinants.

Cross Price Elasticity of Demand- It is the ratio of the percentage change in the demand for commodity X to the percentage change in the price of commodity Y, assuming all other factors influencing demand remain unchanged.

Point Income Elasticity of Demand- It provides a measure of the responsiveness of demand for a commodity at a specific income level over the demand function.

Arc income elasticity - It is a technique for computing income elasticity between two income levels of the consumers.

Income Elasticity of Demand- It is measured as the ratio of the percentage change in demand for the commodity to the percentage change in consumers' income, assuming that all the other factors influencing demand remain unchanged.

2.8 SELF- ASSESSMENT TEST

1. What is demand? Discuss briefly the various determinants of demand.
2. State and illustrate the law of Demand, giving its assumptions and importance.
3. What are the factors on which the market demand for a commodity depends? In which category would you place the following from the categories affecting market demand for a commodity?
    a) Liking for tea as against coffee?
    b) A decline in birth rate.
    c) Grant of dearness allowance to the employees
    d) A tax of Rs 3/- per kg on tea.
4. Why does the demand curve slopes downward to the right? Under what circumstances a demand curve slopes upward to the right?
5. Distinguish between:
    (a) Expansion in demand and Increase in demand
    (b) Contraction in demand and Decrease in demand

    Show this diagrammatically.
6. Answer the following in one or two sentences:
    (a) When does a consumer buy more of a commodity at a given price?
    (b) When does a consumer buy less of a commodity at a given price?
    (c) When is the demand for a commodity said to be completely inelastic?

(d) Why the demand for coffee does increases when the price of tea increases?

(e) Why the demand for ink does increases when the price of pen falls?

7. The demand function of a commodity X is given by $Q_x = 12 - 2\ P_x$. Find out the individual demand schedule and the demand curve.

8. Write short notes on:

a) Demand function

b) Demand schedule and demand curve

c) Income and substitution effects of price change

d) Giffen Paradox

9. Define the concept of elasticity of demand. Discuss its significance in theory of demand.

10. "The concept elasticity is a versatile tool of economic analysis." Discuss the validity of this statement with appropriate examples.

11. What do you understand by price elasticity of demand? How is it measured?

12. Discuss briefly the factors on which price elasticity of demand for a commodity depends.

13. What do you understand by point and arc price elasticities of demand? How are these measured?

14. A list of goods is given below. Will there demand be less elastic, moderately elastic, highly elastic or completely inelastic? Give brief reasons in support of your answer.

(a) demand for petrol (b) demand for needles

(c) demand for textbooks (d) demand for seasonal vegetables

(e) demand for salt (f) demand for milk

(g) demand for cars (h) demand for Hutch cellular services

15. Discuss the relationship between price, quantity demanded, marginal revenue, total revenue and price elasticity of demand.

16. Write short notes on:

(a) Point elasticity

(b) Arc elasticity

(c) Advertisement elasticity of sales

(d) Elasticity of price expectations

2.9 ANSWER TO CHECK PROGRESS

1. Downward sloping
2. Price and Quantity of a commodity.
3. Change in the price of a commodity.
4. Giffen goods.
5. Price
6. Larger
7. Perfectly inelastic.
8. 3
9. An increase in total revenue.
10. Inelastic.

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Consumer Theory- Cardinal Utility Analysis

STRUCTURE:

3.0 Learning Objective

3.1 Introduction

3.2 Meaning of Utility

3.2.1 The Law of Diminishing Marginal Utility

3.2.2 Cardinal and Ordinal Concepts of Utility

3.3 Analysis of Consumer Behavior: Cardinal Utility Approach

3.4 Check You Progress

3.5 Summary

3.6 Keywords

3.7 Self-Assessment Test

3.8 Answers to Check Your Progress

3.9 References/Suggested Readings

3.0 LEARNING OBJECTIVE

After going through this lesson the students should be able to explain the meaning of utility and cardinal concept of utility with reference to consumer behavior.

3.1 INTRODUCTION

Generally, we know that our needs are unlimited and we require or demand for the products/commodities to satisfy the needs. Because of the products are of "bundle of utilities". In other words, the consumers demand a commodity because they derive or expect to derive utility from that commodity. The expected utility from a commodity is the basis of demand for it.

3.1 MEANING OF UTILITY

Even though, the term 'utility' is very commonly used term. But, it has a specific meaning and use in the analysis of consumer demand or consumer behaviour in terms of cardinal analysis. The concept of utility can be looked upon from two angles: the commodity angle and the consumers' angle. At the first sight, utility is the want- satisfying property of a commodity. And the other, utility is the psychological feeling of satisfaction; pleasure, happiness or well being which a consumer derives from the consumption, possession or the use of a commodity. There is a disparity between these two concepts, which must be kept in mind. The concept of a want-satisfying property of a commodity is 'absolute' in the sense that this property is inbuilt in the commodity irrespective of whether one needs it or not. For example, a pen has its own utility of writing irrespective of whether a person is literate or illiterate. Another important feature of the 'absolute' concept of utility is that it is 'ethical neutral' because a commodity may satisfy socially immoral needs, e.g. alcohol. In contrary, from the consumer's point of view, utility is supposed as a post-consumption phenomenon as one derives satisfaction from a commodity only when one consumes or uses it.

Utility in terms of satisfaction is a subjective or relative concept because (i) a commodity need not be useful for all, e. g. cigarettes do not hove any utility for non-smokers, and meat has no utility for pure vegetarians; (ii) utility of a commodity varies from person to person and from time to time; and (iii) a commodity need not have the same utility for the same consumer at different points of times, at different levels of consumption and at different moods of a consumer. In consumer analysis, only the 'subjective' concept of utility is used.

TOTAL UTILITY

Assuming that utility is measurable and additive, total utility may be defined as the sum of the utilities derived by a consumer from the various units of goods and services he consumes. Suppose a consumer consumes four units of a commodity, X, at a time and derives utility as u_1, u_2, u_3 and u_4. His total utility from commodity X (TU_x) can be measured as follows.

$$TU_x = u_1+u_2+u_3+u_4$$

If a consumer consumes *n* number of commodities, his total utility, TU_n, will be the sum of total utilities derived form each commodity. For example, if the consumed goods are X, Y and Z and their total respective utilities are U_x, U_y, and U_z, then

$$TU_n = U_x+U_y+U_z$$

MARGINAL UTILITY

Marginal utility is another most important concept used in economic analysis. Marginal utility may be defined as the utility derived from the marginal unit consumed. It may also be defined as the addition to the total utility resulting from the consumption of one additional unit. Marginal Utility (MU) thus refers to the change in the Total Utility (i.e.. ΔTU) obtained from the consumption of an additional unit of a commodity. It may be expressed as

$$MU = \frac{\Delta TU}{\Delta Q}$$

Where TU = total utility, and ΔQ = change in quantity consumed by one unit.

Another way of expressing marginal utility (MU), when the number of units consumed is n, can be as follows:

MU of *n*th unit = $TU_n - TU_{n-1}$

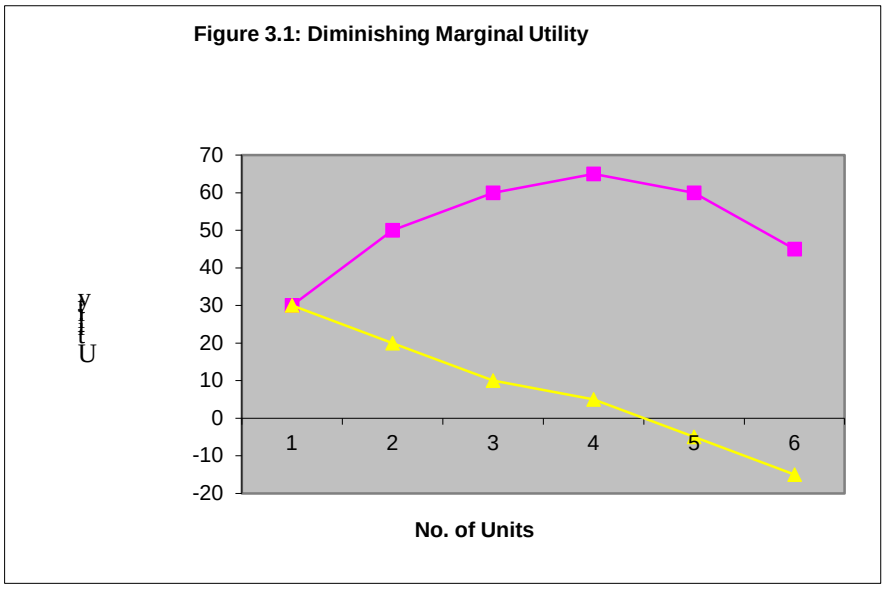
3.2.1 THE LAW OF DIMINISHING MARGINAL UTILITY

The law of diminishing marginal utility is one of the fundamental laws of economics. It states, as the quantity consumed of a commodity increases, the utility derived from each successive unit decreases, remaining the same consumption of all other commodities. In simple words, when a person consumes more and more units of a commodity per unit of time, e.g., ice cream, keeping the consumption of all

other commodities constant, the utility which he derives from the successive units of consumption goes on diminishing. This law applies to all kinds of consumer goods-durable and non-durable sooner or later. Let us assume that utility is measurable in quantitative terms and illustrate the law of diminishing marginal utility. The law of diminishing marginal utility is illustrated numerically in Table 3.1 and graphically in Figure 3.1.

Table 3.1: Total and Marginal Utility Schedules

No. of units	Total Utility	Marginal Utility
1	30	30
2	50	20
3	60	10
4	65	5
5	60	-5
6	45	-15



As shown in Table 3.1, with the increase in the number of units consumed per unit of time, the TU increases but at a diminishing rate. The diminishing MU is shown in the last column. Fig. 3.1

illustrates graphically the law of diminishing MU. The rate of increase in TU as the result of increase in the number of units consumed is shown by the MU curve in Fig. 3.1. The downward sloping MU curve shows that marginal utility goes on decreasing as consumption increases: After four units consumption, the TU reaches its maximum level, the point of saturation, and MU becomes zero. Beyond this, MU becomes negative and TV begins to decline. The downward sloping MV curve illustrates the law of diminishing marginal utility.

WHY DOES THE MU DECREASE?

The utility gained from a unit of a commodity depends on the intensity of the desire for it. When a person consumes successive units of a commodity, his need is satisfied by degrees in the process of consumption and the intensity of his need goes on decreasing: Therefore, the utility obtained from each successive unit goes on decreasing.

Assumptions: The law of diminishing marginal utility holds only under certain conditions. These conditions are referred to as the assumptions of the law. The assumptions of the law of diminishing marginal utility are: (i) the unit of the consumer good must be a standard one, *e.g.*, a cup of tea, a bottle of cold drink, a pair of shoes or trousers, etc. If the units are excessively small or large the law may not hold; (ii) the consumer's taste or preference must remain the same during the period of consumption; (iii) there must be continuity in consumption. Where a break in continuity is necessary, the time interval between the consumption of two units must be appropriately short; and (iv) the mental condition of the consumer must remain normal during the period of consumption.

Given these conditions, the law of diminishing marginal utility holds universally. In some cases, e.g., accumulation of money, collection of hobby items like stamps, old coins, rare paintings and books, melodious songs, etc. the marginal utility may initially increase rather than decrease. But eventually it does decrease. As a matter of fact, the law of marginal utility generally operates universally.

3.2.2 CARDINAL AND ORDINAL CONCEPTS OF UTILITY

Utility is a psychological phenomenon. It is a feeling of satisfaction, pleasure or happiness. Measurability of utility has, however, been a controversial issue. The classical economists like Jeremy Bentham, Leon Walrus, Carl Menger, etc. and neo-classical economist, notably Alfred Marshall-believed that utility is cardinally or quantitatively measurable like height, weight, length, temperature

and air pressure. This belief resulted in the Cardinal Utility concept. The modern economists, most notably J.R. Hicks and R.G.D. Allen, however, hold the view that utility is not quantitatively measurable-it is not measurable in absolute terms. Utility can be expressed only ordinally, relatively or in terms of less than or more than. It is, therefore, possible to list the goods and services in order of their preferences or desirability. This is known as the ordinal concept of utility.

CARDINAL UTILITY

The concept of cardinal utility implies that utility can be assigned a cardinal number like I, 2, 3, etc. the Neo-classical economists built up the theory of consumption on the assumption that utility is cardinally measurable. They used a term “util” meaning 'units of utility'. In their economic analysis, they assumed (i) that one 'util' equals one unit of money, and (ii) that utility of money remains constant. It has, however, been realised over time that absolute or cardinal measurement of utility is not possible. Difficulties in measuring utility have proved to be impossible. Neither economists nor scientists have succeeded in devising a technique or an instrument for measuring the feeling of satisfaction, i. e., utility. Nor could an appropriate measure of unit be devised. Numerous factors affect the state of consumer’s mood, which are impossible to determine and quantify. Utility is therefore immeasurable in cardinal terms.

APPROACHES TO CONSUMER DEMAND ANALYSIS

There are two approaches to the analysis of consumer behaviour.

(i) Cardinal Utility Approach: attributed to Alfred Marshall and his followers, is also called the Neo-classical Approach.

(ii) Ordinal Utility Approach: pioneered by J.R. Hicks, a Nobel laureate and R.G.D. Allen, is also called the Indifference Curve Analysis.

The two approaches are not in conflict with one another. In fact, they represent two levels of superiority in the analysis of consumer behaviour. Both the approaches are important for managerial decisions depending on the level of superiority required. It is important to note in this regard that in spite of tremendous developments in consumption theory based on ordinal utility, the classical demand theory based on cardinal utility has retained its appeal and applicability to the analysis of market behaviour. Besides, the study of classical demand theory serves as a foundation for understanding the advanced

theories of consumer behaviour. The study of classical theory of demand is of particular importance and contributes a great deal in managerial decisions.

In the following sections, we will discuss the theory of consumer behaviour based on the cardinal utility approach. Consumption theory based on the ordinal utility approach is discussed in the subsequent chapter.

3.3 ANALYSIS OF CONSUMER BEHAVIOUR: CARDINAL UTILITY APPROACH

The central theme of the consumption theory is the utility maximizing behaviour of the consumer. The fundamental postulate of the consumption theory is that all the consumers: individuals and households aim at utility maximisation and all their decisions and actions as consumers are directed towards utility maximization. The cardinal utility approach to consumer analysis makes the following assumptions.

(i) Consumer is rational: It is assumed that the consumer is a rational being in the sense that he satisfies his wants in the order of their preference. That is, he or she buys that commodity first which yields the highest utility and that last which gives the least utility.

(ii) Limited income: The consumer has a limited income to spend on the goods and services he or she chooses to consume. Limitedness of income, along with utility maximization objective makes the choice between goods inevitable.

(iii) Maximization of satisfaction: Every rational consumer intends to maximize his/her satisfaction from his/her given money income.

(iv) Utility is cardinally measurable: The cardinalists have assumed that utility is cardinally measurable and that utility of one unit of a commodity equals the money which a consumer is ready to pay for it or 1 util = 1 unit of money.

(v) Diminishing marginal utility: It is assumed that the utility gained from the successive units of a commodity consumed decreases as a consumer consumes larger quantity of the commodity.

(vi) **Constant marginal utility of money:** The cardinal utility approach assumes that marginal utility of money remains constant whatever the level of a consumer's income. This assumption is

necessary to keep the scale of measuring rod of utility fixed. It is important to recall in this regard that cardinalists used money as a measure of utility.

(vii) **Utility is additive:** Cardinalists assumed not only that utility is cardinally measurable but also that utility derived from various goods and services consumed by a consumer can be added together to obtain the total utility. In other words, the consumer has a utility function, which may be expressed as:

$U = f(X_1, X_2, X_3, X_n)$, where X_1, X_2, X_3, X_n denote the total quantities of the various goods consumed.

Given the utility function, total utility obtained form *n* items can be ex pressed as

$U_n = U_1(X_1) + U_2(X_2) + U_3(X_3) + ... + U_n(X_n)$

It is this utility function, which the consumer aims to maximize.

CONSUMER'S EQUILIBRIUM

Conceptually, a consumer is said to have reached his equilibrium position when he has maximized the level of his satisfaction, given his resources and other conditions. Technically, a utility-maximizing consumer reaches his equilibrium position when allocation of his expenditure is such that the last penny spent on each commodity yields the same utility. How does a consumer reach this position? We know from assumptions 2 and 5, that the consumer has limited income and that the utility, which he derives from various commodities, is subject to diminishing returns. We also know that the *MU* schedules of various commodities may not be the same. Some commodities yield a higher marginal utility and some lower for the same number of units consumed. In some cases, *MU* decreases more rapidly than in case of others for the same number of units consumed. A rational and utility-maximising consumer consumes commodities in the order of their utilities. He first picks up the commodity, which yields the highest utility followed by the commodity yielding the second highest utility and so on. He switches his expenditure from one commodity to the other in accordance with their marginal utilities. He continues to switch his expenditure from one commodity to another till 'he reaches a stage where MU 'Of each commodity is the same per unit of expenditure. This is the state of consumer's equilibrium.

(i) Consumer's Equilibrium: One-Commodity Model:

Let us first illustrate consumer's equilibrium in a simple one-commodity model. Suppose that a consumer with certain money income consumes only one commodity, X. Since both his money income and commodity X have utility) for him, he can either spend his income on commodity X or retain it in the form of asset. If the marginal utility of commodity X, (MU_x), is greater than marginal utility of money (MU_m) as an asset, a utility-maximizing consumer will exchange his money income for the commodity. By assumption, MU_x is subject to diminishing returns (assumption 5), whereas marginal utility of money (MU_m) as an asset remains constant (assumption 6). Therefore, the consumer will exchange his money income on commodity X so long as $MU_x > P_x(MU_m)$, P_x being the price of commodity X and $MU_m = 1$ (constant). The utility maximizing consumer reaches his equilibrium, i.e., the level of maximum satisfaction, where

$$MU_x = P_x(MU_m)$$

Alternatively, the consumer reaches equilibrium point where,

$$\frac{MU_x}{P_x(MU_m)} = 1$$

Consumer's equilibrium in a single commodity model is graphically illustrated in Figure 3.2 as follows.

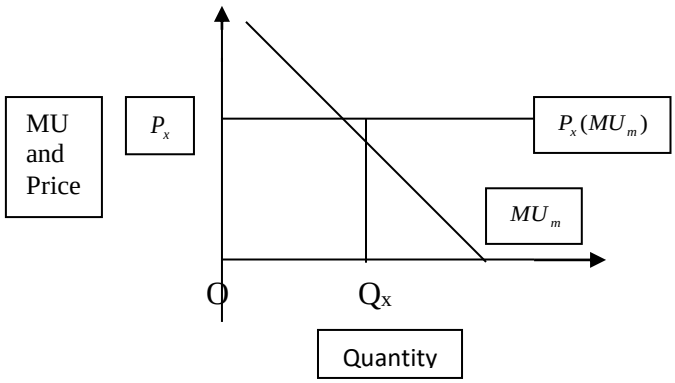


Figure 3.2: Consumer's Equilibrium

The horizontal line $P_x(MU_m)$ shows the constant utility of money weighted by the price of commodity X (i.e. P_x) and MU_x curve represents the diminishing marginal utility of commodity X. The $P_x(MU_m)$ line and MU_x curve intersect each other at point E. Point E indicates that at quantity OQ_x consumed, $MU_x = P_x(MU_m)$, Therefore, the consumer is in equilibrium at point E. At any point beyond *E*, $MU_x > P_x(MU_m)$. Therefore, if the consumer exchanges his money for commodity *X*, he

will increase his total satisfaction because his gain in terms of MU_x is greater than his loss in terms of MU_m, This conditions exists till he reaches point *E.* And, at Quantity any point below *E*, $MU_x < P_x(MU_m)$. Therefore, if he consumes more than OQ_x, he loses more utility than he gains. He is therefore a net loser. The consumer can, therefore, increase his satisfaction by reducing his consumption. This means that at any point other than *E*, consumer's total satisfaction is less than maximum satisfaction. Therefore, point E is the point of equilibrium.

(ii) Consumer's Equilibrium with Multiple-Commodity Model or The Law of Equi-Marginal Utility:

In real life, however, a consumer consumes multiple numbers of goods and services. So the question arises: How does a consumer consuming multiple goods reach his equilibrium? The law of equi-marginal utility explains the consumer's equilibrium in a multi-commodity model. This law states that a consumer consumes various goods in such quantities that the MU derived per unit of expenditure on each good is the same. In other words, a rational consumer spends his income on various goods he consumes in such a manner that each rupee spent on each good yields the same MU. Let us now explain consumer's equilibrium in a multi-commodity model. Here, we will consider only a two-commodity case. Suppose that a consumer consumes only two commodities, X and Y, their prices being P_x and P_y, respectively. Following the equilibrium rule of the single commodity case, the consumer will distribute his income between commodities X and Y, so that

$MU_x = P_x(MU_m)$ and $MU_y = P_y(MU_m)$

Given these conditions, the consumer is in equilibrium where

$$\frac{MU_x}{P_x(MU_m)} = 1 = \frac{MU_y}{P_y(MU_m)} \quad \text{.....(3.1)}$$

Since, according to assumption (6), MU of each unit of money (or each rupee) is constant at I, Equation (3.1) can be rewritten as

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} \quad \text{.....(3.2)}$$

$$\frac{MU_x}{MU_y} = \frac{P_x}{P_y} \text{ ……..……(3.3)}$$

Equation (3.2) leads to the conclusion that the consumer reaches his equilibrium when the marginal utility derived from each rupee spent on the two commodities *X* and *Y* is the same. The two-commodity case can be used to generalize the rule for consumer's equilibrium for a consumer consuming a, large number of goods and services with a given income and at different prices. Supposing, a consumer consumes *A* to Z goods and services, his equilibrium condition may be expressed as

$$\frac{MU_A}{P_A} = \frac{MU_B}{P_B} = \ldots\ldots = \frac{MU_Z}{P_Z} = MU_m \text{ ……(3.4)}$$

Equation (3.4) gives the Law of Equi-marginal Utility.

It is important to note that, in order to achieve his equilibrium, what a utility maximizing consumer intends to equalize is not the marginal utility of each commodity he consumes, but the marginal utility per unit of his money expenditure on various goods and services.

3.4 CHECK YOUR PROGRESS

1. A commodity that the consumer prefers less to more of is referred to as a ‘bad’.(T/F)
2. If the total utility obtained from consuming a given good is maximised then marginal utility will be approaching zero. (T/F)
3. Transitivity of choice implies that if the consumer prefers one good to another they should never change that preference. (T/F)
4. The characteristics approach to consumer demand sees utility as being derived from the characteristics inherent within the good. (T/F)
5. Total utility at zero level of consumption is zero. (T/F)

3.5 SUMMARY

An individual demand the commodities due to their utility and utility is the want- satisfying property of a commodity. In addition, it is the psychological feeling of satisfaction; pleasure, happiness or well being which a consumer derives from the consumption, possession or the use of a commodity. Further, the demand for goods in terms of quantity is based upon their MU. If the marketers increase MU in terms of reuse of the product, reduction in price, change in the design of the product etc.; than they may create the demand for the same commodities.

3.6 KEYWORDS

Total Utility- Total utility may be defined as the sum of the utilities derived by a consumer from the various units of goods and services he consumes.

Marginal Utility- It may also be defined as the addition to the total utility resulting from the consumption of one additional unit.

Law of Diminishing Marginal Utility- It states, as the quantity consumed of a commodity increases, the utility derived from each successive unit decreases, remaining the same consumption of all other commodities.

Consumer Equilibrium- A consumer is said to have reached his equilibrium position when he has maximized the level of his satisfaction, given his resources and other conditions.

3.6 SELF-ASSESSMENT TEST

1. What do you mean by utility and the concept of cardinal utility?
2. Define the law of diminishing marginal utility.
3. What is the meaning of consumer equilibrium with reference to cardinal approach?
4. Define the marginal rate of substitution. What is the law behind the diminishing marginal rate of substitution?
5. Define the concepts of TU and MU and distinguish them.

3.7 ANSWER TO CHECK YOUR PROGRESS

1. True
2. False
3. False
4. True
5. True

3.8 REFERENCES/SUGGESTED READINGS

1. Boulding, K.E., *Economics Analysis: Microeconomics,* Vol. I, 4th ed., New York, Harper And Row, 1966,
2. Baumal, W.L., *Economic Theory and Operations Analysis,* 4th ed., New Delhi, Prentice Hall Of India, 1985,
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4. Koutsoyanis, A., *Modern Microeconomics,* Macmillon, 1979,
5. Marshall, A., *Principles Of Economics,* 8th Edn., London, Macmillan & Co., 1920

Course: **Micro Economics**	
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Ordinal Utility Theory: Indifferent Curve Approach

STRUCTURE:

4.0 Learning Objectives

4.1 Introduction

4.2 Ordinal Utility Approach

4.2.1 Meaning of Indifference Curve

4.2.2 Budgetary Constraint and Budget Line

4.3 Consumer's Equilibrium

4.3.1 Effects of Change in Income on Consumer Demand

4.3.2 Cardinal Approach Versus Ordinal Utility Approach

4.4 Check Your Progress

4.5 Summary

4.6 Keywords

4.7 Self-Assessment Test

4.8 Answer to Check Your Progress

4.9 References/Suggested Readings

4.0 LEARNING OBJECTIVE

After going through this lesson the students should be able to explain the meaning of ordinal utility,

indifference curve and ordinal concept of utility with reference to consumer behaviour.

4.1 INTRODUCTION

The modern economists have discarded the concept of cardinal utility and have instead employed the concept of ordinal utility for analysing consumer behaviour. The concept of ordinal utility is based on the fact that it may not be possible for consumers to express the utility of a commodity in absolute terms, but it is always possible for a consumer to tell introspectively whether a commodity is more or less or equally useful as compared to another. For example, a consumer may not be able to tell that an ice-cream gives 5 utils and a chocolate gives to utils. But he or she can always tell whether chocolate gives more or less utility than ice-cream. This assumption forms the basis of the ordinal theory of consumer behaviour. While neo-classical economists maintained that cardinal measurement of utility is practically possible and is meaningful in consumer analysis, modem economists maintain that utility being a psychological phenomenon is inherently immeasurable, theoretically or conceptually and quantitatively as well. They also maintain that the concept of ordinal utility is a practical concept and it meets the conceptual requirement of analysing the consumer behaviour in the absence of any cardinal measures of utility.

4.2 ORDINAL UTILITY APPROACH

Unlike Marshall, the modern economists-Hicks in particular-have used the ordinal utility concept to analyse consumer's behaviour. This is called ordinal utility approach. Hicks has used a different tool of analysis called "indifference curve" to analyse consumer behaviour.

ASSUMPTIONS OF ORDINAL UTILITY THEORY

(i) Rationality of consumer: The consumer is assumed to be a rational being. Rationality means that a consumer aims at maximizing his total satisfaction given his income and prices of the goods and services that he consumes and his decisions are consistent with this objective.

(ii) Ordinal Utility: Indifference curve analysis asslli1es that utility is only ordinally expressible. That is, the consumer is only able to tell the order of his preference for different basket of goods.

(iii) **Transitivity and consistency of choice:** Consumer's choices are assumed to be transitive. Transitivity of choice means that if a consumer prefers A to B and B to C, he must prefer A to C. Or, if he treats A=B and B=C, he must treat A=C. Consistency of choice means that if he prefers A to B in one period, he will not prefer B to A in another period or even treat them as equal.

(iv) **No saturation:** It is also assumed that the consumer is never over-supplied with goods in question. That is, he has not reached the point of saturation in case of any commodity. Therefore, a consumer always prefers a larger quantity of all the goods.

(v) **Diminishing marginal rate of substitution:** The marginal rate of substitution is the rate at which a consumer is willing to substitute one commodity (X) for another (Y) so that his total satisfaction remains the same. This rate is given as D_Y/D_X. The ordinal utility approach assumes that D_Y/D_X goes on decreasing when a consumer continues to substitute X for Y.

4.2.1 MEANING AND NATURE OF INDIFFERENCE CURVE

An indifference curve may be defined as the locus of points. Each point represents a different combination of two substitute goods, which yield the same utility or level of satisfaction to the consumer. Therefore, he/she is indifferent between any two combinations of goods when it comes to making a choice between them. Such a situation arises because he/she consumes a large number of goods and services and often finds that one commodity can be substituted for another. It gives him/her an opportunity to substitute one commodity for another, if need arises and to make various combinations of two substitutable goods which give him/her the same level of satisfaction. If a consumer faced with such combinations, he/she would be indifferent between the combinations. When such combinations are plotted graphically, the resulting curve is called indifference curve. An indifference curve is also called Isoutility curve or Equal utility curve. For example, let us suppose that a consumer makes five combinations a, b, c, d and e of two substitute commodities, X and Y, as presented in Table 4.1. All these combinations yield the same level of satisfaction.

TABLE 4.1: INDIFFERENCE SCHEDULE OF COMMODITIES X AND Y

Combination	**Units of Commodity Y**	**Units of Commodity X**	**Total Utility**
a	25	3	U
b	15	6	U
c	8	9	U
d	4	17	U
e	2	30	U

Table 4.1 is an indifference schedule-a schedule of various combinations of two goods, between which a consumer is indifferent. The last column of the table shows an undefined utility (U) derived from each combination of X and Y. The combinations a, b, c, d and e given in Table 4.1 are plotted and joined by a smooth curve (as shown in Figure 4.1).

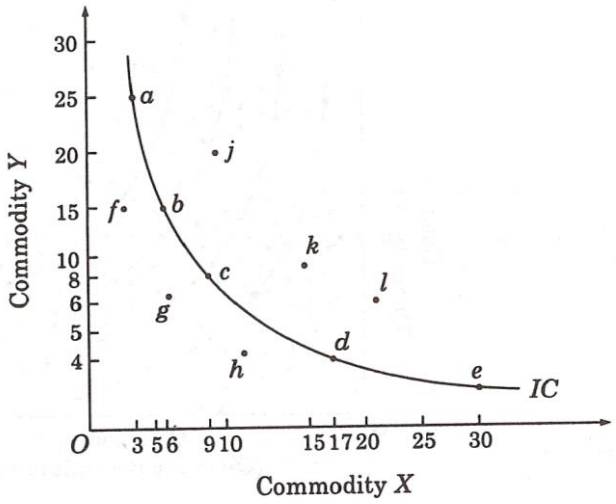
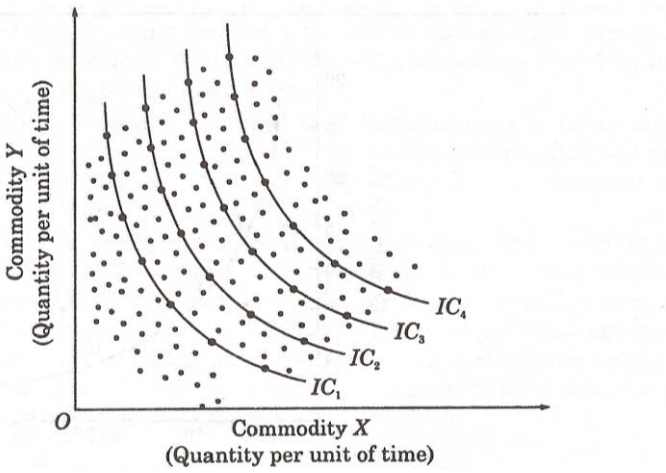


Figure 4.1: Indifference Curve

The resulting curve is known as an indifference curve. On this curve, one can locate many other points showing different combinations of X and Y which yield the same level of satisfaction. Therefore, the consumer is indifferent between the combinations, which may be located on the indifferent curve.

Indifference Map: The combinations of the two commodities, X and Y, given in the indifference schedule or those indicated by the indifference curve are by no means the only combinations of the two commodities. The consumer may make many other combinations with less of one or both of the goods- each combination yielding the same level of satisfaction but less than the level of satisfaction indicated by the indifference curve (IC) in Figure 4.1. As such, an indifference curve below the one given in Figure 4.1 can be drawn, say, through points f, g and h. Similarly, the consumer may make many other combination with more of one or both the goods; each combination yielding the same satisfaction but greater than the satisfaction indicated by IC. Thus, another indifference curve can be drawn above IC, say, through points j, k and l. This exercise may be repeated as many times as one wants, each time generating a new indifference curve. In fact; the space between X and Y-axes is known as the 'indifference plane' or 'commodity space'. This plane is full of finite points and each point on the plane indicates a different combination of goods X and Y. Intuitively, it is always possible to locate any two or more points a indicating different combinations of goods X and Y yielding the same satisfaction. It is thus possible to draw a number of indifference curves without intersecting or touching the other, as shown in Figure 4.2.



The set of indifference curves IC_1, IC_2, IC_3 and IC_4 drawn in this manner make the indifference map. In fact, an indifference map may contain any number of indifference curves, ranked in the order of consumer's preferences.

THE MARGINAL RATE OF SUBSTITUTION (MRS)

Substituting one good for another forms an indifference curve. The MRS is the rate at which one

commodity can be substituted for another, the level of satisfaction remaining the same. The MRS between two commodities X and Y, may be defined as the quantity of X which is required to replace one unit of Y (or quantity of Y required to replace one unit of X), in the combination of the two goods so that the total utility remains the same. This implies that the utility of X (or Y) given up is equal to the utility of additional units of Y (or X). The MRS is expressed as D_Y/D_X, moving down the curve. The Diminishing MRS The basic postulate of ordinal utility theory is that $MRS_{y,x}$ (or $MRS_{x,y}$) decreases. It means that the quantity of a commodity that a consumer is willing to sacrifice for an additional unit of another goes on decreasing when he goes on substituting one commodity for another. The diminishing $MRS_{x,y}$ obtained from combinations of X and Y given in Table 4.1 are presented in Table 4.2.

Table 4.2: The Diminishing MRS between Commodities X and Y

Indifference Points	Combinations Y + X	Change in Y (-ΔY)	Change in X (ΔX)	$MRS_{y,x}$ (ΔY/ΔX)
a	25 + 3	-	-	-
b	15 + 6	-10	3	- 3.3
c	8 + 9	-7	3	- 2.3
d	4 + 17	-4	9	- 0.4
e	2 + 30	-2	13	- 0.2

As Table 4.2 shows, when the consumer moves from point *a* to *b* on his indifference curve (Figure 4.1) he/she gives up 10 units of commodity Y and gets only 3 units of commodity X, so that

$$MRS_{y,x} = \frac{\Delta Y}{\Delta X} = \frac{-10}{3} = -3.3$$

As he moves down from point b to c, he loses 7 units of Y and gains 3 units of X, giving

$$MRS_{y,x} = \frac{\Delta Y}{\Delta X} = \frac{-10}{3} = -3.3$$

The $MRS_{y,x}$ goes on decreasing as the consumer moves further down along the indifference curve, from point c through d and e. The diminishing marginal rate of substitution causes the indifference curves to be convex to the origin.

WHY DOES *MRS* DIMINISH?

The MRS decreases along the IC curve because, in most cases, no two goods are perfect substitutes for one another. In case any two goods are perfect substitutes, the indifference curve will be a straight line with a negative slope and constant MRS. Since goods are not perfect substitutes, the subjective value attached to the additional quantity (i.e., subjective MU) of a commodity decreases fast in relation to the other commodity whose total quantity is decreasing. Therefore, when the quantity of one commodity (X) increases and that of the other (Y) decreases, the subjective MU of Y increases and that of X decreases. Therefore, the consumer becomes increasingly unwilling to sacrifice more units of Y for one unit of X. But, if he is required to sacrifice additional units of Y, he will demand increasing units of X to maintain the level of his satisfaction. As a result, the MRS decreases.

Furthermore, when combination of two goods at a point on indifference curve is such that it includes a large quantity of one commodity (Y) and a small quantity of the other commodity (X), then consumer's capacity to sacrifice Y is greater than to sacrifice X. Therefore, he can sacrifice a larger quantity of Y in favour of a smaller quantity of X. For example, at combination a (see the indifference schedule; Table 4.1), the total stock of Y is 25 units and that of X is 5 units. That is why the consumer is willing to sacrifice 10 units of Y for 3 unit of X (Table 4.2). This is an observed behavioural rule that the consumer's willingness and capacity to sacrifice a commodity is greater when its stock is greater and it is lower when the stock of a commodity is smaller. These are the reasons why MRS between the two substitute goods decreases all along the indifference curve.

PROPERTIES OF INDIFFERENCE CURVE

Indifference curves have the four basic properties: Indifference curves have a negative slope; Indifference curves are convex to the origin; Indifference curves do not intersect nor are they tangent to one another; and upper indifference curves indicate a higher level of satisfaction. These properties of indifference curves, in fact, reveal the consumer's behaviour, his choices and preferences. They are, therefore, very important in the modern theory of consumer behaviour. Now, we will observe their implications.

Indifference Curves have a negative slope: In the words of Hicks, “so long as each commodity has a positive marginal utility, the indifference curve must slope downward to the right", as shown in Fig. 4.1.

The negative slope of indifference curve implies (i) that the two commodities can be substituted for each other; and (ii) that if the quantity of one commodity decreases, quantity of the other commodity must increase so that the consumer stays at the same level of satisfaction. If quantity of the other commodity does not increase simultaneously, the bundle of commodities will decrease as a result of decrease in the quantity of one commodity. And, a smaller bundle of goods is bound to yield a lower level of satisfaction. The consumer's satisfaction cannot remain the same if indifference curves have a positive slope (i.e., $\Delta Y/\Delta X>0$) or if slope is equal to infinity, (i.e., $\Delta Y/\Delta X>\infty$). These situations are shown in Fig. 4.3 through inconsistent indifference curves.

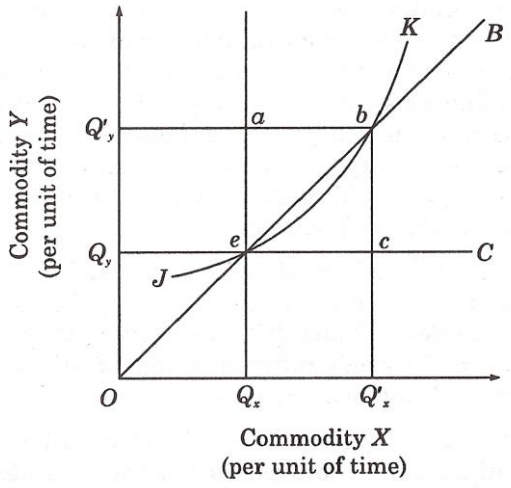


Figure 4.3: Inconsistent Indifference Curves

Let us suppose that the consumer is initially at point *e* where he/she is deriving some utility from OQ_x of X and OQ_y of Y. If an indifference curve has a positive slope (i.e., $\Delta Y/\Delta X>0$); as shown by the line OB and curve JK, it implies that the consumer is equally satisfied with larger and smaller baskets of X and Y. This means an irrational behaviour of the consumer. For example, if the consumer moves from point *e* to *b*, the combination of the two goods increases by *ea* (= bc) of Y and *ec* (= ab) of X. Unless *MU* of *ea* and *ec* are equal to zero, the level of satisfaction is bound to increase whereas on an indifference curve, the total utility is supposed to remain the same. Therefore, line OB and curve JK cannot be indifference curves.

Similarly, in the case of a vertical indifference line, aQ_x, and the movement from *e* to *a* means an increase in the quantity of Y by *ea*, while quantity of X remains the same, OQ_x. If MU of $ea>0$, the total utility will increase. So is the case if an indifference curve takes the shape of a horizontal line, like Q_yC.

Indifference Curves are Convex to Origin: Indifference curves are not only negatively sloped, but are also convex to the origin. The convexity of the indifference curves implies two properties: (a) the two commodities are imperfect substitutes for one another, and (b) the marginal rate of substitution (MRS) between the two goods decreases as a consumer moves along an indifference curve. This characteristic of indifference curves is based on the postulate of diminishing marginal rate of substitution.

The postulate of diminishing MRS, as mentioned above, states an observed fact that if a consumer substitutes one commodity (X) for another (Y), his willingness to sacrifice more units of Y for one additional unit of X decreases, as quantity of Y decreases. There are two reasons for this: (i) two commodities are not perfect substitutes for one another, and (ii) MU of a commodity increases as its quantity decreases and vice versa, and, therefore, more and more units of the other commodity are needed to keep the total utility constant.

Indifference Curves can Neither Intersect nor be Tangent with one another: If two indifference curves intersect or are tangent with one another, it will reflect two rather impossible conclusions: (i) that two equal combinations of two goods yield two different levels of satisfaction, and (ii) that two different combinations-one being larger than the other-yield the same level of satisfaction. Such conditions are impossible if the consumer's subjective valuation of a commodity is greater than zero. Besides, if two indifference curves interest, it would mean negation of consistency or transitivity assumption in consumer's preferences.

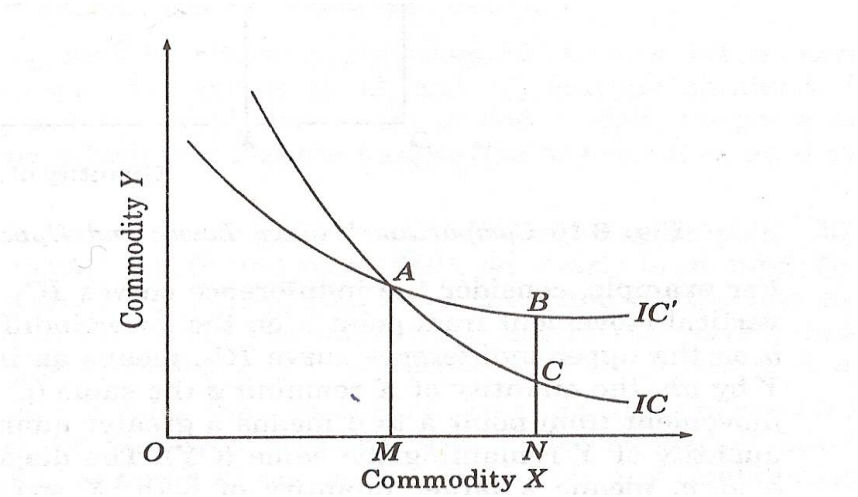


Figure 4.4: Intersecting Indifference Curves

Let us now see what happens when two indifference curves, IC and IC^1, intersect each other at point A (Fig. 4.4). Point A falls on both the indifference curves, IC and IC^1. It means that the same basket of goods (OM of X + AM of Y) yields different levels of utility below and above point A on the same indifference curve. The inconsistency that two different baskets of X and Y yield the same level of utility can be proved as follows. Consider two other points: point B on indifference curve IC^1 and point C on indifference curve IC both being on a vertical line. Points A, Band C represent three different combinations of commodities X and Y. Let us call these combinations as A, Band C, respectively. Note that combination A is common to both the indifference curves. The intersection of the two IC_s implies that in terms of utility, A=B; and A=C; therefore A=C. But if B = C it would mean that in terms of utility,

ON of X + BN of Y = ON of X + CN of Y

Since ON of X is common to both the sides, the above equation would mean that

BN of Y = CN of Y

But, Figure 4.4 shows BN> CN. Therefore, combinations Band C cannot be equal in terms of satisfaction. The intersection, therefore, violates the transitivity rule, which is a logical necessity in indifference curve analysis. The same reasoning is applicable when two indifference curves are tangent with each other.

Upper Indifference Curves Represent a Higher Level of Satisfaction than the Lower Ones: An indifference curve placed above and to the right of another represents a higher level of satisfaction than the lower one. In Figure 4.5, indifference curve IC_2 is placed above the curve IC_1. It represents, therefore, a higher level of satisfaction. The reason is that an upper indifference curve contains all along its length a larger quantity of one or both the goods than the lower indifference curve. And a larger quantity of a commodity is supposed to yield a greater satisfaction than the smaller quantity of it, provided MU>0. For example, consider the indifference curves IC_1 and IC_2 in, Figure 4.5.

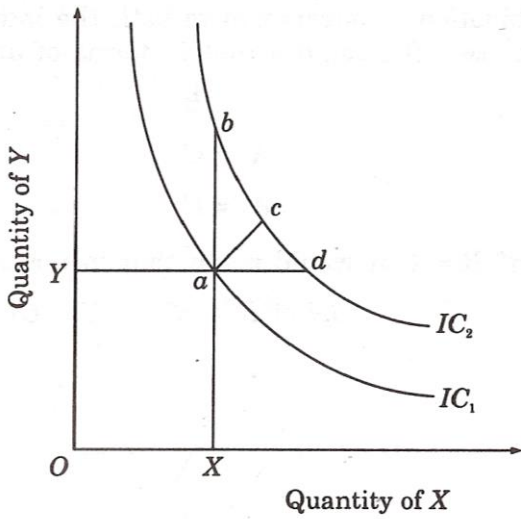


Figure 4.5: Comparison between Lower and Upper Indifference Curves

The vertical movement from point a on the lower indifference curve IC_1 to point b and Quantity of X on the upper indifference curve IC_2, means an increase in the quantity of Y by *ab*, the quantity of X remaining the same (OX). Similarly, a horizontal movement from point a to d means a greater quantity (*ad*) of commodity X, quantity of Y remaining the same (OY). The diagonal movement, i.e., from *a* to *c*, means a larger quantity of both X and Y. Unless the utility of additional quantities of X and Yare equal to zero, these additional quantities will yield additional utility. Therefore, the level of satisfaction indicated by the upper indifference curve (IC_2) would always be greater than that indicated by the lower indifference curve (IC_1).

4.2.2 BUDGETARY CONSTRAINT AND THE BUDGET LINE

Given the indifference map, a utility maximizing consumer would like to reach the highest possible indifference curve on his indifference map. But the consumer is assumed to have a limited income. The limitedness of income acts as a constraint on how high a consumer can ride on his indifference map. This is known as budgetary constraint. In a two-commodity model, the budgetary constraint, may be expressed through a budget equation as

$$P_x \cdot Q_x + P_y \cdot Q_y = M$$

Where P_x and P_y are prices of X and Y, respectively, and Q_x and Q_y are their respective quantities; M is the consumer's money income. The budget equation states that the total expenditure of the consumer on goods X and Y cannot exceed his total income, M. The quantities of X and Y can be easily obtained from the budget equation, as shown below.

$$Q_x = \frac{M}{P_x} - \frac{P_y}{P_x} Q_y \quad \text{and} \quad Q_y = \frac{M}{P_y} - \frac{P_x}{P_y} Q_x$$

These equations are also called budget equations. Given Y the budget equations, if M, P_x and P_y are known, the values of Q_x and Q_y and different combinations thereof can be easily calculated. Now, Q_x or Q_y may be alternatively assigned any positive numerical value and the corresponding values of Q_y and Q_x may be obtained. When the values of Q_x and Q_y are plotted on the X and Y axes, we get a line with a negative slope, which is called the budget line or price line, as shown in Figure 4.6.

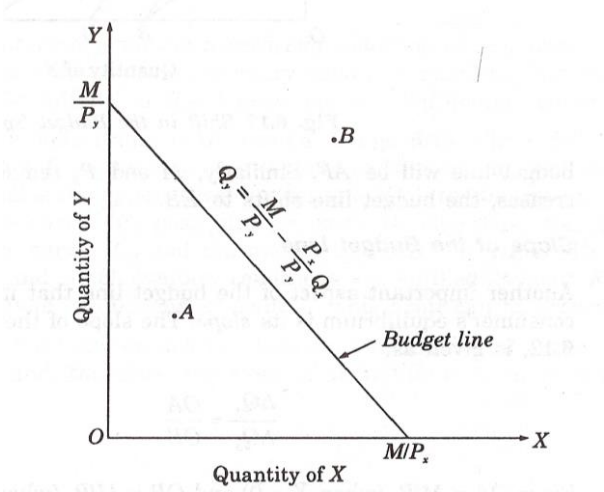


Figure 4.6: Budget Line and Budget Space

An easier method of drawing the budget line is to mark point M/P_y on the Y axis (assuming $Q_x = 0$) and point M/P_x on X-axis (assuming Qy = 0) and to join these points by a line. This gives the same budget line as given by the equation in Figure 4.6. The budget line shows the market opportunities available to the consumer given his income and the prices of X and Y. The budget line divides the commodity space into two parts: (i) feasibility area, and (ii) non-feasibility area. The area under the budget line (including the budget line) is feasibility area (Figure 4.6). For, any combination of goods X and Y represented by a point within this area (e.g., point A) or on the boundary line (i.e., on the budget line) is a feasible

combination, given M, P_x and P_y The area beyond the budget line is non-feasibility area because any point falling in this area, e.g., point B, is unattainable (given M, P_x and P_y). Shifts in the Budget Line The budget line shifts upward or downward or swivels due to change in the consumer's income and prices of the commodities. If the consumer's income increases, prices remaining the same, the budget line shifts upwards, and remaining parallel to the original budget line. Suppose, the original budget line is given by line *AB* in Figure 4.7.

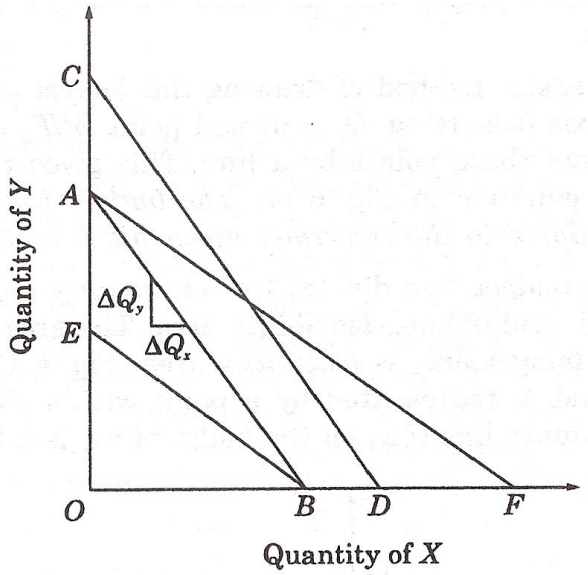


Fig. 4.7: Shift in the Budget Space

If M increases (prices remaining the same), the budget line AB will shift to CD. And, if M decreases by the same amount, the budget line will shift backward to its original position AB. Income remaining the same, if prices change, the budget line changes its position. For example, if M and P_y remain constant and P_x decreases to a half then the budget line will be AF. Similarly, M and P_x remaining constant; if P_y increases, the budget line shifts to EB.

Slope of the Budget Line: Another important aspect of the budget line that matters in determining a consumer's equilibrium is its slope. The slope of the budget line (AB) in Figure 4.8, is given as:

$$\frac{\Delta Q_y}{\Delta Q_x} = \frac{OA}{OB}$$

Since OA = M/P_y (when X = 0) and OB = M/ P_x (when Y = 0), the slope of the budget line AB in Fig. 4.8 may be rewritten as

$$\frac{OA}{OB} = \frac{M/P_y}{M/P_x} = \frac{P_x}{P_y}$$

Thus, the slope of the budget line is the same as the price ratio of the two commodities.

4.3 CONSUMER'S EQUILIBRIUM

As noted earlier, a consumer attains his equilibrium when he maximizes his total utility, given his income and market prices of the goods and services that he consumes. The ordinal utility approach specifies two conditions for the consumer's equilibrium: (i) necessary or the first order condition and (ii) supplementary or the second order condition. In a two-commodity model, the necessary or the first order condition under ordinal utility approach is the same as equilibrium condition under cardinal utility approach. It is given as

$$\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$$

Since, by implication, $MU_x/MU_y = MRS_{x,y}$ the necessary condition of equilibrium under ordinal utility approach can be written as

$$MRS_{x,y} = \frac{MU_x}{MU_y} = \frac{P_x}{P_y}$$

This is a necessary but not a sufficient condition of consumer's equilibrium. The, second order or supplementary condition requires that the necessary condition be fulfilled at the highest possible indifference curve.

Consumer's equilibrium is illustrated in Figure 4.8. The indifference curves IC), IC2 and IC3 present a hypothetical indifference map of the consumer. The line AB is the hypothetical budget line. Both the budget line AB and the indifference curve IC_2 pass through point E. Therefore, the slopes of the indifference curve IC_2 and the budget line (AB) are equal. Thus, both the necessary and supplementary conditions are fulfilled at point E. Therefore; consumer is in equilibrium at point E. This point can' be proved as follows.

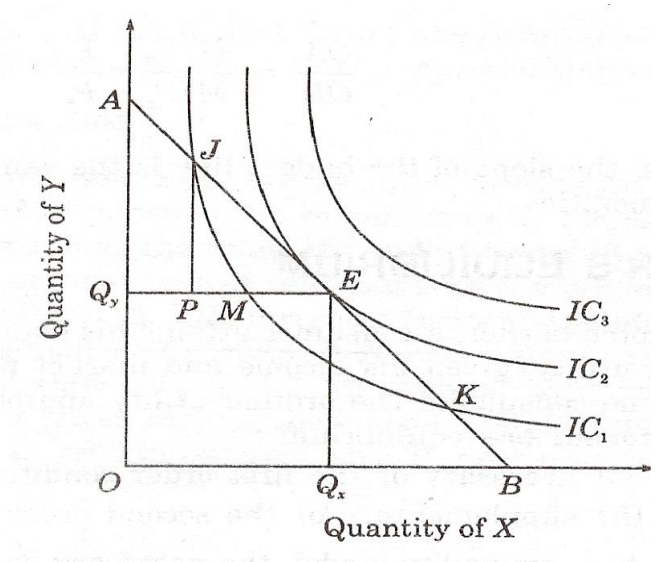


Figure 4.8: Equilibrium of the Consumer

We know that between any two points on an indifferent curve, $\Delta Y.MU_y = \Delta X. MU_x$ and, therefore, the slope of an indifference curve is given by

$$\frac{\Delta Y}{\Delta X} = \frac{MU_x}{MU_y} = MRS_{x,y}$$

We know also that the slope of the budget line is given by

$$\frac{OA}{OB} = \frac{P_Y}{P_X}$$

As shown in Figure 4.8, at point E, $MRS_{x,y} = \frac{P_Y}{P_X}$. Therefore, the consumer is in equilibrium at point E.

The tangency of IC_2 with the budget line AB indicates that IC_2 is the highest possible indifference curve, which the consumer can reach, given his budgetary constraint and the prices. At equilibrium point E, the consumer consumes OQ_x of X and OQ_y of Y, which yield him the maximum satisfaction. Although, the necessary condition is also satisfied on two other points, J and K (i.e., the points of intersection between the budget line AB and indifference curve IC_1), these points do not satisfy the

second order condition. Indifference curve IC_1 is not the highest possible curve on which the necessary condition is fulfilled. Since indifference curve IC_1 lies below the curve IC_2, at any point on IC_I, the level of satisfaction is lower than the level of satisfaction indicated by IC_2. So long as the utility maximizing consumer has an opportunity to reach the curve IC_2, he would not like to settle on a lower indifference curve.

From the information contained in Figure 4.8, it can be proved that the level of satisfaction at point E is greater than that on any other point on IC_I. Suppose the consumer is at point J. If he moves to point M, he will be equally well-off because points J and M are on the same indifference curve. If he moves from point J to M, he will have to sacrifice JP of Y and take PM of X. But in the market, he can exchange JP of Y for PE of X. That is, he gets extra ME (= PE - PM) of X. but in the market he can exchange JP of Y for PE of X. That is, he gets extra utility ME (= PE-PM) of X. Since ME gives him extra utility, the consumer moves to point E which means a utility higher than the point M. Therefore, point E is preferable to point M. The consumer will, therefore, have a tendency to move to point E from any other point on .the curve IC_1 in order to reach the highest possible indifference curve, all other things (taste., preference and prices of goods) remaining the same. Another fact which is obvious from Figure 4.8 is that, due to budget constraint, the consumer cannot move to an indifference curve placed above and to the right of IC_2. For example, his income would be insufficient to buy any combination of two goods at the curve IC_3. Note that the indifference curve IC_3 falls in the infeasibility area.

4.3.1 EFFECTS OF CHANGE IN INCOME ON CONSUMER DEMAND

Generally, it is observed that the income of consumer change the quantity demanded by a consumer. Assuming, other things remaining the same; when a consumer's income changes, his capacity to buy goods and services changes too, these changes may be shown by a parallel upward or downward shift in the consumer's budget line. As shown in Figure 4.7, when a consumer’s income decreases, his budget line shifts downward and when his income increases, the budget line shifts upward. With the changes in his income, the consumer moves from one equilibrium point to another. Such movements show the rise and fall in the consumption basket. This is called, "income effect"; illustrated in Figure 4.9.

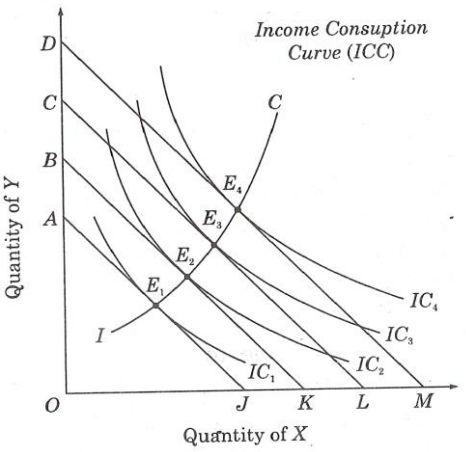


Figure 4.9: Income consumption curve of normal goods

The indifference curves IC_1, IC_2, IC_3 and IC_4 represent the consumer's indifference map. To analyse the effect of change in income on consumption, let us suppose that the consumer has a given income and prices of goods X and Y are given and his budget line is given by AJ, and that the consumer is initially in equilibrium at E_1 on the IC_1. Now let the consumer's income increase so that his budget line shifts from position AJ to BK and the consumer reaches a new equilibrium point, E_2 on IC_2. Similarly, if his income increases further, he moves from equilibrium E_2 to E_3 and then to E_4. Thus, with each successive upward shift in the budget line, the equilibrium position of the consumer moves upward. The successive equilibrium combinations of goods (X and Y) at four different levels of income are indicated by points E_1, E_2, E_3 and E_4 in Figure 4.9. If these points of equilibrium are joined by a curve, we, get the path of increase in consumption resulting from the increase in income. Tl1is curve is called the income consumption curve (lCC). The income-consumption curve may be defined as the locus of points representing various equilibrium quantities of two commodities consumed by a consumer at different levels of income, all other things remaining constant. The movement from point E_1, towards point E_4 indicates increase in the consumption of the normal goods X and Y. This is called income effect.

Income-Effect on Inferior Goods

The income-effect on the consumption of different kinds of commodities is not uniform. It can be positive or negative or even neutral. Whether-the income effect is positive or negative depends on the nature of a commodity. In case of normal goods, income-effect is positive and in case of inferior goods, it is negative. By definition, an inferior good is one whose consumption decreases when income increases. In Figure 4.9, consumption of both the commodities, X and Y, increases with an increase in the consumer's income. Therefore, the income-effect on both X and Y is positive. Figure 4.10 (a) and (b) present the case of negative income effect. In Figure 4.10 (a), X is an inferior good; its consumption decrease when consumer's income increases. The income-effect on consumption of X is, therefore, negative. Similarly, in Fig. 4.10 (b), income-effect on Y is negative as Y is considered to be an inferior commodity. Consumption of Y decreases with increase in income.

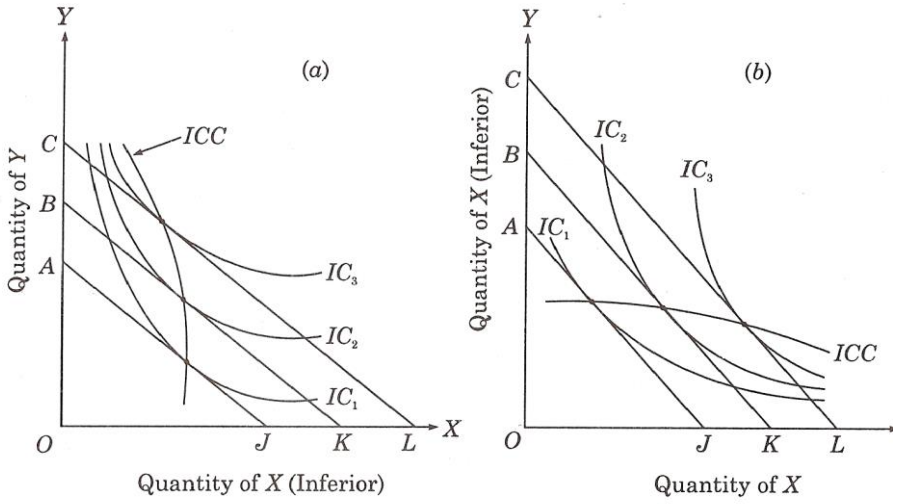


Figure 4.10: Income consumption curve of normal goods

In fact, whether a commodity is a normal good or an inferior good depends on whether income-effect on its consumption is positive or negative. If income effect is positive, the commodity is considered to be a 'normal good' and if it is negative, the commodity is said to be an 'inferior good'. Thus, the income consumption-curve may take various shapes depending on whether a commodity is a 'normal good' or an 'inferior good'.

Effects of Change in Prices on Consumption

The change in the price of a commodity changes the slope of the budget line and disturbs the

consumer's equilibrium. A rational consumer adjusts his consumption basket with a view to maximizing his satisfaction under the new price conditions. The change in consumption basket is called "price-effect". It may be defined as the total change in the quantity consumed of a commodity due to a change in its price. To examine the price-effect, let us introduce to our two-commodity model, it changes in price of commodity X. holding constant the consumer's income, his taste and preference and the price of commodity Y. The consumer's response to a change in the price of X and the resulting change in the combination of the two goods are illustrated in Figure 4.11.

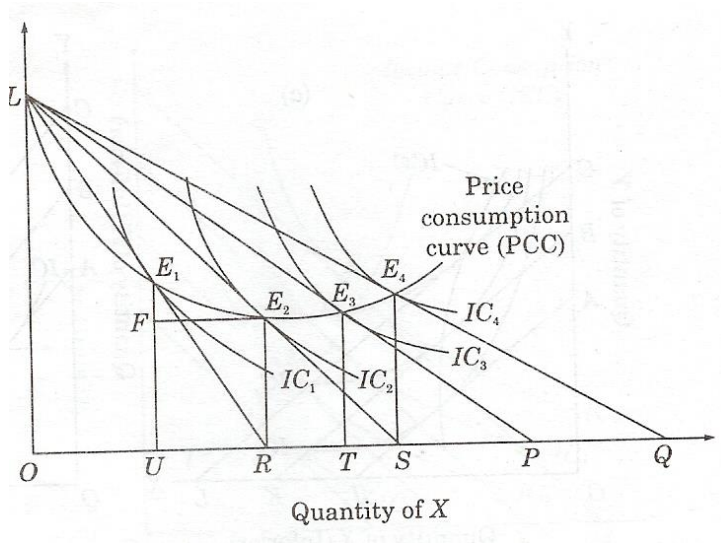


Figure 4.11: Price-consumption Curve

Suppose that the consumer is initially in equilibrium at point E_1. Now let the price of X fall, so that the consumer's budget line shifts from its initial position LR to the position LS. As a result, the consumer reaches a higher indifference curve IC_2 and his new equilibrium point is E_2. Here, his consumption of X increases by UR. This is the price-effect on the consumption of commodity X. As shown in Figure 4.11, with a successive fall in the price of X, consumer's equilibrium shifts from E_2 to E_3 and from E_3 to E_4. By joining the points of equilibrium E_1, E_2, E_3 and E_4, we get a curve called price-consumption-curve (PCC). Price-consumption-curve is a locus of points of equilibrium on indifference curves, resulting from the change in the price of a commodity. The price-consumption curve (PCC) shows the change in consumption basket due to a 'change in the price of commodity X. It can be seen from Figure 4.11 that the quantity of X consumed goes on increasing whereas that of Y first decreases and then increases.

Income and Substitution Effects of Price Change

As illustrated above, the change in consumption basket due to change in the price of consumer goods is called 'price effect'. Price-effect combines two effects: (i) income-effect and (ii) substitution-.effect. Income-effect results from the increase in real income due to a decrease in the price of a commodity. Substitution-effect arises due to the consumer's inherent tendency to substitute cheaper goods for the relatively expensive ones. Income-effect arises due to change in real income caused by the change in price of the goods consumed by the consumer. Income effect is reflected by the movement along the income-consumption-curve which has a positive slope. Substitution-effect, on the other hand, causes a movement along the price-consumption-curve which generally has a negative slope. There are two approaches: (i) Hicksian approach, and (ii) Slutsky s approach, which may explore the total price-effect into income and substitution-effects.

The Hicksian method of separating income and substitution effects of a price change is illustrated in Figure 4.12. Let the consumer be in equilibrium initially at point P on indifference curve IC_1 and budget line MN, where he consumes PX_1 of Y and OX_1 of X. Now let the price of X falls, price of Y remaining the same, therefore the new budget line is MN''. The new budget line (MN'' is tangent to IC_2 at point Q. At this point, the consumer buys an additional quantity (X_IX_3) of X. That is, total price effect = X_1X_3.

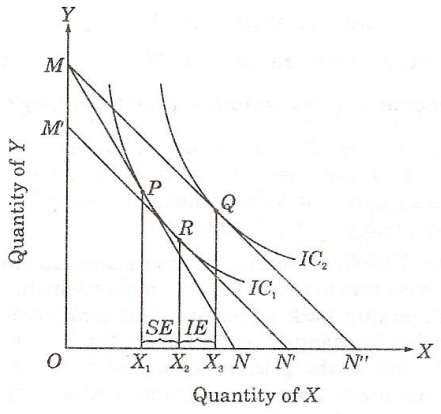


Figure 4.12: Income and substitution effects: Hicksian approach.

Now the problem is how to split the price-effect (X_1 X_3) into income and substitution effects. We know that X_1X_3 = IE + SE. Given this equation, if either of the two effects is known, the other can be easily measured. The general practice is to first measure income-effect of the price-effect and then deducts it from the price effect to find the substitution-effect. The Hicksian method of eliminating income-effect is

to reduce the consumer's income (by way of taxation) so that he returns to his original indifference curve IC_1, to equilibrium point conforming to the new price ratio. This has been done by drawing an imaginary budget line (M'N') parallel to MN" and tangent to indifference curve ICI. The budget line M'N' is tangent to indifference curve IC_1 at point R. Point R is thus the income-adjusted equilibrium of the consumer at the new price ratio of X and Y, after the elimination of the real income-effect caused by the fall in the price of X. The shift in equilibrium from Q to R means that the consumer cuts his consumption of X by X_2X_3 due to fall in his income. This gives, by implication, the measure of income-effect (X_2X_3) caused by the increase in real income of the consumer due to fall in price of X. The income effect of a change in the price of a commodity may thus be defined as the change in quantity demanded of the commodity resulting exclusively from a change in the real income, all other things remaining the same. With income effect measured at X_2X_3 the substitution effect (SE) can be easily obtained as SE = PE - IE or, by substitutions as $X_1X_2 = X_1X_3 - X_2X_3$. In Figure 4.12, the movement of the consumer from P to R shows his response to the change in relative price ratio, his real income being held constant at its original level. The consumer's movement from point P to R means an increase in quantity demanded of X by X_1X_2. This change in quantity demanded is called substitution-effect. The substitution effect may thus be defined as the change in quantity demanded; resulting from a change in relative price after real income-effect of price change is eliminated. The outcome of the above exercise may be summarized as follows:

Price Effect = X_2X_3

Income effect = $X_1X_3 – X_1X_2 = X_2X_3$

Substitution Effect = $X_1X_3 – X_2X_2 = X_1X_2$

According to Slutsky's method, the real income-effect of a fall in the price of a commodity must equal only that amount which if taken away from the consumer leaves with him an adequate income to buy the original combination of two goods after the change in price ratio. That is, Slutsky's method brings the consumer back not only to the original indifference curve but also to the original point of equilibrium. In simple words, under Hicksian method consumer's income has to be so reduced that he moves back to his original IC curve whereas, under Slutsky's method consumer's income has to be so reduced that he moves back not only to the original indifference curve but also to his original equilibrium point (P). The Slutskian method of splitting the total price effect into income and

substitutioneffects is depicted in Figure 4.13.

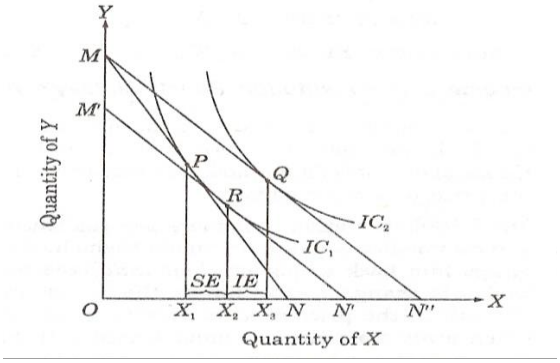


Figure 4.13: Income and Substitution effects: Slutsky's approach

The consumer is shown to be in equilibrium at point P on indifference curve IC_1. When price of X falls, other things remaining the same, the consumer moves to another equilibrium point Q on indifference curve IC_3. The movement from point P to Q increases the consumer's purchase of X Quantity of X by X_1X_3. This is the total price-effect caused by the fall in the price of X in Slutsky's method is the same as in Hicksian method.

To measure the substitution-effect, the income-effect has to be eliminated first. According to the Slutskian approach, a consumer's real income is so reduced that he is still able to purchase his original combination of the two goods (i.e., OX of X and PX_1 of Y) at the new price ratio. This is accomplished by drawing an imaginary budget line, M'N' through the point P. Since the whole commodity space is full of indifference curves, one of the indifference curves (IC_2) is tangent to the imaginary budget M'N' at point R. The movement from point Q to R shows a fall in the consumption of X by X_2 X_3. This is the income effect. We may now easily find out the substitution effect (IE) by subtracting the income effect (IE) from the total price effect (PE), as given below.

Substitution Effect: PE - IE = SE

$= X_1X_3 - X_2 X_3 = X_1 X_2$

In Figure 4.13, the movement form P to R and the consequent increase in the quantity purchased of X (i.e., X_1X_2) is the substitution effect. Similarly, the consumer's movement from R to Q and the consequent increase in the quantity purchased of X is the income-effect.

Comparison of Hicksian Approach and Slutskian Approach

The comparison of Hicksian and Slutskian approaches is depicted in Figure 4.14. The Slutskian approach attempts to hold only apparent real income constant which is obtained by adjusting the consumer's real income by the amount of cost-difference so that the consumer is left with an income just sufficient to buy the original combination of the goods. The Hicksian approach, however, holds constant the real income expressed in terms of the original level of satisfaction so that the consumer is able to stay on the original indifference curve. To express the difference graphically, Hicksian method puts the consumer .on the original indifference curve whereas Slutskian method makes the consumer move to an upper indifference curve. Let us compare the two methods in Figure 4.14. Let the consumer be in equilibrium at point P on indifference curve IC_1. When the price of X falls the consumer moves to point Q. The movement from P to Q is the total price-effect which equals X_1X_4 of commodity X. Upto this point, there is no difference between Slutsky and Hicks. Beyond this point, they differ. According to the Slutskian approach, the movement from P to T is the substitution effect and the movement from T to Q is the income effect. According to the Hicksian approach, the movement from P to R is the substitution effect and movement from R to Q is the income effect. The substitution and income effects of Slutskian and Hicksian approaches are summed up in quantitative terms in the following table.

Method	Price-effect	Substitution effect	Income effect
Hicksian	X_1X_4	X_1X_2	X_2X_4
Slutskian	X_1Y_4	X_1X_3	X_3X_4

Figure 4.14 shows; there is a good deal of difference between Hicksian and Slutskian measures of income and substitution effects. But it can be shown that if the change in price is small the difference between the Slutskian and Hicksian measures would be small and if the change in price tends to be zero, the difference would also be zero.

In addition to above, while the Hicksian approach is considered as a Highly persuasive solution to the problem of splitting price-effect into substitution and income effects, the Slutskian approach is intuitively perhaps less satisfying,. But the merit of the Slutskian approach is that substitution and income effects can be directly computed from the observed facts, whereas the Hicksian measure of these effects cannot be obtained without the knowledge of a consumer's indifference map.

Both the methods, have however, their own merits. The merit of the Slutskian method, which Hicks calls the 'cost-difference' method, lies in its property that it makes income effect easy to handle. Hicks himself recognised this merit of the Slutskian method. The merit of Hicksian method or 'compensating variation method' is that it is a more convenient method of measuring the substitution effect. In Hicks own words, "The merit of the cost-difference method is confined to [its] property... that its income effect is peculiarly easy to handle. The compensating variation method [i.e., his own method] does not share in this particular advantage; but it makes up for its clumsiness in relation to income-effect by its convenience with relation to the substitution effect.

4.3.2 CARDINAL APPROACH VERSUS ORDINAL UTILITY APPROACH

Similarity:

1. Both cardinal' and ordinal approaches assume rationality and utility maximizing behaviour of the consumer.
2. The diminishing marginal utility assumption of the cardinal utility approach is implicit in the diminishing marginal rate of substitution assumption of the ordinal utility approach.
3. Both cardinal and ordinal utility approaches arrive at an identical equilibrium condition. The necessary (or the first order) equilibrium condition of the cardinal utility approach i.e.,

$$\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$$

and the first order (or necessary) equilibrium condition of the ordinal utility approach given as

$$\text{MRS}_{x,y} = \frac{P_x}{P_y}$$

are in fact, one and the same because $MU_x/MU_y = MRS_{x,y}$.

The second order equilibrium condition of the cardinal utility approach is that the total expenditure must not exceed the consumer's total income, This is similar to the second order condition of the ordinal utility) approach, i.e., the first order equilibrium condition must be fulfilled at the highest possible indifference curve on his indifference map.

Thus, in spite of the fact that cardinal and ordinal approaches are based on different assumptions regarding measurability of utility, both arrive at the same conclusion with respect to consumer behaviour.

Superiority of Indifference Curve Approach:

In spite of their similarity in some respects, indifference curve analysis is in many respects superior to the cardinal utility approach. The indifference curve analysis has made major advances in the theory of consumer analysis at least in the following respects. First, the assumptions of the indifference curve approach are less restrictive than those of the cardinal utility approach. While cardinal utility approach assumes cardinal measurability of utility, the ordinal approach assumes only ordinal expression of utility. Besides, unlike the cardinal utility approach, the ordinal utility approach does not assume stability of utility of money. The Marshallian assumption of constancy of marginal utility of money is incompatible with demand functions involving more than one good. Second, indifference curve approach provides a better criterion for the classification of goods into substitutes and complements. This is considered it as one of the most important contributions of the ordinal utility approach. The cardinal utility approach uses the sign of cross-elasticity for the purpose of classifying goods into substitutes and complements. The cross-elasticity between two goods, X and Y, is given by

$$e_{x,y}=\Delta Q_y.P_x/\Delta P_x.Q_y$$

If cross-elasticity has a positive sign, it means X and Yare substitutes for each 'other and if elasticity has a negative sign, it means they are complements. This method of classifying goods into substitutes and compliments is somewhat misleading. For, as shown in the above measure of cross-elasticity, it uses the total effect of a price change (ΔP_x) on quantity demanded (ΔQ_y) without compensating for the change in real income caused by the change in the price of the commodity (i. e., ΔP_x). On the contrary, the indifference curve analysis suggests measuring cross elasticity after compensating for the changes in real income resulting from the change in P_x According to Hicks, goods X and Yare substitutes for each other if cross-elasticity measured after eliminating the income effect is positive. Although the Hicksian criterion for classifying goods into substitutes and complements is theoretically superior to the cross-elasticity method (unadjusted for real income-effect) and provides greater insight into the price-effect, it is impracticable, The reason is estimating income and substitution effects of a price-change is an extremely difficult task In the absence of an empirical indifference curve, On the other hand, the usual

cross-elasticity method is feasible because it requires only the knowledge of the market demand function which is empirically estimable. Third, indifference curve analysis provides a more realistic measure of non-consumer's surplus compared to one provided by Marshall. The Marshallian concept of Consumer's surplus is based on the assumptions that utility cardinally measurable in terms of money and that utility of money remaining constant, Nether of' these two assumptions is realistic, Indifference curve analysis measures consumer's surplus in terms of ordinal utility. The Hicksian measure of consumer's surplus is of great importance in welfare economics and in the formulation and assessment of government policy.

4.4 CHECK YOUR PROGRESS

Answer the following True/False on the basis of your knowledge regarding this chapter:

1) An indifference curve shows combinations of two goods yielding the same level of satisfaction. (T/F)
2) Any combination of goods that lie above a given indifference curve will provide the individual with a greater level of satisfaction. (T/F)
3) A 'budget line' shows combinations of two goods that can be purchased with a given income and prices of those goods. (T/F)
4) If income were to rise and prices fall then the budget line referred to in question 7 above will shift inwards towards the origin. (T/F)
5) When the indifference curve with 'good y' on the vertical axis and 'good x' on the horizontal is tangential to the budget line then at that point the marginal rate of substitution of 'good x' for 'good y' is equal to the ratio of the price of 'good x' to 'good y' (Px/Py). (T/F)

4.5 SUMMARY

According the classical economists, the concept of cardinal utility and have instead employed the concept of ordinal utility for analysing consumer behaviour. The concept of ordinal utility is based on the fact that it may not be possible for consumers to express the utility of a commodity in absolute terms, but it is always possible for a consumer to tell introspectively whether a commodity is more or

less or equally useful as compared to another. While neo-classical economists maintained that cardinal measurement of utility is practically possible and is meaningful in consumer analysis, modem economists maintain that utility being a psychological phenomenon is inherently immeasurable, theoretically or conceptually and quantitatively as well. They also maintain that the concept of ordinal utility is a practical concept and it meets the conceptual requirement of analysing the consumer behaviour in the absence of any cardinal measures of utility. In real life, both concepts may not be implemented; because the consumer is in hurry to purchase as well as he is not so economist so that he/she may compare the equilibrium of consumer behaviour in terms consumption of goods and services.

4.6 KEYWORDS

Ordinal Utility- Ordinal utility refers to the utility which can be presented into absolute terms.

Consumer Equilibrium- A consumer attains his equilibrium when he maximizes his total utility, given his income and market prices of the goods and services that he consumes.

Law of Diminishing Marginal Utility- Law of Diminishing Marginal Utility states that all else equal as consumption increases the marginal utility derived from each additional unit declines.

Indifference Curve- An indifference curve may be defined as the locus of points. Each point represents a different combination of two substitute goods, which yield the same utility or level of satisfaction to the consumer.

Marginal Rate of Substitution- The marginal rate of substitution is the rate at which a consumer is willing to substitute one commodity (X) for another (Y) so that his total satisfaction remains the same.

4.7 SELF ASSESSMENT TEST

1) What do you mean by utility and the concept of ordinal utility?
2) Define the law of diminishing marginal utility.
3) What is the meaning of consumer equilibrium with reference to ordinal approach?
4) What is an indifference curve? What are its properties or characteristics? What role does it play in consumer analysis?

5) Define the marginal rate of substitution. What is the law behind the diminishing marginal rate of substitution?

4.8 ANSWERS TO CHECK YOUR PROGRESS

1. TRUE
2. TRUE
3. TRUE
4. FALSE
5. TRUE

4.9 REFERENCES/SUGGESTED READINGS

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Course Code: **BCOM 102**	**Author: Dr. Ved Pal**
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Production Functions and Laws of Production

Structure

5.0 Learning Objectives

5.1 Introduction to Production Process

5.1.1 Inputs

5.1.2 Production Function

5.1.3 The Marginal Productivity of Factors of Production

5.1.4 The Marginal Rate of Substitution and the Elasticity of Substitution

5.1.5 Behavior of Production Function

5.2 Law of Variable Proportions- Behaviour of Short Run Production Function

5.2.1 The law of Diminishing Returns

5.2.2 Important of the stage of Production

5.3 Check Your Progress

5.4 Summary

5.5 Keywords

5.6 Self-Assessment Test

5.7 Answer to Check Your Progress

5.8 References/Suggested Readings

5.0 LEARNING OBJECTIVES

One of the important elements in the economic theory of the firm is the production transformation process or processes which enables it to convert same finite number of inputs into a finite number of different outputs. The basic purpose of studying the production transformation process of a firm is to examine the conditions of supply for a commodity. The response of supply of a commodity to its price depends upon (i) the physical relationship between inputs and output and (ii) the prices of inputs. These two together determine the costs of production of commodity. Thus costs influence supply which together with demand determines the price.

5.1 INTRODUCTION TO PRODUCTION PROCESS

Production refers to the transformation of resources into output of goods and services. For example, a farm takes fertilizer, seed, land and labour and turns them into wheat or corn. Modern factories like Maruti hire workers who use machinery in factories to transform steel, plastic, glass, rubber and so on into automobiles. The output of a firm can either be a final commodity such as automobiles or an intermediate product such as steel. The output can also be a service rather than a good. An airlines takes airplanes, fuel, labour and computer systems and provides passengers with the ability to travel quickly through its network of routes. An accounting firm takes pencils, computers, papers, office space and labour and produce audits or tax return for its clients.

Major portion of goods and services consumed in a modern economy are produced by firms. A firm is an organization that combines and organizes resources for the purpose of producing goods and services for sale at a profit. The most important reason for a firm or business enterprises exist is that firms are specialized organization devoted to manage the process of production.

Production is organized in firm because efficiency generally requires large scale production, the raising of significant financial resources and careful management and monitoring of ongoing activities. In microeconomic theory our focus is to know what the firm does. Just consumers seek to maximize utility or satisfaction; firms generally seek to maximize profits. Both consumer and firms can be regarded as maximizing entities. For maximizing the profit in a given circumstances, firm always strive to produce efficiently, that is at lowest cost. In other words, they always attempt to produce the maximum level of output for a given does of inputs, avoiding waste wherever possible.

5.1.1 INPUTS

Firms convert the inputs into outputs. Inputs also refer resources, or factors of production are the means of producing the goods and services demanded by society. Inputs can be classified broadly into labour or human resources, capital or investment goods, and land or natural resources. All these variables are flow variables, since they are measured per unit of time. Inputs may be further classified on the basis of availability as fixed and variable inputs. Fixed factor is one that remains fixed (or constant) for a certain level of output e.g. plant size etc. A variable input is defined as one that changes with the change in output e.g. raw material, labour etc.

5.1.2 PRODUCTION FUNCTION

The term production function refers to the physical relationship between a firm's input of resources and its output of goods or services per unit of time, leaving prices asides. In other words production function is a purely technical relation which connects factor inputs and output. It means it is defined for a given state of engineering and technical knowledge. There may be enormous of different production functions – one for each and every product or service. In areas of the economy where technology is changing rapidly like computer software and biotechnology production function may become obsolete soon after they are used and of range of techniques available the firm uses those that are economically most efficient, that is those provides the greatest value of output for a given value of input. An improvement in the state of technology will in general increase the output per unit of input.

A production function can be represented by a table, a graph or an equation and shows the maximum output for a commodity that can be produced per unit of time with each set of inputs. Both inputs and outputs are measured in terms of physical rather than monetary units. Graphically, the production function is usually presented as a curve on two dimensional graphs. Changes in relevant variables are shown either by movements along the curve that depicts the production function or by shift this curve. The most commonly used diagrams for production function of a single commodity are show in fig.1

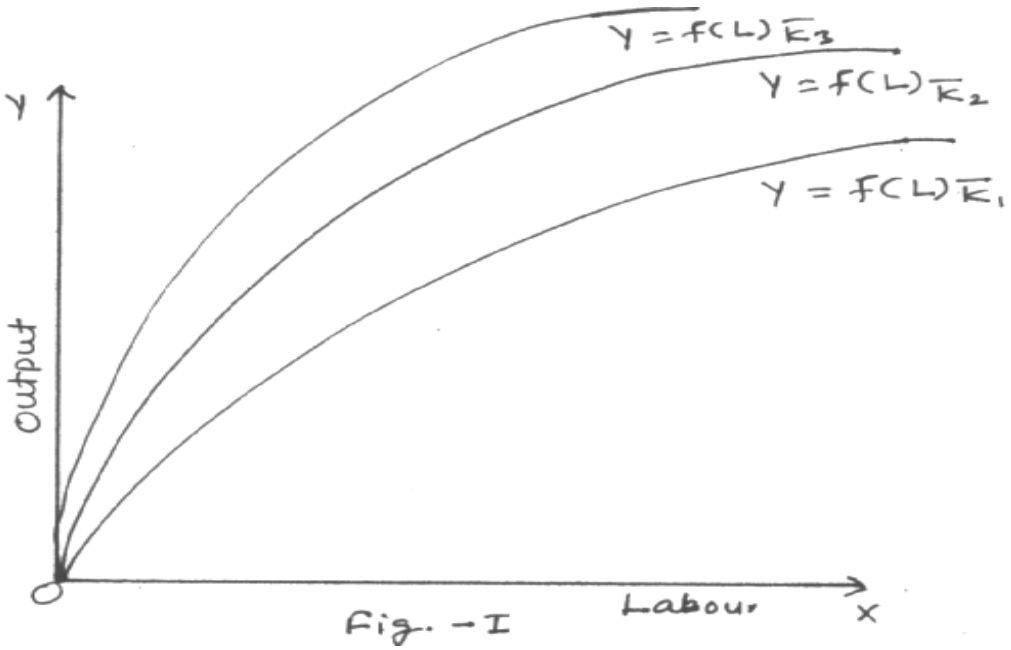

Fig. – I

Assuming that production Y commodity depends upon the two inputs capital (K) and labour (L). As labour increases, while keeping capital constant, output measures we move along the curve depicting the production function. If capital (K) increases, the production function Y = f (L) shifts upwards.

The general form of production function can be expressed as

$$Y = f (I_1, I_2 \_\_\_\_\_ I_n) \text{----------(i)}$$

Where Y is the quantity of output for a production unit and inputs are represented as I_1, I_2 -------- I_n. In economic theory very often labour (L) and capital (K) are taken as variable. In agricultural economics, land is taken constant and other factors as variable. Production functions involve concepts which are useful tools in all fields of economics. The main concepts are:

5.1.3 THE MARGINAL PRODUCTIVITY OF FACTORS OF PRODUCTION:

It is defined as change in output resulting from a change in a factor of production, keeping all other factors constant. Mathematically, the marginal product of each factor is the partial derivative of the production function with respect to this factor. Thus,

$$MP_L = \frac{\partial Y}{\partial L} \quad \text{and} \quad MP_K = \frac{\partial Y}{\partial K} \quad \text{----------(ii)}$$

In principle, the marginal product of a factor may assume any value, positive, zero or negative. However basic production theory concentrates only on the efficient part of the production function, that is, on the range output over which the marginal products of the factors are positive. Ranges of output over which the marginal products of factors would be negative imply irrational behavior of the firm and are not considered by the theory of production.

5.1.4 THE MARGINAL RATE OF SUBSTITUTION AND THE ELASTICITY OF SUBSTITUTION.

The marginal rate of substitution measures the how one factor of production is substituted for another while keeping the output constant. Suppose in simple care output (Y) depends upon capital (k) and labour (L) so

Y = f (K,L)----------(iii)

The marginal rate of sustained of labour for capital K can be determined as

$$MRS_{LK} = -\frac{\partial K}{\partial L} = \frac{\partial Y / \partial L}{\partial Y / \partial K} = \frac{MP_L}{MP_K} \text{ ----------(iv)}$$

Where MP_L and MP_K are marginal productivity of labour and capital respectively.

The marginal rate of substitution as a measure of the degree of substitutability of factors has a serious defect it depends on the units of measurement of the factors. A better measure of the ease of factor substitution is provided by the elasticity of substitution. The elasticity of substitution is defined as the percentage change in capital labour ratio divided by the percentage change in the rate of technical substitution

$$\sigma = \frac{\text{Percentage change in K/L}}{\text{Percentage change in MRS}} \text{ ----------(iv)}$$

or

$$\sigma = \frac{d(K/L)/(K/L)}{d(MRS)/(MRS)} \text{ ----------(v)}$$

The elasticity of substitution is a pure number independent of the units of measurement of K and L, since both the numerator and denominator are measured in the same units.

5.1.5 BEHAVIOR OF PRODUCTION FUNCTION

To illustrate the behaviour of production function, let us assume that output (Y) of a firm is based on two inputs capital (K) and labour (L)

Y = f (K L)

For changing the output the firm can change K and L or only L depends upon the time period whether the firm considers a short run or a long run. The short run behaviour of production process is subject to three general restrictions: the time period should (i) short enough so that firm is unable to alter the levels of its fixed inputs (ii) sufficiently short so that the shape of the production function is not changed through technological improvements and (iii) sufficiently long to allow the completion of the necessary technical processes. In long run expansion of output may be achieved by varying all inputs. In the long run all factors of production are variable so the major difference between a short run and long run production analysis lies in the number of variable inputs. A variable input is defined as one where supply in short run is elastic e.g. labour and raw material etc. In short run output may be expanded by using more of variable factors where factors like capital are kept constant. In the long run, however the firm can employ more of both capital and labour because of capital becomes elastic overtime. It is to be noted that both types of inputs variable as well as fixed are necessary for production, only short run production function is characterized by variable or non proportional return to a variable factor ratio and may be expressed for instance as.

Y = f (L/K)----------(vi)

Where only labour (L) is variable, while capital (K) is constant. The rate of increase in output in response to an increase in the variable input is not a question of logic and mathematics but of actual observation of real world and of the experience of producers.

5.2 LAW OF VARIABLE PROPORTIONS- BEHAVIOUR OF SHORT RUN PRODUCTION FUNCTION

Some factors of production are elastic in supply in short period and the production units can employ an unlimited quantity of such factors also called variable factors. For production, the firms can employ in short run varying quantities of variable inputs against a given quantity of fixed factors. This kind of change in input combination leads to variation in factor proportions. The relationship between varying factor proportions and output is known as law of diminishing returns. According to this law as equal increments of one input are added, the input of other productive services being held constant, beyond a certain point the resulting increments of product will decrease – that is marginal product will diminish. This law is subject to three conditions (i) there are other inputs whose quantities are held constant (ii) the state of technical knowledge is given and (iii) the proportions in which inputs can be effectively combined are variable due to this it is also called law of variable proportions.

This law is illustrated with the help of table -1. In this table it is assumed that a firm is using different amount of labour for given amount of capital.

Table-I

Unit of Capital	No. of Labourers	Capital Labour Ratio	Total Output	APl	MPl
1	1	1	3	3	3
1	2	½	8	4	5
1	3	1/3	12	4	4
1	4	¼	14	3.5	2
1	5	1/5	14	2.8	0
1	6	1/6	12	2	-2

We can see from the table that if we combine increasing inputs of labour with constant amount of capital total output increases at an increasing rate in the beginning (from 3 to 8 i. e. more than double whereas the labour input just doubles, hence increasing marginal returns) and then increases at a diminishing rate. By employing fifth unit of labour, the total product becomes constant so the marginal product becomes zero and further employing of the labour with constant amount of capital, leads to ultimately decline in the total production and so negative marginal productivity. Here in our case total product is a function of both factors K and L : Y = f (L/K) and marginal productivity of labour in $MP_L = \frac{\Delta Y}{\Delta L}$ and average productivity of labour is

$$AP_L = \frac{Y}{L} = \frac{f(L/K)}{L} . \quad \text{----------(vii)}$$

The input level K is treated as a parameter and Y becomes a function of L along.

If we see the relationship between the capital labour ratio and output it is observed that as the ratio of capital labour decreases initially the output increases at increasing rate and then intimately with declining rate. The reason for decline in production is that as more and more labour is employed the optimum combination of capital and labour lost and labourers get into each other's way and actually disturb the production where sixth worker is employed.

The short run behaviour of production function can also be explored through diagram as shown in fig.(ii).

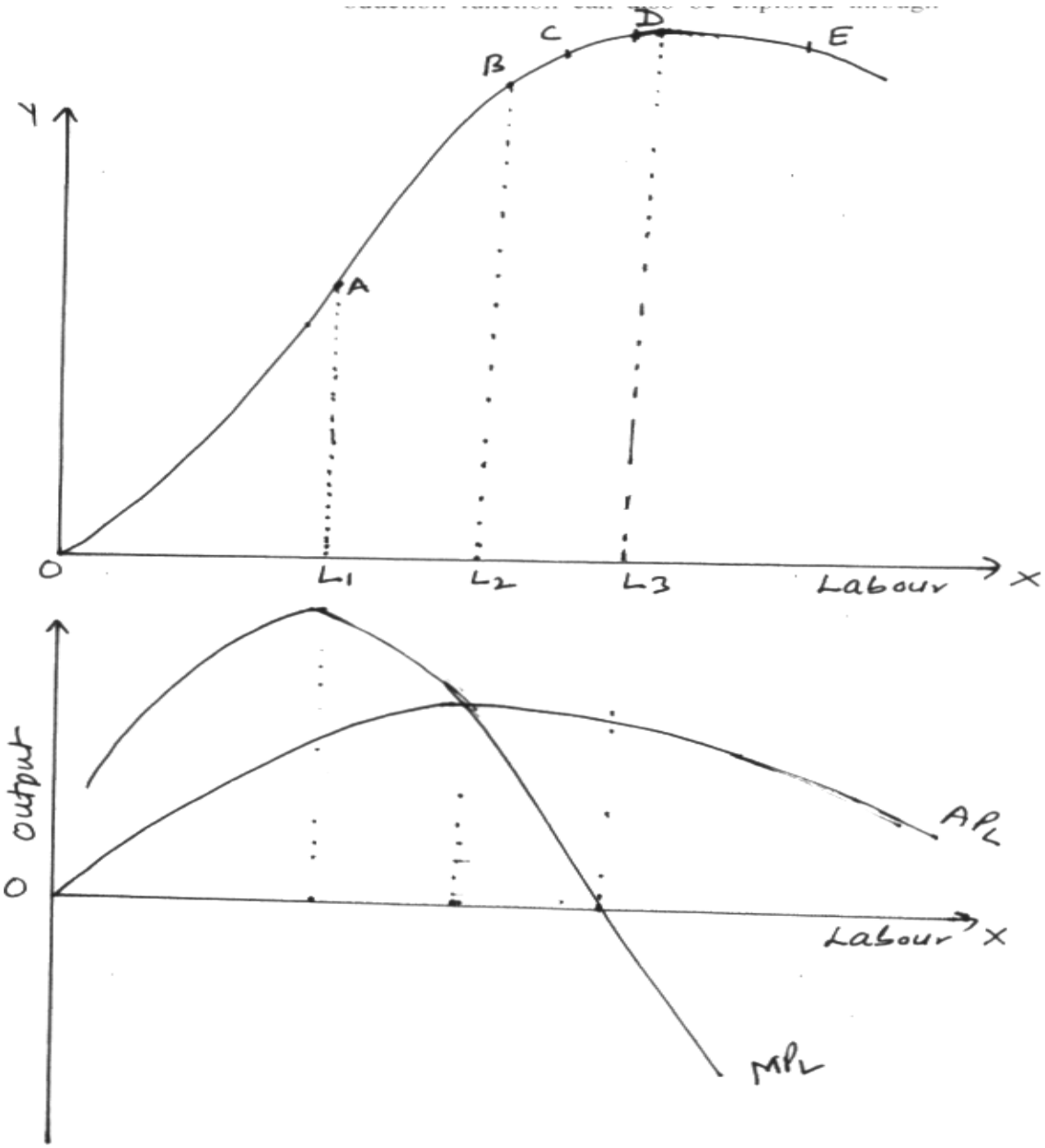

Fig -(ii)

It shows that total product increases at an increasing rate up to the point of inflexion A on total product curve and both AP_L and MP_L products consequently increase. At the point B on the TP curve average product of labour becomes equal to marginal product of labour ($AP_L = MP_L$) and at point B the AP_L is highest meanwhile MP_L has already started declining and three workers are employed at this point. This is known as the first stage of production.

In the second stage, total output continue to increase and reaches the highest point D, but this increase is at further decline rate, with the result that the MP_L curve continues to decline and yields zero output at the end of the stage when total output is the highest. The average output now starts declining though continues to be positive so long as the total output is positive.

In the third stage the total output declines, the marginal output is negative and the average output is negative and the average output continues to decline though positive.

5.2.1 THE LAW OF DIMINISHING RETURNS

The decline in marginal productivity of labour in figure (i) is a reflection of the law of diminishing returns. This is an empirical generalization or a physical law, not a proposition of economics. It postulates that as more units of a variable input are used with a fixed amount of other inputs, after a point, a smaller and smaller return will accrue to each additional unit of the variable unit. In other words, the marginal product of the variable input eventually declines. This occurs because each additional unit of the variable input has less and less of the fixed inputs with which to work. It is to be noted that to observe the law of diminishing returns at least one input must be held constant. Technology is also assumed to remain unchanged.

5.2.2 IMPORTANT OF THE STAGE OF PRODUCTION

From above, it is observed that the variations in output are a function not of labour alone but of the proportion in which the two factors are combined. During the process of production capital's efficiency is constant and similarly all the labourers are equally efficient. Unless we know the prices of inputs and the output, we cannot decide about the optimal combination of the two factors. Even then the physical law itself throws light on the nature of the problem.

In the first state the capital labour ratio is favourable to efficient production. As labour or more capital (more machines) is increased, the average productivity continuously increases. It is profitable to employ more labour. The marginal productivity also increases, though it starts declining before the end of the first stage.

In the second stage, though total product continues to increase, both the AP_L and MP_L decline. Some decision has to be taken this stage, because at the end of 2^{nd} stage, TP is highest and the MP_L becomes

zero. The law of diminishing marginal returns to labour has to operate as labour is a very important imperfect substitute for capital. The point of zero MP_L of labour is its intensive margin.

No wise producer will consciously enter the 3rd stage even when both the factors are free, when for the TP declines and the MP is negative, though it is not uncommon for lacking perfect knowledge to a producers actually produce in this region.

The second stage is therefore crucial for decision making. But maximum total product need not coincide with the point of the most profitable employment of labour. If the inputs are paid in terms of their own output, the employment of the variable input labour is carried up to the point where its marginal physical product equals its market rate of remuneration.

5.3 CHECK YOUR PROCESS

On the basis of your knowledge about production function, answer the followings:

1- Which of the following is not a factor of production?

A) Capital B) Material C) Money D) Labour

2- A production function tells the firm

A) The maximum it can expect to produce with a given mx of inputs.

B) The minimum it can expect to produce with a given mx of inputs.

C) The average it can expect to produce with a given mx of inputs.

D) The average level of production for other firms in the industry.

3- Which of the following statement is TRUE in short term?

A) The ratio of output to the number of workers used to produce the output.

B) Whether or not an input is considered fixed is dependent on the paid for the input.

C) Generally, labour is a variable input.

D) Generally, capital is a variable input.

4- The marginal product of labour is

A) The ratio of output to the number of workers used to produce that output.

B) The change in total product resulting from an extra unit of labour, holding other factors constant.

C) Equal to the marginal product of labour when average product is increasing

D) The amount of output that can be produced by a given amount of labour.

5- Given the production function q= 4L+K, formula for MP of labour

A) 4+K

B) 4

C) 4K

D) Cannot be determined.

5.4 SUMMARY

Production is a process by which goods and services are made available to the consumer. In theory of demand, individual consumer is considered as economic unit .Similar to that, in the theory of production, individual firm or industry is regarded as economic unit. Product refers to the volume of goods produced by a firm or industry during that specified period of time. Product has reference to physical volume, whereas productivity is a ratio and has reference to output per unit of input. Production function can be short run production function or long run production function. This chapter presents the traditional production theory by explaining three different laws of production applicable in short period. Production function shows the physical relation between firm input and output of goods and services per unit of time. It means the nature of production function is an economic but technological .Production function depends upon technique of production. The relationship of input and output not only depends upon combination of input and output but affected by technology also. Short period production function shows the physical relationship between input and output when some factors are fixed whereas others are variable or changing. Short period production function is also known as Laws of Returns. As per classical economist in short period three different laws are applicable. These are Law of Increasing Returns to Scale, Law of Constant Returns to Scale and Law of Diminishing Returns to Scale. In case of manufacturing industries role of man increases when we employee more

and more variable factors of production with some fixed factors. As a result of this marginal productivity will increase .At the same time average cost will fall and law of increasing returns to scale will be applicable. Law of constant returns to scale as per classical economists applies in the short period .It applies after the application of law of increasing returns to scale. This law is applicable when advantages from increased scale of production become equal to disadvantages. Constant returns to scale means the stage where input and output increases in the same proportion. It means when more and more doses of labour and capital are employed with some fixed factor then output increases in the same proportion in which the factors of production are employed. Law of diminishing returns to scale is also known as law of Increasing Cost .This law states that when with some fixed factors ,units of variable factors like labour and capital are increased without making any improvement in the technology of production then marginal return will be diminishing .On the other hand average cost will be increasing.

5.5 KEYWORDS

Production refers to the transformation of resources into output of goods and services.

Inputs also refer resources, or factors of production are the means of producing the goods and services demanded by society.

Production Function refers to the physical relationship between a firm's input of resources and its output of goods or services per unit of time, leaving prices asides. It is a purely technical relation which connects factor inputs and output.

The Marginal Productivity of Factors of Production is change in output resulting from a change in a factor of production, keeping all other factors constant. Mathematically, the marginal product of each factor is the partial derivative of the production function with respect to this factor

The Marginal Rate of Substitution and the Elasticity of Substitution measures the how one factor of production is substituted for another while keeping the output constant. The marginal rate of substitution as a measure of the degree of substitutability of factors has a serious defect it depends on the units of measurement of the factors. A better measure of the ease of factor substitution is provided by the elasticity of substitution. The elasticity of substitution is defined as the percentage change in capital labour ratio divided by the percentage change in the rate of technical substitution.

Law of Variable Proportions & Diminishing Return Some factors of production are elastic in supply in short period and the production units can employ an unlimited quantity of such factors also called variable factors. For production, the firms can employ in short run varying quantities of variable inputs against a given quantity of fixed factors. This kind of change in input combination leads to variation in factor proportions. The relationship between varying factor proportions and output is known as law of diminishing returns. According to this law as equal increments of one input are added, the input of other productive services being held constant, beyond a certain point the resulting increments of product will decrease – that is marginal product will diminish.

5.6 SELF–ASSESSMENT TEST

1. What is meant by production? Define production function and describe the underlying assumptions.

2. "As we add more and more of variable input to a fixed input the amount of extra product will fall off." (Samuelson). Explain the conditions under which this law operates and discuss if it will also operate with several variable inputs

3. What do you mean by production function? What is the difference between a short run and a long-run production function?

4.(a) What is the marginal rate of technical substitution?

(b) What is elasticity of technical substitution?

5. What is meant by production? Explain the different stages Define production function and describe the underlying assumptions.

5.7 ANSWERS TO CHECK YOUR PROCESS

1- C

2- A

3- C

4- B

5- B

5.8 REFERENCES/ SUGGESTED READINGS

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Course: Micro Economics	
Course Code: **BCOM 102**	**Author: Dr. Ved Pal**
Lesson No: **6**	**Vetter: Dr. Tilak Sethi**
SLM Conversion By: Ms. Chand Kiran	

Concept of Cost

Structure

6.0 Learning Objectives

6.1 Introduction to Concepts of Cost

- 6.1.1 Opportunity Cost
- 6.1.2 Accounting Cost
- 6.1.3 Explicit and Implicit Costs
- 6.1.4 Social Costs and Private Cost of Production
- 6.1.5 Marginal, Incremental and Sink Costs
- 6.1.6 The Behaviour of Cost Function
  - 6.1.6.1 Firm's Short-Run Cost Curves
  - 6.1.6.2 Firm's Long Run Cost Curves

6.2 Economies and Diseconomies of Scale

- 6.2.1 Real Economies of Scale
- 6.2.2 Diseconomies of Scale

6.3 Break-even Analysis

6.4 Check Your Progress

6.5 Summary

6.6 Keywords

6.7 Self- Assessment Test

6.8 Answers to Check your Progress

6.9 References/ Suggested Readings

6.0 LEARNING OBJECTIVES:

After reading this chapter you will be able to understand the concept of cost and its different types. This chapter also provides you knowledge regarding behaviour of cost in short run and long run. Further, economies and diseconomies of scale are also described to you in this chapter and break even analysis is discussed in the last section of this chapter.

6.1 INTRODUCTION TO CONCEPT OF COST

The term cost has different meanings, so it becomes pertinent to define the term precisely. In the traditional approach, the explicit and historical dimension of cost is considered, whereas contrast the economic approach to cost emphasizes opportunity cost rather than historical cost and includes both explicit and implicit costs.

6.1.1 OPPORTUNITY COST

It is major component of decision making in economic. The best measure of cost of a consumer product or a factor of production is what must be given up to obtain that product for factor. For example the resources needed to build 10 houses can also be used to build one office building, and then opportunity cost of the decision to build office building is equal to the 10 houses that have to be forgone. With fixed quantity of resources available to the organization, input used in the production of one good cannot be used in the production of other goods. In general, opportunity cost is the value of a resource in its next best alternate use. Opportunity cost represents the return or compensation that must forgo as a result of the decision to employ the resources in a given activity.

6.1.2 ACCOUNTING COST

Accounts have been primarily concerned with measuring cost for financial reporting purposes. So an accountant considers only the explicit costs as costs those which involve cash payment by the entrepreneur of the firm. Accountants define and measure the cost by the historical outlays of funds that take place in the exchange or transformation of a resource.

In case of economists, they are mainly concerned with measuring costs for decision making purposes. The objectives are to determine the present and future costs of resources associated with various alternative courses of action. Such an objective requires a consideration of the opportunities forgave whenever a resource is used in a given cause of action. An economist would include, in addition to accounting costs, all other implicit costs as well that are typically not reflected in the cost figures appearing in the financial reports of the firm. Both the accounting cost and economic cost of a product will include such explicit cost as labour, raw material, rent etc. Economists also include several implicit costs. The implicit cost consists of the opportunity costs of time and capital that the owner manager has invested in producing the given quantity of output.

6.1.3 EXPLICIT AND IMPLICIT COSTS

Explicit costs are those which fall under actual or business costs entered in the books of accounts. The payments for wages and salaries, materials, license fee, insurance etc. are the examples of explicit costs. These costs involve cash payments and are recorded in normal accounting practices. In contrast, there are certain other costs which do not take the form of cash outlays, nor do they appear in the accounting systems. Such costs are known as implicit or imputed costs. An Opportunity cost is an important example of implicit cost. For example, suppose an entrepreneur does not utilize his services in his own business and works as a manager in some other firm on a salary business. If he sets up his own business, he forgoes his salary as a manager. The loss of salary is the opportunity costs of doing his own business. This is on implicit cost of his own business. Thus implicit wages, rent, and implicit interest are the wages of rents and interest which the owners, labour, building and capital respectively can earn from these second best use.

6.1.4 SOCIAL COSTS AND PRIVATE COST OF PRODUCTION

The social cost of using a bundle of resources for the production of a unit of commodity X is the number of units of commodity Y that must be sacrificed in the process. The social cost of producing

gun is the amount of butter forgone. It is also called the alternative or opportunity cost of production. Private costs of production refer to individual firms and include explicit costs as well as monetary estimates of implicit costs. Implicit costs consist of the amounts of income the entrepreneur could earn in the best alternative use of his time and money.

6.1.5 MARGINAL, INCREMENTAL AND SINK COSTS

Sink costs are the expenditure that have been made in the past or that must be paid in future as part of a contractual agreement. The cost of inventory and future rental payments on a warehouse that must be paid as part of a long-term lease are examples. In general such costs are irrelevant in making decision.

Marginal costs refer to the change in total cost associated with a unit of change in output. This concept is integral to short run decision about profit maximizing rates of output. For example, in an automobile manufacturing plant the marginal cost of making one additional car per production period would be labour, materials and every cost directly associated with that extra car. In contrast, the long run incremental cost refers to the total additional cost of implementing a managerial decision. The cost associated with adding a new product line, acquiring a major competitor to fall into the broader class of incremental costs. In a sense, marginal cost so that subcategory of incremental cost that refers to the additional cost associated with the decision to make marginal variation in the rate of output.

The cost function belongs to both in the short run and the long run. The short-run costs are those costs of production at which the firm operate in one given period when one or more factors of production are fixed in quantity. Therefore, the firm has some fixed costs and some variable costs. On the other hand, 'the long-run costs are planning costs or ex ante costs, in that they present the optimal possibilities for expansion of the output and thus help the entrepreneur to plan his future activities. In the long run, there are no fixed factors of production and hence no fixed costs. In the long run, all factors being variable, all costs are also variable. Therefore, the firm plans for the future, given its fixed capital equipment. But it operates on the short-run cost curves relating to each plant.

6.1.6 THE BEHAVIOUR OF COST FUNCTION

The traditional theory of costs analyses the behaviour of cost curves in the short run and the long run and arrives at the conclusion that both the short run and the long run cost curves are U-shaped but the long-run cost curves are flatter than the short-run cost curves.

6.1.6.1 FIRM'S SHORT-RUN COST CURVES

The short run is a period in which the firm cannot change its plant, equipment and the scale of organisation. To meet the increased demand, it can raise output by hiring more labour and raw materials or asking the existing labour force to work overtime. The scale of organisation being fixed, the short-run total costs are divided into total fixed costs and total variable costs:

TC = TFC + TVC

Total costs or TC: Total costs are the total expenses incurred by a firm in producing a given quantity or a commodity. They include payments for rent, interest, wages, taxes and expenses on raw materials, electricity, water, advertising, etc.

Total fixed costs or TFC is those costs of production that do not change with output. They are independent of the level of output. In fact, they have to be incurred even when the firm stops production temporarily. They include payments for renting land and buildings, interest on borrowed money, insurance charges, property tax, depreciation, maintenance expenditures, wages and salaries of the permanent staff, etc. They are also called overhead costs.

Total variable costs or TVC is those costs of production that change directly with output. They rise when output increases, and fall when output declines. They include expenses on raw materials, power, water, taxes, hiring of labour, advertising etc. They are also known as direct costs.

The curves relating to these three total costs are shown diagrammatically in Figure-1 the TC curve is a continuous curve which shows that with increasing output total costs also increases. This curve cuts the vertical axis at a point above the origin and rises continuously from left to right. This is because even when no output is produced, the firm has to incur fixed costs. The TFC curve is shown as parallel to the output axis because total fixed costs are the same whatever the level of output.

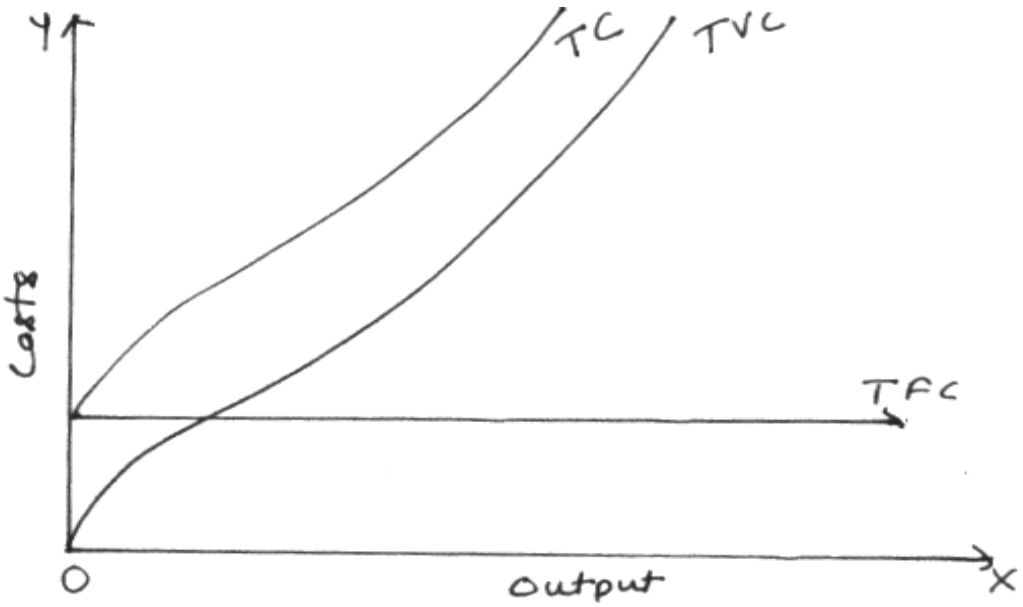

Fig.-(i)

The TVC curve has an inverted-S shape and starts from the origin O because when output is zero, the TVC are also zero. They increase as output increases. So long as the firm is using less variable factors in proportion to the fixed factors, the total variable costs rise at a diminishing rate. But after a point, with the use of more variable factors in proportion to the fixed factors, they rise steeply because of the application of the law of variable proportions. Since the TFC curve is a horizontal straight line, the TC curve follows the TVC curve at an equal vertical distance.

Short-run average costs: In the short run analysis of the firm, average costs are more important than total costs. The units of output that a firm produces do not cost the same amount to the firm. But they must be sold at the same price. Therefore, the firm must know the per unit cost or the average cost. The short-run average costs of a firm are the average fixed costs, the average variable costs, and the average total costs.

Average fixed costs or AFC equal total fixed costs at each level of output divided by the number of units produced:

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

The average fixed costs diminish continuously as output increases. This is natural because when a constant figure, total fixed costs, are divided by a continuously increasing unit of output; the result is continuously diminishing average fixed costs. Thus the AFC curve is a downward sloping curve which approaches the quantity axis without touching it, as shown in Fig.-(ii). It is a rectangular hyperbola.

Short-run average variable costs **(or SAVC)** equal total variable costs at each level of output divided by the number of units produced:

$$\text{SAVC} = \frac{\text{TVC}}{\text{Q}}$$

The average variable costs first decline with the rise in output as larger quantities of variable factors is applied to fixed plant and equipment. But eventually they begin to rise due to the law of diminishing returns. Thus the SAVC curve is U-shaped, as shown in Fig.-(ii).

Short-run average total costs (or SATC or SAC) are the average costs of producing any given output. They are arrived at by dividing the total costs at each level of output by the number of units produced:

$$\text{SAC or SATC} = \frac{\text{TC}}{\text{Q}} = \frac{\text{TFC}}{\text{Q}} + \frac{\text{TVC}}{\text{Q}} = \text{AFC} + \text{AVC}$$

Average total costs reflect the influence of both the average fixed costs and average variable costs. At first average total costs are high at low levels of output because both average fixed costs and average variable costs are large. But as output increases, the average total costs fall sharply because of the steady decline of both average fixed costs and average variable costs till they reach the minimum point. This results from the internal economies, from better utilisation of existing plant, labour, etc. the minimum point E in the figure represents optimal capacity. As production is increased after this point, the average total costs rise quickly because the fall in average fixed costs is negligible in relation to the rising average variable costs. The rising portion of the SAC curve results from producing above capacity and the appearance of internal diseconomies of management, labour, etc. Thus the SAC curve is U-shaped, as shown in Figure-(ii).

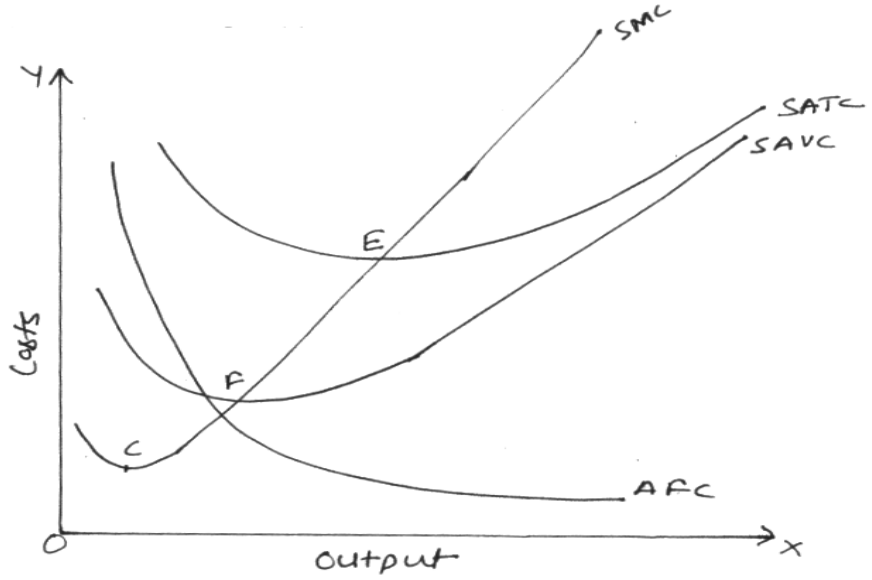

Fig.-(ii)

The U-shape of the SAC curve can also be explained in terms of the law of variable proportions. This law tells that when the quantity of one variable factor is changed while keeping the quantities of other factors fixed, the total output increases but after some time it starts declining. Machines, equipment and scale of production are the fixed factors of a firm that do not change in the short run. On the other hand, factors like labour and raw materials are variable. When increasing quantities of variable factors are applied on the fixed factors the law of variable proportions operates. When, say the quantities of a variable factor like labour are increased in equal quantities, production rises till fixed factors like machines, equipment, etc. are used to their maximum capacity. In this stage, the average costs of the firm continue to fall as output increases because it operates under increasing returns. Due to the operation of the law of increasing returns when the variable factors are increased further, the firm is able to work the machines to their optimum capacity. It produces the optimum output and its average costs of production will be the minimum which is revealed by the minimum point of the SAC curve, point E. If the firm tries to raise output after this point by increasing the quantities of the variable factors, the fixed factors like machines would be worked beyond their capacity. This would lead to diminishing returns. The average costs will start rising rapidly. Hence due to the working of the law of variable proportions the short-run AC curve is U-shaped.

Marginal cost- A fundamental concept for the determination of the exact level of output of a firm is the marginal cost. Marginal cost is the addition to total cost by producing an additional unit of output:

$$MC = \frac{DTC}{DQ}$$

Algebraically, it is the total cost of n+1 units minus the total cost of n unit of output $MC_n = TC_{n+1} - TC_n$. Since total fixed costs do not change with output, therefore, marginal fixed cost is zero. So marginal cost can be calculated either from total variable costs or total costs. The result would be the same in both the cases. As total variable costs or total costs first fall and then rise, marginal cost also behaves in the same way. The SMC curve is also U-shaped, as shown in Figure-2.

Relationship of Short-run Cost Curves

The relationships of short-run curves are explained in terms of Figure -2.

(i) The AFC curve declines continuously and is asymptotic to both axes. It means that the AFC curve approaches both axes but never touches either X-axis or Y-axis. Thus the AFC curve is a rectangular hyperbola.

(ii) The SAVC curve first declines, reaches a minimum at point F, and rises thereafter. When the SAVC curve reaches its minimum point F, the SMC curve equals the SAVC curve.

(iii) The SAC curve first declines, reaches a minimum at point E, and rises thereafter, when the SAC curve reaches its minimum point E, the SMC curve equals the SAC curve. Since SAC = AFC + AVC, the vertical distance between the SAC and the SAVC curves gives the AFC curve. So there is no need to draw a separate AFC curve. As output expands, the vertical distance between the SAC curve and the SAVC curve declines because of the falling AFC curve.

(iv) Relation between AC and MC curves: There is a direct relationship between AC and MC curves as shown in the Figure-3. Both the AC curve and the MC curve are U-shaped. When AC falls, MC is less than AC. This is because the fall in MC is related to one unit of output while in the case of AC the same decline is spread over all units of output. That is why the fall in AC is less and that in MC is more. This also explains the fact that MC reaches its minimum point F before the minimum point A of AC is reached. So when MC starts rising. AC is still declining, as shown in Figure-(iii).

When AC is minimum, MC equals AC. The MC curve cuts the AC curve from below at its minimum point A in the figure.

When AC rises, MC is greater than AC. MC is above AC when AC is rising but the rise in MC is greater than AC. This is because the rise in MC is the result of the increase in one unit of output while in the case of AC the same increases are spread over all units of output.

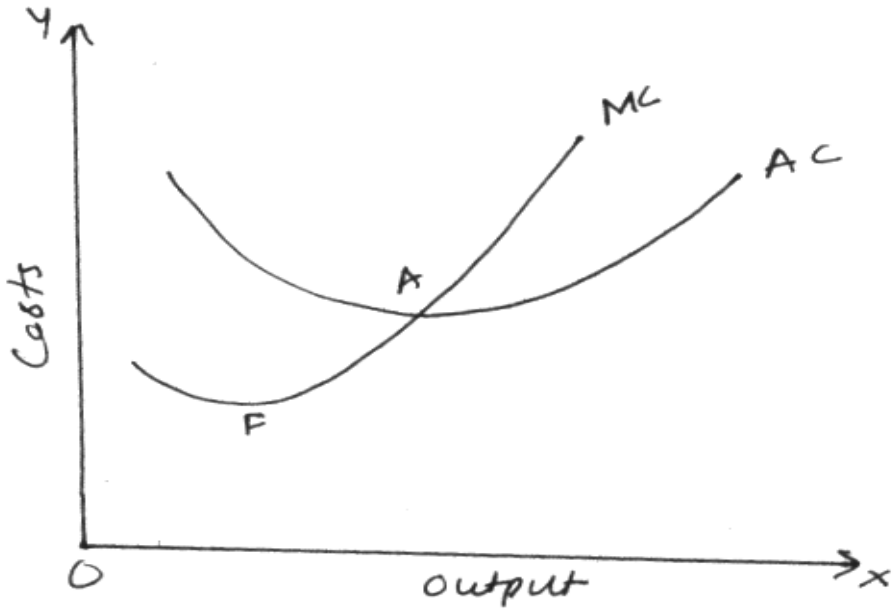

Fig.-(iii)

It should be noted that we cannot say anything about the direction of MC, when AC rises or falls. When AC is falling, it is not essential that MC must fall. MC can increase or fall but it is definite that MC will be less than AC. Similarly, when AC is increasing, it is not essential that MC must rise. MC can fall or rise but it is definite that MC will be larger than AC. But if AC is constant, MC must be constant.

Relation between SMC and AVC curves

The SMC curve bears a close relationship to the SAVC curve along with the SAC curve. So long as the SMC curve lies below the SAVC and SAC curves, it continues to fall and its rate of fall is greater than that of SAC and AVC curves. But the AVC and SAC curves start rising from the points E_1 and E_2 respectively where the SMC curve touches them, as shown in Figure –(iv). The SMC curve passes through the minimum point of the SAVC curve to the left of the minimum point of the SAC curve.

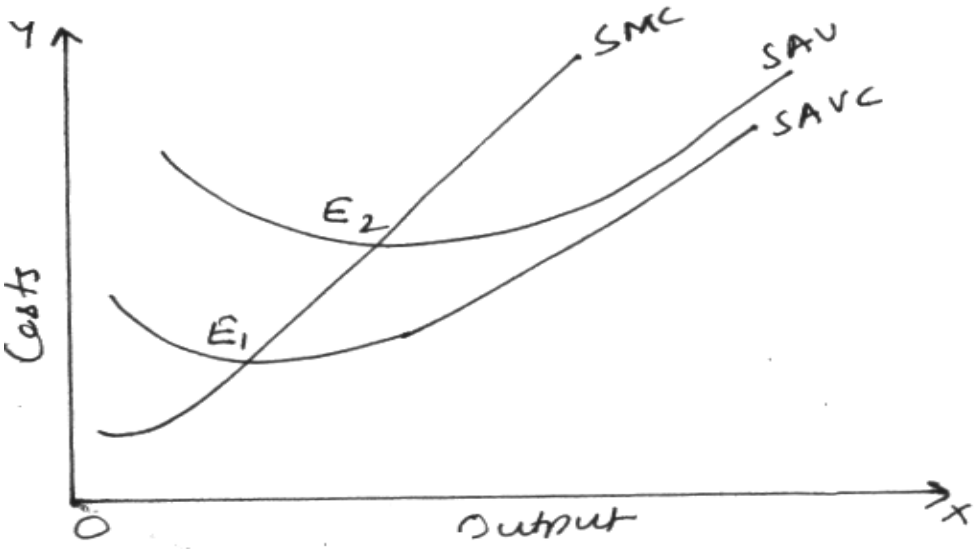

Fig.-(iv)

Since AC is the sum total of ACV + AFC, therefore when SAVC is at its minimum point, AFC is falling and it takes time for SAC to reach its minimum point. E_1 and E_2 are thus the respective minimum points of the SAVC and SAC curves. After these points the SMC curve rises sharply and is above the SAVC and SAC curves.

6.1.6.2 FIRM'S LONG RUN COST CURVES

In the long run, there are no fixed factors of production and hence no fixed costs. The firm can change its size or scale of plant and employ more or less inputs. Thus in the long run all factors are variable and hence all costs are variable.

The long run average total cost or LAC curve of the firm shows the minimum average cost of producing various levels of output from all possible short-run average cost curves (SAC). Thus the LAC curve is derived from the SAC curves. The LAC curve can be viewed as a series of alternative short-run situations into any one of which the firm can move. Each SAC curve represents a plant of a particular size which is suitable for a particular range of output. The firm will, therefore, make use of the various plants up to that level where the short-run average costs fall with increase in output. It will not produce beyond the minimum short-run average cost of producing various outputs from all the plants used together.

Let there be three plants represented by their short-run average cost curves SAC_1, SAC_2 and SAC_3 in Figure-(v).

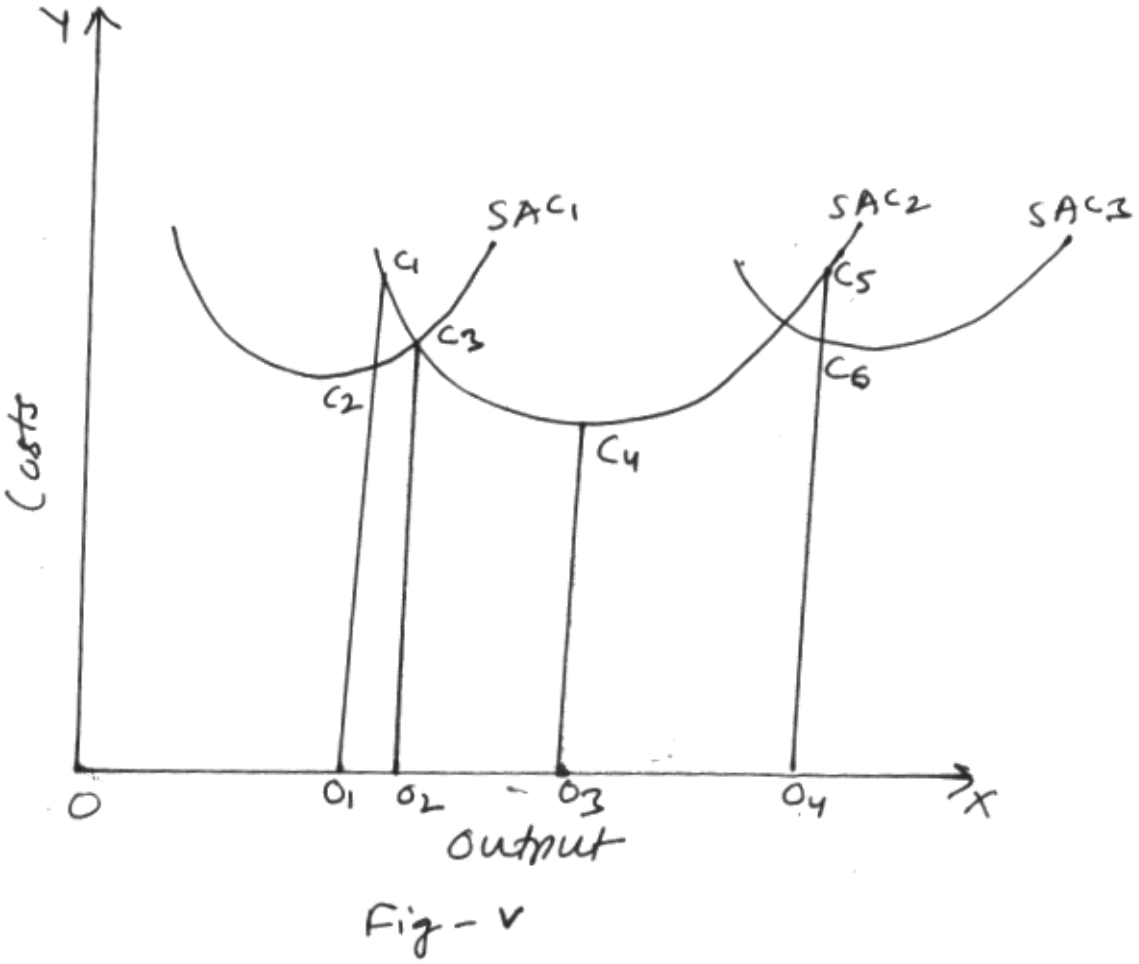

Fig - v

Each curve represents the scale of the firm. SAC_1 depicts a lower scale while the movement from SAC_2 to SAC_3 shows the firm to be of a larger size. Given this scale of the firm, it will produce up to the least cost per unit of output. For producing OO_1 output, the firm can use SAC_1 or SAC_2 plant. The firm will, however, use the scale of plant represented by SAC_1 since the average cost of producing OO_1 output is O_1C_2 which is less than O_1C_1, the cost of producing this output on the SAC_2 plant. If the firm is to produce OO_2 output, it can produce at either of the two plants. But it would be advantageous for the firm to use the plant SAC_2 for the OO_2 level of output because the larger output OO_3 can be obtained at

the lowest average cost O_3C_4 from this plant. However, for output OO_4, the firm would use the SAC_3 plant where the average cost O_4C_5 is lower than O_4C_6 of the SAC_2 plant. Thus in the long-run in order to produce any level of output the firm will use that plant which has the minimum unit cost.

If the firm expands its scale by the three stages represented by SAC_1, SAC_2 and SAC_3 curves, the thick wave-like portions of these curves from the long-run average cost curve. The dotted portions of these SAC curves are of no consideration during the long run because the firm would change the scale of plant rather than operate on them.

But the long-run average cost curve LAC is usually shown as a smooth curve fitted to the SAC curves so that it is tangent to each of them at some point, as shown in Figure-6 where SAC_1, SAC_2, SAC_3, SAC_4 and SAC_5 are the short-run cost curves. It is tangent to all the SAC curves but only to one at its minimum point. The LAC is tangent to the lowest point E of the curve SAC_4 in Figure-(vi) at OO_1 optimum output, the plant SAC_3 which produces this OQ optimum output at the minimum cost EO_1 is the optimum plant, and the firm producing this optimum output at the minimum cost with this optimum plant is the optimum firm. If the firm produces less than the optimum output OO_1, it is not working its plant to full capacity and if it produces beyond OO_1, it is overworking its plants. In both the cases, the plants SAC_2 and SAC_4 have higher average costs of production than the plant SAC_3.

The LAC curve is known as an 'envelope' curve because it envelopes all the SAC curves. Every point on an envelope long-run cost curve is also a point on one of the short-run cost curves which it envelopes. Some economists consider it as a planning curve because it is composed of plant curves and the firm plans to expand its scale of production over the long run.

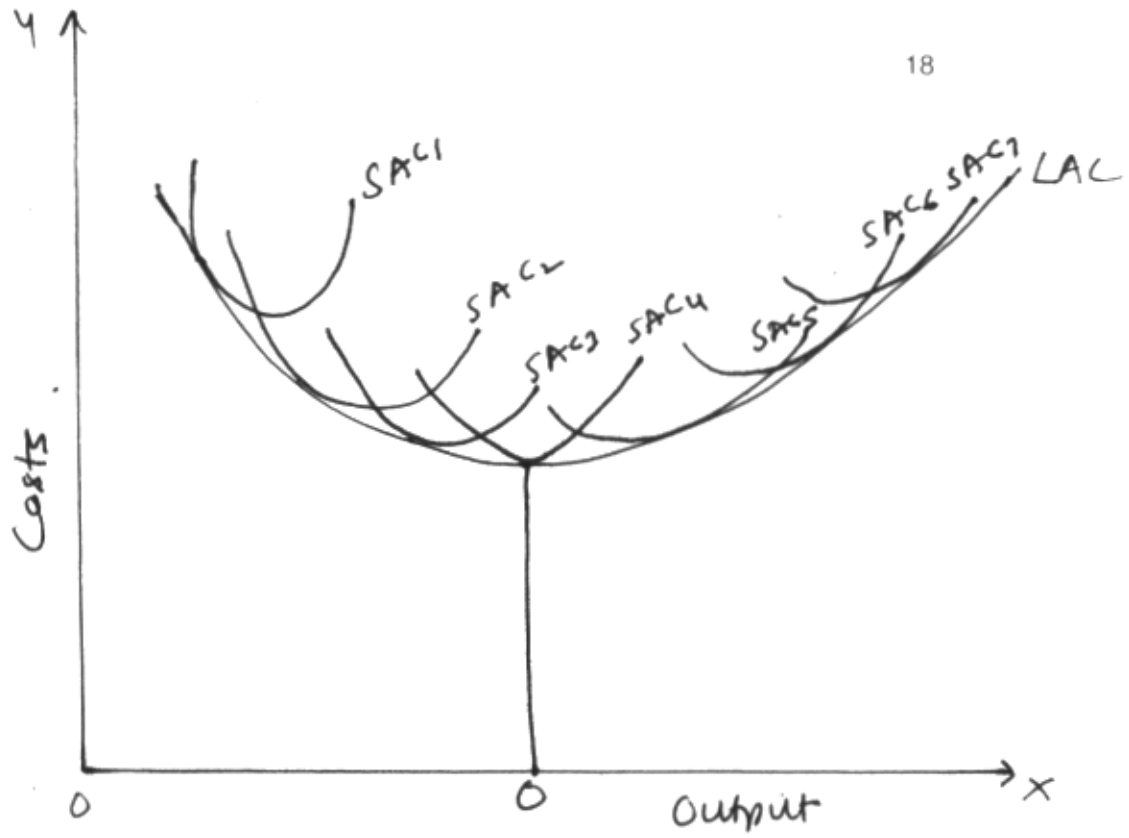

Fig.-(vi)

The long-run marginal cost (LMC) curve of the firm is derived from the SAC curves, as illustrated in Figure-(vii) where the SAC_1, SAC_2 and SAC_3 curves are enveloped by the LAC curve at points C_2, C_3 and C_4 respectively. Draw perpendiculars C_2O_1, C_3O_2 and C_4O_3 from these Respective points on the X-axis. When the points C_1, C_3 and C_5 where the curves SMC_1, SMC_2 and SMC_3 cut these vertical lines, are joined, they trace out the LMC curve. The LMC curve intersects the curves SAC_2 and LAC at the minimum point C_3 so that LMC=LAC= SAC_2 = SMC_2. Thus there exists the usual relation between marginal and average cost curves. To the left of point C_3, LAC > LMC and to its right LMC > LAC.

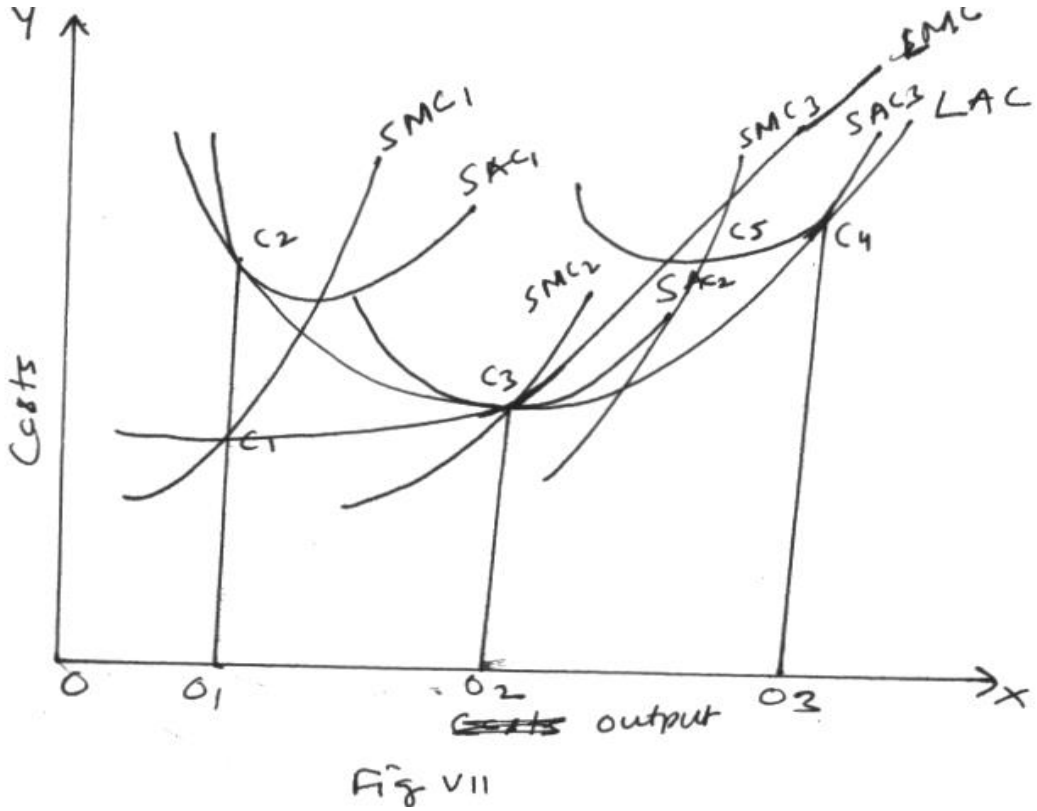

Fig VII

6.2 ECONOMIES AND DISECONOMIES OF SCALE:

The long run average cost function of economic theory is hypothesized to be U-shaped- Long run average costs decline over lower range of output and rise over higher ranges of output.

Economies of scale: Declining long run average cost over the lower part of the range of possible output is usually attributed to economies of scale. The sources of economies of scale can be classified into two categories- one is real economies and second is pecuniary economies of scale. Pecuniary economies are realised from paying lower prices for the factors used in the production and distribution of the product, due to bulk buying by the firm as its size increases. Such economies of scale do not imply reduction in the inputs used in production process. Real economies are those associated with a reduction in physical quantity of inputs, raw materials, various types of labour and various types of capital. These economies of scale can be explained as under:

6.2.1 REAL ECONOMIES OF SCALE:

These economies of scale can be attributed to the following factors:

1. Production Economies of Scale: Production economies may arise from product specific economies and plant specific economies.

Product Specific Economies: A number of different sources of scale economies are associated with producing large volume of a single product. Expansion of output may lead to greater specialisation in the use of labour and capital. Large scale allows division of labour and specialisation of labour force with the result of an improvement of the skills and hence productivity of the various types of labour. As the scale of production is increased, the production process can be broken into a series of small tasks and the workers can be assigned to the tasks for which they are most qualified workers are then able to acquire additional proficiency through repetition of the tasks to which they are assigned. It is also observed a learning curve effect in producing multiple units of a product that is the amount of inputs such as labour and associated costs required to produce each unit of output decrease for successive increases in the cumulative output of the enterprise. Similarly the higher scale of production may lead to technical economies which are result of (i) specialisation and indivisibilities of capital (ii) set up costs (iii) initial fixed costs (iv) reserve capacity requirements. Modern technology generally involves a higher degree of mechanisation for large scales output. That is the production methods become more mechanised as scale increases. Mechanisation often implies more specialised capital equipment as well as more investment. Such method may lead to higher overhead costs but there methods have lower variable costs which may affect the overhead cost at higher output level.

Firm's Specific Economies: These economies are related to the overall size of the firm. The major sources of these economies arise from sales and distribution, raising funds and; transport and storage.

Economies in Marketing: Economies in marketing arise from large scale from the large scale purchase of inputs and large scale selling of the firm's own products. As to get the economies in purchase of inputs the large size firms normally make bulk purchases of their inputs. The large scale purchase entices the firm for certain discounts which are not available on small purchases. Large scale of firm may also lead to economies in marketing and sales promotion. These scale economies can take such forms as quantity discounts in securing advertising media space and time and ability of the large firm to spread the fixed costs of advertising preparation over a greater output volumes. In addition, the large firm may be able to achieve a relatively greater degree of brand recognition and brand loyalty from its higher level of sales promotion expenditure over an extended period of time. Purchasing financial funds

for larger firm is also easy, because securities of larger firm are generally less risky than those of smaller firm. Most investors are averse to risk, so they are often willing to pay a higher price for less risky securities of larger firm.

Managerial Economies: Managerial economies are attributed to (i) specialisation in management and (ii) mechanisation of managerial functions. For a large size firm, it becomes possible to divide its management into specialized departments under specialised personnel such as production manager, sales manager, and finance manager. Such a framework in modern organisation lead to quick decision making, help in saving valuable time of management and thereby the management efficiency.

Economies of Transport and Storage: The large size firms may acquire their own mean of transport and they can thereby reduce the unit cost of transportation compared to market rate and also prevents delay in transporting goods. Similarly large scale firm can generate their own god owns in the various centre of product distribution and can save cost of storage.

6.2.2 DISECONOMIES OF SCALE:

Rising long run average costs at higher level of output are usually attributed to diseconomies of scale. These diseconomies are disadvantage that arise due to the higher scale of production and lead to rise in cost of production. These economies may be classified into two categories- (i) Internal diseconomies (ii) External diseconomies.

These diseconomies are exclusive and internal to a firm. When a firm becomes very large a limit of economies of scale may reached. This limit is reached when the advantage of division of labour and managerial staff have been fully exploited, excess capacity of plant, storage, transport and communication system is fully used. These diseconomies may also appear in the form of problems of co-ordination and control encountered by management as the scale of operation is increased. These coordination and control problems may impose rising cost on the firm in a number of different ways. These costs may be associated with the increase in costs of salary and perks, and losses arising from delayed or faulty decision and weakened or distorted management incentives.

6.3 BREAK-EVEN ANALYSIS:

Many of the planning activities that take place within a firm are based on anticipated level of output. The study of the interrelationship among firm's sales, costs and operating profits at various level of output levels is known as cost-volume profit analysis or break even analysis. This analysis is often used by business executive to determine the sales volume required to break even and total profits and losses at different output levels. For illustrating the breakeven analysis. It is assumed that the cost and revenue curves are non-linear as shown in Fig-(viii) Total revenue is equal to the number of units of output sold multiplied by the price per unit. The concave form of revenue curve implies that the firm can sell additional units of output only by lowering the price. The total cost curve is based on traditional approach of relationship between cost and output in short run;

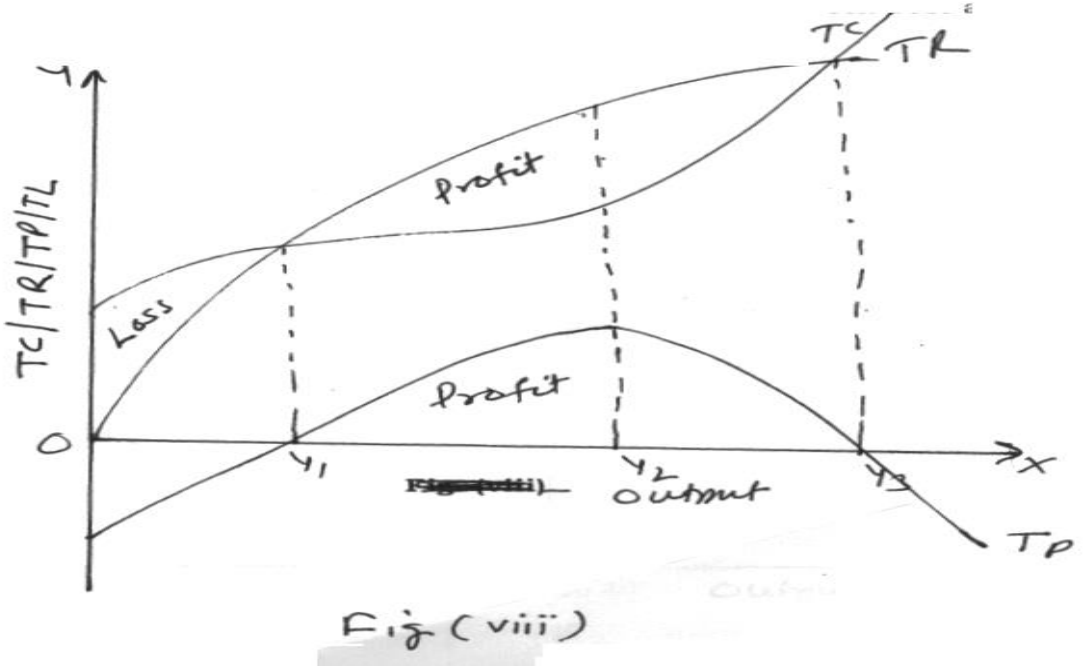

Fig (viii)

The difference between total revenue and total cost at any level of output represents the total profit or loss that will be realised. The total profit (TP) at any level of output is given by vertical distance between the total revenue (TR) and total cost (TC) curves. A breakeven situation (zero profit) occurs whenever total revenue equals total cost. In Fig. not that a breakeven condition occurs at two different output level- Y_1 and Y_3. Below an output level Y_1 losses will incurred because TR < TC. Between Y_1 and Y_3 profits will be obtained because TR > TC. An output level above Y_3, losses will occur again

because TR < TC. Total profit are maximized within the range of Y_1 to Y_3, where the vertical distance between the TR and TC curves is greatest, that is at an output level of Y_2.

For practical decision making the non-linear revenue output and cost output relationship of economic theory are generally replaced by linear functions. The breakeven analysis based on linear function is shown in Fig-(ix)

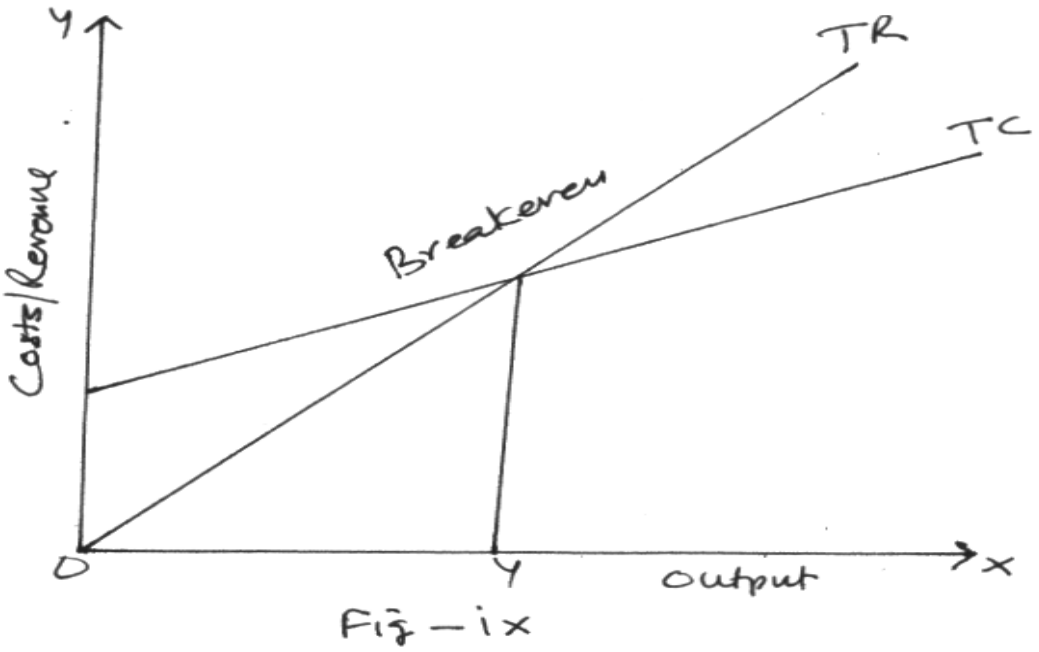

Fig – ix

Here TR is a straight line assuming that firms change a constant selling price P per unit of output. In case of cost curve, total cost is taken as sum of fixed cost which are independent of the output level plus the variable costs which increases at a constant rate per unit of output. In this case the breakeven analysis occurs at point Y_b in Fig-(ix) where TR and TC intersect. If a firm's output level is below this breakeven point that is If TR < TC, it incurs operating losses. If firm's output level is above this breakeven point that is if TR > TC it realises operating profits. Algebraically it can be defined as:

Total revenue is equal to the selling price per unit times the output level.

$TR = P \times Y$

Total cost is equal to fixed cost plus variable cost, where the variable cost is the product of the variable cost per unit times the output level.

$TC = TFC + AVC \times QY$

Now break-even output level is that level where profit is zero.

$TR = TC.$

$P \times Y = TFC + AVC \times Y$

$P \times Y - AVC \times Y = TFC$

$Y (P - AVC) = TFC$

$$Y = \frac{TFC}{P - AVC}$$

6.4 CHECK YOUR PROGRESS

After reading this chapter, you have to answer the following True/False so that you can check your progress.

1- With increase in level of output, AFC goes on falling till reaches zero.
2- AVC falls even when MC is rising.
3- The difference between TC and TVC falls with increase in output.
4- As output is increased, the difference between ATC and AVC falls and ultimately becomes zero.
5- The difference between ATC and AVC is constant.

6.5 SUMMARY

The information of production costs provides an important input for decision making at management level in a firm. Decisions such as resource allocation, expansion, and diversification are made through cost analysis. For the profit maximizing firm, decision on capital investment in the form of new machinery or a warehouse are made by comparing the rate of return on investment with the opportunity cost of funds used to make the capital acquisitions. Further, the traditional theory of costs analyses the behaviour of cost curves in the short run and the long run and arrives at the conclusion that both the short run and the long run cost curves are U-shaped but the long-run cost curves are flatter than the short-run cost curves. At the end, many of the planning activities that take place within a firm are based on anticipated level of output. The study of the interrelationship among firm's sales, costs and operating

profits at various levels of output levels is known as cost-volume profit analysis or break even analysis. This analysis is often used by business executive to determine the sales volume required to break even and total profits and losses at different output levels.

6.6 KEYWORDS

Opportunity cost is the value of a resource in its next best alternate use. Opportunity cost represents the return or compensation that must be forgone as a result of the decision to employ the resources in a given activity.

Accounting cost: *a*ccountants define and measure the cost by the historical outlays of funds that take place in the exchange or transformation of a resource.

Explicit costs are those which fall under actual or business costs entered in the books of accounts. The payments for wages and salaries, materials, license fee, insurance etc. are the examples of explicit costs.

Implicit Cost: there are not certain other costs which don't take the form of cash outlays, nor do they appear in the accounting systems. Such costs are known as implicit or imputed costs.

Sink costs are the expenditure that have been made in the past or that must be paid in future as part of a contractual agreement.

Marginal costs refer to the change in total cost associated with a unit of change in output.

In the long run, there are no fixed factors of production and hence no fixed costs. The firm can change its size or scale of plant and employ more or less inputs. Thus in the long run all factors are variable and hence all costs are variable.

Economies of scale*:* declining long run average cost over the lower part of the range of possible output is usually attributed to economies of scale.

Diseconomies of Scale*:* Rising long run average costs at higher level of output are usually attributed to diseconomies of scale.

6.7 SELF- ASSESSMENT TEST

1. Discuss the nature of the short-run and long-run average cost curves. Why is the long-fun cost curve flatter than the short-run cost curve?

2. Explain and illustrate the traditional cost curves of a firm in the short run and the long run.

3. How do economies and diseconomies of scale affect the LAC curve?

4. Derive geometrically long-run average and marginal cost curves from a long-run total cost curve.

5. What is opportunity cost? Give some examples of opportunity cost. How are these costs relevant for managerial decisions?

6.8 ANSWERS TO CHECK YOUR PROGRESS

1- FALSE
2- TRUE
3- FALSE
4- FALSE
5- FALSE

6.9 REFERENCES/ SUGGESTED READINGS

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Course: **Micro Economics**	
Course Code: **BCOM 102**	**Author: Dr. Ved Pal**
Lesson No: **7**	**Vetter: Dr. Tilak Sethi**
SLM Conversion By: Ms. Chand Kiran	

Equilibrium of Firm and Industry under Perfect Competition

Structure

7.0 Learning Objective

7.1 Introduction

7.2 Market and its type

7.2.1 Perfect Competitive Market

7.2.2 Equilibrium of the Firm and Industry in the Perfect Competitive Market

7.3 Monopoly

7.3.1 Price and Equilibrium Determination under Monopoly

7.3.2 Monopoly Power

7.3.3 Lerner's Method

7.3.4 Bain's Method to Measure the Monopoly Power

7.3.5 Monopoly and Price Discrimination

7.4 Check Your Progress

7.5 Summary

7.6 Keywords

7.7 Self- Assessment Test

7.8 Answers to Check Your Progress

7.9 References/ Suggested Readings

7.0 LEARNING OBJECTIVE

After reading this chapter you will be able to understand the market and its structure. Then, you will be provided knowledge regarding types of market and price determination in different types of market. Further, equilibrium in short run and long run is also described. One important topic i.e. price discrimination is also discussed at the end of this chapter.

7.2 INTRODUCTION TO MARKET

Markets are focal point for economic activity as it plays important role in pricing and allocating resources in a competitive economy. A market is a group of economic agents (individuals/or firms) that interact with each other in a buyer-seller relationship. This interaction results in transactions between the demand (buyer) side of the market and the supply side of the market. The determination of output and the price of a commodity in a market depend upon the number of buyers, sellers and the characteristics of the product which are also the determinants of market structure.

7.3 MARKET AND TYPES OF MARKET:

The determination of output and the price of a commodity in a market depend upon the number of buyers, sellers and the characteristics of the product which are also the determinants of market structure. On the basis of the characteristics of market structure the market can be classified as given under.

1. Perfect competitive market
2. Monopoly
3. Monopolistic competition

   (i) Duopoly

   (ii) Oligopoly

Firm: Basically there are two types of actors in an economy.

(1) Households (2) Firms.

Households are the consumers of the goods and services while firms are the producers of such goods and services. Firm is an economic entity which works for profit motive.

7.2.1 PERFECT COMPETITIVE MARKET

Perfect competitive market is that market where large numbers of are many sellers and buyers producing homogeneous product but the size of the sellers and buyers is so small that they can not change the demand and supply of the product. In this market the price of the commodity is determined by the industry and the firm is merely a price taker.

Characteristics of the Perfect Competitive Market:

1. Larger number of buyers and sellers and their size is small.
2. Homogenous product.
3. Perfect knowledge.
4. Perfect mobility.
5. There is no entry ban on the firms.
6. There is no transport and selling costs in this market.
7. Equal cost throughout the market.

7.2.1.1 PRICE DETERMINATION IN THE PERFECT COMPETITIVE MARKET:

In this market the price of the commodity is determined by the industry. The industry determines the price of the commodity at the point where the market demand and supply of the commodity becomes equal to each other. We can show it with the help of following schedule and Fig-1:

Price of the commodity	Demand	Supply
1	10	2
2	8	4
3	6	6
4	4	8
5	2	10

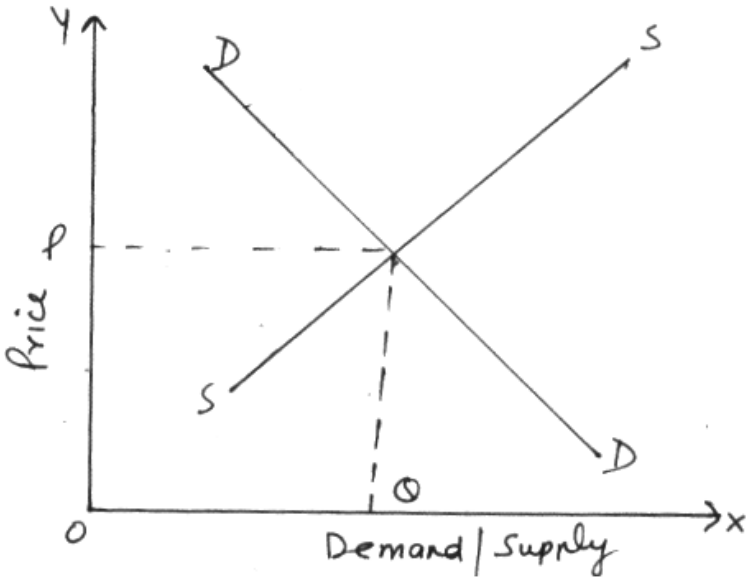
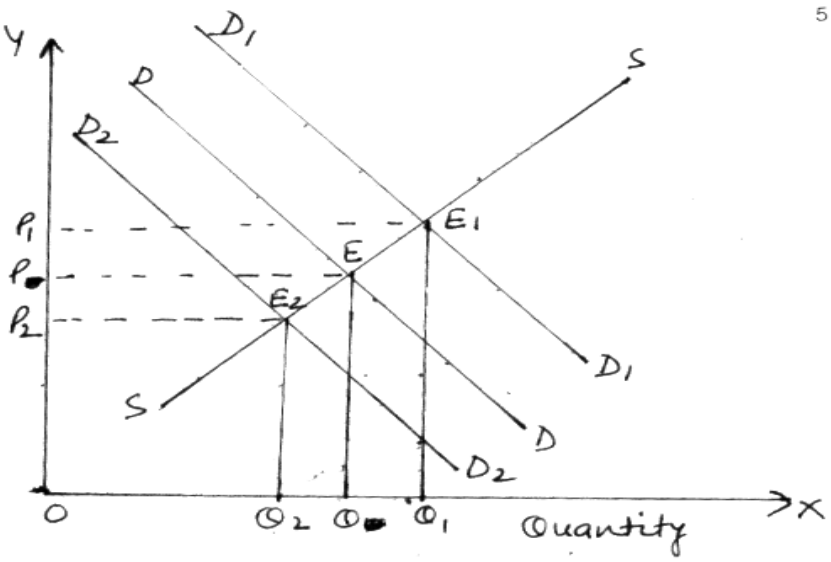


Fig.-I

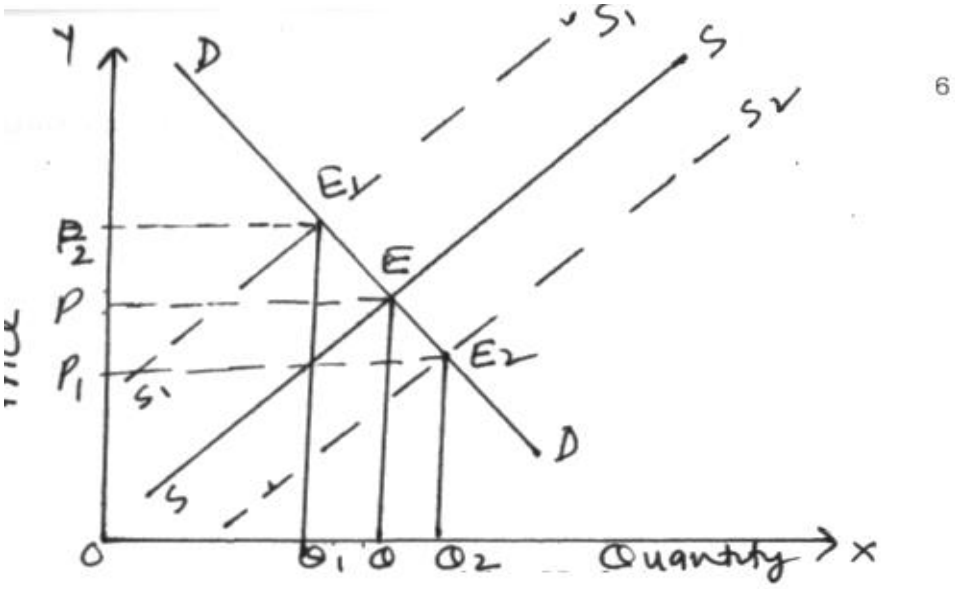
7.2.1.2 EFFECT OF CHANGE IN DEMAND ON THE PRICE:

If the supply of the commodity remains constant and its demand increases the price of the commodity increases in the same way if the demand decreases supply being the constant than price decreases we can show it as



In the above diagram SS and the supply curve and DD is the first demand curve. Point E is the first equilibrium-point where price is OP and the equilibrium quantity is OQ. If the demand curve shifts upward i.e. it becomes D_1D_1 after increasing the demand. Now the new equilibrium point is E_1, where the new price is OP_1 which is more than OP. and in the same way after decreasing the demand the demand curve shifts backward i.e. it becomes D_2D_2 and the new equilibrium point is E_2 where new price is OP_2 which is less than OP.

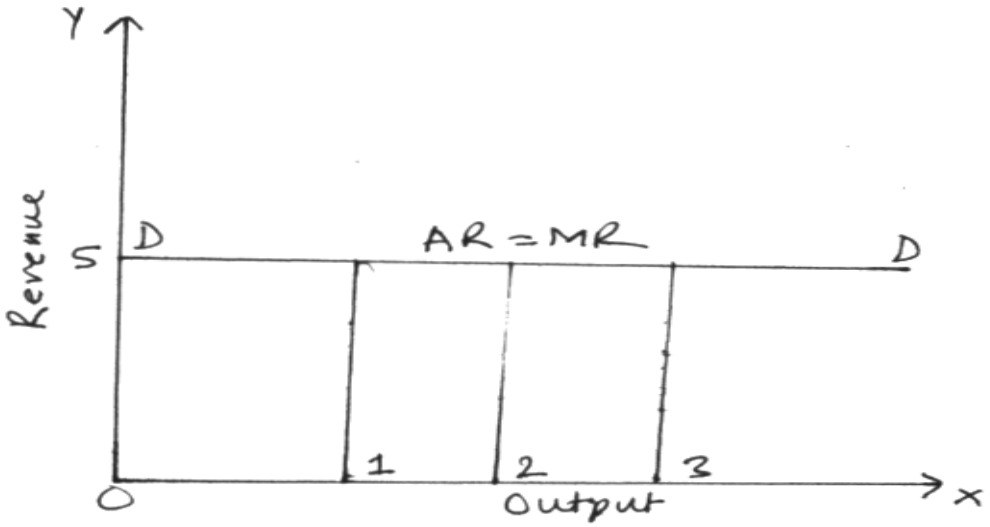
7.2.1.3 EFFECT OF THE CHANGE OF THE SUPPLY ON THE PRICE: When the supply of the commodity increases when its demand remains constant its price decreases and vice-versa also. We can show it as



Revenue Curve of the Perfect Competitive Market

In the perfect competitive market the demand curve i.e. the price curve and the marginal revenue curves are the same.

In the above diagram it is shown that if the one unit of the commodity is sold than AR i.e. price is 5 Rs. If the demand increases and two or three units of the commodity



Remains same i.e. of 5 Rs. /unit. So the marginal revenue also remains the same i.e. 5 Rs. /unit. The demand/revenue curve in this market remains parallel to X-axis.

7.2.2 EQUILIBRIUM OF THE FIRM AND INDUSTRY IN THE PERFECT COMPETITIVE MARKET:

A firm is a business or economic entity which produces goods and services for sale. Its motive is to maximise its profit.

Industry: In the perfect competitive market there are so many firms which produce homogeneous product. The group of these firms is known as industry.

In the perfect competitive market the equilibrium of the firm and industry are shown less than two time periods.

(1) Short run equilibrium.

(2) Long run equilibrium.

1. Short run equilibrium

Meaning of the Firms Equilibrium

A firm is in equilibrium when it is satisfy with its present production quantity. At its equilibrium point the firm is getting either maximum profit or minimum loss. For a firm, equilibrium is a position when to increase and decrease in production is not profitable for it.

Firm's equilibrium can be explained in two ways-

1. On the basis of total revenue and total cost.
2. On the basis of marginal revenue and marginal cost.

Firm's Equilibrium on the Basis of Total Revenue and Total Cost:

On the basis of total revenue and total cost a firm is in equilibrium when the difference between total revenue and total cost is maximum i.e. at the point where the firm's total profit is maximum.

□ = TR – TC = Maximum.

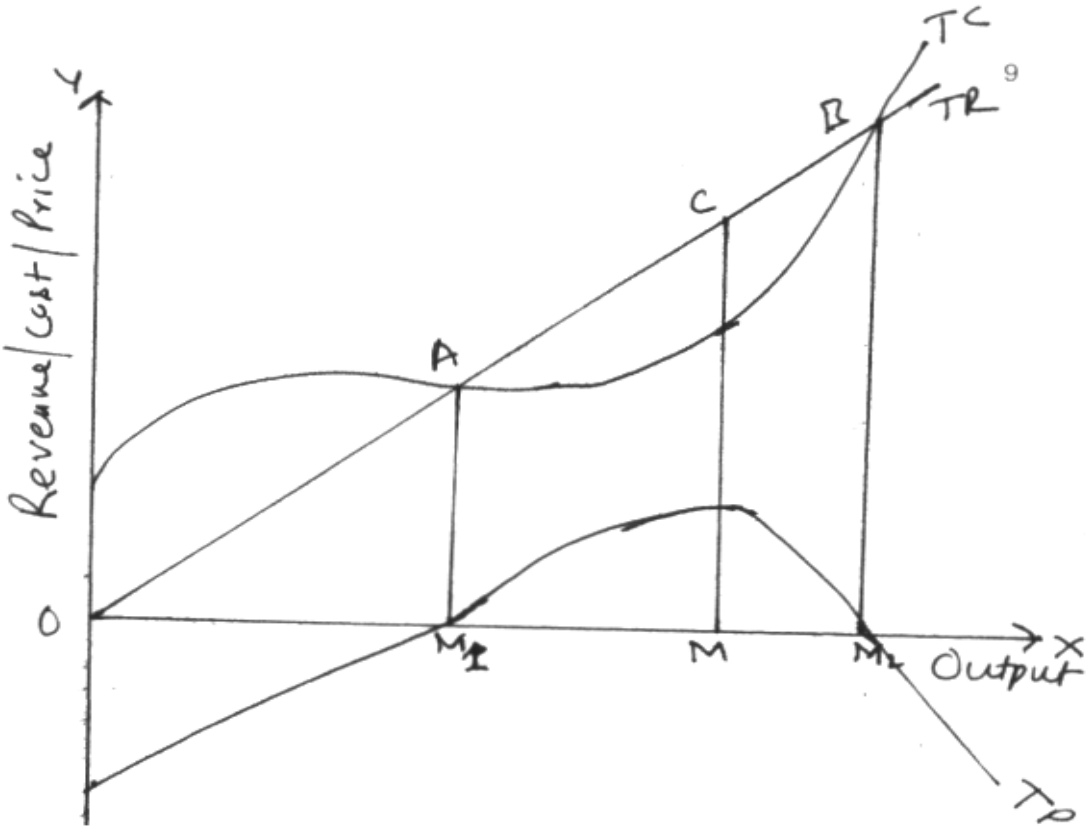
□ = Total profit

TR = Total revenue

TC = Total cost.

In perfect competitive market, we can show it as,

TR is the total revenue curve in the diagram given which remains increasing with a same rate because in this market the price of the good is determined by the industry and the firms have to sell their whole production on this price. So in this market marginal and average revenue remains constant and equal to each other's is the total cost curve which becomes equal to TR at point A and remains decreasing till point B and then starts increasing and cuts the total revenue curve at point C. the reasons of this is that at first the returns to scale are increasing and after some time decreasing returns to a scale are required.



TP is the total profit curve which is negative before point A because before this point total cost is more than total revenue. Total profit is maximum at the output M where the difference between total revenue and total cost is maximum. After that total profit starts decreasing and it becomes equal to zero at output M_2, OM is the firm's equilibrium production because at this production the firm is acquiring maximum profit.

2. Firms Equilibrium on the Basis of Marginal Revenue (MR) and Marginal Cost (MC) Method:

Another and most popular method to know the firms equilibrium position is the marginal revenue and marginal cost method.

Marginal Revenue: The change in total revenue due to addition of revenue by selling one more unit by a firm is known as the marginal revenue.

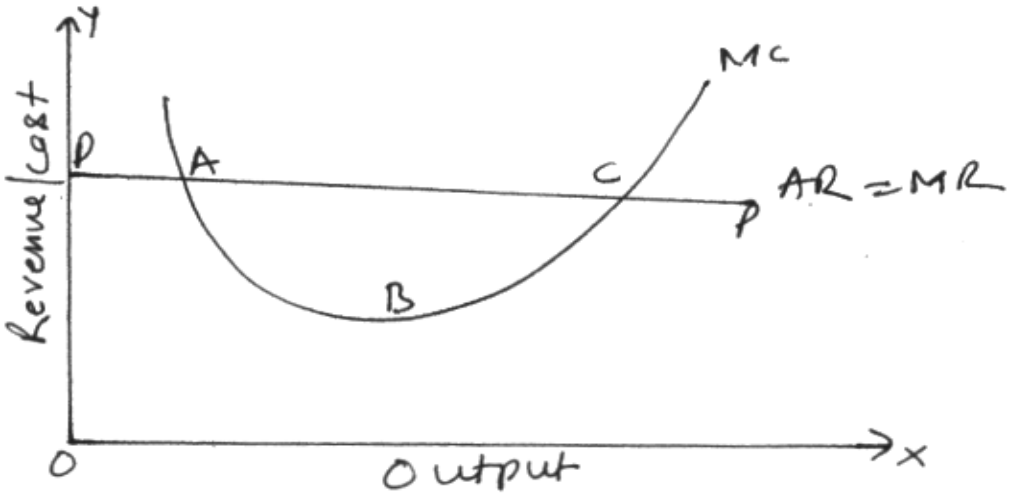
Marginal Cost: The change in total cost due to addition of cost by producing one more unit is known as marginal cost.

To determine the equilibrium position a firm has to compare its marginal revenue and marginal cost. A firm increases its production till its marginal revenue is more than its marginal cost i.e. till MR > MC. A firm wants to decrease its production when its marginal revenue MR is less than its marginal cost i.e. when MR < MC. A firm does not want to change its production when its MR = MC. This position will be the firm's equilibrium position.

Marginal revenue should be equal to marginal cost is the necessary condition for a firms equilibrium but not the sufficient condition. So the second condition of the firm's equilibrium is that the marginal cost (MC) curve should cut the marginal revenue (MR) curve from below. Because it may be possible that at the point where MR = MC firm is not acquiring maximum profit. So according to marginal analysis the above two conditions are necessary for the firms equilibrium. i.e.

1. MC = MR
2. Marginal cost curve should cut the marginal revenue curve from below.

In perfect competitive market the equilibrium position of the firm can be shown as under:



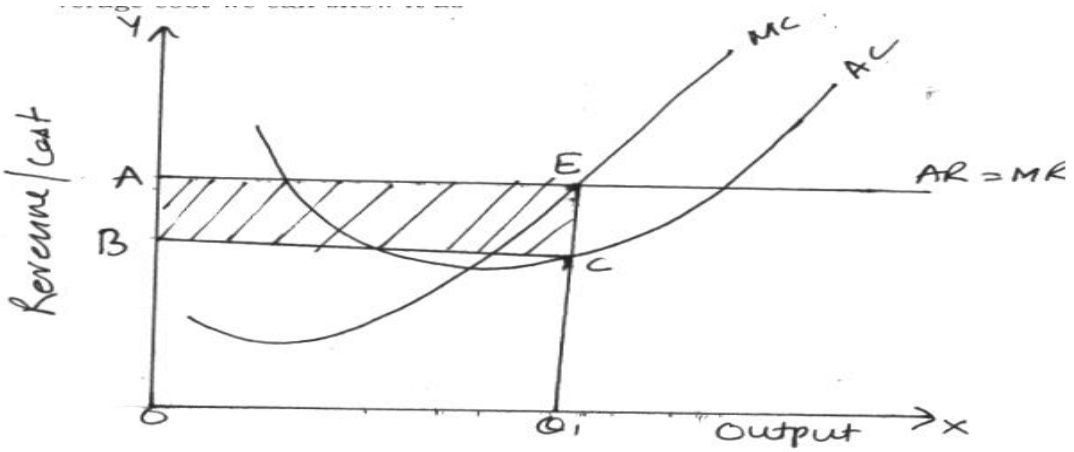
In the above diagram PP curve is the average (AR) and marginal (MR) revenue curve, which is parallel to X-axis. MC is the firms marginal cost curve which slops downward first and after point B it starts increasing. The marginal cost curve cuts the marginal revenue curve at point A and C. Point A is not equal equilibrium point because at this point the equilibrium's first condition i.e. MC = MR is satisfied but the second condition i.e. MC cuts the MR from below is not satisfied. Point C is the equilibrium point because at this point both the conditions of equilibrium are satisfied.

7.2.2.1 EQUILIBRIUM OF THE FIRM IN THE SHORT RUN:

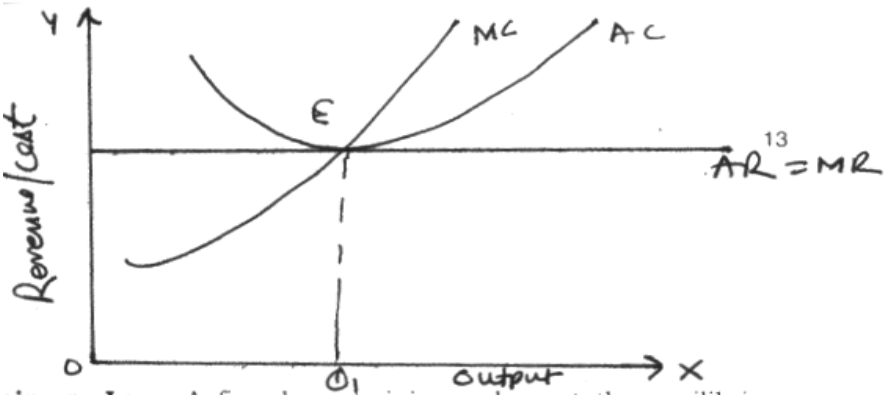
Short run is the time period in which the firm can increase its production by increasing its variable factor only. So in the short run the scale of the production remains constant i.e. in the short run no firm can enter or leave the industry. In the short run equilibrium position a firm may be in three positions.

1. Abnormal profit
2. Normal profit
3. Minimum loss

1. Abnormal Profit: A firm is in equilibrium when it produces so much amount of a commodity at which its marginal revenue (MR) will be equal to its marginal cost i.e. (MC) and its (MC) curve cuts its (MR) curve from below. A firm requires abnormal profit in its equilibrium position when the average revenue determined by the industry is more than the firms average cost we can show it as



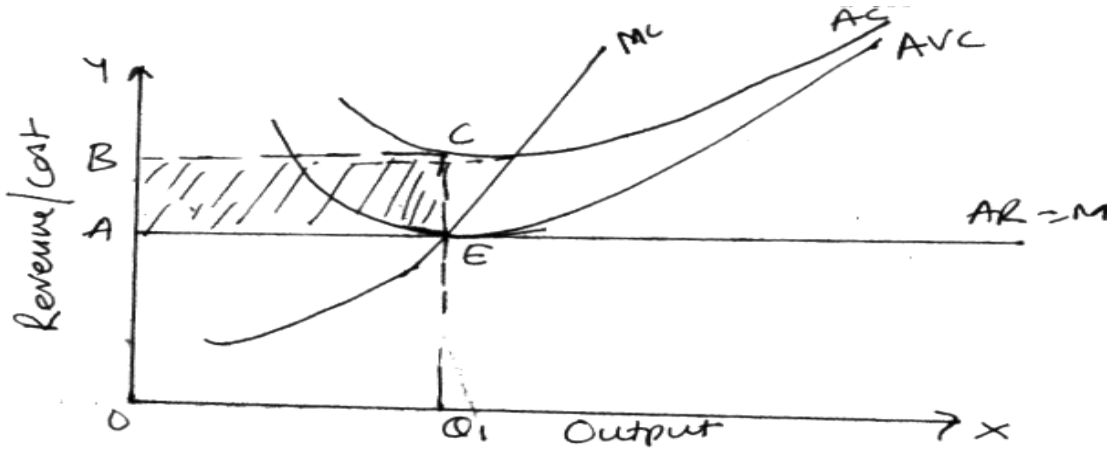
2. Normal Profit: A firm acquire normal profit at the equilibrium position when the average cost at the equilibrium production will be equal to the price determined by the industry it can be shown as.



3. Minimum Loss: A firm bears minimum loss at the equilibrium position when the difference between AC and AR at equilibrium output is equal to fixed cost of the firm i.e.

When AC – AR = FC

It means that in the short run a firm continue its production till it acquires revenue equal to its marginal variable costs. Because in the short run if it drops production it will have to bear the fixed costs. We can show it as



In the above diagram E is the firm's equilibrium point and the firm bears minimum loss which is equal to its fixed cost at equilibrium point. Because at equilibrium point the industry has determined the price of the output equal to average variable cost. If the industry decreases price less than this than the firm will stop production.

7.2.2.2 LONG RUN EQUILIBRIUM OF THE FIRM IN PERFECT COMPETITION MARKET

Long run is the time period in which supply can be changed according to demand. The new firms can enter or the existing firms can leave the industry. The existing firms can also change their scale of production according to their necessity.

Conditions of Long Run Equilibrium of the Firm:

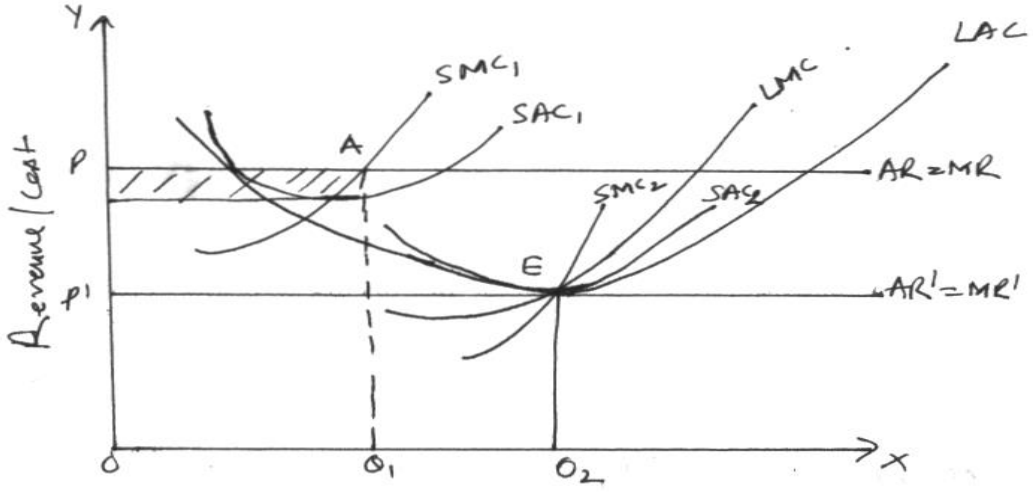
A firm will be in equilibrium in the long run when

1. Firm's long run marginal cost and long run marginal revenue will be equal to each other.

i.e. LMC = LMR

2. Long run marginal cost curve should cut the long run marginal revenue curve from below.

In the long run all firms get only normal profit when they are in equilibrium. Because in the long run, if firms will get abnormal profit then the old firms will increase their production and the new firms will enter the industry. So the supply of the commodity will increase and price will decrease. On the other hand if the firms are in loss than some firms will leave the industry and the supply decreases and the price will increase. In the long run the firm will produce at minimum average cost in equilibrium position. This production is also known as optimum production.



In the above diagram point A is showing the short-run equilibrium of the firm where a firm is earning supernormal profit. The long run equilibrium of the firm will be at point E. where the firm is acquiring normal profit, here its LMC = SMC = MR = AR = SAC = LAC.

7.2.2.3 EQUILIBRIUM OF THE INDUSTRY

An industry will be in equilibrium when there will be no tendency of change in it. It means that in equilibrium position no firm can enter or leave the industry.

New firms will not enter the industry when the existing firms are acquiring normal profit. In the same way the older firm will not leave the industry because due to fear of loss. So when the existing firm will not want to leave and the new firms will not want to enter the industry. There will be no tendency of contraction or extension of the industry. This position is known as the industries equilibrium.

Conditions of the Industry Equilibrium

An industry can contract or expand in two ways-

1. When the existing firms of the industry make contraction or expansion in their production.
2. Either new firms enter or the older firms leave the industry.

The industry will be in equilibrium when there will be no tendency of above two changes. So there are two conditions of industry's equilibrium.

1. Constant number of firms.
2. Existing firms should be in equilibrium.

7.2.2.4 SHORT RUN EQUILIBRIUM OF THE INDUSTRY

In the short run an industry will be in equilibrium at the price at which the industry's demand and supply are equal to each other. In the short run industry can not acquire perfect equilibrium, because to acquire perfect equilibrium all the firms should acquire normal profit but in the short run there is a possibility that some firms are in a position of abnormal profit and some are in loss. We can show it as

Diagram A is showing the industry as equilibrium E is the equilibrium point where demand and supply curves of the industry cut each other. Diagram B, is showing that at the equilibrium price firms are acquiring abnormal profit so these will be a tendency that they will increase there supply in the long run.

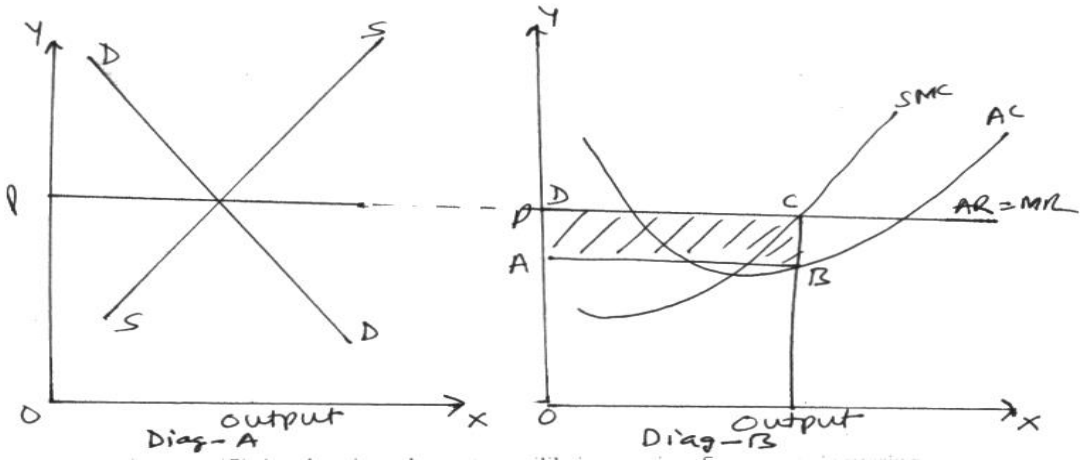
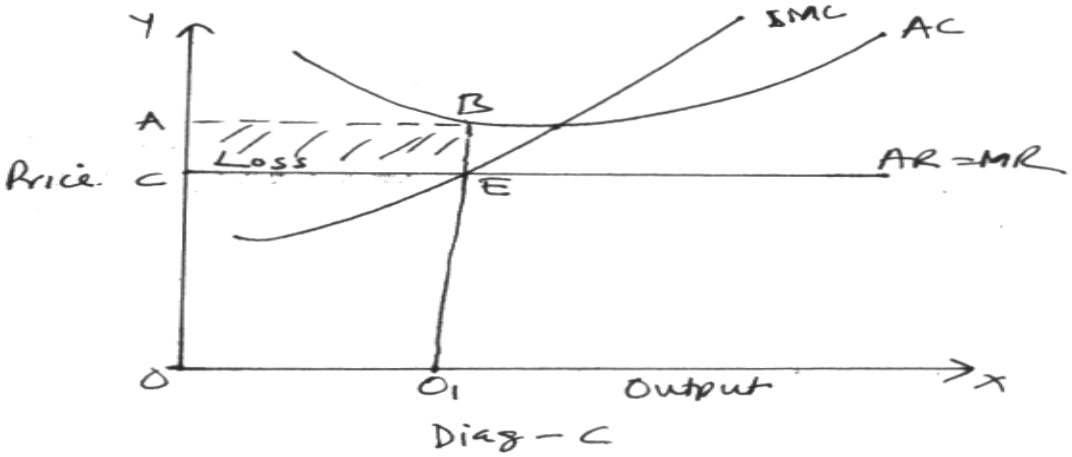


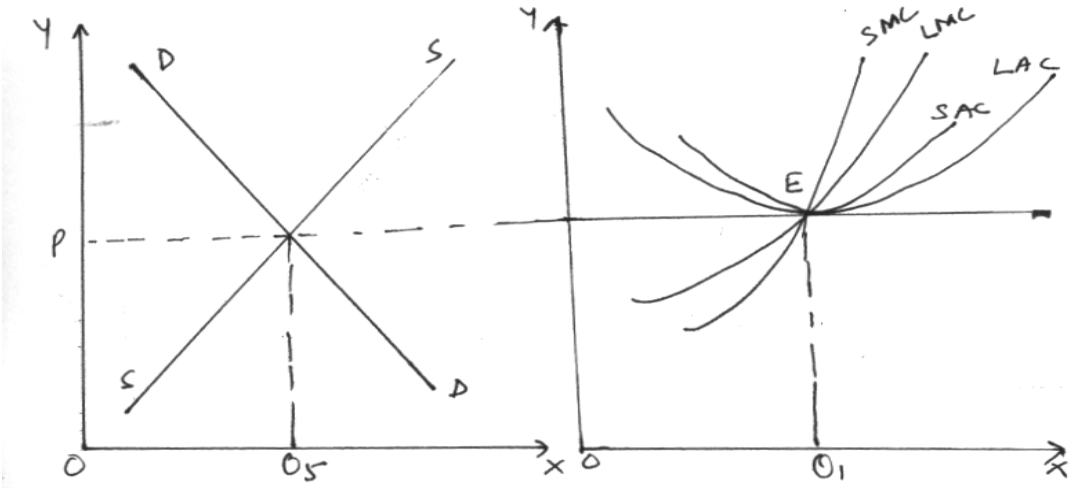
Diagram (C) is showing that at equilibrium price firms are incurring losses so there will be a tendency to decrease the supply in the long run. So the industry will be in perfect equilibrium only in the long run.



Diag – C

7.2.2.5 LONG RUN EQUILIBRIUM OF THE INDUSTRY-

In the long run the industry will be in equilibrium when it testifies these conditions.



1. Each form of the industry should be in equilibrium individually i.e. their MC = MR and their MC should cut MR from below.
2. The number of firms should remain constant i.e. LAC = LAR.

7.3 MONOPOLY

Monopoly is a market where there is only one producer of a good or services. There is also no substitute of the good or service.

Conditions of Monopoly Market

1. Single seller and large number of buyers.
2. There is no substitute in the market.
3. Entry ban.
4. Controlled supply.
5. Independent price policy.
6. There is no difference between firm and industry.
7. Price discrimination.
8. Abnormal profit.
9. There are no selling costs.
10. Different average and marginal revenue curve.

7.3.1 PRICE AND EQUILIBRIUM DETERMINATION UNDER MONOPOLY

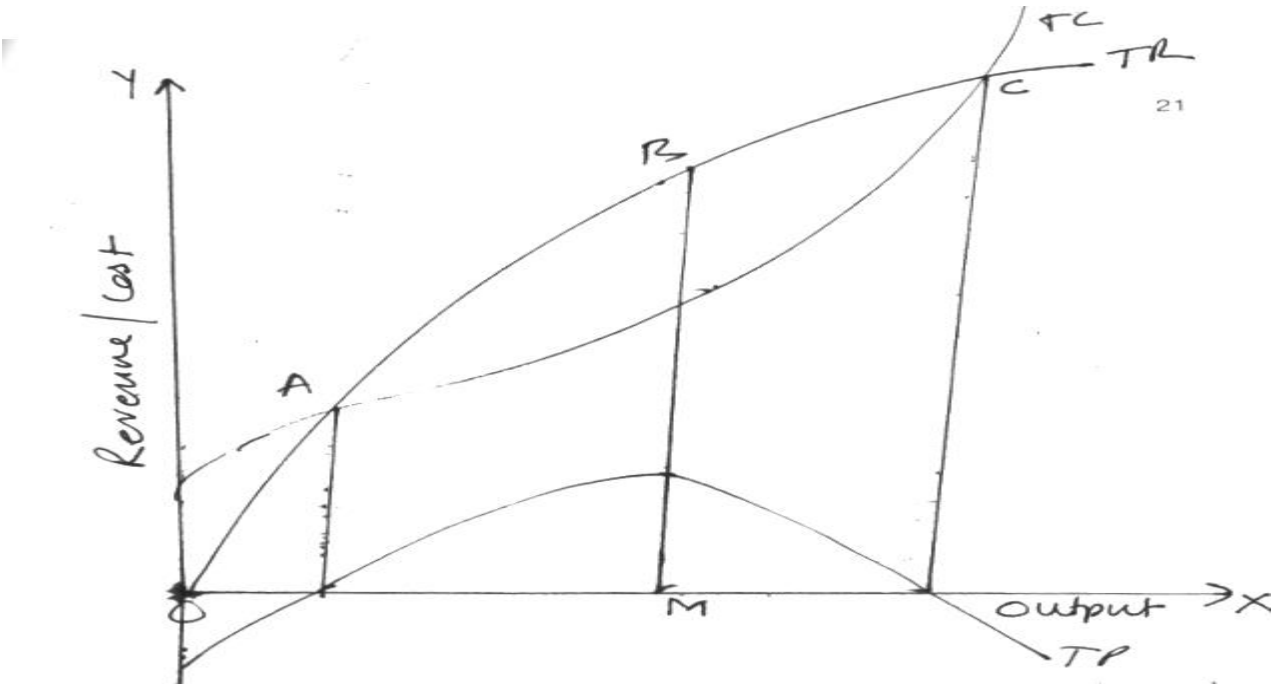
A monopolist determines that price of his product at which he will get maximum profit. He will be in equilibrium when he produces that amount of his product at which his total profit will be maximum. In the short run the monopolist may get minimum loss at the equilibrium position.

In monopoly also price and equilibrium determines by two ways-

1. Total revenue and total cost method.
2. Marginal revenue and marginal cost method.

Total Revenue and Total Cost Method:

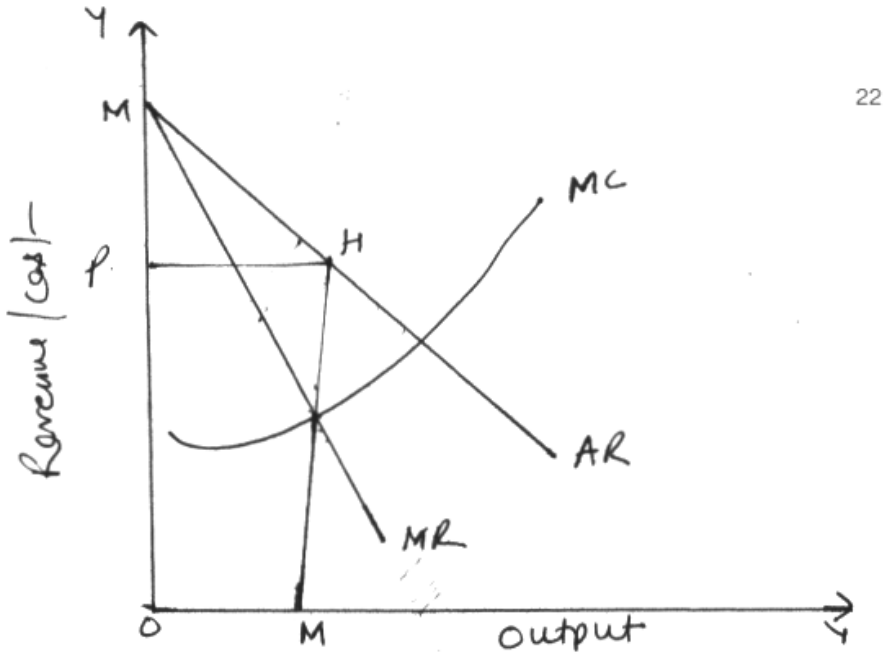
According to this method a monopolist will be in equilibrium when he is acquiring maximum profit i.e. where the difference between total revenue and total cost will be maximum. □ = TR – TC = maximum; □ = Total profit, TR = Total revenue, TC = Total cost. This can be shown as under:



TC is the total cost curve in the above diagram and TR is the total revenue curve. TC starts from OP it means that if the firm stops production than also it has to bear fixed costs. TP is the total profit curve. The firm is in equilibrium when it produces OM quantity of its product because of this production the firm is getting maximum profit.

2. Marginal Revenue and Marginal Cost Analysis-

According to this method a monopolist is in equilibrium when (a) its MR is equal to MC (b) MC cuts MR from below. This can be shown as



E is the equilibrium point in the above diagram where MC = MR and MC cuts MR from below.

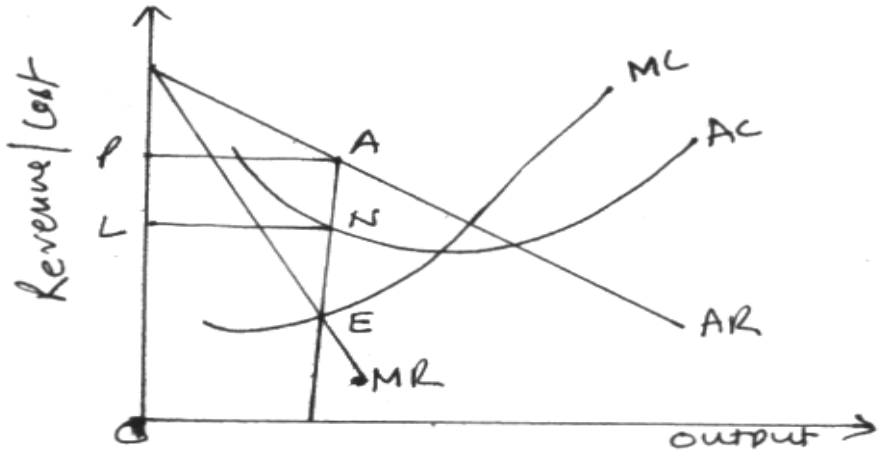
7.3.1.1 SHORT RUN EQUILIBRIUM OF THE MONOPOLIST:

In the short run the monopolist can increase or decrease its production only by increasing or decreasing its variable factors. He will be in equilibrium.

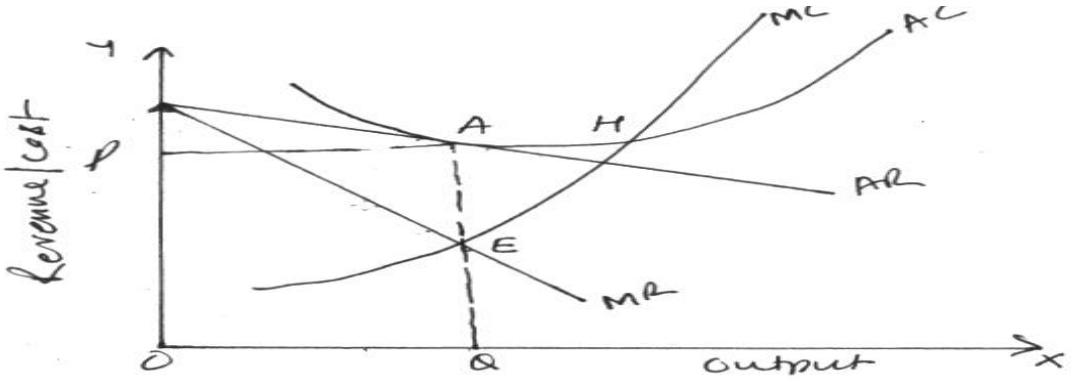
When MC = MR and MC cuts MR from below. In short-run the monopolist may be in three positions during equilibrium

1. Abnormal profit.
2. Normal profit
3. Minimum loss

Abnormal Profit: At equilibrium point if the price determined by the monopolist i.e. (AR) is more than average cost i.e. (AC) of production, the monopolist will get abnormal profit. The monopolist will control its production till as MC = MR. It will be known as equilibrium profit.

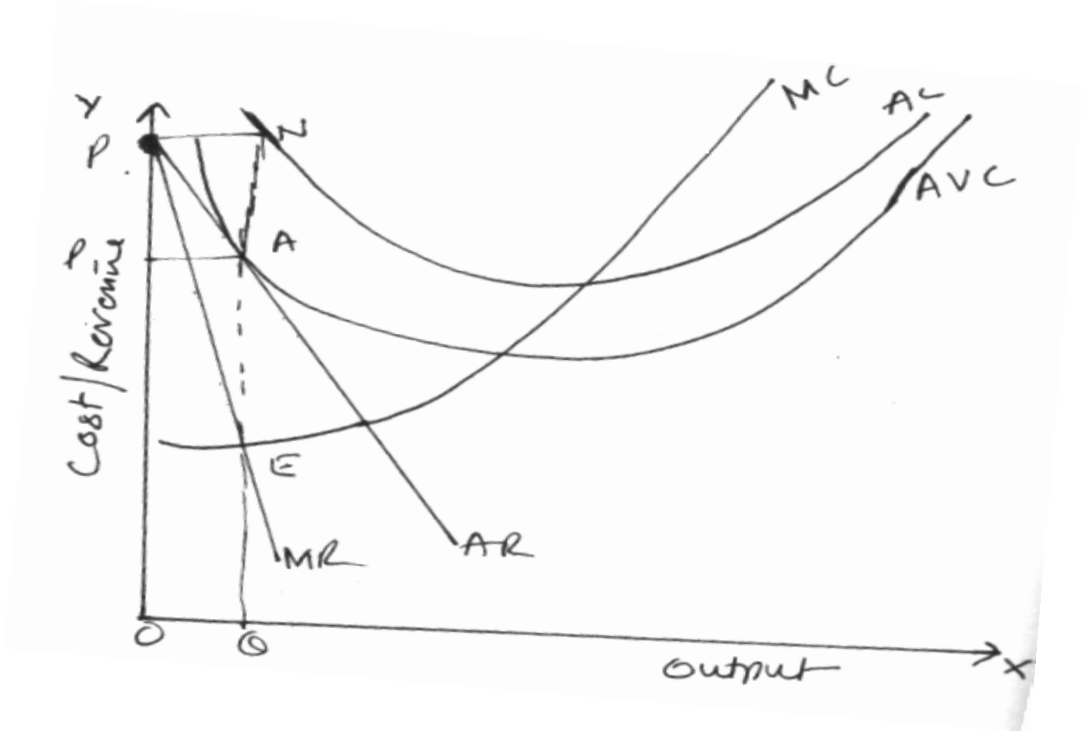


Normal Profit: The price determined by monopolist at equilibrium position is equal to the average cost i.e. AR = AC then the monopolist will get only normal profit. This can be shown as-



E is the equilibrium point of the monopolist because at this point MR = MC. Equilibrium production is OQ. At this production average cost curve AC is touches average revenue curve AR. It means that at point A both the prices of the commodity and its average cost are equal. So the monopolist is getting normal profit.

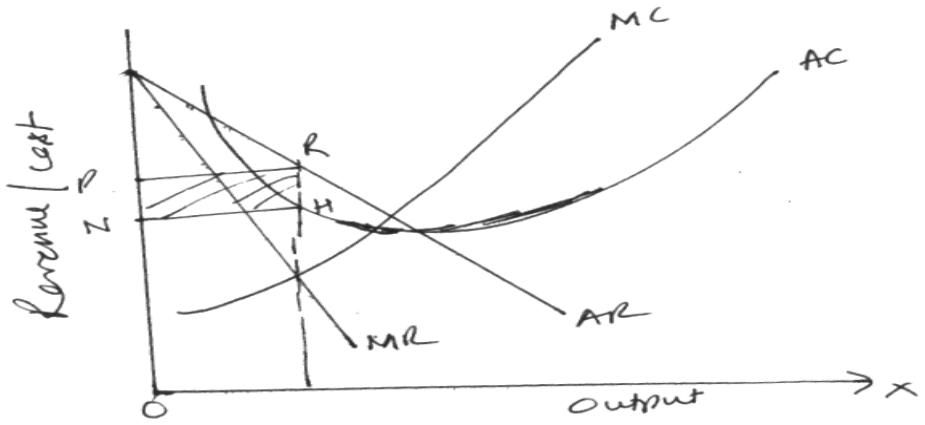
3. Minimum Loss- In the short run the monopolist will have to continue its production even at losses. In the short run if the demand of the commodity decreases then price a will also decrease and the monopolist will continue its production if he is getting price equal to (AVC) i.e. equal to average variable cost. This can be shown diagrammatically as under



A monopolist is in equilibrium at point E in the above diagram. The equilibrium production of it is OQ and the price is OP_1. At this price AVC curve touches AR curve at point A. It means that the firm is acquiring price equal to its average variable cost. The firm is bearing total loss equal to $ANPP_1$ which is its minimum at production of OQ quantity, then any other amount of quantity of production. If the price will decrease than OP_1 then the monopolist stop the production.

7.3.1.2 LONG RUN EQUILIBRIUM OF THE MONOPOLIST-

In the long run the monopolist will be in equilibrium at the point where its LMR will be equal to its LMC. The short run price of a monopolist may be less, more or equal to average cost but in the long run his price will be more than its long run average cost i.e. he acquires abnormal profit in the long run. In the long run the monopolist determines the price at which he gets abnormal profit.



The monopolist is in equilibrium at point E after producing OQ production. At equilibrium point its average revenue is QR which is more than its average cost which is equal to QH. It means that he is getting total abnormal profit equivalent to NHRP.

7.3.2 MONOPOLY POWER

The monopolist can decide its production quantity or the price of its product. This decision power of the monopolist is known as monopoly power. This power depends on many factors.

The entire monopolist is not equal in this matter.

The economists have developed many methods to measure the monopoly power the two main methods of them are as,

7.3.3 LERNER'S METHOD

According to Lerner monopoly power depends upon the difference between price and marginal cost. The monopoly power increases as this difference increases. He used this method to measure the monopoly power.

$$\text{Monopoly power} = \frac{P - MC}{P}$$

P = AR (Price) ,MC = Marginal cost

In perfect competitive market the difference between price and marginal cost at equilibrium point is zero. So the monopoly power is also zero, but in monopoly price may be more than marginal cost at

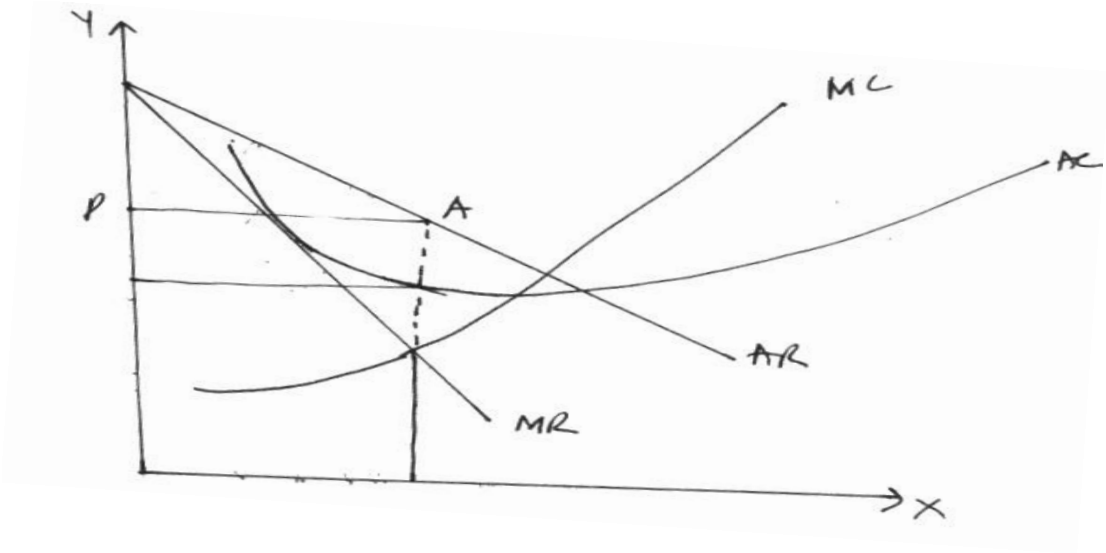
equilibrium point. As the price determined by the monopolist is more than the marginal cost as more is his monopoly power.

Elasticity of demand of a commodity is also determined the monopoly power of a monopolist. There is an inverse relationship between monopoly power and elasticity of demand of a good.

Monopoly power = $\frac{P - MC}{P}$

P = AR at equilibrium point

MC will be equal to MR i.e. MC = MR



Monopoly power = $\frac{AR - MR}{AR}$

$E_p = \frac{AR}{AR-MR}$

$E_p (AR – MR) = AR$

$E_pAR-AR = E_pMR$

$AR (E_p-1) = E_pMR$

$$MR = \frac{AR\ (E_p\text{-}1)}{E_p}$$

$$\text{Now monopoly power} = \frac{AR - MR}{AR}$$

After putting the value of MR

$$M_p = \frac{AR - AR\ \frac{(E_p - 1)}{E_p}}{AR}$$

$$M_p = \frac{E_pAR - E_pAR + AR}{\frac{E_p}{AR}}$$

$$M_p = \frac{1}{E_p}$$

7.3.4 BAIN'S METHOD TO MEASURE THE MONOPOLY POWER:

Prof. Bain measured monopoly power on the basis of difference between price and average cost. The difference between price and average cost is known as abnormal profit. More will be this difference more will be the abnormal profit and more will be the monopoly power.

In brief we can say that there is no appropriate method to measure the monopoly power. It is based on many factors as elasticity of demand, possibility of competition or the possibility of substitutions etc.

7.3.5 MONOPOLY AND PRICE DISCRIMINATION

When a monopolist charges different prices from different consumers of the same product. Such a situation is described as a discriminating monopoly situation. For example Barbers who do hair cutting charges different prices from different clients. In the same way electricity department also charges different prices from industrialist and households.

7.3.5.1 TYPES OF PRICE DISCRIMINATION

Price discrimination is of three types mainly-

1. Discrimination of First Degree- It is said to exist when the monopolist or the monopoly firm charges a separate price for each separate unit of the commodity from the same consumers of the product. Consumers are charged according to their demand functions. The maximum price they are willing to pay for each unit rather than doing without it. There is no consumer surplus here according to Joan Robinson this type of price discrimination is known as perfect price discrimination.

2. Second Degree Price Discrimination

In this discrimination consumption of a good is divided into various blocks, a separate price is charged from each separate block but for each block a uniform price is charged. This type of pricing rule is adopted by public utility concerns like electricity, telephones, waterworks, gas supplies etc.

3. Third Degree Discrimination- This is the most commonly observed discrimination. In this discrimination consumers are divided into various groups. According to their price elasticities and different prices are charged from different consumer groups. The market for a good is split into submarkets with differential prices charged from sub-markets.

7.3.5.2 CONDITIONS OF PRICE DISCRIMINATION

Price discrimination means to charge different prices from different consumers. But this is possible only when there prevail these conditions in the market.

1. There should be monopoly in the market.

2. Different markets.

For price discrimination it is necessary for the monopolist that he can differentiate the markets from each other. It is possible only when the commodities can not transferred from cheap market to costly market nor the buyers can go from cheap to costlier market.

3. Difference in Price Elasticity of Demand-

Price discrimination is possible only when the price elasticity of demand is different in different submarkets.

4. The expenditure on division and sub-division of markets should be minimum.

5. Recognition by law.

6. Commodity differentiation
7. Behaviour of the consumers.

7.3.5.3 WHEN THE PRICE DISCRIMINATION IS BENEFICIAL

Price discrimination is beneficial only when the price elasticity of demand is different in one market from other. If the price elasticity is equal in both the markets than the marginal revenue acquired from the commodity unit in both the markets will be same. So there will be no benefit to the monopolist. On the other hand if the price elasticity is different in two markets than the marginal revenue acquired from these two markets will be different than the monopolist will be profitable only when he sells commodity in the market where he get more marginal revenue. We can explain it as-

$$MR = \frac{AR\ (E_p-1)}{E_p}$$

There are two markets i.e. market (A) and market (B). The AR in both the markets is equal to 10 E_p is 2 in market (A) and 5 in market B. Now the MR acquired by the monopolist in these two markets will be as-

Market (A)

$$MR = \frac{10\ (2 - 1)}{2} = 5/-$$

Market (B)

$$MR = \frac{10\ (5-1)}{5} = 8/-$$

The monopolist will be beneficial if he sells his products in market B. He should do it till the (MR) in both the markets does not become equal.

Determination of Price and Output under Price Discrimination

A monopolist adopts price discrimination so that he can increase his total revenue or profit. In this situation to maximise his profit a monopolist will continue its production till his MC = MR.

Let a monopolist sell his production in two different markets, where the price elasticity of demand is different. Now the monopolist will have to decide

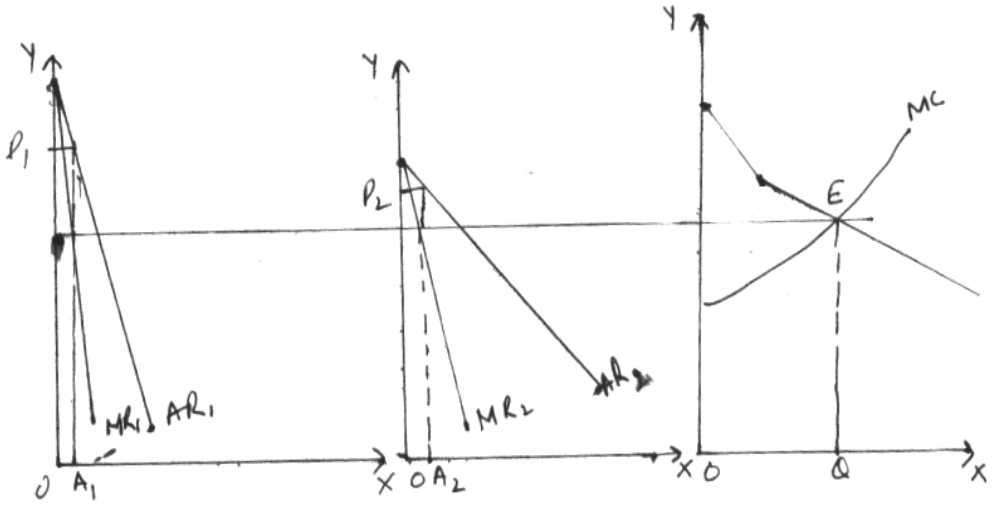
1. What will be his total production?
2. How many production will be sold in each market?
3. What will be the price at which he will get maximum profit?

To acquire maximum profit the monopolist has to follow following two conditions.

1. The marginal revenue of the commodity should be equal in both the markets. i.e. $MR_1 = MR_2$.
2. The marginal revenue acquired from each market should be equal to MC of total revenue.

i.e. $MR_1 = MR_2 = MC$

We can show it as under



In the above diagram it is seen that the revenue curves of market A are less elastic than the revenue curves of the market B. Point N is the equilibrium point of the monopolist at this point the marginal cost of the total production is equal to MR. The total production of the monopolist is equal to OQ. The monopolist will divide this production into two markets. He will divide this production on the basis of equality of MR of each market to the marginal cost of the total production. The monopolist will get maximum profit if he sells OQ_1 amount of production in market A at price OP_1 and OQ_2 amount of production in market B at price OP_2 and the total output is

$OQ = OQ_1 + OQ_2$

7.3.5.4 SOCIAL EFFECTS OF PRICE DISCRIMINATION

Price discrimination is both beneficial and harmful for society.

Beneficial Effects of Price Discrimination

1. Beneficial for the Backward Section of the Society- If the price of a commodity is decided low so that the backward section of the society can also consume it and the losses which are beared so are be compensated by charging high price from the rich people than the price discrimination will be beneficial for the society.

2. Public Services- There are so many public services which can not be provided without price discrimination for example- Train services or electricity etc.

3. Total Utilization of the Factors of Production- With the help of price discrimination producers can sell their products in the foreign market and the factors of production of a country can be utilized perfectly in this way.

7.3.5.5 HARMFUL EFFECTS OF THE PRICE DISCRIMINATION

1. Imperfect Utilization of the Sources of Production- In price discrimination factors of production are not fully utilized because the monopolist tempts to produce luxury goods as price discrimination is easily possible in luxury goods. The necessary goods are produced less and the poor people will have to face problem.

2. Low Production- The price discrimination is also harmful when the monopolist produces less to maximise its profit and to charge high price.

Dumping- Dumping is a special type of price discrimination here the monopolist sell its production on less price in the foreign market. In this situation these are two markets for the monopolist.

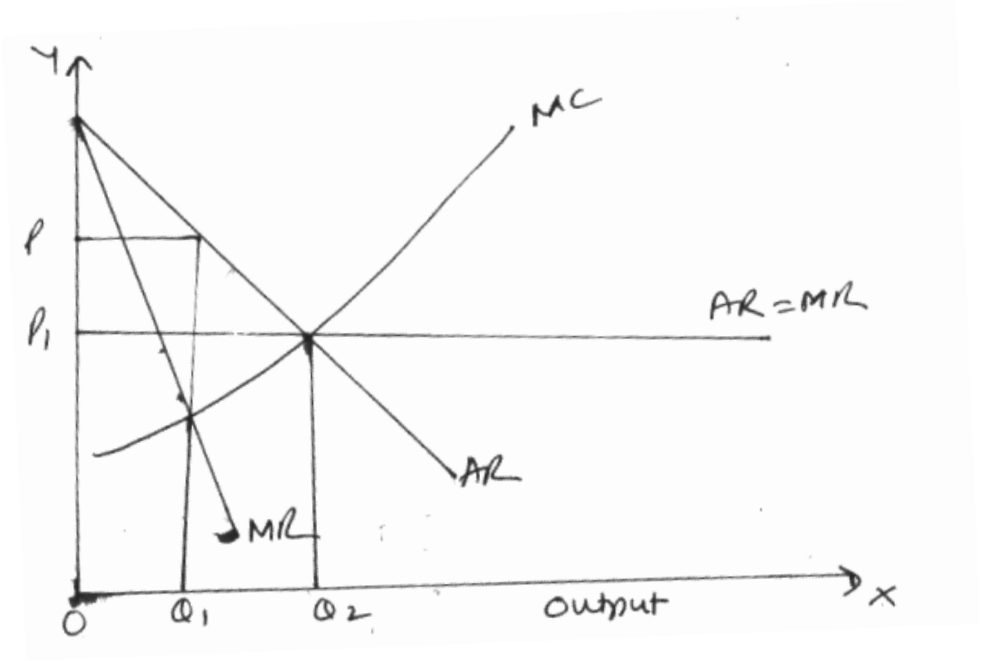
1. Home market
2. Foreign market

He will be perfect monopolist in the home market but in the foreign market he has to face perfect competition. So in the home market he charges high price and in foreign market he charges less price.

Motives of Dumping

1. To destroy the competitors in the foreign market.
2. To get benefits of increasing returns.
3. To increase the demand of the commodity in the foreign market.
4. To dispose the extra storage of the commodity.
5. To acquire the benefit of difference in elasticities in demand.

Determination of Price and Output during Dumping: In the foreign market there is perfect competition and the monopolist will sell OQ_1



Production on price P_1 and in the home market he is monopolist he is selling OQ production on price OP, which is more than OP_1.

7.4 CHECK YOUR PROGRESS

Answer the following questions on the basis of your knowledge regarding this chapter:

1- In which market form are there no close substitutes of the product?

2- Under which market form, a firm is a price-taker?

3- In which market form can a firm not influence the price of the product?

4- How many firms are there in a monopoly market?

5- In which market form, are there restrictions on the entry of new firms?

7.5 SUMMARY

Markets are focal point for economic activity as it plays important role in pricing and allocating resources in a competitive economy. A market is a group of economic agents (individuals/or firms) that interact with each other in a buyer-seller relationship. This interaction results in transactions between the demand (buyer) side of the market and the supply side of the market. The determination of output and the price of a commodity in a market depend upon the number of buyers, sellers and the characteristics of the product which are also the determinants of market structure. Further, equilibrium in market is also based on the large number of factors discussed in this chapter. This theoretical knowledge regarding market is necessary whether it is practically used or not. Like, we mostly observe perfect competition in the market but still knowledge regarding monopoly, monopolistic, dumping, transfer pricing, etc. is necessary.

7.6 KEYWORD

Industry: In the perfect competitive market there are so many firms which produce homogeneous product. The group of these firms is known as industry.

Marginal Revenue: The change in total revenue due to addition of revenue by selling one more unit by a firm is known as the marginal revenue.

Equilibrium conditions: Marginal revenue should be equal to marginal cost is the necessary condition for a firm's equilibrium but not the sufficient condition. So the second condition of the firm's equilibrium is that the marginal cost (MC) curve should cut the marginal revenue (MR) curve from below. Because it may be possible that at the point where MR = MC firm is not acquiring maximum profit

Monopoly- It is a market where there is only one producer of a good or services. There is also no substitute of the good or service.

Discrimination of First Degree- It is said to exist when the monopolist or the monopoly firm charges a separate price for each separate unit of the commodity from the same consumers of the product.

Second Degree Price Discrimination: In this discrimination consumption of a good is divided into various blocks, a separate price is charged from each separate block but for each block a uniform price is charged.

Third Degree Discrimination- This is the most commonly observed discrimination. In this discrimination consumers are divided into various groups. According to their price elasticities and different prices are charged from different consumer groups.

7.7 SELF-ASSESSMENT TEST

1. State and show in diagrams the conditions of long-run equilibrium of the firm and industry under perfect competition.
2. "No producer can be in equilibrium unless his marginal revenue and marginal cost are equal". Comment on this.
3. Explain with the help of a diagram price is determined in a perfectly competitive market.
4. How does a monopolist fix the price of the product? Is it inevitable that the monopoly price is higher than the competitive price?
5. Explain discriminatory pricing under monopoly. Is price discrimination economically justifiable?
6. What conditions must be present for price discrimination to be possible under monopoly? Under what circumstances might price discrimination be possible, but not profitable?
7. What is meant by 'the degree of monopoly power'? How is it sought to be measured?
8. State and appraise the various criteria to measure the 'degree of monopoly power'.

7.8 ANSWERS TO CHECK YOUR PROGRESS

1- Monopoly.
2- Perfect competition.
3- Perfect competition.
4- Single seller.
5- Monopoly.

7.9 REFERENCES/SUGGESTED READINGS

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Course: **Micro Economics**	
Course Code: **BCOM 102**	**Author: Dr. Ved Pal**
Lesson No: **8**	**Vetter: Dr. Tilak Sethi**
SLM Conversion By: Ms. Chand Kiran	

Equilibrium of Firm and Industry under Monopoly and Monopolistic Competition

Structure

8.0 Learning Objectives

8.1 Introduction to Monopolistic Competition

8.1.1 Characteristics of Monopolistic Competition

8.2 Price-output Equilibrium of a Firm under Monopolistic Competition

8.2.1 Short run Equilibrium of a Monopolistic Firm

8.2.2 Long run Equilibrium under Monopolistic Competition

8.2.3 Long run Equilibrium with Entry Closed

8.2.4 Long-run Equilibrium when Entry Permitted

8.3 Price Determination under Oligopoly

8.3.1 Characteristics of Oligopoly

8.3.2 Indeterminateness of Demand curve facing by an oligopolistic.

8.3.3 Price and Output Determination under Oligopoly

8.3.4 Collusive Oligopoly

8.3.5 Kinked Demand Curve Oligopoly Theory and Price rigidity

8.4 Check Your Progress

8.5 Summary

8.6 Keywords

8.7 Self- Assessment Test

8.8 Answers to Check Your Progress

8.9 References/Suggested Readings

8.0 LEARNING OBJECTIVES

After reading this chapter you will be able to understand the concept of monopolistic market and oligopoly market. We will discuss about price determination and equilibrium in both the markets. This chapter will provide you deep understanding of these markets and their characteristics.

8.1 INTRODUCTION MONOPOLISTIC COMPETITION

We have studied about perfect competitive and monopoly markets in previous chapters but these markets hardly exist in real world. In the economic world the firms are taking benefits of internal economies of scale. In the perfect competitive market it is not possible to achieve the benefits of internal economies of scale. So it is a great need to take the price theory close to the real world.

The monopolistic market is a market which prevails in between the both markets i.e. between perfect competitive and monopoly, and has the elements both the markets. In this market there are large numbers of firms which are selling close substitutes of each other. The individual revenue curves in this market are downward slopes like monopoly market but are more elastic than it. According to Prof. Chemberlin monopolistic competitive market is a blending of the elements of perfect competition and monopoly.

8.1.1 CHARACTERISTICS OF MONOPOLISTIC COMPETITION

1. Large number of sellers.
2. Product differentiation.
3. No entry ban with product differentiation.

4. Importance of selling costs.

5. Group behaviour.

6. There is no difference in firm and industry in this market.

8.2 PRICE-OUTPUT EQUILIBRIUM OF A FIRM UNDER MONOPOLISTIC COMPETITION

A monopolistic firm faces more problems than a perfect competitive market. The equilibrium of a monopolistic firm depends upon three areas or we can say that in this market the firm has to take following three decisions.

1. Price decision.

2. about the production quantity.

3. Advertisement costs.

But here we are explaining the equilibrium of a monopolistic firm in relation of its price and output keeping its production costs and advertisement costs constant.

8.2.1 SHORT RUN EQUILIBRIUM OF A MONOPOLISTIC FIRM

The individual demands curve of a monopolistic firm slopes downward. Although different firms in this market produces close substitutes of each other. The position, level and elasticity of demand faced by a firm depends upon the availability of substitutes and their prices, so in this market the equilibrium of an individual firm can not be explained separately. But for convenience we suppose that the availability of substitutes and their prices are constant. If we take the types and prices of substitute's constant than the firms under monopolistic competition face an identical downward sloping demand curves. Although monopolistic competition is characteristically close to perfect competition, pricing and output decisions under this kind of market are similar to those under monopoly. The reason is that a firm under monopolistic competition, like a monopolist, faces a downward sloping demand curve. This kind of demand curve is the result of (i) a strong preference of a section of consumers for the product and (ii) the quasi-monopoly of the seller over the supply. The strong preference or brand loyalty of the consumers gives the seller an opportunity to raise the price and yet retain some customers.

The conditions of equilibrium in this market are as under:

1. The marginal cost of the firm should be equal to its marginal revenue.

2. Marginal cost curve should cut marginal revenue curve from below.

The firm may be in three positions under equilibrium in the short-run.

Abnormal Profit- As shown in the figure-1 given the prices and types of the substitutes DD is the demand curve of an individual firm. AC is the average cost curve and MC is the marginal cost curve of it. E is the equilibrium point of the firm where MC cuts MR from below. OM is firms equilibrium output and its price cost is equal to OP at the equilibrium point firm is taking abnormal profit equal to PQRS. Because at equilibrium point the price determined by the firm is more than its average cost.

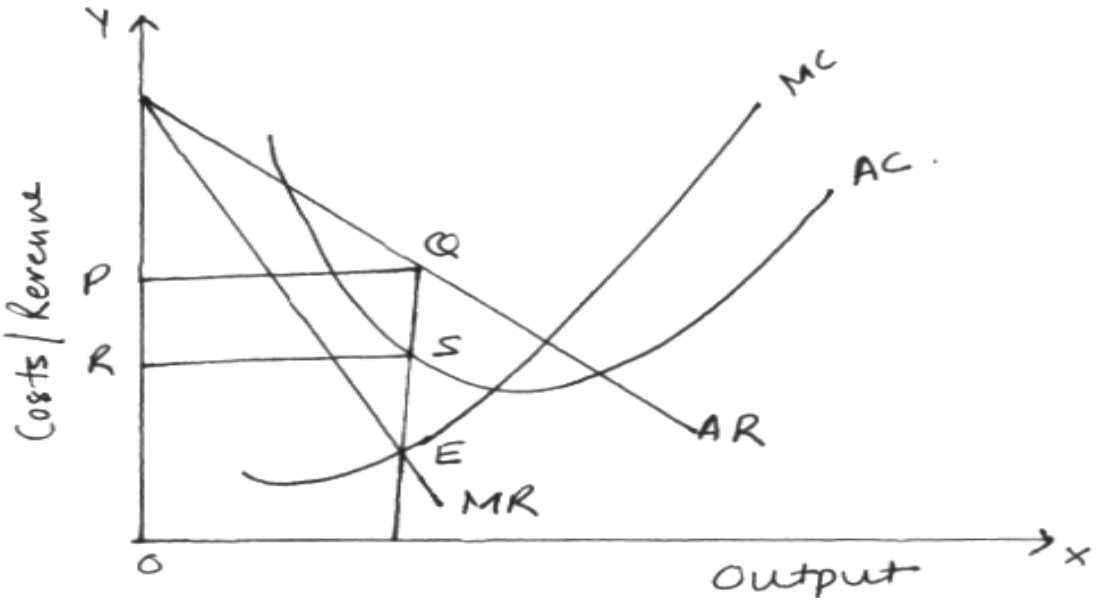
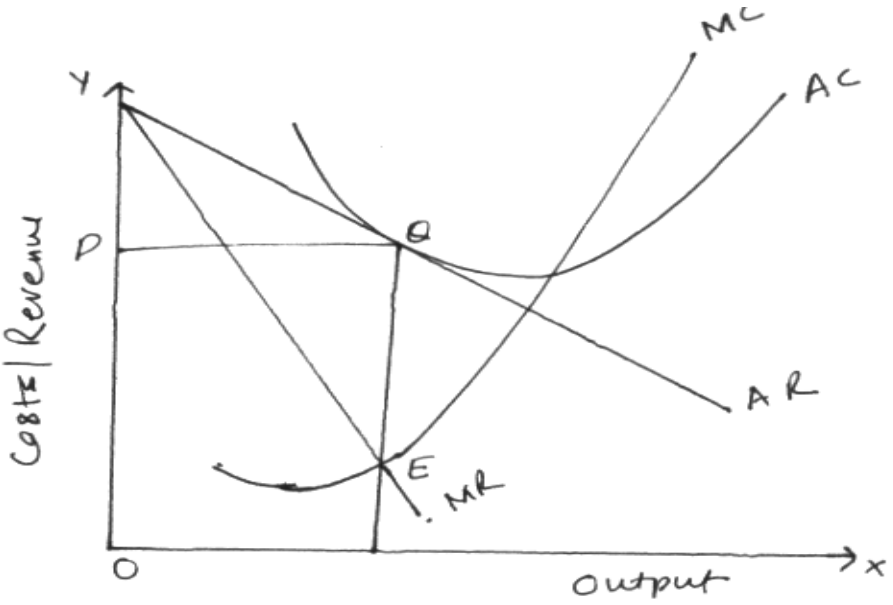


Fig.-1

(a) Normal profit- The firm will get normal profit in the short run when the equilibrium price determined by it is equal to its average cost as shown in the figure-2



(c) Minimum Losses- If the demand conditions of the firm are not good in comparison to cost conditions then in the short run the firm may have to bear losses also. But the firm will bear equal to its fixed costs only. If the price or average revenue which the firm gets is less than its AVC than the firm will stop production.

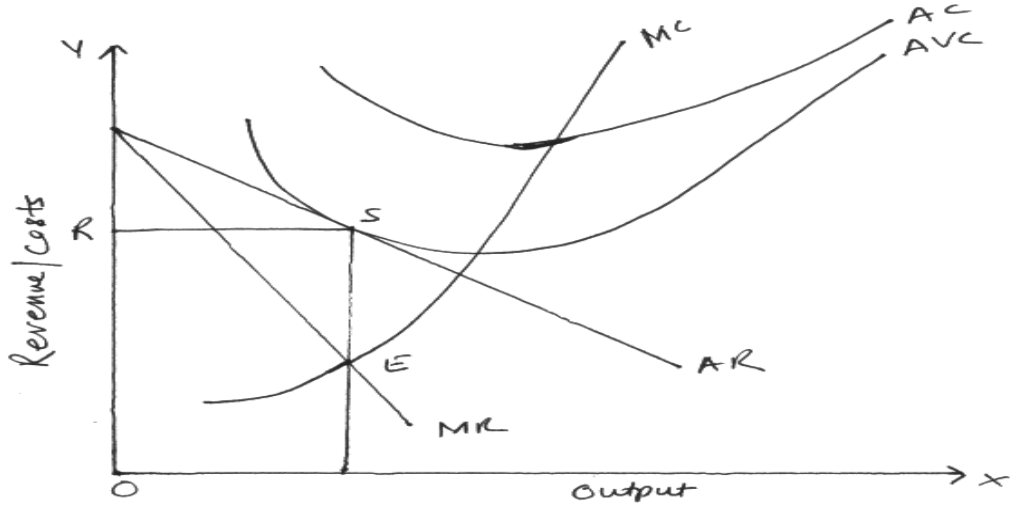


Fig.-3

In the above Fig.-3 E is the equilibrium point of the firm, where price is equal to AVC of the firm and the firm bears losses equal to RSPQ which are the minimum losses of the firm because below this price the firm will stop its production.

8.2.2 LONG RUN EQUILIBRIUM UNDER MONOPOLISTIC COMPETITION

Interdependence is the main characteristic of the monopolistic competitive firms. Now the problem is to know the nature of interdependence and inter-relationships between the firms of a monopolistic group. In the long-run as the number of firms is very large and there is free entry abnormal profits cannot be earned by any firm, which is possible only when AR=AC, along with MR=MC. But the situation is not exactly the same as that under perfect competition. Let us first consider, and distinguish between two types of demand curves. In perfect competition we have the negatively sloped industry demand curve and the horizontal demand curve facing each seller. In the theory of monopolistic competition also there are two types of demand curves, as shown in the figure-4

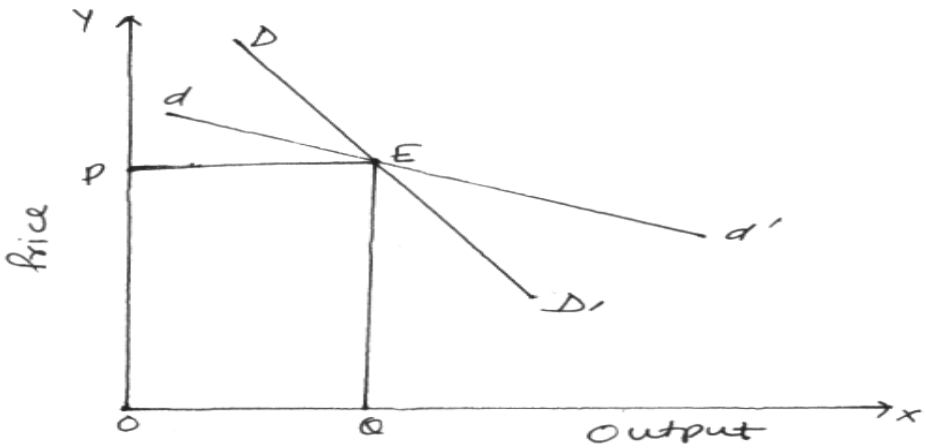


Fig.- 4

Initially the firm is at point E, with output OQ and price OP per unit. In case of large-group with differentiated product, if the producer wants to reduce price from OP, he will expect a substantial expansion in sales. First, sales to his existing customers will expand and, secondly, if his competitors do not react (do not reduce price), he will capture a part of their markets. On the other hand, if he increases his price he can expect a substantial loss in sales, as his competitors may not follow him (increase price). Consequently, assuming such a large number of sellers in the market that each expects his actions to go unnoticed by his rivals, every producer expect his demand curve to be very elastic. The producer's expected or anticipated demand curve is shown by the relatively elastic curve.

If every producer under monopolistic competition thinks individually this way and reduces his price (on the assumption that none of his rivals will react) and, therefore, if all the prices are reduced

simultaneously, each producer will gain only that increment in sales attributable to the general price reduction. He will not be able to capture portions of his rivals' markets. Thus the "group-effect" or "group-behaviour" will give the actual, less elastic, demand curve DD' to the firm. The DD' curve shows the actual sales to be gained or lost when all firms change price simultaneously.

The long-run equilibrium of the firm in the context of the whole "group" of firms may be discussed under two sets of assumptions: (a) when fresh entry into the group is not necessary, and (b) when entry is permitted. Meanwhile, in order to make the analysis simple, some heroic assumptions have been made. We know that in monopolistic competition there is heterogeneity of prices and variations over a wide range in outputs and in profits. Many such variations are temporary, but many persist for a long time. It defies comprehensive description as a "group" problem. In other words, as Chamberlin says: "Imperfection of competition is not uniform. It is not imperfect knowledge or immobility of production factors here. But here, the differentiation of product is not uniformly spaced." He further observes: "We, therefore, proceed under the heroic assumption that both supply and demand curves for all the products are uniform throughout the group. The product is different. Only that consumers' preferences be evenly distributed among the different varieties, and that differences between them be not such as to give rise to differences in cost."

As the number of producers is very large, it is further assumed that any adjustment of price or of product by a single producer spreads its influence over so many of his competitors that the impact felt by any one is negligible and does not lead him to any readjustment of his own situation.

In the long-run due to external economies and diseconomies, costs of firms may decrease or increase. Chamberlin has assumed constant costs, for two reasons: (a) the theory in this form is widely applicable to facts, and (b) where it is not applicable, its extension to cover cases of increasing and decreasing costs for the group is easily made.

8.2.3 LONG RUNS EQUILIBRIUM WITH ENTRY CLOSED:

Figure-5 represents the long run equilibrium of the group under monopolistic competition on the assumption that no new firm can enter the group. Adjustment of long run equilibrium start from point A where dd and DD curves intersect each other so that Q_1A is the short run

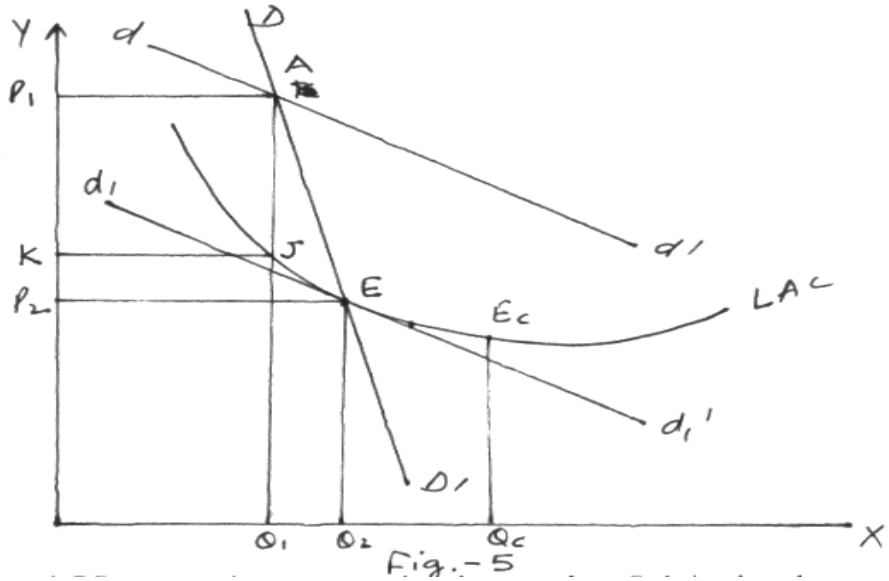


Fig.-5

equilibrium price level at which each firm sells OQ_1 quantities of the product and short-run total profit is represented by rectangle P_1AJK. Every producer, regarding dd' as his demand curve, believes he can increase his total profit by reducing price and expanding output. But when others also think and do the same, this producer instead of expanding along dd', actually moves along DD'. Ultimately he comes to the point E on LAC, below which only losses are incurred. At E his expected demand curve is d_1d_1'. The position of long-run equilibrium is E, where the d1d1' curve is tangent to LAC. At this point there are no abnormal profits.

The position of DD' depends upon the number of producer-sellers in the field. It will lie further to the left if there are more of them, since the share of each in the total will then be smaller; and further to the right if there are fewer of them. It is drawn through E, the point of tangency of dd' (dashed one) with LAC curve, since the number of producer-sellers is assumed to be that consistent with the final equilibrium adjustment.

8.2.4 LONG-RUN EQUILIBRIUM WHEN ENTRY PERMITTED

It is given in Figure-6. In this case before the existence of profits induces the existing firms to expand, new firms selling slightly differentiated products enter this product group. The greater variety of available products causes the demand for each seller's product to contract. In the process DD' shifts to the left and becomes tangent to LAC at A through which passes the producer's expected dd' curve. Though at G (with output OQ_1 and price OP_1) all profits are eliminated, if one typical firm increases

output along its dd' curve, it can make profits. But, as we have seen, when all the producers do the same, the dd' slides down the instantaneously existing DD'.

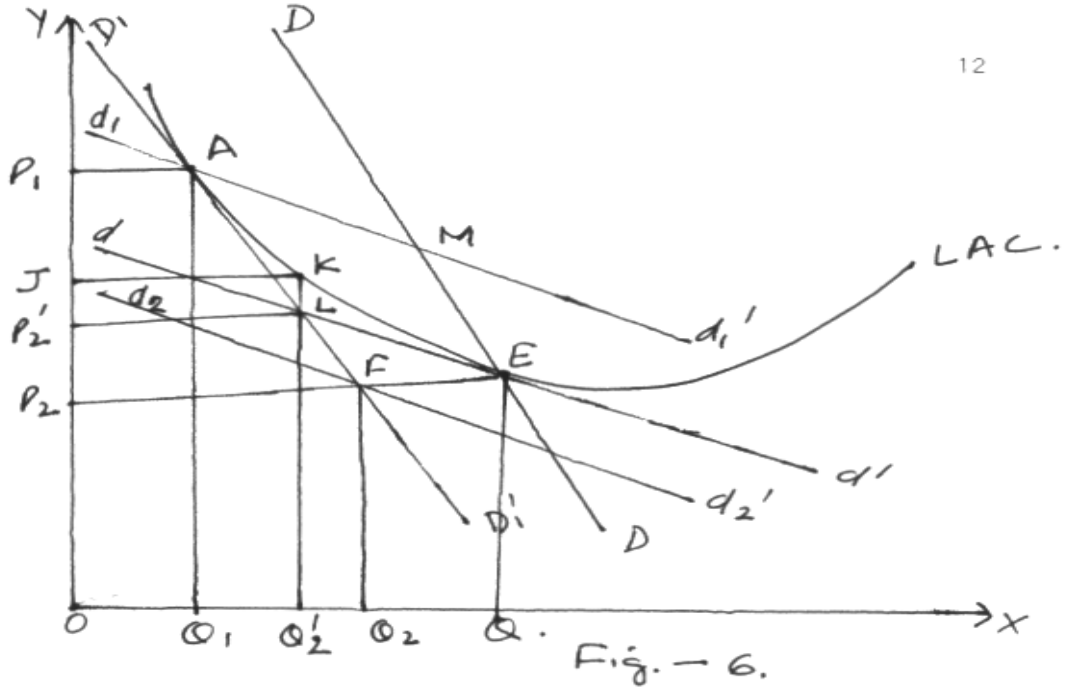


Fig. – 6.

The transition from the initial DD' to D_1D_1', as new firms enter, and finally to the ultimate long-run equilibrium point at E is long, and can come about in a number of ways. When the producer comes to point A on D_1 D_1' (with output $0Q_2$) the total loss is shown by rectangle $JKLP_2$. However, if he can still travel along its imagined dd' curve passing through M, he can hope to reach E on LAC and eliminate the losses altogether (with output OQ_E and price OP_2). But as his rivals also act in the same fashion, he further stumbles down along D_1 D_1' to point F: here his output will be OQ_2 and price OP_2. But the situation is unstable.

Now, even when he can hope to travel along his expected demand curve $d_2d'_2$ passing through F, there are losses. Ultimately some firms must leave the group. As marginal firms leave the group the proportional demand curve DD shifts to the right, together with the anticipated individual demand curve. The exit of firms must continue until the DD curve is DD' and the anticipated curve dd'. The long-run equilibrium is attained at E.

Equilibrium, then, is defined, by two conditions: (a) dd' must be tangent to LAC, (b) DD' must intersect

both dd' and LAC at the point of tangency. The final equilibrium point, with all the relevant curves, is shown as under

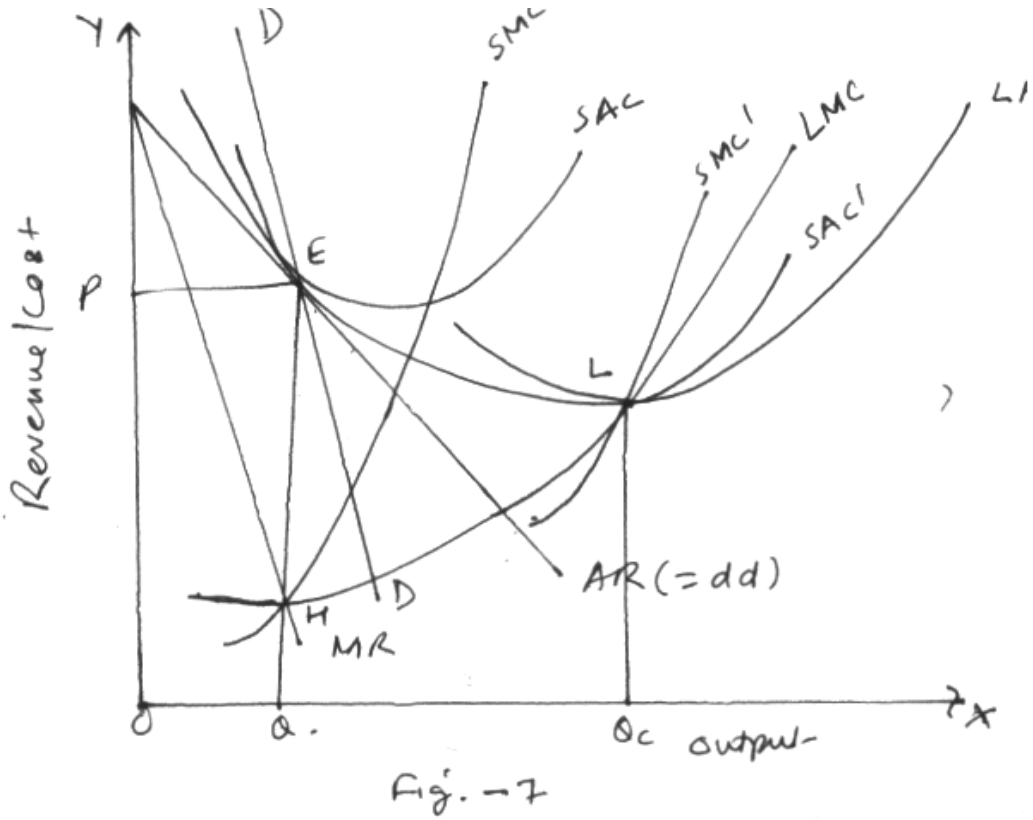


Fig. – 7

8.3 PRICE DETERMINATION UNDER OLIGOPOLY

Oligopoly is an important type of imperfect competition. Oligopoly is a market position where the producers or sellers of the good are few and having strong rivalry. So it is also called many times as competition among the few. Although the number of firms in the oligopoly is not certain but if the number of firms is more than two and equal to or less than ten than it is known as oligopoly. When all the firms in the oligopoly are producing homogenous product than it is known as oligopoly without product differentiation. If the product of the firms are different than it is known as oligopoly with product differentiation.

8.3.1 CHARACTERISTICS OF OLIGOPOLY

1. **Interdependence-** Interdependence in decision making is the main characteristics of oligopoly. Because the number of firms in this market is small so the changes done by a firm in production and prices etc. will putt exert pressure on the price and production policies of the competitors.

2. **Importance of advertising and selling costs-** The main effect of interdependence in oligopoly is seen when the firms has to use market saving weapons to save their existing market share or to increase it. For this the different firms have to bear many selling costs as advertising cost.

3. **Group behaviour-** The oligopoly theory is not a theory of an individual and not a theory of large number of individuals but it is a group behaviour theory and the assumption that firms want to maximize their profit is not so fit for oligopoly market. The numbers of firms in a group are few and all of them are interdependent on each other. At present there is no general accepted theory to explain group behaviour. We have to face numbers of questions while understanding group behaviour such as whether the different members of the group cooperate to each other to achieve common benefits or otherwise they compete to each other for their personnel benefits? Is there any leader of the group? If there is any leader then how he prepares others to follow him, etc.

8.3.2 INDETERMINATENESS OF DEMAND CURVE FACING BY AN OLIGOPOLISTIC

The demand curve which is faced by the oligopolist is not certain. The demand curve tells how many goods or commodities a firm can sell at different prices. The demand curve faced by the firm in perfect competition, monopoly and in monopolistic competition is certain but in the oligopoly market due to interdependence the position is different. An oligopolist firm can not assume that the rivals will not change their prices when the firm itself will change its price and production policy so his demand curve becomes uncertain because it depends upon the uncertain behaviour of the competitors under different circumstances.

8.3.3 PRICE AND OUTPUT DETERMINATION UNDER OLIGOPOLY-

There is no specific formula to determine the price and output in oligopoly market. The economist has developed various models on the basis of various assumptions to explain price and output determination under oligopoly. Some of them are as-

8.3.3.1 PRICE LEADERSHIP-

It is impossible to decide price independently in oligopoly market. In specific industries the oligopolist takes collective decisions on the basis of written guidelines decided by them or either on the basis of their oral commitments. One example of their oral commitment is price leadership.

In price leaderships, firms take collective decisions without any specific agency to control the activities of the different firms. In this way they are also able to save them from the penalties they have to bear to break anti-trust laws which are imposed by the government. Price leadership may of many types-

Dominant Firm Price Leadership- In this leadership model a dominant firm captures a large share of the market and the other firms are so small that they can not change market conditions or environment by themselves. So the dominant firm decides the price of the good at which its profit becomes maximum according to its demand curve and the other firms will have to accept this price and should decide their production according to that price.

To determine price and output we assume here that-

(a) The dominant firm has the full knowledge of the market demand of the commodity.

(b) The dominant firm also knows the marginal cost (MC) curves of the small firms by the lateral summation of which the demand of the small firms can be known at different prices.

On the basis of above assumptions the dominant firm can estimate about the quantity supplied by the small firms and also know about its own demands.

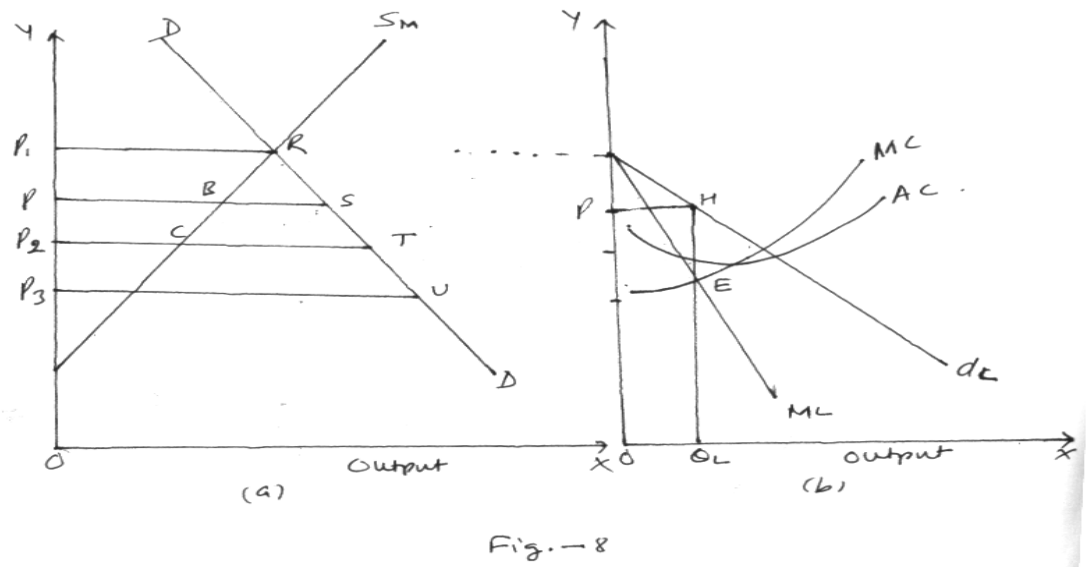
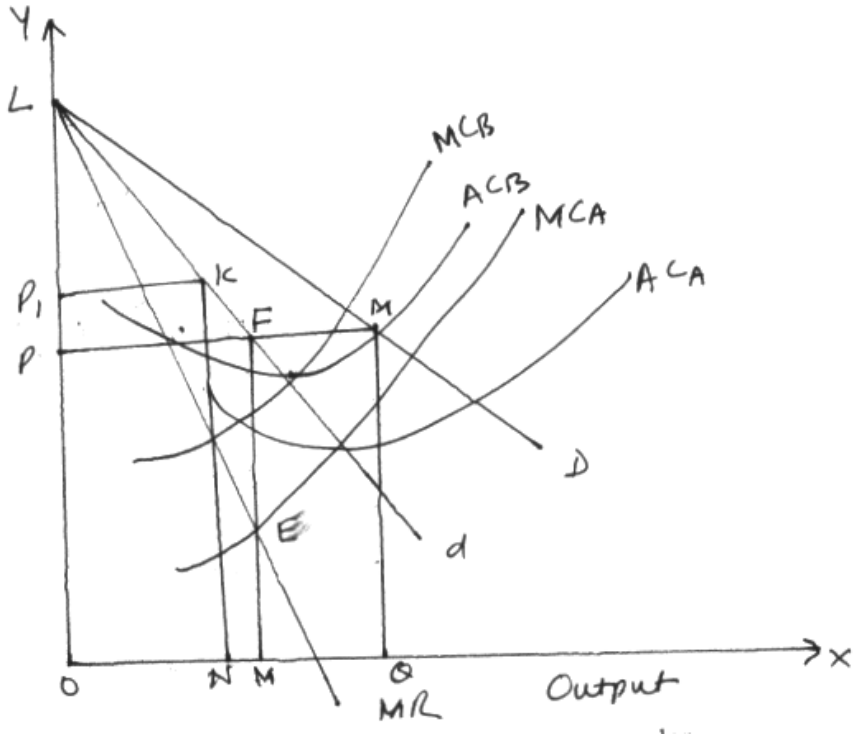


Fig.—8

Above fig-8 shows that at price P_1 the small firms are supplying P_1R amount of the commodity produced. So on price P_1 the demand of the dominant firm is zero. At price P the small firms are supplying equal to PB and the total demand of the market is equal to PS so the dominant firm can supply equal to BS amount at this price. At price P_2 the small firms will supply equal to P_2C and the dominant firm will supply equal to CT and at price P_3 the small firms will supply amount equal to (zero). With market demand (DD) of the commodity at different prices and the supply (S_M) supplied by small firms the demand curve d_L of the dominant firm can be drawn as in fig-8(b).

In fig.-8(b) d_L is the average demand curve and M_L is the marginal demand curve of the dominant firm. AC and MC are its average and marginal cost curves. The dominant firm will produce OQ output at price OP because at this output the dominant firm is acquiring maximum profit. At this price all the small firms collectively will supply PB amount of the commodity.

8.3.3.2 PRICE OUTPUT DETERMINATION UNDER PRICE LEADERSHIP TO LOWER COST



It is given in figure -9 which is based on assumptions as under

1. There are two firms A and B. The production cost of firm A is less than firm B.
2. Goods produced by both the firms are same so there is no preference in the mind of consumers.
3. Both the firms have equal share in the market. So in the above diagram each firm has demand curve dd which is equal to half of the market demand curve i.e. LD. MR is the marginal revenue curve of each firm. In the equilibrium position firm A will produce OM quantity of the good and determines price equal to OP. But the firm B will be in equilibrium when it produces quantity equal to ON at this position the price will be equal to OH. From the diagram it is clear that the price (OP) on which the firm A is getting maximum profit is less than the price (OH) at which the firm B is getting maximum profit. Because both the firms are producing homogenous product so cannot charge different prices. So the firm B has to determine or fix its price equal to OP in the other words firm A will be the price leader and the firm B will be price follower.

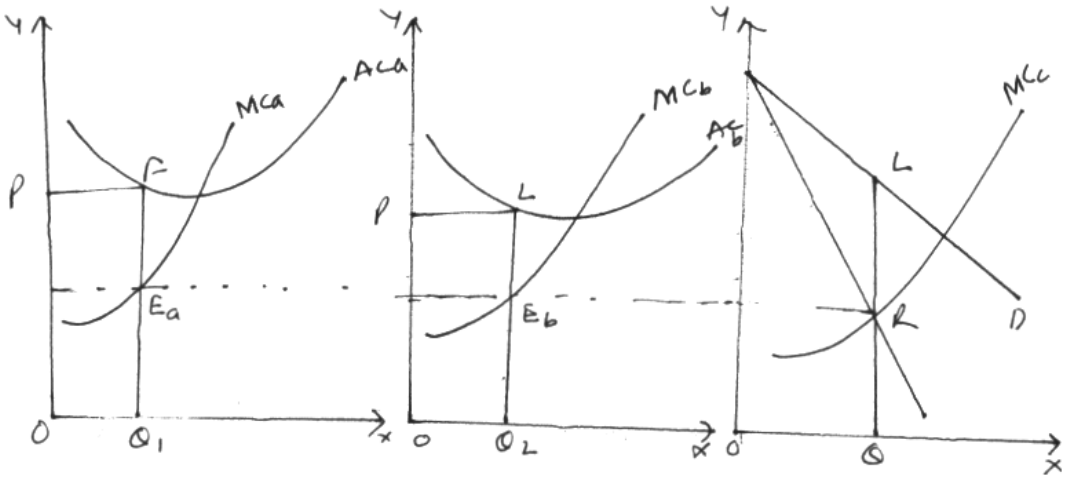
8.3.4 COLLUSIVE OLIGOPOLY-

When all the oligopolists make a formal agreement about price and output then it is said that they have formed collusive oligopoly. At first the cartel word is used for those agreements where a common selling agency is elected to so the selling activities of all the firms. The chief motive of cartel is to stop competition among the firms. So in many countries rules are framed to stop these.

The collusive oligopoly can take many forms. But its highest position and where when all the partner firms give the wake of their all price and production decisions to a common administrative agency. This type of collusive oligopoly is known as perfect cartel.

In the perfect cartel the central officer decides about the different partners of the cartel. All the profits of the industry are divided among the partners on the basis of the pre-defined rules and not on the basis of their production shares.

To know how the cartel works it is assumed that two firms make a cartel on the basis of a formal agreement. It is also assumed that the motive of the cartel is to acquire the maximum joint profit for the firms. First of all the cartel estimates the demand curve of the industry. The demand curve which the cartel faces will be the total demand curve of the consumers. It is equal to DD in the figure-8. The marginal revenue curve which is equal to MR in the diagram is telling about the increase in the revenue of the cartel due to a small increase in the sale of the cartel. The marginal cost curve of the cartel (MC_{a+b}= MC_a+MC_b) is acquired by the horizontal summation of the marginal cost curves of both the firms.



To maximise the industries profit the cartel will fix the industries profit where the (MR) of the cartel will cut its (MC) in the above diagram both of these curves are cut to each other at point R at this point the top total production is equal to OQ and the price is equal to OP. After knowing the total production of the industry the cartel will have to divide this production among different forms of the industry. This can be done by stretching a straight line from point R towards Y-axis. From the above diagram it can be seen that when firm A produces OQ_1 and firm B produces OQ_2 quantity then the cost of both the firms is equal. So the production quota of the firm A and B will be equal to OQ_1 and OQ_2 and

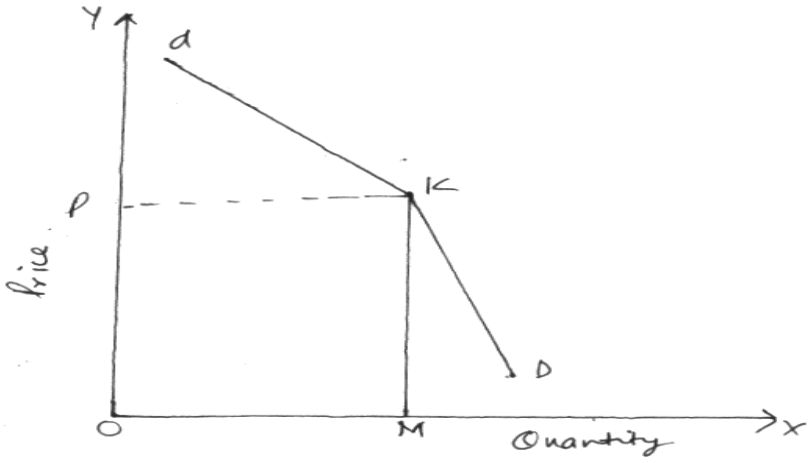
$OQ = OQ_1 + OQ_2$.

8.3.5 KINKED DEMAND CURVE OLIGOPOLY THEORY AND PRICE RIGIDITY

Generally it is observed that the oligopoly industries shows price rigidity i.e. oligopolist do not want to change their price even after the change in the economic conditions. The kinked demand curve theory is propounded by P.M. Sweezy and Hall and Hitch. This theory tells us only about the rigidity of the price in oligopoly markets after price determination, it does not tell us about the determination of price under these markets.

According to this theory there is a kink in the demand curve which is faced by the oligopolist at present price.

The kink in the demand curve is found at the present price because the part of the curve which is above the present price is more elastic and part of the curve which is below this price is less elastic or inelastic.



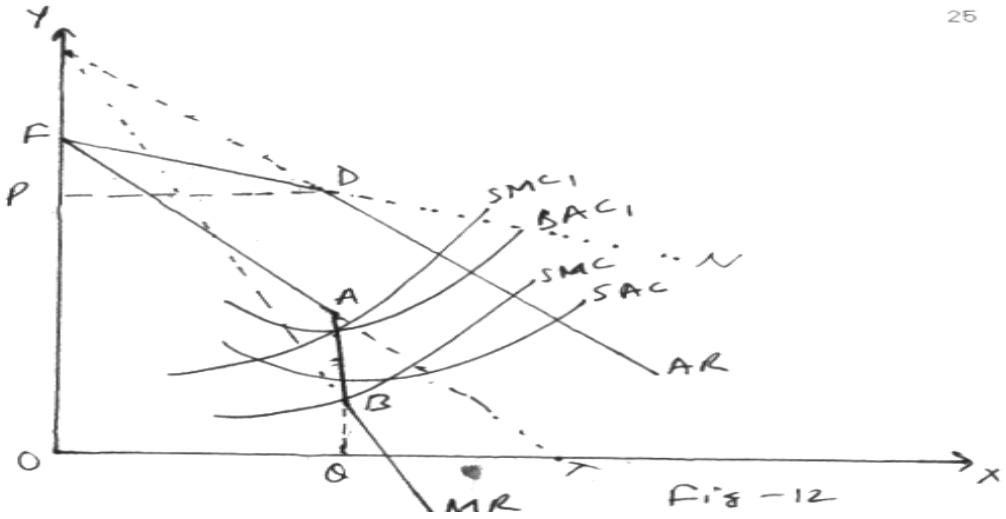
In the above diagram dD is the kinked demand curve. It is kinked at the point k. where firm is producing OM output at price OP. The upper part dk of the demand curve is more elastic than lower part kD. The reason of it is the special relation pattern assumed in this theory which is as-

Each oligopolist believes that if he lowers the price below the prevailing level, his competitors will follow him and will accordingly lower their prices, whereas if he raises the price above the prevailing level, his competitors will not follow his increase in price.

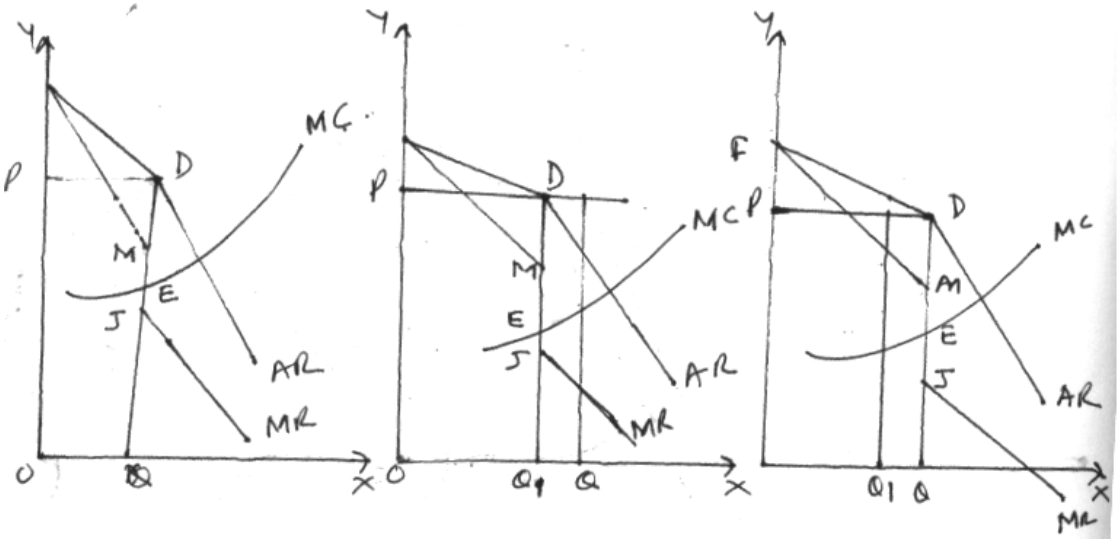
On the basis of above analysis it is easy to understand that why an oligopolist who is facing kinked demand curve is rigid about the change in price. Because in the same way after increasing the price above this level he can not increase his revenue due to so much fall of in his demand. On the basis of above analysis it is easy to understand that why an oligopolist who is facing kinked demand curve is rigid about the change in price.

The kinky demand curve has important implications for the MR curve of the firm; it is FABC and is discontinuous at the output OQ. This is due to a sudden change in the elasticity of AR curve at point D. As the MR==P (1-1/e), it drops sharply at output OQ.

One important reason for a fairly rigid price policy on the part of individual firms of the industry now becomes apparent. Even if the MC curve goes up or down, so long as it cuts the discontinuous MR curve, AB, the output and the price will not change. Thus, there is enough room for the cost curves to shift up or down without affecting the oligopolies' profit-maximizing price and output.



Even if the costs are constant, but demand conditions change, the price may be rigid at the price UP, though now output may vary. Such variations in output 'with a kink at price OP are shown in figure-13



8.4 CHECK YOUR PROGRESS

Answer the following questions on the basis of your knowledge regarding this chapter:

1. At which price demand and supply equate to each other?
2. A group of large number of firms which explicitly and openly agree to work together is called?
3. In which market form are products differentiated?
4. Where an attempt is made to persuade a consumer to buy products of the firm?
5. The minimum profit which a firm must earn to continue to remain in business.

8.5 SUMMARY

The *monopolistic market* is a market which prevails in between the both markets i.e. between perfect competitive and monopoly, and has the elements both the markets. In this market there are large numbers of firms which are selling close substitutes of each other. Monopolistic firm, like a monopolist, faces a *downward sloping demand curve*. This kind of demand curve is the result of (i) a strong preference of a section of consumers for the product and (ii) the quasi-monopoly of the seller over the supply. The strong preference or brand loyalty of the consumers gives the seller an opportunity to raise

the price and yet retain some customers. *Oligopoly* is an important type of imperfect competition. Oligopoly is a market position where the producers or sellers of the good are few and having strong rivalry. An oligopolist firm can not assume that the rivals will not change their prices when the firm itself will change its price and production policy so *his demand curve becomes uncertain* because it depends upon the uncertain behaviour of the competitors under different circumstances. When all the oligopolists make a formal agreement about price and output then it is said that they have formed *collusive oligopoly*. Generally it is observed that the oligopoly industries shows *price rigidity* i.e. oligopolist do not want to change their price even after the change in the economic conditions

8.6 KEYWORDS

Oligopoly - Oligopoly is a market position where the producers or sellers of the good are few and having strong rivalry. So it is also called many times as competition among the few.

Monopolistic Market- The monopolistic market is a market which prevails in between the both markets i.e. between perfect competitive and monopoly, and has the elements both the markets. In this market there are large numbers of firms which are selling close substitutes of each other.

Normal profit- The firm will get normal profit in the short run when the equilibrium price determined by it is equal to its average cost.

Collusive Oligopoly- When all the oligopolistic make a formal agreement about price and output then it is said that they have formed collusive oligopoly.

Dominant Firm Price Leadership- In this leadership model a dominant firm captures a large share of the market and the other firms are so small that they cannot change market conditions or environment by themselves.

8.7 SELF -ASSESSMENT TEST

1. Discuss and illustrate with diagrams the equilibrium of the firm and industry under monopolistic competition.
2. Evaluate critically Chamberlin's model of monopolistic competition.

3. Explain with diagrams the main characteristics of an oligopolistic market and equilibrium of a firm facing kinked demand curve.

4. Explain price and output determination under price leadership by a dominant firm.

5. Explain price determination under conditions of price leadership in an oligopolistic market.

8.8 ANSWERS TO CHECK YOUR PROGRESS

1) Equilibrium Price
2) Cartel
3) Monopolistic competition.
4) Persuasive advertising.
5) Normal profit.

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