PRINCIPLES OF MICROECONOMICS-I

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Unit 4	Demand and Supply in Practice	
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Course Contents

INTRODUCTION TO PRINCIPLES OF MICROECONOMICS-I

Economics is a live subject and helps the economic agents in their decision making like: Which commodities to produce? How to produce? Which techniques to use? Which factors or resources to use, in which combinations to produce and what quantity of a commodity? How consumers make purchasing decisions and how their choices are affected by changing prices and incomes? How firms decide how many workers to hire and how workers decide where to work and how much work to do? In other words, economics has moved away from financing the activities of State to helping the common man in the street to make many a crucial decisions impinging on their day-to-day life.

We, today incorporate a wide spectrum of activities in the domain of economics. These activities include: (a) consumer's behaviour or choice process; (b) producers' behaviour or how is the production organised and carried on, what is the special role of cost functions therein and also the different forms of market organisations; (c) different individuals co-operate in the process of production to contribute factors owned by them. The present course on principles of Micro Economics aims to expose the learners to each of these aspects. The course is divided into three blocks.

Introducing the nature of Economics, **Block 1** throws light on the basics of demand and supply and how the demand and supply curves are used to describe market mechanism. The block comprises 4 units. Unit 1 on Introduction to Economics and Economy covers the essential nature of economics and the basic concepts and methodology used in the discipline. Unit 2 deals with the Principles of Demand, Concept and Measurement of Elasticity of Demand and its Determinants. Unit 3 discusses Law of Supply, Elasticity of Supply and its determinants and Measurement. Unit 4 discusses the Market Mechanism by putting the Supply curve and Demand curve together.

Block 2 deals with the theory of consumer behaviour and consists of two units. Unit 5 discusses Cardinal Utility Approach for measurement of utility and how a consumer attains equilibrium with the help of equi-marginal utility. Unit 6 analyse the Consumer Behaviour under Ordinal Approach.

Block 3 covers production function and theory of cost. It consists of four units. Unit 7 throws light on production function with one variable input, Unit 8 deals with the nature of production function with two variable inputs. Unit 9 covers the production function in the event of all inputs vary and hence application of returns to scale. Unit 10 discusses the cost side of production considering different types of costs.

UNIT 1 INTRODUCTION TO ECONOMICS AND ECONOMY

Structure

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1.0   OBJECTIVES

After studying this unit, you will be able to:

- explain the problem of scarcity of resources for satisfying ever-increasing wants of society;

- state the meaning and nature of an economy;

- describe the concept of economic entities;

- discuss the concept of production possibility curve;

- state the issues relating to allocation of resources between investment and consumption, and between private and public goods;

- explain the methods of resource allocation in a market economy in a socialist economy and in a mixed economy;

- clearly describe the basic concepts and methodology of Economics;

- state the nature of economic laws; and

- explain some of the analytical concepts associated with economic reasoning.

1.1   INTRODUCTION

Let us begin with defining the discipline of Economics.

Definition of Economics

Economics has been variously defined. As summarised by Samuelson, some of the definitions seek to explain that economics:

- analyses how a society's institutions and technology affect prices and the allocation of resources among different uses.

- explores the behaviour of the financial markets, including interest rates and stock prices.

- examines the distribution of income and suggests ways that the poor can be helped without harming the performance of the economy.

- studies the business cycle and examines how monetary policy can be used to moderate the swings in unemployment and inflation.

- studies the patterns of trade among nations and analyses the impact of trade barriers.

- looks at growth in developing countries and proposes ways to encourage the efficient use of resources.

- asks how government policies can be used to pursue important goals such as rapid economic growth, efficient use of resources, full employment, price stability, and a fair distribution of income.

A common theme running through all these definitions is that scarcity is a fact of life and that an efficient use of these scarce resources is to be found. That is how we define economics as a science that deals with scarcity.

It explains the behaviour of different economic units, households, firms, government and the economy as a whole, when they are faced with scarcity.

1.2 CONCEPT OF SCARCITY

"Scarcity" lies at the root of all economic activities. The concept of scarcity finds an expression in two basic facts of economic life:

A. Unlimited wants or ends, and

B. Scarce resources or means.

A. Unlimited wants or ends

Every person has some wants. Different persons have generally different wants, and wants of even the same person keep changing with the passage of time, change of place and status.

Human **wants are unlimited and keep on increasing.** Different wants differ in their intensity. Subject to the availability of resources, higher order wants need be satisfied first and if the resources are still available these may be used to satisfy lower order wants.

B. Scarce resources or means

Satisfaction of wants requires resources (or the means to satisfy wants). Availability of resources is limited in relation to requirements.

However, scarce means have alternative uses.

The resources therefore need be allocated among different uses in a systematic coordinated manner. Every individual and economy has to devise a mechanism for this.

Different societies try to solve these issues in different ways and in the process each society creates a set-up called 'an economy'. The term 'economy' or 'economic system' is a comprehensive one. It covers the entire set of institutions and arrangements, (including rules and regulations which facilitate their interactions) for resolving the basic and permanent problem of an imbalance between means and wants.

The human society has evolved several sets of such institutional arrangements each is termed an economic system and they have their own distinguishing features and nomenclatures. These systems try to adopt their own means and methodologies for solving the basic problems.

For example, take the case of a capitalist economy. In this case the means of production are owned and inherited by individuals, and various economic decisions are guided by prices of goods and services in the market. The income of an individual is determined by means of production supplied by him to the market and the price which they are paid for their service. On the other hand, in a strict socialist economy all the means of production are owned by the state. The state takes all the decisions regarding the use of available resources.

However, whatever its nature, every economy has to solve the basic problem of scarcity of means in relation to the ever-increasing and varied wants. The means and wants can be combined in alternative ways. The problem of scarcity exists in every society, irrespective of the levels of its development. Hence it has to address itself to two issues:

1)   increasing the availability of means of satisfaction, and

2)   laying down the priorities of the wants to be satisfied.

Check Your Progress 1

1)   State two important characteristics of wants which make them unlimited in number.

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2)   What is an economy?

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3)   Pick up the correct option among the following:

Which of the following can be called scarce:

a)   Stock of rotten vegetables

b)   Useless plants in a jungle

c)   Number of flowers in a nursery

d)   Water in a dirty pit.

1.3   MEANING OF PRODUCTION

The term **'Production' implies the transformation of various inputs into output thereby increasing the want-satisfying capacity of the inputs.** The process of production transforms the things occurring in nature into goods and services which are capable of satisfying human wants. The things which are so transformed are called inputs while output is nothing but the transformed form of inputs, that is, the goods and services. This involves some human effort, both physical and intellectual. The transformation may be physical (a different appearance which enhances want satisfying capacity), spatial (relocate or transfer the things from one place to another to make them available to the end users) or inter-temporal (saving/preserving things which arise/grow/made today for use at a later date-storage and warehousing). A particular transformation is production if the want-satisfying capacity of the output (also called 'product') is more than that of inputs used. To put it differently production is nothing but the creation of utility.

1.4 CENTRAL PROBLEMS OF AN ECONOMY

Because of the scarcity of resources every economy is faced with certain basic or fundamental problems which it must try to solve within its socio-economic framework. These central problems are:

1.4.1 What to Produce?

An economy does not have enough resources to produce everything required by it. So, it must be selective and decide what to produce and what not to produce. When some goods are not produced, some wants of the society remain unsatisfied. The decisions regarding the wants to be satisfied and the goods and services to be produced are interrelated and are taken in a coordinated manner. This is called allocation of productive resources. If some factors of production are employed in the production of product X, to that extent, these will no longer be available for production of product Y. The problems can be illustrated by Production Possibility Curve which we will introduce shortly.

1.4.2 How to Produce?

This is a problem which covers the details of the allocation of productive resources in the production of various goods and services. More precisely, we can say that when an economy decides to produce X , it has also to work out exactly how much of labour, capital, land, etc., would go into its production. The exact proportion of factor-inputs used in the production of goods needs to be decided, irrespective of the size and nature of an economy. This is called the technique of production of that item. For example, we may think of goods which are produced by using more of labour than capital. In such cases labour intensive techniques of production are said to be in use. On the other hand, if more of capital goes into the production of an item, then we say that it is being produced by a capital-intensive technique.

When an individual producer is to decide about the technique of producing any particular product, he considers the prices and productivities of alternative inputs, say labour and capital, since frequently their relative usage can be varied. He tries to use those inputs in such a combination which costs him the least and will yields him the maximum output.

His decision is based on consideration of following two factors:

i)   the relative price of labour and capital, and

ii)   the relative efficiency of the two inputs

1.4.3 For Whom to Produce?

A society comprises a large number of individuals and households. All the output of consumption goods and services is ultimately meant for their use. Therefore, all goods and services produced are to be distributed amongst the individuals and households. The share of each individual and household has to be determined and also the quantities of specific goods and services which comprise that share.

We can see that it is possible to propose different principles whereby this distribution may be carried out. In an economic system organised on market

principles, the income shares of individual members of the society are determined in the following manner:

In a market economy, productive resources are privately owned. They are sold, bought and hired like any other goods or services. The price of a productive resource is determined by the market forces of demand and supply. Whenever it is to be employed by a producer, he has to pay its market price to its owner. It is for the owner to supply it to the market or withhold it. The income of each individual under these conditions, is determined by the amounts of different productive resources owned and supplied by him to the market and their respective price.

1.4.4 The Problem of Growth

Every economy seeks to increase its stock of capital to increase its production capacity and thereby generate more income. The generated income in an economy has two alternative uses, viz. consumption expenditure (C) and saving (S). Thus, $Y = C + S$. Saving is source of finance for investment in an economy. Investment adds to the capital stock of an economy. And therefore, there is a need to reduce the share of consumption expenditure (and thereby increase investment); this helps in capital formation.

1.4.5 Choice between Public and Private Goods

1) **Private Goods:** There are certain goods (the term goods here includes services also) whose availability can be restricted to selected individuals only. For example, a product may be priced in the market and only those who pay its price may be allowed to have it. This characteristic of a product by which some people can be prevented from its use is referred to as the **'principle of exclusion'**. Accordingly, those persons who cannot pay for it or who are not ready to pay, are not allowed to use it. The use of the goods is thus divisible between different persons. **Any goods which can be priced and whose use can be restricted to selected persons is termed** as private goods.

2) **Public Goods:** When it is not possible to restrict the availability of a product to selected individuals, they are termed as public goods or social goods. Such goods cannot be so priced as to deprive some persons from using it. That way, it is indivisible. Defence service is a typical example of a public service. When a country is protected against foreign aggression, every citizen is protected.

With its limited resources, an economy cannot have enough of both public and private goods. It must try to achieve an optimum combination of both.

1.4.6 The Problem of 'Merit Goods' Production

Those goods whose consumption is considered highly desirable for the members of the society are termed as merit goods. The important feature of the merit goods is that their consumption benefits both the user and non-users. For example, if a person is educated and healthy, it not only helps him but also the society as a whole. Health and education, therefore, are called a merit product/service and it is desirable that every member of the society gets education. Consumption of merit goods benefits the society as a whole and raises the level of its efficiency and well-being. Therefore, every society has to decide the extent it can and should produce and consume merit goods.

Check Your Progress 2

1) State the central problems of an economy?

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2) What is capital formation?

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3) What is a technique of production?

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4) What are merit goods?

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   ....

5) Differentiate between public and private goods.

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1.5   PRODUCTION POSSIBILITY CURVE

The economy has to choose between alternative combinations of various goods and services. This problem of choice can be illustrated by a simple graph known as **Production Possibility Curve or a Product Transformation Curve.** A typical Production Possibility Curve (PPC) is drawn on the following assumptions:

i)   The country has to choose between alternative combinations of only two goods, say. LED (L) and computer monitor (M).

ii) All productive resources of the country are taken as given and so is the state of technology, no changes are made in them.

iii) All productive resources of the economy are fully employed. There is no wastage or under utilisation.

iv) The productive resources are suitable for the production of both goods (L) and (M). They can, therefore, be shifted from the production of one to the other goods. However, such a shift would reduce the production of the first good and increase that of the other.

v)   No factor of production is considered to be specific in the production of one good alone and inappropriate for the production of the other.

vi) We consider the productive efficiency of the productive resources only in physical terms, i.e., the units of LED (L) and Computer Monitor which they can produce.

Based upon these assumptions, we can illustrate the set of production possibilities available to a country by a hypothetical example. Look at Table 1.1. The figures in the table show that all the productive resources of the country put together can produce a maximum of either 30 L or 30 M or some other combinations thereof. The production possibilities illustrated in Table 1.1 are also represented in Fig. 1.1 in the form of a production possibility curve (PPC).

Quantity of M is measured along X-axis and the numbers of L are measured along Y-axis. The respective pairs of the quantities of L and M are plotted and joined with each other to yield a curve which is called the Production Possibility Curve. Thus, the PPC represents all the possible combinations of L and M which can be produced by using all the productive resources of the economy, efficiently. In that sense, each point on the curve represents the maximum possible output and, for that reason, it is also termed as the production frontier of the economy.

Table 1.1: Production Possibilities Available to a Country

Combination	LED (Numbers) (L)	Computer Monitor (M)	Loss of M for each Additional L Produced (Tones)	Loss of L for each Additional M Produced (Numbers)
1	30	0	2.8	
2	25	14	1.2	0.357
3	20	20	0.8	0.833
4	15	24	0.6	1.250
5	10	27	0.4	1.667
6	5	29	0.2	2.500
7	0	30		5.000
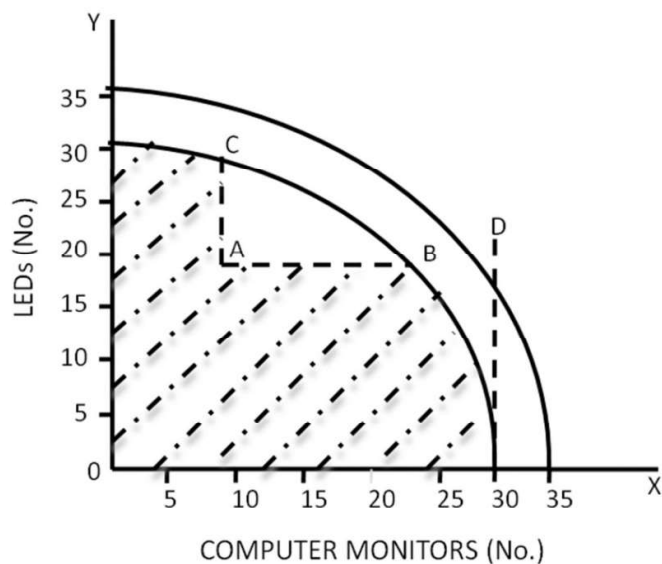
Fig. 1.1

The economy can produce any combination of L and M represented by a point either on the PPC or in the shaded area of the diagram. Production combinations represented by the shaded area imply that the economy can produce either L or M or both. For example, combinations represented by points A, B and C are feasible, as these lie either on the PPC or in the shaded area. But the combination represented by A is feasible but not efficient. Combination represented by points B and C are both feasible and efficient. If it produces at Point A it is not utilising some of its productive resources and let them go waste. Thus consider point A which represents a combination of 10 tonnes of M and 14 L. The PPC, however, shows that with this much of M, the economy can produce 27 L (as shown by point C on PPC). Alternatively, with 14 L, the quantity of M can be increased to 25 tonnes (see point B).

Any point beyond the PPC, which is in the non-shaded area of the diagram, shows a combination of L and M which the economy cannot produce. For example, point D represents a combination of 30 M and 20 L. However, when 30 M is produced, no resources are left for the production of L. On the other hand, if 20 L are produced, then the quantity of M has to be reduced to 20.

Characteristics of PPC

A typical PP curve has two characteristics:

1) **Downward sloping from left to right**

It implies that in order to produce more units of one good, some units of the other good must be sacrificed (because of limited resources).

2) **Concave to the origin**

A concave downward sloping curve has an increasing slope. The slope is the same as MRT. So, concavity implies increasing MRT, an assumption on which the PP curve is based.

Can PP curve be a straight line?

Yes, if we assume that MRT is constant, i.e. slope is constant. When the slope is constant the curve must be a straight line. But when is MRT constant? It is constant if we assume that all the resources are equally efficient in production of all goods.

Note that a typical PP curve is taken to be a concave curve because it is based on a more realistic assumption that all resources are not equally efficient in production of all goods. (Fig. 1.2)
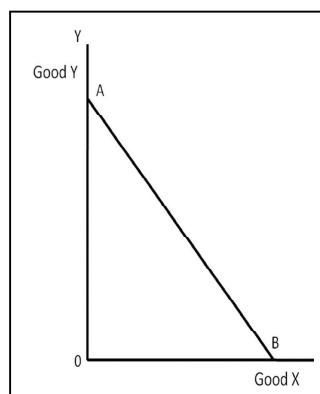

Fig. 1.2

Does production take place only on the PP curve?

Yes and no, both. Yes, if the given resources are fully and efficiently utilised. No, if the resources are under-utilised or inefficiently utilised or both. Refer to the Fig. 1.3.

On point F, and for that matter on any point on the PP curve AB, the resources are fully and efficiently employed. On point U, below the curve or any other

point but below the PP curve, the resources are either under-utilised or inefficiently utilised or both. Any point below the PP curve thus highlights the problem of unemployment and inefficiency in the economy.
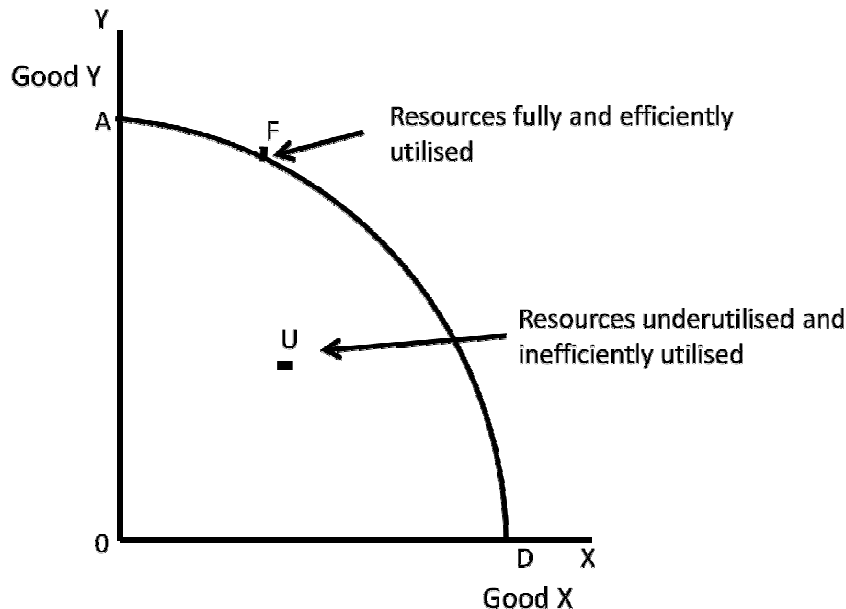

Fig. 1.3

Can the PP curve shift?

Yes, if resources increase. More labour, more capital goods, better technology, all means more production of both the goods. A PP curve is based on the assumption that resources remain unchanged. If resources increase, the assumption breaks down, and the existing PP curve is no longer valid. With increased resources, there is new PP curve to the right of the existing PP curve.
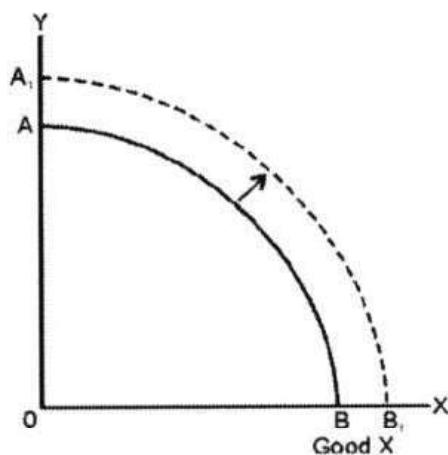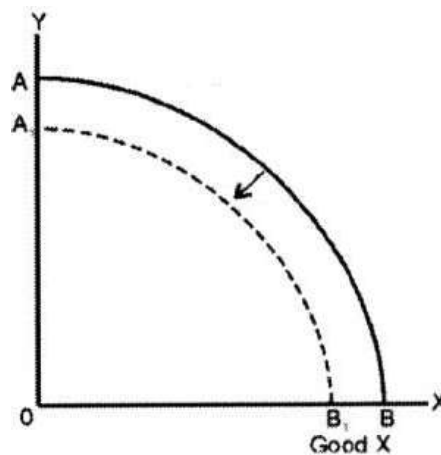
Fig. 1.4   **Fig. 1.5**

It can also shift to the left, if the resources decrease. It is a rare possibility but sometimes it may happen due to fall in population, and due to destruction of capital stock caused by large scale natural calamities, war, etc.

1.6 ALLOCATION OF RESOURCES: SOLUTION OF CENTRAL PROBLEMS

Theoretically, there are two types of economic systems, viz.. Capitalistic economy and socialistic economy. In practice, all the countries have adopted a system which is broadly identified as mixed economy.

The problem of resources allocation may be tackled in several ways and each economy tries to solve it in line with its own chosen objectives.

1.6.1 Resource Allocation in a Mixed Economy

A mixed economy is one in which some decisions are left to the market forces while others are taken under direct government regulation or even ownership.

Some selected areas of economic activities are reserved for the government sector. The government acquires the necessary productive resources for these activities and employ them in conformity with its priorities. The production pattern of the public sector, the prices of items produced by the public sector and other measures are used to regulate the allocation of resources in private sector as well. These other measures include price controls, licensing, taxation, subsidies and others. Additionally, various labour welfare measures are implemented and enforced by the government. Similar steps are taken to encourage the use of productive resources for encouraging the development of backward areas of the country for removing specific shortages, and for bringing about a balanced development of the economy as a whole.

1.7 ECONOMIC METHODOLOGY AND ECONOMIC LAWS

Economic methodology investigates the nature of economics as a science. It investigates the nature of assumptions, types of reasoning and forms of explanations used in economic science. Various practices such as classification, description, explanation, measurement, prediction, prescription and testing are associated with economic methodology. Economic methodology examines the basis and groups for the explanations. Economists give answer why questions about the economy. For example, economists use the shifting of demand and supply curves to answer the question of why prices change.

Economics being a social science, economic laws are, therefore, a part of social laws. In the words of Alfred Marshall, we should separate that part of behaviour of members of the society where the main motive happens to be an economic one, where the main motive can be expressed in terms of money price. The corresponding activities are then economic activities. However, such a dividing line between economic laws and other social laws is not always clear. Very often an activity happens to be motivated by a combination of both economic and non-economic considerations. As a result, it is often quite difficult to formulate pure economic laws which have full validity also.

1.7.1 Inductive and Deductive Reasoning

Economists have followed two traditions in formulating economic laws. According to one tradition, the causes (also called conditions or assumptions)

are specified and different economic units are expected to behave in a 'rational' manner. The outcome in this case is predictable, provided the assumptions made are satisfied. The assumptions themselves may be totally unrealistic or may be very close to reality but they are stated in a precise manner. In any case, this type of reasoning is called deductive reasoning. In this method, the generalisation or law is stated and the individual activities are expected to conform to it. A typical example of deductive reasoning is the law of demand which states that, other things being equal, the quantity of a product demanded varies inversely with its price. When price falls, demand expands and when price rises, demand contracts.

As against this deductive reasoning, some thinkers try to discover economic laws the other way round. Instead of laying down causes or conditions on a hypothetical basis, they collect the actual information regarding the behaviour of economic units under different conditions. In other words, empirical information is collected and generalisations regarding the behaviour of economic units under different conditions are worked out. This is called the method of inductive reasoning. A well-known example of the use of this method is the Engel's Law. Through a study of family budgets, Engel concluded that as the income of a family increases, the proportion of its expenditure on necessities decreases while that on comforts and luxuries goes up. Most business firms prefer this line of approach.

In economics, both inductive and deductive methods of reasoning are used to supplement our understanding of an economy and its working.

1.7.2 Equilibrium

The concept of equilibrium is an important tool of analysis in economics. It is very frequently used and one should become familiar with it. Usually, an economic variable (such as the price of a commodity) is subject to various forces trying to pull it in different directions. When these forces are in balance, the value of variable stops changing and it is said to be in equilibrium.

Concept of Equilibrium

Equilibrium means a state of rest, the attainment of a position from which there is no incentive nor opportunity to move.

- A consumer is in equilibrium when his expenditure on different goods and services yield maximum satisfaction. No move on his part can increase his satisfaction but, rather, will decrease it.

- A business firm is in equilibrium when its resource purchases and its output are such that it maximises its profits, if profit maximisation is its objective, any change on its part will cause profits to decrease.

- A resource owner is in equilibrium when the resources which he owns are placed in their highest paying employments and the income of the resource owners is maximised. Any transfer of resource units from one employment to another will cause his income to decrease.

- An economy is in equilibrium at the level of income (and employment) where aggregate demand equals aggregate supply.

Equilibrium concepts are important, not because equilibrium is ever in fact attained but because they show us the directions in which economic changes

proceed. Economic units in disequilibrium usually move toward equilibrium positions.

Equilibrium can be analysed in two forms:

1) **Partial:** In partial equilibrium analysis we concentrate on a single market in isolation from the rest of the economy.

2) **General:** In general equilibrium analysis, we analyse simultaneously all the markets in the economy on the basic premise that everything depends on everything else.

1.8 POSITIVE VERSUS NORMATIVE ECONOMICS

The term **positive economics is concerned with only formulating economic laws and describing reality.** The economic laws may be derived from theoretical assumptions or from recorded facts. Either way, they only tell us what exists. They do not pass any judgement as to whether the findings of economic analysis are desirable or need a modification.

As against this, **normative economics realises the fact that an economy is never perfect. The outcome of its working can always be improved upon.** It is quite normal to find an economy faced with many problems requiring immediate attention. Such problems can be related to price changes, employment, scarcity of certain inputs, inequalities of Income and wealth, and so on. In normative economics, the knowledge gained is put to use for improving the working of the economy. Targets of improvement are laid down and policy measures are formulated by which the targets are to be achieved. Thus, normative economics is concerned with what ought to be.

A positive statement:

"An increase in price of petrol leads to a fall in its quantity demanded."

A normative statement:

Government should take steps to cut the consumption of Petrol.

More generally, normative statement uses the verb "should".

1.9 MICROECONOMICS AND MACROECONOMICS

The terms microeconomics and macroeconomics are used in connection with the level of aggregation, that is the extent to which economic units and variables are covered in economic analysis. At one end, the analysis may cover the behaviour and responses of a single economic unit and at the other extreme it may cover the entire economy. These two terms (micro and macro) are derived from Greece words **mikros** and **makros** which mean small and large respectively.

Microeconomics deals with the behaviour of individual elements in an economy such as the determination of the price of a single product or the behaviour of a single consumer or business firm.

As against this, macroeconomics covers large aggregates or collection of economic units which may extend to the entire economy. In the words of Kenneth Boulding, **macroeconomics covers the great aggregates and averages of the economic system rather than individual items.** Here we study collections of variables and economic units (i.e., macro variables) such as national income, employment, level of prices in general, intersectoral flows of goods and services, total savings and investment, and the like. **While the study of an individual firm or an industry lies within the scope of microeconomics, an entire sector falls within the scope of macroeconomics.**

To use a metaphor, macroeconomics studies elephant as one object; microeconomics (like five blind men in a flok tale) studies individual parts of a whole body. Each study leads to different results. Or, to use another metaphor, one enjoys the macro-view of a cricket test match while one enjoys a ball-by-ball description when sitting in before a TV.

1.10   STOCKS AND FLOWS

Economic variables are of two kinds: 1) stocks and 2) flows. **A stock variable is the one which can be measured only with reference to a point of time and not over a period of time. As against this, a flow variable is the one which can be measured only with reference to a period of time and not a point of time.** We come across numerous economic variables which belong to one category or the other. Take the examples of the supply of money and magnitude of wealth. They have reference to point of time. They are, therefore, 'stock' concepts. Correspondingly, examples of flow variables are production, saving, expenditure, income, sales, purchases, etc. All these variables can be measured only over a period of time. A factory can produce so much during, say, a month and not at a given moment of time. A person does not have an income at a point of time. But he has it only for a period of time. A flow concept can assume some value only with the passage of time, not otherwise. One should observe that **stock and flow variables are often used together in economic analysis.**

1.11   STATICS AND DYNAMICS

Economic analysis can be conducted either by using a static framework or a dynamic setting. Static and dynamic modes of analysis can be differentiated in more than one ways. According to one definition, in a static model (theory) the variables (cause effect) are not dated. The demand-supply model of market behaviour is a static model. The model that demand depends on own price, supply depends on own price, with an equilibrium condition that demand must equal supply, time does not enter into the picture at all and the variables are all undated. According to this definition, a dynamic model would be one where the relevant variables are dated. If the demand-supply model is restructured as follows, then the model would become dynamic according to this criterion.

$$D_t = f(P_t)$$

$$S_t = g(P_t)$$

$$D_t = S_t$$

where 't' is the relevant time unit.

However, according to some economists, even if the variables are dated the model does not become dynamic. A dynamic model according to this definition would be one where the variables must be dated and a time lag must exist in their relationships. According to this criterion the following would be a dynamic model.

$$D_t = f(P_t)$$

$$S_t = g(P_{t-1})$$

$$D_t = S_t$$

There is **no lag** in the demand relationship. Demand in period 't' depends on own price of the same period. However, in the supply relationship a gestation lag exists which makes the model dynamic. Supply in period 't' depends on price prevailing in the previous period (t–1). The price level in previous period (t–1) would have induced the producers to increase or decrease the supply, full impact of such decisions are visible in time period 't' only. For market to attain equilibrium, demand in period 't' must equal supply in period 't'.

Check Your Progress 3

1) State whether the following statements are True or False:

    i)   Positive economics is concerned with what ought to be.

    ii)   Normative economics requires a system of value judgement for recommending policy steps.

    iii)   Every economist prescribes the same remedies for a particular economic problem.

    iv)   Positive economies always depict reality.

    v)   We can always extend the conclusions of microeconomics to the field of macroeconomics.

    vi)   Demand and supply are both stock variables.

    vii)   In comparative statics, a comparison of two equilibrium positions is made.

2) Match the item in Column A with those in Column B.

Column A		Column B
i)	Study of individual firm and industry	a) Barter
ii)	A variable which can be measured at a point of time	b) Macroeconomics
iii)	Study of an entire sector of an economy	c) Marginal utility
iv)	A variable which can be measured over a period of time	d) Ceteris paribus
v)	Want satisfying capacity of a good	e) Flow variable
vi)	Satisfaction yielded from consuming one additional unit	f) Microeconomics
vii)	Other things being equal	g) Utility
viii)	Exchange of apples with eggs	h) Stock variable

3) Which of the following will be the new production possibility frontier, if new technology is developed that enables higher productivity in agricultural (A) only? Industrial output (I) is not impacted.
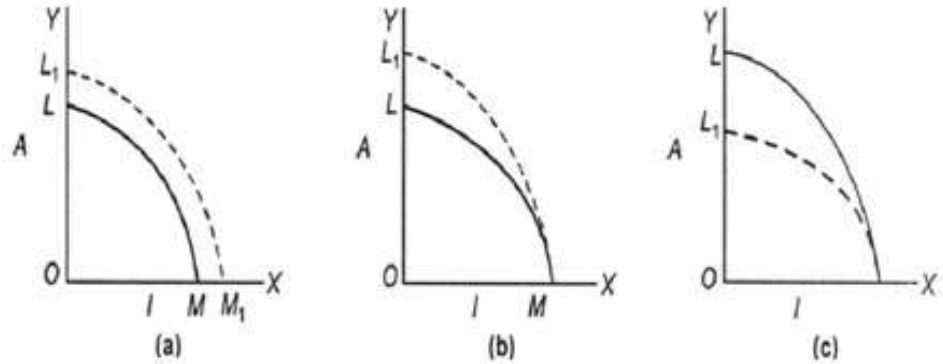

Fig. 1.6

1.12   LET US SUM UP

Economics explains the behaviour of different economic units like consumer, producer, households, firms, governments and the economy as a whole when they are faced with the problem of scarcity. Scarcity is observed in terms of unlimited wants in relation to available scarce resources. Scarcity gives birth to three central problems: What to produce, how to produce and for whom to produce. The other problems aligned with these three problems are the problems growth, choice between public and private goods and the problem of merit goods production. The central problem of an individual as well as for the society is therefore the allocation of scarce means among competing ends. A production possibility curve shows, given scarcity of resources and given technology, the maximum output produced of one good, given the output of other good. It shows how one good can be transformed into another good not physically but via the transfer or shifting of the resources from one line of use to another.

Economic methodology investigates the nature of economics as a science. Economic laws enable us to provide explanation of an event or phenomena in terms of cause and effect relationship. Two types of logics are followed in formulation of economic laws – induction and deduction.

Equilibrium is an important tool of analysis in economics. When the different forces pulling a variable in different directions are in balance, its value stops changing and is said to be in equilibrium.

The term positive economics denotes that part of economic analysis which just describes reality (or theoretical reasoning) without stating the desirability or otherwise of the findings. Normative economics, on the other hand, is concerned with what ought to be. It views reality in the light of chosen goals of society and suggests ways and means of achieving them.

Microeconomics studies the economic activities and responses of individual economic units and their small groups. **Macroeconomics** covers large collections of economic units, their aggregates and averages and macro-variables like national income, employment, and so on.

Economic variables can further be classified into stocks and flows. A **stock variable** is the one which can be measured only with reference to a point of time. A **flow variable**, on the other hand, is measurable only over a period of time.

Static economic or comparative statics is a technique of analysis in which the parameters of the economy are taken to be given. The assumption of ceteris paribus is made and the initial and final equilibrium positions arc compared. In dynamic-economics or dynamic analysis, parameters of the economy are allowed to change.

1.13 REFERENCES

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1.14 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) Unlimited, ever increasing

2) Economy refers to the setup created for meeting the basic and permanent problem of an imbalance between means and wants.

3) c)

Check Your Progress 2

1) The central problems of an economy are (i) what to produce, (ii) how to produce, (iii) for whom to produce, (iv) the problems of growth, (v) choice between public and private goods (vi) the problem of merit goods production.

2) Addition in its stock of capital is capital formation.

3) Technique of production refers to exact proportion of factor inputs used in the production of goods.

4) The goods whose consumption benefits both user and non-users are merit goods.

5) Private goods are the goods whose availability is restricted to selected individuals whereas in case of public goods nobody is excluded in the availability of such goods.

Check Your Progress 3

1) i) False ii) True iii) False iv) False – It will depict reality only if its assumptions are realistic. Otherwise it would have only correct reasoning without applicable conclusions. v) False vi) False vii) True

2) i) f   ii) h   iii) b   iv) e   v) g   vi) c   vii) d   viii) a

3) b

1.15   TERMINAL QUESTIONS

1) What is an economic system? Explain the central problems of an economy.

2) What are the main characteristics of human wants?

3) Scarcity lies at the root of every economy. Explain.

4) What do you understand by factors of production? Briefly explain each of the four main factors.

5) Write short notes on the following:

a) Public goods and private goods

b) Merit goods

c) Human wants

6) Explain how the solutions to the fundamental problems of an economy are interlinked with each other.

7) Explain the concept of a production possibility curve. Enumerate its assumptions. Illustrate it with the help of an example.

8) Briefly explain how resource allocation takes place in the following systems:

a) Market economy

b) Socialist economy

c) Mixed economy

9) Giving reasons state which of the following statements are true or false:

i) All human wants cannot be satisfied. It is a universal truth. Why to make a serious effort to satisfy them?

ii) Only a resource rich economy like Dubai is not faced with the problem of choice.

iii) The difference between labour force and work force of an economy indicates the size of unemployed persons.

iv) National Library at Kolkata is a right example of a public good.

v) MTNL/BSNL produce a private good.

10) Distinguish between positive and normative economics. Which one should be preferred and why?

11) Write short notes on the following :

   a) Concept of Equilibrium

   b) Limitations of Economic Laws

   c) Ceteris Paribus

   d) Tracing the Path of Change

12) Distinguish between :

   a) Microeconomics and Macroeconomics

   b) Static Economics and Dynamic Economics

13) State the reasons on account of which almost every modern economy is a dynamic one.

14) In what forms opportunity costs manifest themselves for the consumer, the producer, the investor, and a factor of production?

UNIT 2   DEMAND AND ELASTICITY OF DEMAND

Structure

2.0   OBJECTIVES

After studying this unit, you will be able to:

- distinguish between want and demand;

- explain the law of demand with the help of a demand schedule and a demand curve;

- identify the movement along a demand curve and a shift of the demand curve;

- state the various types of elasticity of demand and various methods of measurement; and

- explain the importance of the concept of elasticity of demand.

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2.1 INTRODUCTION

Satisfaction of human needs is the basic end and goal of all production activities in an economy. As we have learnt in Unit 1, human wants are unlimited and recurring in nature, whereas means available to satisfy them are limited. Therefore, a rational consumer has to make an optimal use of available resources. The demand theory provides a framework within which these decisions have to be made. Hence, in this unit we shall discuss the various issues related to the theory of demand.

2.2 THE NATURE OF DEMAND

At first, let us understand the meaning of the terms like desire, want, and demand. Desire is just a wish on the part of the consumer to possess a commodity. If the desire to posses a commodity is backed by the purchasing power and the consumer is also willing to buy that commodity, it becomes want. The demand, on the other hand is the wish of the consumer to get a definite quantity of a commodity **at a given price in the market** backed by a sufficient purchasing power.

There are three important points about the quantity demanded which should always be kept in mind. **First,** it is the quantity demanded, which is desired to be purchased by the consumers that we consider rather than the quantity which the consumers actually succeed in purchasing. Thus, quantity demanded is the desired purchase and the quantity actually bought is referred to as actual purchase.

Secondly, quantity demanded is always considered as a flow variable which is measurable over a period of time. Thus, for instance, when we say that demand or quantity demanded of oranges is 10, it must be per day or per week, etc.

Thirdly, the quantity demanded of a commodity has an economic meaning only at a given price. For example, to say that the quantity demanded of oranges is 10 units over a week has no meaning unless we specify the price of oranges per dozen or per unit. In short, the demand for oranges equal to 10 units per week at a price of Rs. 100 per dozen is a full and meaningful statement, as used in microeconomic theory.

2.3 DEMAND FUNCTION OR DETERMINANTS OF DEMAND

The demand of a product is determined by a number of factors. Let us discuss them in detail.

2.3.1 Determinants of Demand for a Consumer

The demand for commodity or the quantity demanded of a commodity on the part of the consumer is dependent on a number of factors. These are mentioned as follows:

i)   Price of the commodity in question

ii)   Prices of other related commodities

iii)   Income of the consumers, and

iv)   Taste of the consumers.

Demand function refers to the rule that shows how the quantity demanded depends upon above factors. A demand function can be shown as:

$$D_x = f(P_x, P_y, P_z, M, T)$$

where, D_x is quantity demanded of X commodity, P_x is the price of X commodity, P_y is the price of substitute commodity, P_z is price of a complement good, M stands for income, and T is the taste of the consumer.

If all the factors influencing the demand for the commodity X are allowed to vary simultaneously, the picture would look highly complicated. Therefore, normally what we do is to allow one of the factors to change on the assumption that all other factors remain unchanged, or, as an economist will state it by using the term, 'ceteris paribus' (other things remaining equal).

Demand Relationship: Relationship of quantity demanded of a commodity to its various determinants can be stated as follows:

1) **Price of the commodity:** The price of the commodity has an important influence on the quantity demanded by a consumer. Normally, the higher the price of the commodity, the lower the demand of the commodity. This, as will be explained latter, is referred to as the operation of the law of demand. The law of demand is always stated on the assumption that the other factors influencing demand remain constant.

2) **Size of the consumer's income:** The demand for a commodity is also influenced by the size of the income of the consumer. In cases where the increase in income of the consumer leads to an increase in the quantity demanded of the commodity it is referred to a case of a 'normal commodity'. At times an increase in the size of the income leads to a fall in the quantity demanded of the commodity. Such a situation is possible when the commodity in question is what is referred to as an 'inferior commodity'.

3) **Prices of other commodities:** A consumer's demand for a commodity is equally influenced by the prices of the commodities other than the commodity in question.

Complementary goods are those goods whose utility depends upon the availability of both the goods together. The demand for a commodity bears an inverse relationship with the price of the complementary goods.

Substitute goods are those goods which can be used with equal ease in place of one another. Demand for a good will bear a direct relationship to the price of its substitute good.

In some cases, the demand for the commodity in question will increase as the price of the other commodities increases while in other cases, the demand for the commodity will decrease as the price of the other commodity increases. The first case is a situation of what is called a 'substitute' and the later case is a situation of what is called a 'complement'. Tea and coffee are examples of substitutes while car and petrol or ink pen and ink are examples of complements.

4) **Tastes of consumer:** The demand for a commodity is also influenced by the tastes of the consumer. If a consumer has developed a taste for a particular commodity, he/she will demand more of that commodity. Similarly, if a consumer has changed his taste against a particular commodity, less of it will be demanded at a particular price.

The change of tastes can be illustrated with the help of an example. The consumers have developed taste for coloured T.V. so that even if its price rises consumers will still buy more of it. Taste for coloured T.V. has developed at the cost of black and white T.Vs.

2.3.2 Determinants of Demand in a Market

The factors determining the demand for a commodity in a market are the same as those which determine the demand for the commodity on the part of a consumer. Besides that two additional factors are also to be included. These two factors are:

1) **Size of the population:** All other factors remaining unchanged, the greater is the size of the population, more of a commodity will be demanded. Size of the population itself is dependent on so many other factors.

2) **Income distribution:** It is a little difficult concept to explain. In simple terms, it implies how the National Income (the factor income of the nationals of an economy over a year) is distributed among lower and higher income groups of people.

More unequal is distribution of income, more will be the demand for the commodities which are purchased by the rich. Such commodities may be cars, refrigerators, air conditioners etc. Less unequal is distribution of income, more will be the demand for the commodities which is purchased by relatively poorer people. Such commodities may be food items like wheat and rice, fans, bicycles etc.

It may be observed that if all the variables that influence demand are not included in the demand function or if the parameters are not correctly estimated, the demand equation will not predict demand accurately, sales forecasts will be in error, and incorrect expansion and operating decisions will be made.

Check Your Progress 1

1) Distinguish between want and demand of a commodity.

   ....

   ....

   ....

2) What are the determinants of demand of a commodity by an individual consumer?

   ....

   ....

   ....

3) Explain the factors influencing the market demand of a commodity.

    ....

    ....

    ....

4) Which of the following curves shows the income demand for inferior goods?
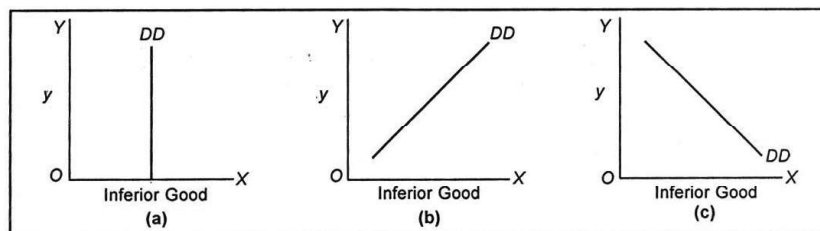
Fig. 2.1

5) If the air travel fare between Bengaluru and Delhi falls significantly, how will it affect (i) demand for rail travel and (ii) demand for air travel. Show graphically.
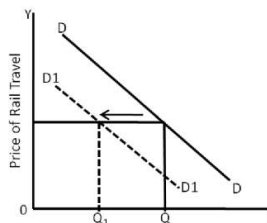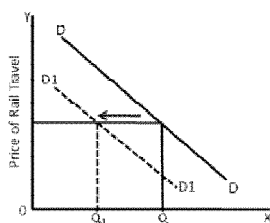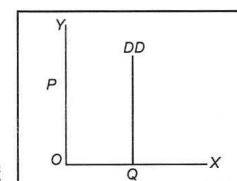
Fig. 2.2   **Fig. 2.3**

2.4   LAW OF DEMAND

Among the factors influencing demand for a commodity explained above, the most important factor is price of the commodity in question. Generally speaking, in almost all commodities, the quantity demanded of a commodity increases as the price of the commodity falls and vice versa, where price of other commodities, income of the consumer and tastes of the consumer remaining unchanged. The reason of this tendency will be explained below. This inverse relation

Alfred Marshall

between the quantity of the commodity and amount of money demanded is called the. 'Law of Demand'. In short, the law of demand can thus be stated as follows: Other things remaining equal, there obtains inverse relationship between the price of a commodity and its quantity demanded.
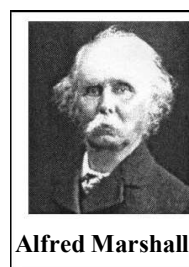
2.4.1 The Demand Schedule

Let us use imaginary figures to show the application of the law of demand. Table 2.1 given below, showing the application of the law of demand, is called the 'Demand Schedule'.

Table 2.1 : The Demand Schedule of a Consumer for Apples

Price of Apple per Kg. (in Rs.)	Quantity Demanded of Apples (in Kg. per week)
100	15
200	12
300	8
400	3

There are four combinations of price and quantity demanded shown in the Table 2.1. If we study this table, we can easily infer that as price of an apple is rising quantity demanded of apples on the part of the consumer is falling. Thus, the figures chosen are such that the law of demand is applicable.

2.4.2 The Demand Curve

The demand curve states the relationship between the quantity of a good that consumers are willing to buy and the price of the good. Let us understand the demand curve with the help of the Fig. 2.4. In this figure, on the Y-axis, price of an apple in rupees in measured and on the X-axis the quantity demanded of apples per week on the part of a consumer is measured. The first combination of Table 2.1 is shown by point a where at Rs. 100 per kg 15 units of apples are demanded. Similarly points b, c, d represent combinations of Rs. 200 price – 12 quantity demanded, Rs. 300 price – 8 quantity demanded and Rs. 400 price – 3 quantity demanded, respectively. The joining together of points a, b, c, and d give us what is called the demand curve. Thus DD is the demand curve.
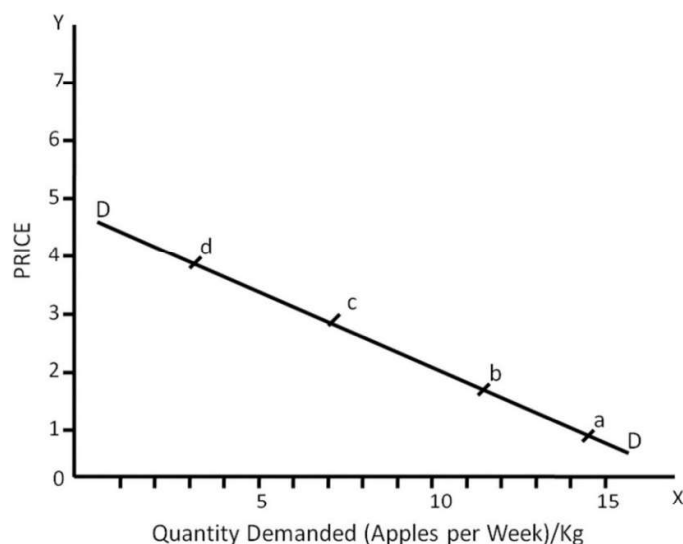
Fig. 2.4

The most important feature of a demand curve is that it slopes downward from left to right. In Fig. 2.4 the demand curve has been shown as a straight line. But the demand curve need not always be a straight line. It can also be in the form of a curve as shown in Fig. 2.5.

Whether a demand curve is a straight line or a curve depends on how much quantity demanded rises with the fall of its price or how much quantity

demanded falls with the rise in the price of the commodity. Whether we take Fig. 2.4 or 2.5, in both the cases the law of demand is applicable.
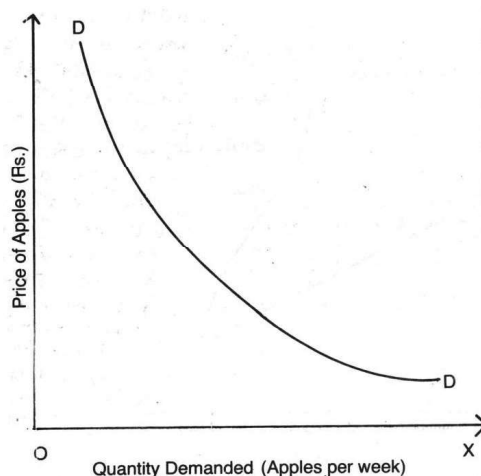

Fig. 2.5

Example : The demand schedules for ice cream for two individual households in a given period are given below. Suppose, there are only two households that demand ice cream. Draw market demand schedule and curve for ice creams.

We will estimate the market demand schedule as follows:

Price (Rs)	Quantity Demanded by				Market Demand
	Household A			Household B	
3	4	+		5	=9
4	3		+	4	=7
5	2	+		3	=5
6	1	+		2	=3

Market demand curve is a horizontal summation of individual demand curves, as illustrated below
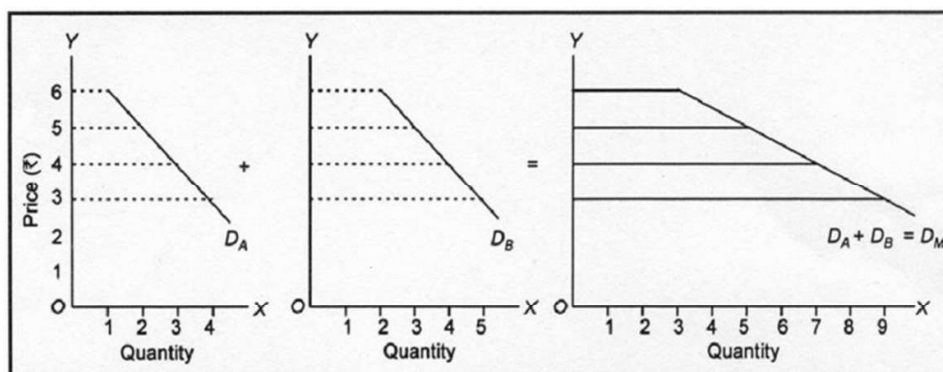
Fig. 2.6

2.4.3   Why does a Demand Curve Slope Downwards?

Law of demand states that there is an inverse relationship between the price of a commodity and its quantity demanded. Traditional demand Theory explained

this relationship with the help of cardinal utility analysis. Modern demand Theory explained it with the help of three concepts as explained below:

1)   Substitution Effect

Substitution effect results from a change in the relative price of a commodity. Suppose a Pepsi Can and a Coke Can both are priced at Rs. 20 each. If the price of Coke is raised to Rs. 25, and the price of Pepsi is not changed, Pepsi will become relatively cheaper to Coke, i.e. although the absolute price of Pepsi has not changed, the relative price of Pepsi has gone down. The change, in the relative price of commodity causes substitution effect.

When the price of a commodity say mango falls, prices of other fruits remaining constant, the consumer buys more mangoes by buying less of other fruits. This happens because mango starts looking relatively cheaper to him. This can also be stated by saying that the consumer substitutes mango for other fruits when the price of mango drops. This effect is called 'substitution effect'. This is the main reason for the consumer to buy more of mango, when the price of mango falls, provided prices of other fruits remain unchanged.

2)   Income Effect

Given the money income of the consumer, as price of mango falls the purchasing power of that given money income rises. In other words, as price of mango falls, given money income of the consumer, his real income rises. Thus, he can buy more of the mangoes with the same money income and consequently, there is tendency for the demand for mangoes to rise.

This rise in real income with the fall in price of the commodity is called the **'income effect'**. The rise in money income has the same impact on the quantity demanded of a commodity as the rise in real income. Such a commodity whose quantity demanded rises with the rise in money or real income is called a 'normal commodity'. The income effect in such a case is called **positive income effect**. It is positive because there is a direct relationship between the income and the quantity demanded. In a case when rise in money or real income leads to a fall in the quantity demanded of a commodity, we have a case of **negative income effect**. The negative income effect operates in the case of an **'inferior commodity'**. An unbranded cardigan is an inferior commodity in comparison to a branded cardigan.

3)   Price Effect

Price Effect is the sum total of the substitution effect and income effect, i.e.

$$PE = SE + IE$$

Where PE = Price Effect

$$SE = \text{Substitution Effect}$$

$$IE = \text{Income Effect}$$

Substitution effect and income effect are combined together to get what is called **'price effect'** which relates the quantity demanded of a commodity to the price of the commodity. It is important to note that substitution effect and

income effect do not operate in a sequence, when the price of a commodity changes. In fact, **both substitution and income effects operate simultaneously** with the change in the price of the commodity. **'Substitution effect',** and **'income effect'** taken together give 'price effect.' We can identify three cases.

1) Substitution effect always operates in a manner such that as price falls, quantity demanded of this commodity increases. If along with substitution effect, we take income effect and if that happens to be positive (a case of normal commodity) the law of demand will necessarily apply.

2) Given substitution effect, if income effect is negative (a case of an 'inferior commodity') the law of demand can still apply provided the substitution effect outweighs or is more powerful than the negative income effect, and

3) Given substitution effect, if income effect is negative (a case of an 'inferior commodity') the law of demand will not apply provided negative income effect outweighs or is more powerful than the substitution effect.

Each of these concepts have been explained in great details in Unit 5 and 6.

GIFFEN GOOD

A case where negative income effect outweighs substitution effect is possible when we have 'Giffen good' named after the Robert Giffen who first talked of such paradox. In case of a Giffen Good the fall in price of a commodity need not lead to an increase in the quantity demanded of the commodity. On the contrary, a fall in the price of a Giffen good may result in a fall in demand for this good.

2.5 CHANGE IN QUANTITY DEMANDED AND CHANGE IN DEMAND

Whenever the demand for a commodity changes because of the change in the price of the commodity, it is called 'change in quantity demanded'. On the other hand, when the demand of the commodity changes because of change in factors other than the price of the commodity it is called 'change in demand'.

Expansion and Contraction in Demand

The change in quantity demanded of a commodity may take the form of expansion or contraction in demand. Expansion in demand takes place when with a fall in the price of a commodity, quantity demanded rises. Conversely, with a rise in the price of a commodity, its quantity demanded falls.

Expansion and contraction in demand can be represented in the form of a movement on a demand curve, as shown in Fig. 2.7.
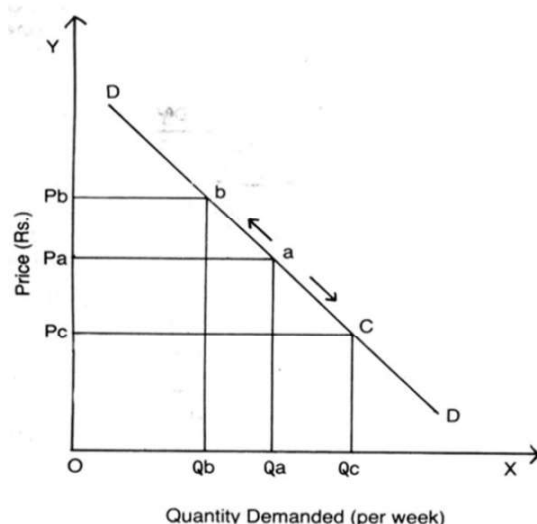
Fig. 2.7

On X-axis quantity demanded of a commodity is measured and on Y-axis price of the commodity is measured in rupees. DD is the demand curve. At point 'a' on the demand curve we find that at price OP_a, OQ_a of a commodity is demanded. As price falls to OP_c, demand becomes OQ_c. This movement from point a to point c on the demand curve DD is referred to as 'extension in demand'. It is also indicated by the arrow from a to c. Similarly when price of a commodity rises to OP_b, demand falls to OQ_b. Thus the movement from a to b on the demand curve DD is known as 'contraction in demand'.

Change in Demand

Change in demand takes place when the whole demand condition undergoes a change. This change occurs due to a change in any determinant of demand, except the price of that commodity.

Change in demand may take two forms:

(i) Increase in demand, and (ii) Decrease in demand

Increase in demand takes place when;

a)   at a given price, higher quantity is demanded, or

b)   at a higher price, the same quantity is demanded

Decrease in demand takes place when:

a)   at a given price, lower quantity is demanded, or

b)   at a lower price, the same quantity is demanded

Graphically, increase in demand results in rightward shift of the whole demand curve. Likewise, decrease in demand results in leftward shift of the demand curve. This is shown in the Fig. 2.8
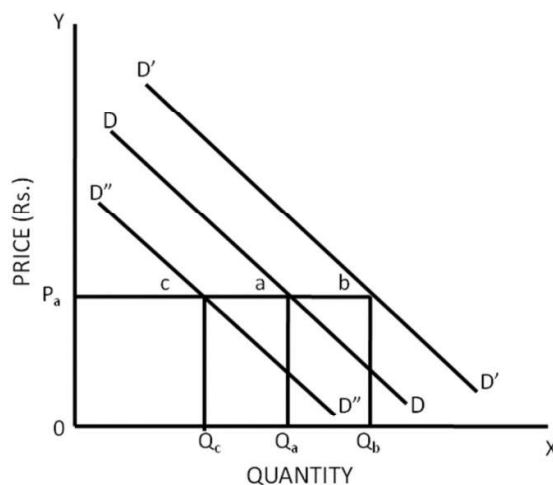
Fig. 2.8

As usual, quantity demanded of a commodity is measured on X-axis. On Y-axis price of a commodity is measured in rupees. At price Pa, on the demand curve DD at point 'a', quantity demanded is OQa and at the same price OPa 'quantity demanded rises to OQb at point c on the demand curve D'D'. This rise in demand is called 'increase in demand'. Similarly, at price OPa the quantity demanded comes down to OQc on point b of demand curve D"D". This change in quantity demanded form OQa to OQc is 'decrease in demand'. The shift of the demand curve to the right of the initial demand curve is called 'increase in quantity demanded' and a movement of the demand curve to the left of the initial demand curve is called 'decrease in demand'.

There can be a number of factors responsible for the shift of the demand curve. Some of the factors are given below:

1) Increase in quantity demanded or shift in the demand curve to the right can be because of increase in money income of the consumer. An increase in money income of the consumer enables him to demand more of a commodity at a given price. Similarly, decrease in quantity or shift in the demand curve to the left can be because of decrease in money income of the consumer.

2) A rightward shift in the demand curve can also take place because of increase in price of a substitute or decrease in price of a complement good. Similarly, a leftward shift in the demand curve can be because of decrease in price of a substitute or increase in price of a complement good.

3) If the consumer has developed a taste for a commodity, he can start demanding more of that commodity even if the price remains unchanged. Thus, a rightward shift in the demand curve can be caused by the fact that the consumer has developed a taste for the commodity in question. Similarly, a leftward shift in the demand curve can be the result of the fact that the consumer has started disliking the commodity. It may be remembered that we have been considering movements of only the demand curve of an individual consumer. The market demand curve and its movements are not been discussed here.

Check Your Progress 2

1) Given the demand function

    q = 90 – 3P

    i) at what price, no one will be will be willing to buy any commodity

    ....

    ii) what will be the quantity demanded, if the commodity is given free.

    ....

2) State whether the following statements are True or False:

    i) The law of demand states that there is an inverse relationship between the price of a commodity and its quantity demanded.

    ii) The demand curve is always straight line sloping downwards from left to right.

    iii) If substitution effect outweighs positive income effect, the law of demand does not operate.

    iv) Substitution effect + Price effect = Income effect.

    v) If the price of a substitute falls, the quantity demanded of a commodity falls.

    vi) Change in taste leads to a movement along the demand curve.

    vii) If increase in consumer's surplus is less than the amount of subsidy given by the government, subsidy needs to be given to an industry.

    viii) If quantity produced is more than the quantity demanded at a particular price, the government should reduce the price of the commodity.

2.6   CONCEPT OF ELASTICITY OF DEMAND

The elasticity of demand is the responsiveness of a dependent variable (demand) to a given change in an independent variable (price of a commodity, income of the consumer or prices of a commodity other than the commodity in question). An elasticity measures the sensitivity of one variable to another. Elasticity is therefore worked out in terms of a percentage or proportionate change in the dependent variable to a given percentage or proportionate change in the independent variable.

Corresponding to the three important determinants of demand we can talk about three important concepts of elasticity of demand. They are (i) Price elasticity of demand, (ii) Income elasticity of demand, and (iii) Cross elasticity of demand.

2.6.1 Price Elasticity of Demand

Price elasticity of demand is a measure of responsiveness of quantity demanded of a commodity to a change in the price of the commodity. This can be measured as the proportional (or percentage change) change in quantity demanded of a commodity divided by the proportional or percentage change in the price of the commodity. The result is called the price elasticity coefficient of demand. It can be estimated as follows:

Let price elasticity coefficient be represented by E_p where P stands for price and E for elasticity of demand. Then

$$E_p = \frac{\text{Proportional change in quantity demanded of a commodity}}{\text{Proportional change in price of the commodity}}$$

Symbols can be used to express proportional changes. Let the difference between the new quantity demanded and the old quantity demanded be represented by ΔQ and the original demand be represented by Q, then proportional change in quantity demanded of commodity is $\frac{\Delta Q}{Q}$. Similarly let us represent the difference between the new price and the old price by ΔP and the original price be represented by P, then the proportional change in price is $\frac{\Delta P}{P}$.

If proportional change in quantity demanded of a commodity is divided by proportional change in price, then price elasticity of demand E_p is:

$$E_p = \frac{\Delta Q}{Q} \div \frac{\Delta P}{P}$$

The above expression can also be represented as:

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

Since the price of a commodity and its quantity demanded are inversely related, minus sign will appear either in the denominator or in the numerator. Therefore, in the final form, price elasticity of demand (E_p) would always be negative:

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

Interpretation of price elasticity coefficient

The value of E_p may vary from Zero ($E_p = 0$) to infinity ($E_P = \infty$). For sake of convenience we can classify these in following five groups.

1) $E_P = 0$. This happens when the quantify demanded does not change at all with a change in the price of the commodity. This situation is called perfectly inelastic demand. Graphically it can be represented in the form of a vertical straight line demand curve as shown in Fig. 2.9. This would be seen that the quantity demanded of commodity remains unchanged at OQ, irrespective of the change in the price of the commodity.
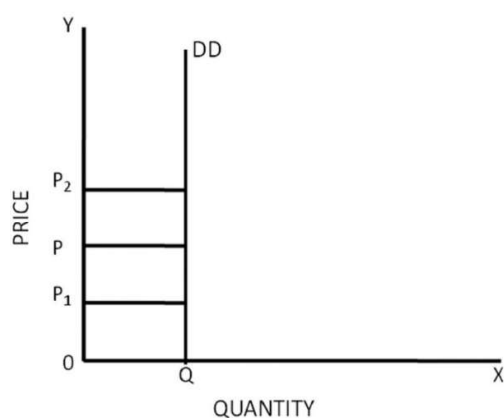
Fig. 2.9

2) E_p greater than zero but less than one – ($E_p > 0 < 1$). This value is obtained when the percentage change in quantity demanded is less than the percentage change in price. For example, a 10 per cent fall in price may induce 8 per cent rise in quantity demanded. This type of demand is known as less than unit elastic.

3) E_p equal to one ($E_p = 1$). This value is obtained when the percentage change in quantity demanded equals the percentage change in price. A 10 per cent fall in price induces a 10 per cent increase in quantity demanded. This type of demand is said to be equal to unit elastic.

4) E_p more than one ($E_p > 1$). This type of elasticity of demand is obtained when the percentage change in quantity demanded is more than the percentage change in the price of a commodity. For example, a 10 per cent reduction in the price of quality chocolate may result in a 30 per cent increase in the quantity demanded of chocolates. In this case, $E_p = \frac{30\%}{10\%} = 3$. This type of demand is called more than unit elastic demand.

5) E_p equal to infinity ($E_p = \infty$). This type of elasticity of demand obtains when a small change in price results in infinite changes in quantity demanded. Alternatively, it can be represented as a situation in which it is not possible to determine the quantity that would be demanded at a given price. This type of demand is also called perfectly elastic demand. Perfectly elastic demand can be represented graphically with the help of a horizontal straight line, as shown in Fig. 2.10.
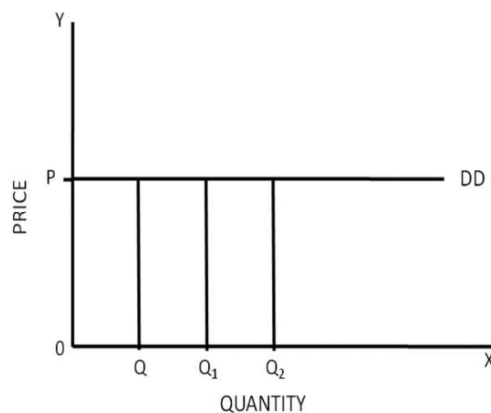

Fig. 2.10

Interpretation of Price elasticity of demand (E_p)

The value of E_p is of significant use, especially in business decision-making. What does $E_p = 1.2$, for example, mean?

The answer is: If the price of a commodity it raised by 1 per cent, quantity demanded of this commodity will fall by 1.2 per cent. Similarly, if the price of a commodity is reduced by 10 per cent, the quantity demanded of this commodity may increase by 12 per cent.

2.6.2 Income Elasticity of Demand

Income elasticity of demand refers to percentage change in the quantity demanded resulting from percentage increase in income. In other words income elasticity of demand is the responsiveness of quantity demanded of a commodity to a change in income of the consumer. It can be measured as the proportional (or percentage) change in quantity demanded of a commodity divided by the proportional change in income of the consumer. The resultant coefficient is called the income elasticity coefficient. Let us use symbols to represent income elasticity of demand (E_i) where i stands for income and E for elasticity of demand. Thus, E_i is:

$$E_i = \frac{\text{Proportinal change in Quantity Demanded}}{\text{Proportional change in income}} = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta Y}{Y}}$$

$$= \frac{\Delta Q}{Q} \times \frac{Y}{\Delta Y}$$

$$= \frac{\Delta Q}{\Delta Y} \times \frac{Y}{Q}$$

Where ΔY is the change in income of the consumer, Y is the original income, ΔQ is the change in quantity demanded of a commodity and Q is the original demand.

Income elasticity coefficient may have a positive value (>0) or a negative value (<0). The plus and minus sign alongwith E_i assume great significance. If we are told that:

i) $E_i = +1.8$, we can assume that the commodity in question is a normal good.

ii) $E_i = -1.8$, we can assume that the commodity in question is an inferior good.

iii) $E_i = 0$, we can assume that there is no relationship between the income of the consumer and the quantity demanded of the commodity (.. Bare necessities of life).

2.6.3 Price Cross-Elasticity of Demand

Price cross-elasticity of demand refers to percentage change in the quantity demanded of one good resulting from some per cent increase in the price of another. In other words, the cross-elasticity of demand is the responsiveness of quantity demanded of the given commodity to a change in the price of a related good (it may be a substitute or a complementary good). It can be measured as proportional or percentage change in the quantity demanded of a commodity

say X divided by the proportional or percentage change in the price of related commodity say Y. Let us use symbol $(E_{Q_x P_y})$ to represent price cross-elasticity of demand. Thus, $E_{Q_x P_y}$ is:

$$E_{Q_x P_y} = \frac{\text{Proportional change in quantity demanded of the commodity X}}{\text{Proportional change in price of commodity Y}}$$

Cross-elasticity of demand can be illustrated with the help of a numerical example. Look at Illustration 3 for the calculation of cross-elasticity of demand.

Illustration 3	Price of Tea in Rs.	Quantity Demanded of Coffee (in Grams)
	20	200
	19	150

The given price of tea is Rs. 20 per 100 grams, suppose further that its price falls to Rs. 19; quantity demanded of tea may rise from 500 grams to 600 grams a week. Now coffee is a substitute, of tea. If price of coffee remains unchanged, quantity demanded of coffee may fall from 200 grams to 150 grams. It has happened because quantity demanded of tea has increased. We can easily realise that the fall in the price of tea from Rs. 20 to Rs. 19 has reduced the quantity demanded of coffee from 200 grams to 150 grams.

The change in quantity demanded of coffee is $150 - 200 = -50$; the change in price of tea is $19 - 20 = -1$, original quantity demanded of coffee is 200 grams and the original price of tea is Rs. 20. Thus, price cross-elasticity of demand is:

$$E_{Q_x P_y} = \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_X}$$

where X is coffee and Y is tea. Thus

$$E_{Q_x P_y} = \frac{-50}{-1} \times \frac{20}{200} = 5$$

It is worth noting that in the given case, the co-efficient of cross-elasticity of demand is positive or there is a positive relationship between the price of tea and quantity demanded of coffee. Whenever the co-efficient of cross-elasticity of demand is positive, it is a case of what is called substitutes; in the above case, tea and coffee are substitute commodities.

Let us now consider the case of complements. Petrol is a complementary good for motorbikes. Price cross-elasticity of demand for petrol in response to change in price of motorbike can be estimated as follows:

Illustration 4	Price of Motorbike in Rs.	Quantity Demanded of Petrol in Litres
	80,000	5,000
	75,000	5,500

The change in quantity demanded of petrol is $5,500 - 5,000 = 500$ litres. The change in price of motorbike is Rs. $75,000 - $ Rs. $80,000 = $ Rs.$(-)5,000$, the original quantity demanded of petrol is 5,000 litres, original price of motorbike is Rs. 80,000. Thus, cross-elasticity of demand $(E_{Q_x P_y})$ is:

$$E_{Q_x P_y} = \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_X}$$

Where X is petrol and Y is motorbike

$$E_{Q_x P_y} = \frac{500}{5000} \times \frac{80000}{-5000} = -1.6$$

In this case the cross-elasticity co-efficient is negative or there is an inverse relationship between the price of motorbike and quantity demanded of petrol. Whenever the co-efficient of cross-elasticity of demand is negative, it is a case of complements. In the above case, car and petrol are complementary commodities.

In short:

i)   If cross elasticity coefficient between two commodities is positive, the two commodities are substitutes (as Pepsi and Coke, or Samsung and Apple Tablets), and

ii)   If cross elasticity coefficient between two commodities is negative, the two commodities are complementary goods (as motorbike and petrol, cell phone and sim card, heir die and shampoo, etc.)

2.7   MEASUREMENT OF PRICE ELASTICITY OF DEMAND

There are a number of methods to measure price elasticity of demand. Some of the important methods are as follows:

1)   **Point Method:** Also known as the percentage method (as discussed above), the main point to remember about this method is that it is employed only when the changes in price and quantity demanded are very small.

2)   **Total Expenditure Method:** The outlay method to measure price elasticity of demand is used whenever the changes in price and demand are not small. Another point to remember about the outlay method is that it cannot help us to find out the co-efficient of price elasticity of demand. It only helps us to distinguish three situations (i) whether the price elasticity of demand is one or unity, (ii) whether the price elasticity of demand is more than one or more than unity and (iii) whether the price elasticity of demand is less than one or less than unity. This method can be explained with the help of numerical example. Study Illustration 1, 2 and 3 for this purpose.

Illustration 1

Price in Rs.	Quantity Demanded of a Commodity (Units)	Outlay in Rs.
5	20	$5 \times 20 = 100$
4	25	$4 \times 25 = 100$

Illustration 2

Price in Rs.	Quantity Demanded of a Commodity (Units)	Outlay in Rs.
5	20	5 × 20 = 100
4	22	4 × 22 = 88

Illustration 3

Price in Rs.	Quantity Demanded of a Commodity (Units)	Outlay in Rs.
5	20	5 × 20 = 100
4	30	4 × 30 = 120

In the above illustrations, we can see that as price of a commodity falls, the quantity demanded of the commodity rises.

In illustration (1) with fall in price of the commodity from Rs. 5 to Rs. 4, the total money spent on the commodity or outlay remains at Rs. 100. It is a situation of what is called unit price elasticity of demand.

In illustration 2, with fall in price of the commodity from Rs. 5 to Rs. 4 the total money spent on commodity or outlay falls from Rs. 100 to Rs. 88. It is a situation of less than unit price elasticity of demand.

Finally, in illustration 3 with the fall in price of the commodity from Rs. 5 to Rs. 4, the total money spent on the commodity or outlay rises from Rs. 100 to Rs. 120. It is a case in which price elasticity of demand is more than unit.

3) **Geometrical Method:** According to this method, elasticity of demand is different at different points on a given demand curve, and is measured as follows on any point of a straight line curve.

$$E_p = \frac{\text{Lower segment of the demand curve}}{\text{Upper segment of the demand curve}}$$

In Fig. 2.11 E_p at point K = KB/AK
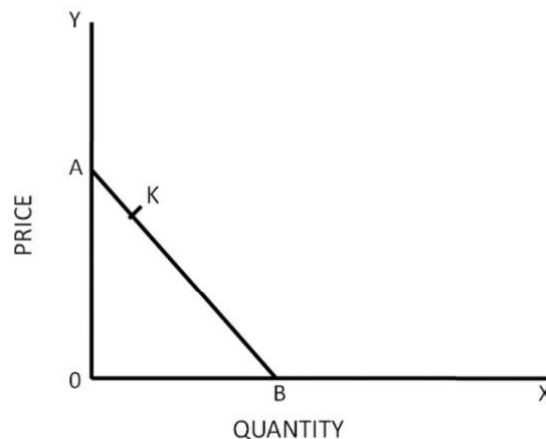
Fig. 2.11

And since KB > KA, the result will be more than 1. We will say E_p at Point K is more than unit elastic. We can use the same method to estimate price elasticity at different points, as shown in Fig. 2.12.

We have marked E at a few selected points in Fig. 2.12. E at the mid-point of a linear demand curve would be equal to unit; it would be zero where the demand curve touches the X-axis, and infinite where the demand curve touches the Y-axis. On any point between A to C, $E_p > 1$; on any point between B and C, $E_p < 1$.
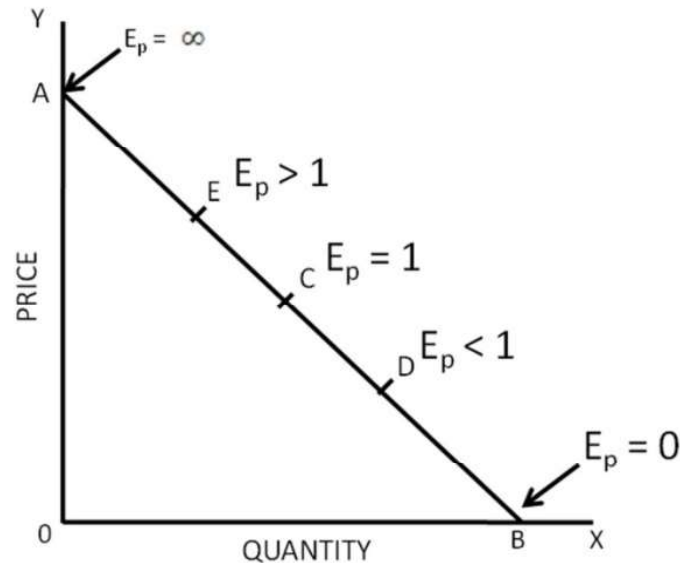
Fig. 2.12

A Case of Unit Price Elastic Demand Curve

Using the outlay method discussed above, we can analyse the case of unitary price elastic demand curve. Look at Fig. 2.13.

On X-axis quantity demanded of the commodity is measured and at the Y-axis it is the price of the commodity which is measured. DD is the demand curve. At point a on the demand curve at OP_0 price OQ_0 quantity is demanded. The total money spent on the commodity or outlay is $OP_0 \times OQ_0$ which is geometrically equal to the area of the rectangle which has sides equal to OP_0 and OQ_0. This area is given by $OQ_0 aP_0$. Now, if price of the commodity falls to OP_1 at which quantity demanded is OQ_1, which is given by point b on the demand curve, then outlay is given by $OQ_1 bP_1$. If the outlay at a which is $OQ_0 aP_0$ is equal to outlay at b which is $OQ_1 bP_1$ then price elasticity of demand at point a and b is unit elastic. If all such rectangles are constructed whose area is equal to each other, then the curve drawn joining all such points give us a demand curve which has the same price elasticity of demand throughout the curve. Such a curve is known as a demand curve which has unitary price elasticity of demand. Such a demand curve is also referred to as 'Rectangular Hyberbola'.
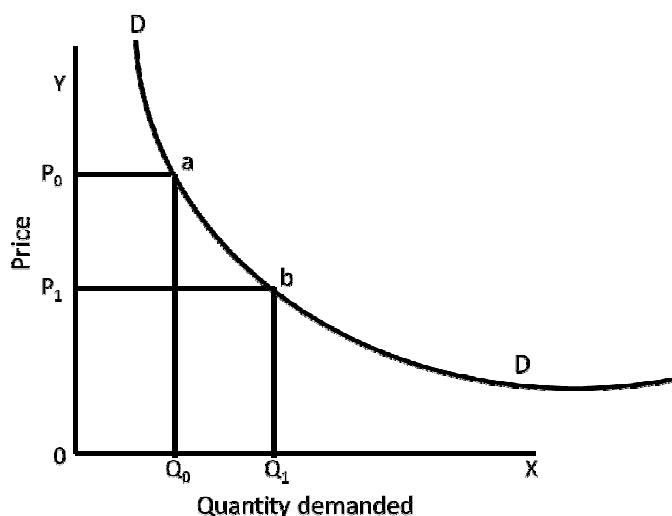
Fig. 2.13: Unit Price Elasticity of Demand

2.8 DETERMINANTS OF PRICE ELASTICITY OF DEMAND

There are a number of factors on which the price elasticity of commodity depends. Some of the important factors affecting price elasticity of demand are discussed below:

1) **Nature of the Commodity:** The commodities are normally divided into three categories (i) necessities, (ii) comforts, and (iii) luxuries. If the commodity happens to be a necessity, price elasticity of demand will be less. Take the case of wheat. Even if the price of wheat rises people will not be able to reduce much the quantity demanded of wheat and therefore, the demand for wheat is relatively less elastic. In the case of comforts, the change in price makes the consumer change the quantity demanded relatively more and so it is more elastic. As regards luxuries, since they are purchased by people who have higher income the demand does not change much with change in price and thus tend to be less price elastic.

2) **Number of Substitutes:** Commodities with few and poor substitutes – wheat and salt, for example, will always tend to have low price elasticity of demand. Commodities with many substitutes – wool, for which cotton and synthetics can be substituted for example, will have relatively high price elasticity of demand.

3) **Number of uses of a commodity:** The greater the number of possible uses of a commodity, the greater its price elasticity of demand will be. Thus a commodity, such as coal – which can be used in producing power generation, domestic purposes and industrial purposes – will have higher price elasticity of demand than a commodity with only one or a very few uses – butter, for instance.

4) **Price level of a commodity:** The level of price will also have an impact on price elasticity of demand. A commodity like a box of matches which has a very low price will have less price elasticity of demand. A commodity like car which has a very high price will also tend to have less price elasticity of demand since it is demanded by persons who have very

high incomes. A medium price commodity like exhaust fan will have relatively more price elasticity of demand. (This idea becomes clear when you revisit Fig. 2.12 at higher price, elasticity is higher)

There can be so many other factors which can also be incorporated in the list. The most important point to remember is that the factors affecting price elasticity of demand are to be taken together before judging the price elasticity of demand of a commodity.

Tabulation of the Different Factors that Affect Elasticity of Demand

S.No.	Tend Towards Elasticity	Tend Towards Inelasticity
1	Long period	Short Period
2	Availability of substitutes	Lack of substitutes
3	Luxuries, comforts	Necessitites
4	Large proportion of expenditure	Small proportion of expenditure
5	Perishable goods	Durable goods
6	Multi-purpose goods	Single-use goods
7	Substitute goods	Complementary goods
8	Low income	High income
9	Normal price range	Extremely high or low price
10	Normality	Habit
11	Urgent want	Postponable want
12	Recurring Demand	Non-recurring demand

2.9 IMPORTANCE OF PRICE ELASTICITY OF DEMAND

The price elasticity of demand is very important in a number of policy decisions. It is especially useful for government policies relating to individual commodity markets. Some of the important fields where price elasticity of demand is important are listed below:

1) **Price fixation by a monopolist:** The monopolist is always interested in charging a higher price from the consumer. If he comes to know that the price elasticity of demand of a commodity is low, he would fix up a higher price for the commodity. He would not be able to charge a very high price for a commodity whose price elasticity of demand is relatively higher.

2) **Price support programme of the government:** Normally, the price elasticity of demand of agricultural commodities like wheat, rice etc, is relatively less. This implies that a given increase in supply say because of better monsoon will lead to a relatively more fall in price. This would reduce the income of the farmer. The government in order to protect the interest of the farmers can announce what is called price support programme such that the price of the commodity will not be allowed to fall below a particular level. Obviously, this would lead to a situation

where the quantity supplied will be more than the quantity demanded of a commodity at the price announced by the government.

Therefore, the government has to be prepared to procure the excess supply of the commodity from the farmers. Similarly, if for some reasons the quantity supplied of a commodity falls which has low price elasticity of demand, the price will tend to be higher and the consumer will be forced to pay relatively higher price. In order to protect the interest of the consumer, the government can announce what is called 'ceiling price' which is a price beyond which the farmer will not be allowed to charge. Whenever the government fixes a price less than what would have prevailed in the market otherwise, the quantity demanded of the commodity will be more than the quantity supplied at the price fixed by the government. The government in order to meet the excess demand of the commodity will either have to release stocks from its godowns or will have to import the commodity from other countries.

3) **Incidence of indirect taxes:** A government imposes indirect taxes on the commodities. Whenever an indirect tax is imposed, the burden of this tax is borne partly by the consumer and partly by the producer himself. The share of burden of an indirect tax borne by the consumer and the producer depends upon the elasticity of demand. Take for example, a situation where the demand curve is perfectly inelastic, irrespective of the shape of the supply curve, the whole burden of the indirect tax will be borne by the consumer. On the other hand, if the demand curve is perfectly elastic the whole burden of the indirect tax will be borne by the producer or the supplier. The situations between two will be decided by the ratio of price elasticity of supply to price elasticity of demand.

Check Your Progress 3

1) State whether the following statements are True or False:

   i) The income elasticity of demand is always positive.

   ii) The co-efficient of cross-elasticity of demand is always negative.

   iii) When price elasticity of demand is determined, income of the consumer is assumed to be changing.

   iv) In the case of complementary commodities the co-efficient of price cross-elasticity of demand is positive.

   v) In the case of 'inferior commodities' the co-efficient of price elasticity of demand is positive.

   vi) In the case of 'normal commodities' the co-efficient of price elasticity of demand is positive.

   vii) When income elasticity of demand is found out, price of the commodities is also allowed to change.

2.10   LET US SUM UP

The demand refers to the wish on the part of the consumer to buy a commodity in the market at a given price backed by the sufficient purchasing power. The price of the commodity in question, prices of other related commodities,

income and taste of the consumers determine the demand for consumer. Demand function refers to the rule that shows how quantity demanded depends upon these determinants. The demand curve states the relationship between the quantity of a good that consumers are willing to buy and the price of the good. Law of demand states inverse relationship between the price of a commodity and its quantity demanded. If the demand for a commodity changes due to change in the price of the commodity, it is termed as 'change in quantity demanded'. Change in the quantity demanded because of change in other factors (other than its own price), it is called 'change in demand'.

Elasticity of demand is the responsiveness of quantity demanded to given changes in price, income or prices of other related goods. It can be of three types- price elasticity of demand, Income elasticity of demand, and cross elasticity of demand. Elasticity of demand can be measured by way of point method, outlay method or geometrical method. Nature of the commodity, number of substitutes, number of uses of a commodity, price level of commodity are among important determinants of price elasticity of demand. Elasticity of demand play an important role in price fixation by a monopolist, price support programme of the government and in determination of incidence of indirect tax.

2.11 REFERENCES

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2.12 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) See Section 2.2

2) See Sub-section 2.3.1

3) Size of the population, Income distribution.

4) (c)

Inferior Good

5) (i) Demand for rail travel will decrease (as shown in Fig. 2.2 (a)).

   (ii) Demand for air travel will expand (as shown in Fig. 2.2 (b)).

Check Your Progress 2

1) (i) Rs. 30

   (ii) q = 90

2) i) True   ii) False   iii) False   iv)False   v) True
   vi) False   vii) False   viii) True

Check Your Progress 3

1) i) False   ii) False   iii) True   iv) False   v) False
   vi) True   vii) False

2.13 TERMINAL QUESTIONS

1) Explain the main determinants of demand for a commodity in the market.

2) Explain the law of demand with the help of a demand schedule and a demand curve.

3) Distinguish between substitution and income effects of a price rise.

4) Explain the exceptions to the law of demand using the distinction between substitution and income effects.

5) Distinguish between an inferior good (commodity) and a Giffen good.

6) What uses can be made by the government of the law of demand in deciding about the price policy and tax cum subsidy policy.

UNIT 3   SUPPLY AND ELASTICITY OF SUPPLY

Structure

3.0   OBJECTIVES

After studying this unit, you should be able to:

- explain the meaning of the term supply of a commodity;

- list the determinants of supply of a commodity;

- describe the concepts of supply function;

- state the concepts of supply schedule and supply curve;

- distinguish between change in supply and quantity supplied;

- explain the concept of elasticity of supply; and

- distinguish between different types of supply curves based on elasticity of supply.

3.1   INTRODUCTION

Demand-supply analysis is a fundamental and powerful tool to understand and predict how changing economic conditions affect market price and production. This tool also enables us to evaluate the impact of government price control, minimum wages, price supports and production incentives. The demand and supply curves are used to describe the market mechanism. In Unit 2, we discussed the concept of demand and its determinants, demand curve, elasticity of demand, its various types and importance.

In this unit we shall talk about the law of supply, supply function, supply schedule and supply curve. We will also get acquainted with the various determinants of supply of a commodity and the concept of elasticity of supply and its determinants.

3.2   THE CONCEPT OF SUPPLY

Supply refers to the quantity of a commodity that producers are willing to produce and sell at different prices per unit of time. The word 'supply' has the following features:

1)   The supply of a commodity is stated in quantitative terms as the offered quantities.

2)   The supply of a commodity is always with reference to the price at which that quantity is supplied. For example, to say that producers of blankets are supplying one thousand blankets does not carry any economic meaning. At the same time, if it is stated that producers supply one thousand blankets at a price of Rs. 500 per blanket, "supply" will start conveying economic meaning.

3)   The supply is always measured as a flow or expressed with reference to a unit of time which may be a day, a week, a fortnight, a month, or a year or any other period of time.

Let us take an example. Consider the statement: "Producers supplied 1,000 blankets at a rate of Rs. 500 per blanket during January 2017." This statement mentions the quantity supplied, the price per unit at which the quantity is supplied and also the period during which the quantity is supplied. So, it is a complete statement about the supply of a commodity.

Formally, supply of a commodity refers to the quantity that a producer is willing to sell at different prices.

It will be better to have a look at distinctions between the 'stock' and the supply:

Differences between Concept of 'Stock' and 'Supply'

Stock	Supply
It implies the volume of a commodity which can be brought into the market for sale at short notice (i.e. 'Stock' is a potential supply).	It implies the quantity of a commodity which is actually brought into the market for sale.

The stock or inventories of a commodity include: Unsold quantity from the previous period, Excess of present production of the commodity over its present sale.	Market sale of the commodity is only a part of the total stock.
The stock of a commodity depends mainly upon: The production of the commodity The procurement and price of the commodity The storage and transport costs, etc.	The supply of a commodity depends mainly upon the market price of that commodity.
The concept of 'stock' has time dimension in a different sense (i.e. we do not say: stock of any commodity per week or month, etc.) We show the stocks at a date or moment of time.	The concept of 'supply' has a time dimension, (i.e. we usually say, the supply of a commodity per day, per week, per month, etc.)
In the case of highly perishable commodities, the 'stock' and 'supply' would almost be the same (since these items cannot be stored for a long period)	In the case of durable commodities, supply consists of only a part of the total stock.
The stock or inventories enable a firm to meet (temporary) an unexpected rise in market demand for the product or a sudden fall in its production.	The supply or the actual market sale enables the firm to earn sales revenue.
The stock of any commodity helps in checking severe fluctuations of market price (say, a steep fall in the price of potatoes during bumper crop, or a steep rise in its price during crop-failure)	The changes in quantity supplied during any particular period, however, depend on the fluctuations in the market price of that commodity.

Determinants of Supply

There are a number of factors which influence the supply of a commodity. Some of the important factors influencing supply or quantity supplied of a commodity can be identified as follows:

1) **Price of the commodity supplied:** The price of a commodity is determined by the forces of demand and supply. Any change in the price of a commodity exerts an influence on the supply of that commodity. Generally speaking, the higher the price of a commodity, the more profitable will it be to produce or supply that commodity, other things

remaining unchanged. The direct relationship between price and supply of a commodity is also referred to as the 'Law of Supply'.

2) **The prices of factors of production or cost of production:** A rise in the prices of factors of production raises its cost of production which, in turn, lowers profits, assuming that receipts from sales remain unchanged. A rise in cost of production of a commodity discourages the production or supply of that commodity. Similarly, a fall in cost of production of a commodity encourages its production or supply.

A change in the price of one factor of production will cause changes in the relative profitability of producing different commodities. This will cause producers to shift from the production of one commodity to another, and thus cause changes in the supplies of different commodities. For example, a fall in the price of land will have a larger effect on cost of production of an agricultural product and only a very small effect on the cost of producing, say televisions.

3) **Prices of other goods:** Other things remaining unchanged, the supply and production of a commodity will fall as the prices of other commodities rise and vice versa. This happens because normally a producer chooses that commodity for production which earns him the highest profit.

4) **The state of technology:** The state of knowledge changes over time and along with that the methods employed to produce a commodity also undergo a change. The increase in the knowledge about the means of production and the methods of production lead to lower costs of production of goods already being produced and to a large variety of new products.

5) **Goals of the producer:** The objective with which the producer undertakes production also influences the supply of the commodity. The goal of the producer may be to maximise total profits or to maximise sales or to capture the market in the long ran.

6) **Other factors:** There can be many other factors influencing supply. Some of other factors are expected changes in government policy, fear of war, unexpected climatic conditions, expected change in prices, growing inequalities of income influencing the demand of particular types of goods and hence making them more profitable to produce.

It is difficult for us to analyse the effect of a simultaneous change in all the factors which influence the supply of a commodity. Therefore, normally, we think of a situation where one of the factors influencing supply changes, assuming other factors as unchanged, and then work out the effect of a change in that factor on the quantity of the commodity supplied by a producer or a group of producers.

3.3 THE LAW OF SUPPLY

Let us assume that the overall objective of a producer is to maximise profits which is the difference between total revenue and total cost. Total revenue is the price of the product multiplied by the quantity sold. Total cost is the average cost of production multiplied by the quantity produced.

PROFIT = TR–TC (where TR stands for total revenue and tC for total cost)

$$TR = Q.P$$

$$TC = Q.AC$$

A higher price would mean more profits, provided there is no change in other factors influencing the supply. Therefore, a producer will be willing to supply more if he expects to get a higher price for his product. Similarly, a producer will be ready to supply smaller quantity only if he expects to get a lower price for his product. So, we observe a direct relationship between the price and the quantity supplied of a commodity. This direct relationship between price and supply of a product is referred to as the 'Law of Supply'.

> **The law of supply states that as the price of a commodity increases, the quantity supplied, per unit of time, of that commodity also increases and vice versa, assuming all other factors influencing supply remain constant.**

The law holds good only on the assumption that other factors remain constant.

In this direct relationship between the price and the supply of a commodity, the change in supply is caused by the change in price such that change in price is the cause and change in supply is the effect. We can express this relationship in functional form treating supply as dependant variable and price as independent variable.

$$S = f(P)$$

It is important to understand that the statement "Price rise leads to supply rise" is true and the statement that "Supply rise leads to price rise" is false. Price is the independent variable whereas quantity supplied is a dependent variable.

3.3.1 The Supply Function

The supply function is a shorthand expression of the various factors affecting quantity supplied of a commodity. Thus, the supply of a commodity can be put as a function of price of that commodity, the price of all other commodities, the prices of factors of production, technology, the objectives of producers and other factors. This relationship can be expressed with the help of following symbols.

$$q_s = f(P_1, P_2, P_3... P_n, F_1... F_n, T, G, E_i)$$

Where q_s stands for the supply of commodity 1;

P_1 is the price of that commodity, P_2, $P_3...P_n$ are the prices of all other commodities;

F_1 …… F_n are the prices of all factors of production;

T is the state of technology;

G is the goal of the producer;

and E_i Indicates other factors influencing supply.

In the Law of Supply we are only concerned with the relation between q_s and $f(P_1)$, other things remaining constant. In specific terms what we state in the law of supply is that the quantity of a commodity produced and offered for sale will increase as the price of the commodity rises and decreases as the price falls, other things remaining constant.

3.3.2 The Supply Schedule

A supply schedule shows different prices of a commodity and the quantities which a producer is willing to supply, per unit of time, at each price, assuming other factors influencing the supply to be constant. A supply schedule of a product based on imaginary data is given in Table 3.1 illustrating the relationship between price and quantity supplied as given by the law of supply.

Table 3.1: A supply schedule of a pen producer

Price (in Rs) per Pen	Quantity Supplied (in thousand) per Month
2	25
3	40
4	50
5	60
6	70

The schedule presented in Table 3.1 shows that at a price of Rs. 2 per pen the producer is willing to supply 25 thousand pens per month. And at a higher price of Rs. 3 per pen he is willing to supply 40 thousand pens per month. As price of pens keep rising, he is willing to supply more and more quantity of pens per month. This supply schedule has been so drawn as to depict a direct relationship between price per pen and quantity supplied of pens per month.

3.3.3 The Supply Curve

Look at Fig. 3.1 where the data from Table 3.1 has been plotted. Here price is plotted on the Y-axis and quantity supplied on X-axis.
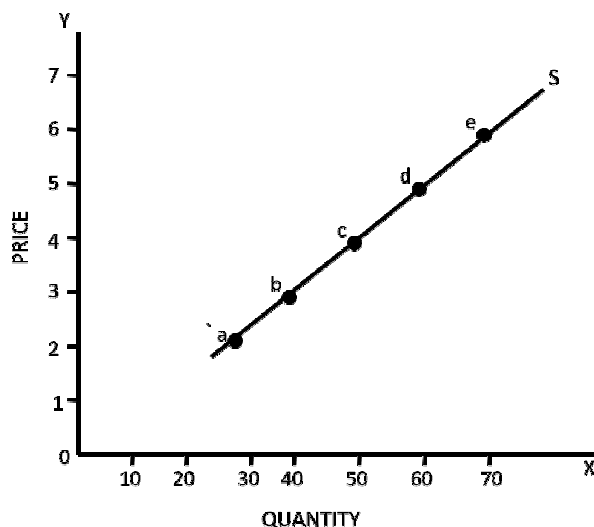

Fig. 3.1: Supply Curve

Fig. 3.1 shows that point labelled a, for example, gives the same information that is given on the first row of the table; when the price of pens is Rs. 2 per pen, 25,000 pens will be produced and offered for sale per month. Similarly, points b, c, d, and e on the graph correspond to row 3rd, 4th, 5th and 6th of Table 3.2 respectively.

The supply curve S is a smooth curve drawn through the five points a, b, c, d and e. This curve shows the quantity of pens that will be produced and offered for sale at each price.

The supply curve (just like a demand curve) can be linear straight line, or in the shape of a upward slopping convex curve.

In short, the supply curve for a product depicts the direct relation between the price of that commodity and the quantity producers wish to produce or sell at that price. This curve is drawn on the assumption that all other factors that influence supply are constant (i.e. they remain unchanged). The upward slope of the supply curve indicates that higher the price, the greater the quantity producers will supply. If the supply curve is extended to the Y-axis, it may or may not pass through O. If it passes through O, it shows that the quantity supplied is zero at zero price; if it does not pass through zero, it shows that unless the price rises upto a point, (indicated by a point not shown in the Fig. 3.1 at which supply curve cuts the Y-axis) quantity supplied will remain zero. Re. 1 can be known as Reserve Price. A producer will not offer any quantity for sale if price is Re. 1 or less. The upward sloping supply curve is just a diagrammatic representation of the law of supply.

3.3.4 Exceptions to the Law of Supply

Generally speaking, the law of supply indicates a direct relation between the price and the quantity supplied. There are some exceptions to the law of supply which are given below:

Non-maximisation of profits: In some cases, the enterprise may not be pursuing the goal of maximisation of profits. In that case, the quantity supplied may increase even when price does not rise. For example, if the firm wants to maximise sales even if price remains unchanged, it may like to increase sales so that total revenue can be increased.

> Sometimes, the firm may be interested to maximise profits in the long run; in the short run it may pursue some other goals.

Similarly, if a firm is controlling a number of companies, it is the profits taken together which may be sought to be maximised so that for different products produced, the law of supply may not apply for each product.

Factors other than price not remaining constant: The law of supply was stated on the assumption that factors other than the price of the commodity remain constant. In reality, we notice that factors other than the price of the product may not remain constant. For example, the quantity supplied of a commodity may fall at a given price if prices of other commodities show a tendency to rise. The change in the state of technology can also bring about a change in the quantity supplied of a commodity even if the price of that commodity does not undergo a change.

Check Your Progress 1

1) Fill in the blanks:

    i)   Producers supply more at a …………… price than at a ……………
          price.

    ii)   A supply curve is …………… sloping.

    iii) A supply curve relates …………… of a commodity to the
          …………… offered for sale during a particular period of time.

    iv)   If price of a commodity …………… the profit from its sale will
          fall, other things remaining unchanged.

    v)   The law of supply states that the price of a commodity and its
          quantity supplied are……………………. related, other things
          remaining unchanged.

2) State whether the following statements are True or False:

    i)   The law of supply states that there exists a relationship between
          supply of a commodity and its price.

    ii)   The law of supply states that there exists direct relationship between
          the price of a commodity and its quantity supplied per unit of time,
          other things remaining constant.

    iii) Supply refers to the quantity of a commodity offered for sale.

    iv)   Supply refers to the quantity of a commodity offered for sale at a
          price during a specific period of time.

    v)   Technological development in a particular field of production is
          likely to increase cost of production.

    vi)   New method of organising an existing productive activity is not a
          technological development.

    vii) The supply is a stock concept.

    viii) Profit maximisation can be the only objective of every firm.

3.4 CHANGES IN SUPPLY VERSUS CHANGES IN QUANTITY SUPPLIED

3.4.1 Changes in Quantity Supplied

Changes in the quantity offered for sale on account of a change in the price of
the commodity only, assuming all other factors to be constant, is termed as
change in quantity supplied. The change in quantity supplied can be of two
types:

1) When the price of a commodity falls and its quantity supplied falls
    provided the law of supply applies, it is termed as 'contraction of supply'.

2) With the rise in the price of a commodity, its quantity supplied rises,
    provided the law of supply applies, it is termed as "extension of supply".

The contraction, and 'extension' of supply has been shown in Fig. 3.2 below.

On X-axis quantity of pens supplied are measured and on Y-axis price per pen is measured. S curve is the required supply curve. Start with point b on the supply curve at which price per pen is Rs. 3 and quantity supplied is 30,000 pens. As price per pen falls to Rs. 2 the quantity supplied falls to 20,000 and when price of pen rises to Rs. 4, the quantity supplied rises to 40,000. The fall in quantity supplied from 30,000 to 20,000 with the fall in price, from Rs. 3 to Rs. 2 is termed as 'contraction in supply'.

On the graph it is the movement from b to a on the supply curve which represents 'contraction of supply'. Similarly, the movement from b to c on the S curve represents 'extension of supply' since it implies that the quantity supplied rises from 30,000 to 40,000 with the rise in price from Rs. 3 to Rs. 4.
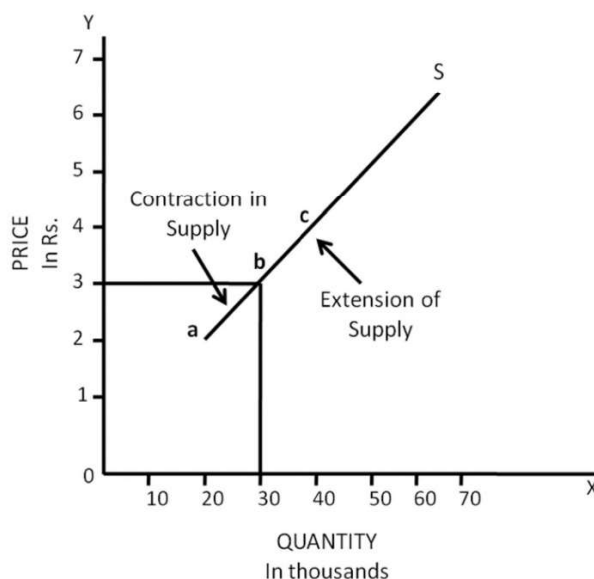
Fig. 3.2 : Supply Curve

3.4.2   Change in Supply

If production of a commodity undergoes a change because of factors other than the price of the commodity, we call this change in supply.

Change in supply can be of two types:

A decrease in supply: When the quantity of a commodity supplied falls, at the same price it is referred to as a 'decrease in supply'. If represented in the form of a curve, it implies a leftward shift of the supply curve.

An increase in supply: When the quantity of a commodity supplied increases, at the same price, it is known as an increase in supply. This amounts to a rightward shift in the supply curve.

In short, a rise in supply implies a rightward shift of the supply curve showing that producers are willing to supply more at each price. A fall in supply, on the other hand, implies a leftward shift of the supply curve indicating that producers are willing to supply less at each price.
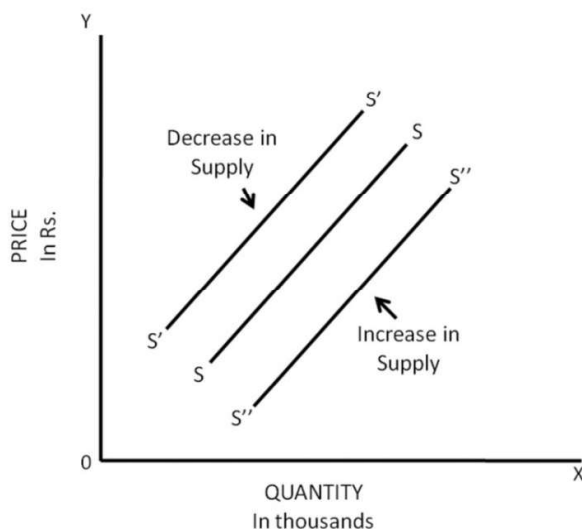
Fig. 3.3 : Shifts in Supply Curve

3.4.3 Why Supply Curve Shifts?

The reasons for 'contraction' and 'extension' of supply have already been explained in section 3.2.

The reasons for the change in supply (both increase and decrease in supply) can be stated as follows:

1) **Change in the prices of other commodities:** A decrease in the prices of other commodities increases the supply of the commodity in question at each price because relative profits from supplying other products fall. An increase in the prices of other commodities decreases the supply of the commodity in question at each price.

2) **Change in the prices of factors of production:** An increase in the prices of factors of production used in producing the commodity tends to reduce the supply of the commodity at each price. Since the cost of production rises at the given price, profits fall. Conversely, a decrease in the price of factors of production used in making a commodity leads to an increase in supply, at each price.

3) **Change in technology:** An improvement in technology normally leads to a fall in cost of production and given the price of the product, a producer tends to produce more of that commodity, at each price. Conversely, loss in technical knowledge (the chances of which are meagre) will lead to a fall in supply, at each price.

4) **Change or expectation of change in other factors:** Sometimes, supply of a commodity may change because of the change in government policies relating to taxes or rate of interest or because of fear of war or because of changing inequalities of income and wealth which influence the demand of particular types of goods and hence making it more or less profitable to produce that commodity. Accordingly, if producers expect more profits because of change in other factors, supply increases at each price. Conversely, if producers expect less profits because of change in other factors, supply decreases at each price.

1) State whether the following statements are True or False:

   i) An 'extension of supply' means that at a given price, more is supplied.

   ii) An 'increase' and 'extension' of supply are one and the same thing.

   iii) The quantity supplied changes because of change in technology.

   iv) The supply increases because of a fall in price of the commodity.

   v) A movement along the supply curve shows the operation of the law of supply.

   vi) A shift in the supply curve leftwards indicates an increase in supply.

   vii) A supply curve shifts because of factors other than the price of a commodity.

2) Distinguish between extension of supply and an increase of supply.

   ....

   ....

   ....

3.5   ELASTICITY OF SUPPLY

The Law of Supply tells us that there is a direct relation between the price of a commodity and its quantity supplied, other things remaining unchanged. Elasticity of supply measures the degree to which the quantity supplied responds to price changes.

3.5.1   Concept and Measurement

Elasticity of supply can be defined as the percentage change in quantity supplied divided by the percentage change in price of the commodity or we can say that Elasticity of Supply (E_s) is :

$$E_s = \frac{\dfrac{\Delta Q_s}{Q_s} \times 100}{\dfrac{\Delta P}{P} \times 100} \qquad \text{or}$$

$$E_s = \frac{\Delta Q_s}{\Delta P} \cdot \frac{P}{Q_s}$$

Where S and P are the original quantity supplied and price respectively and ΔS and ΔP are the change in quantity supplied and change in price.

The method of measurement of the elasticity of supply can be illustrated with the help of an example from Table 3.1. The price of pen rises from Rs. 2 to Rs. 3 and the quantity supplied of pens rises from 25,000 to 40,000. Using the formula to measure elasticity of supply, we can work out the elasticity of supply:

$$E_s = \frac{\Delta Q_s}{\Delta P} \cdot \frac{P}{Q_s}$$

$$= \frac{40,000 - 25,000}{3 - 2} \times \frac{2}{25,000}$$

$$= \frac{15,000 \times 2}{25,000}$$

$$= 1.2$$

It can be interpreted as a situation where the price of pens going up by say one per cent leads to an increase in quantity supplied of pens by 1.2 per cent or we can say that the situation is of elastic supply. If the co-efficient was less than 1, it would mean that we have inelastic supply. $E_s = 1$ is a case of unit elasticity of supply. $E_s = 0$ is a case of perfectly inelastic supply and finally, $E_s = \infty$ is a case of perfectly elastic supply.

3.5.2   Supply Curves with Different Elasticities

Fig. 3.4 shows five cases of elasticity of supply. The case of zero elasticity or perfectly inelastic supply is represented in Fig. 3.4 (i) in which the quantity supplied does not change as price changes. This happens when producers insist on producing a given quantity irrespective of the price prevailing in the market. The case of infinity elasticity or $E_s = \infty$ is illustrated in Fig. 3.4 (ii) where at price P the producers are prepared to supply as much as the market demands and nothing at all is supplied at a price less than OP. A small increase in price to OP leads to supply rising from zero to an infinity.

The Fig. 3.4 (iii) shows supply curve with unit elasticity.

The price rises from P to P_1. As a response quantity supplied is increased from Q to Q_1. We define elasticity as $\frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$. Here, $\Delta Q = QQ_1 = BD$. $\Delta P = PP_1 = AD$. Now, compare right triangles ADB and BQO. Angle ABD = angle BOQ as they are corresponding angles. Therefore, the triangles are similar and their corresponding sides will have same ratios.

Therefore, $E_s = \frac{BD}{AD} \times \frac{BQ}{OQ}$. But $\frac{AD}{BD} = \frac{BQ}{OQ}$.

Using this information we get $E_s = \frac{OQ}{BQ} \times \frac{BQ}{OQ} = 1$ hence, elasticity of supply is unity.

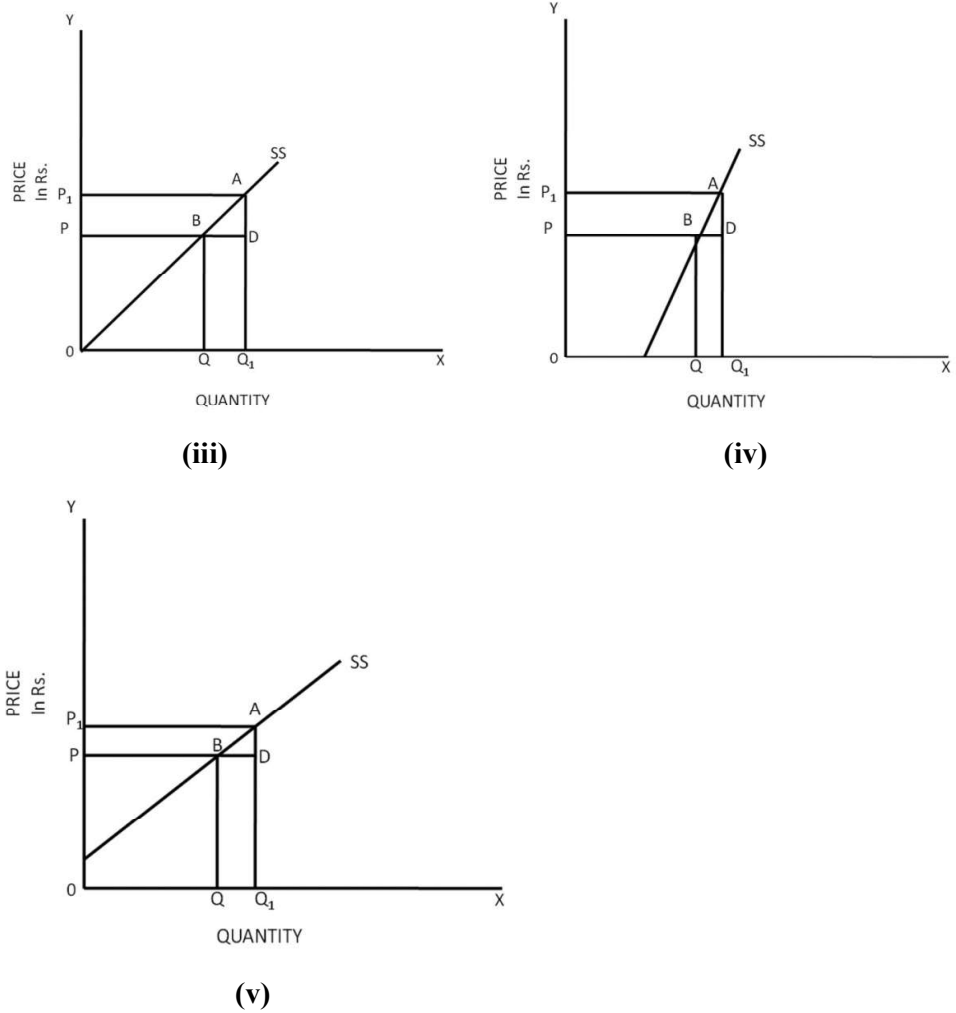|	
(i)	**(ii)**

(iii)

(iv)

(v)
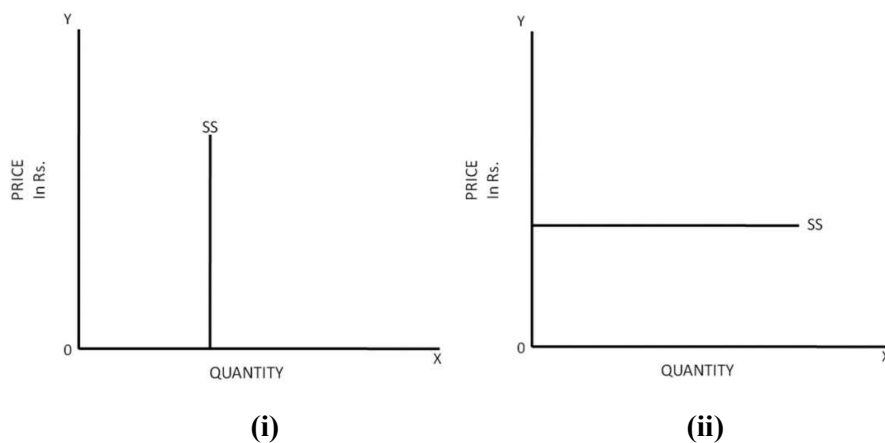
Fig. 3.4 : Supply Curves with Different Elasticities

$E_s = 1$ implies that if the price of a commodity rises by a given per cent, say 5, then the quantity supplied also rises by the same percentage i.e. 5.

Fig. 3.4 (iv) illustrates the case of elasticity of supply as being inelastic or less than unity. At point P, as we move to P_1 quantity changes from Q to Q_1. But change in quantity demanded to original does not bear the same ratio as is between price change and original price. Ratio of AB to BQ is much higher compared to the ratio of change in quantity to the original quantity. Hence, E_s is lesser than unity.

Fig. 3.4 (v) illustrates the case of elasticity of supply as being elastic or more than unity. At point P, here the ratio in change of quantity to original quantity is higher than the ratio of change in price to original price. Therefore, $E_s >$ unity.

PRACTICAL EXERCISES

Practical Exercise 1

Prove that the elasticity of supply on the entire range of a straight line supply curve that originates at the point of origin will be unity.

Solution

The situation is depicted in Fig. 3.5. The curve SS originates from the point O. The elasticity of supply on the entire range of this curve is equal to unity ($E_s = 1$).

Proof

Look at two triangles. One has sides P, Q and the SS curve; the other has sides OP, OB and SS curve BP.
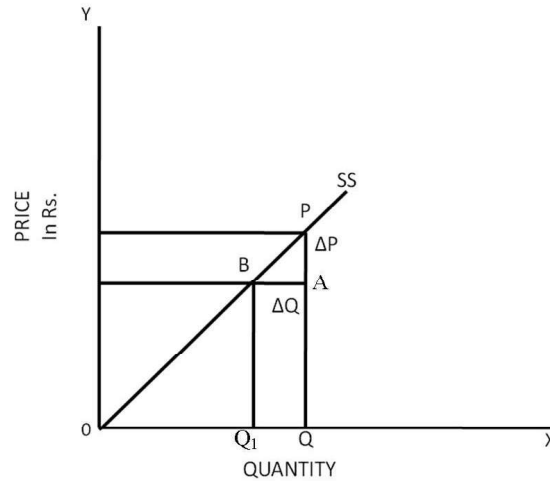
Fig. 3.5

Clearly, they are similar ΔS. It follows that the ratios of their sides are equal,

$$\frac{P}{Q} = AP/AB = \frac{\Delta P}{\Delta Q} \qquad (1)$$

Elasticity of supply is:

$$E_s = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \qquad (2)$$

Substituting $P/Q = \Delta P/\Delta Q$ (since these two are equal) into (1), we get

$$\frac{\Delta Q}{\Delta P} \times \frac{\Delta P}{\Delta Q} = 1 \text{ or unity}$$

Practical Exercise 2

Show that the elasticity of supply of a straight line supply curve cutting Y-axis has greater than unit elasticity.

Solution

In order to prove the above mentioned result we draw a straight line supply curve AB cutting Y-axis at the point A as shown in Fig. 3.6. We extend this AB supply curve to meet X-axis at point R. Take two points L and K on the supply curve which correspond to OP and OP_1 prices respectively.

$$(E_s) = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} = \frac{QQ_1}{PP_1} \times \frac{OP}{OQ}$$

$$= \frac{LZ}{KZ} \times \frac{LQ}{OQ}$$

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Take two right angled triangle KZL and LQR. In these two triangles

$$\angle Q = \angle Z \qquad\qquad \text{(right angles)}$$

$$\angle LRQ = \angle KLZ \qquad\qquad \text{(corresponding angles)}$$

$$\angle RLQ = \angle LKZ \qquad\qquad \text{(corresponding angles)}$$

Thus the two triangles are similar. Therefore, the ratio of the two sides must be equal, i.e.,

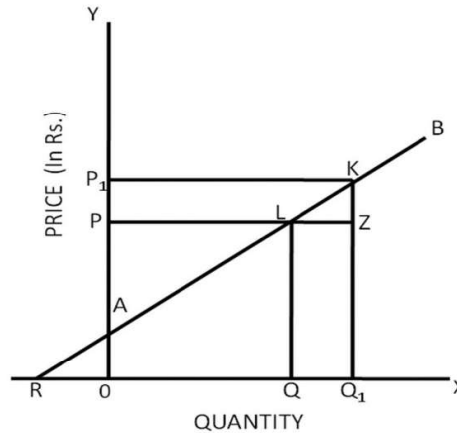$$\frac{LZ}{KZ} = \frac{RQ}{LQ}$$

Fig. 3.6

Putting $\frac{RQ}{LQ}$ for $\frac{LZ}{KZ}$ in the above measure of elasticity of supply, we get

$$(E_s) = \frac{LZ}{KZ} \times \frac{LQ}{OQ} = \frac{RQ}{LQ} \times \frac{LQ}{OQ} = \frac{RQ}{OQ}$$

Since RQ distance is greater than OQ distance, the elasticity of supply is greater than unity.

Practical Exercise 3

Show that the elasticity of supply of a straight line supply curve cutting X-axis has less than unit elasticity.

Solution:

In order to prove the above mentioned result we take a straight line supply curve AB which cuts X-axis at the point A. Also, we take two points L and K corresponding to two prices OP and OP_1 respectively.

$$(E_s) = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

$$= \frac{QQ_1}{PP_1} \times \frac{OP}{OQ} = \frac{LZ}{KZ} \times \frac{LQ}{OQ}$$

Take two right angled triangles, KZL and LQA. In these triangles

$$\angle Q = \angle Z \qquad\qquad \text{(right angles)}$$

$$\angle LAQ = \angle KLZ \qquad\qquad \text{(corresponding angles)}$$

$$\angle ALQ = \angle LKZ \qquad\qquad \text{(corresponding angles)}$$
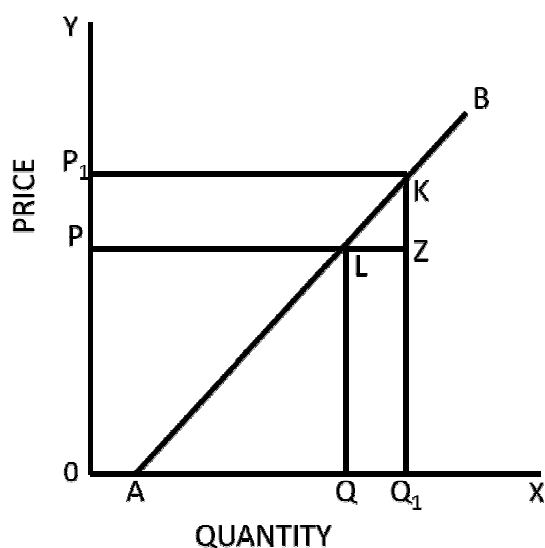
Fig. 3.7

Hence the two triangles are similar. Therefore, the ratio of two sides must be equal,

$$\frac{LZ}{KZ} = \frac{AQ}{LQ}$$

Putting $\frac{AQ}{LQ}$ for $\frac{LZ}{KZ}$ in the above given measure of elasticity of supply, we get

$$(E_S) = \frac{LZ}{KZ} \times \frac{LQ}{OQ} = \frac{AQ}{LQ} \times \frac{LQ}{OQ} = \frac{AQ}{OQ}$$

Since AQ distance is less than OQ distance, the elasticity of supply is less than unity.

3.5.3 Determinants of Elasticity of Supply

Elasticity of supply depends on a number of factors and all these factors are to be taken together before one can comment on the elasticity of supply of a commodity. Some of the important determinants of elasticity of supply are given as follows:

1) **Behaviour of costs as output varies:** As output of a commodity rises, total cost does show a tendency to rise but it does not rise at a uniform rate. Normally, total cost rises at a falling rate in the beginning, then at a constant rate and finally at a rising rate. If cost of production rises rapidly as output rises, then there is less stimulus to expand production in response to rise in price and accordingly supply will tend to be less elastic. If, on the other hand, total costs rise but rather slowly as production increases, a rise in price will bring about a large increase in quantity supplied and so the supply will be more elastic.

2) **Nature of the commodity:** Commodities may be classified, based on their nature, into (i) perishable and (ii) durable. Perishable products cannot be stored for long and thus, their supply does not respond very much to the change in their prices. Supply of perishable products is inelastic. Durable products, on the other hand, can be stored and their

supply responds to the change in their prices. The supply elasticity of durable products is relatively higher.

3) **Time:** Supply of a commodity comes from its production which involves a time lag. If the size of the plant is given and other adjustments in terms of technology etc., are not allowed, a producer cannot effectively respond to the change in price. Under such a situation, i.e., in the short-run supply of a commodity is less elastic. In the long run, when the size of the plant can be changed and technological changes are also allowed, supply responds to the change in price and hence, elasticity of supply is more elastic or the supply curve becomes flatter.

4) **Price expectations:** Expectation of future prices also influences elasticity of supply. If the producers expect that prices in the future will not be allowed to fall below a particular level, they would not mind producing more. Further, if producers expect prices to rise in the future they may hold more stocks and may supply less quantities in the market. Supply in such a case will be inelastic. If the prices are expected to fall in the future, supply will be more elastic.

5) **Nature of techniques of production:** If techniques of production required to produce a commodity are simple, the producer responds to a rise in price and supplies more which makes supply more elastic. More the complex and cumbersome techniques of production required to produce a commodity, more difficult it will be for the supply to respond to rising price and, therefore, less elastic will be the supply.

Check Your Progress 3

1) List three important determinants of elasticity of supply?

....

....

....

2) State whether the following statements' are True or false:

i) Elasticity of supply explains the reasons for the law of supply to apply.

ii) Elasticity of supply can be found out even if the law of supply does not apply.

iii) Elasticity of supply is the responsiveness of price to a given per cent change in quantity supplied.

iv) A case of elastic supply implies when a given per cent rise in price leads to the same percent rise in quantity supplied.

v) Perfectly elastic supply curve is parallel to Y-axis.

vi) Inelastic supply curve passes through the quantity axis.

vii) Elasticity of supply of a curvilinear supply curve is unity throughout the curve.

viii) Short run supply curve of a commodity is generally less elastic than the long run supply curve.

3.6 LET US SUM UP

The law of supply shows a direct relationship between price of the commodity and the quantity supplied of that commodity per unit of time; other things remaining unchanged. A supply schedule shows different prices and the quantities of the product supplied at each price. A supply curve is upward sloping from left to right.

Supply of a commodity is always with reference to: (a) price of the commodity, (b) quantity supplied at that price, and (c) quantity supplied over a period of time. Supply of a commodity is determined by (a) price of the commodity, (b) prices of other commodities, (c) cost of production of the commodity, (d) technical knowledge available with the producer, (e) goal of the producers, and (f) other factors like government policies, fear of war, growing inequalities of income and wealth, etc.

A supply curve shifts when there is a change in supply due to the influence of one or more factors other than the price of the commodity. A movement along the supply curve means change in quantity supplied due to the change in the price of the commodity only, other factors influencing supply remaining constant. A rightward shift of the supply curve represents a situation of 'increase in supply' and a leftward shift of the supply curve shows a situation of 'decrease in supply'. A rightward expansion movement along a supply curve is a case of expansion of supply' and a leftward movement along a supply curve is a case of "contraction in supply".

Elasticity of supply is the percentage change in amount supplied in response to a given percentage change in price of the commodity. Elasticity of supply can be unity, more than unity or less than unity. In the case of perfectly inelastic supply, elasticity of supply is zero; in the case of perfectly elastic supply, elasticity of supply is infinity.

The determinants of elasticity of supply are the behaviour of costs as output varies, nature of the commodity, time, price expectations and nature of techniques of production.

3.7 REFERENCES

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3.8 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) i) higher, lower ii) upward iii) price, quantity iv) falls v) directly

2) i) False   ii) True   iii) False   iv) True
   v) False   vi) False   vii) False   viii) False

Check Your Progress 2

1) i) False   ii) False   iii) False   iv) False   v) True
   vi) False   vii) True

2) Rise in the quantity supplied in response to rise in the price of that commodity is extension of supply where as rise in the quantity supplied due to the factors other than the price of the commodity is increase in supply.

Check Your Progress 3

1) Three important determinants of elasticity of supply are:

   i)   Nature of the commodity

   ii)   Price expectation

   iii) Nature of technique of production

2) i) False   ii) True   iii) False   iv)False
   v) False   vi) True   vii) False   viii) True

3.9 TERMINAL QUESTIONS

1) What is the meaning of the term "supply"? Answer with the help of an example.

2) Explain the various determinants of supply of a commodity.

3) Explain the law of supply. Point out its exceptions.

4) Distinguish between 'extension in supply' and 'increase in supply'. Give examples.

5) Explain the significance of 'movement along the supply curve', as distinguished from 'shift of the supply curve'.

6) Distinguish between perfectly elastic, perfectly inelastic, unit elastic, inelastic and elastic supply curves with the help of diagrams.

7) What are the main determinants of elasticity of supply of a commodity?

UNIT 4   DEMAND AND SUPPLY IN PRACTICE

Structure

4.0   OBJECTIVES

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

- appreciate how market price and quantity are determined;

- evaluate the impact of price controls, minimum wages, price support and arbitrage on price and quantity;

- determine how the taxes and subsidies affect consumers and producers; and

- appreciate the usefulness of economic theory in our day to day life.

4.1   INTRODUCTION

Demand and supply curves are used to describe the market mechanisms. These two market forces by way of equilibrium determine both the market price of a good and the total quantity produced/supplied. The level of price and the quantity depend on the particular characteristics of Demand and Supply. Variations in price and quantity over time depend on the ways in which supply and demand respond to other economic variables.

In this unit we will try to acquaint you with the usefulness of this analysis.

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4.2   DETERMINATION OF EQUILIBRIUM

Equilibrium price is defined as the price at which the quantity demanded and quantity supplied are equal. Quantity demanded is an inverse function of price, while quantity supplied is a direct function of price. The two functions can be stated as follows:

$$q^d = 10 - 1P$$

and

$$q^s = 1P$$

Equilibrium price is the one at which the quantity demanded equals quantity supplied, i.e.,

$$q^d = q^s$$

or

$$10 - 1P = 1P$$

$$\therefore \qquad\qquad\qquad\qquad P = 5$$

Equilibrium price is Rs. 5. At this price $q^d = q^s$ and $q^d = 5$ units. Thus, 5 units would be sold and purchased in the market at price Rs. 5.

Similarly, if we graphically represent these two functions as in Fig. 4.1, we find that the downward sloping demand curve intersects the upward sloping supply curve at E, forming what is known as the **Marshallian cross.**
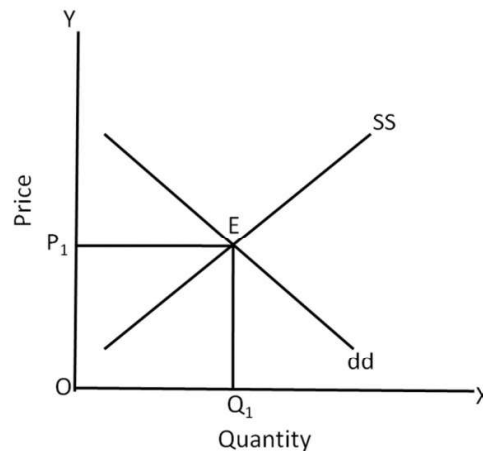
Fig. 4.1

In the equilibrium, OQ_1 quantity is sold and purchased at OP_1 price.

If, for any reason, the market price were to be less than the equilibrium price, say at OP_1, quantity demanded will be more than the quantity supplied, resulting in excess demand in the market, TW in Fig. 4.2. This will push the market price upwards, till the market price equals the equilibrium price.

Similarly, if the market price is more than the equilibrium price, the resultant excess supply, RS, will push the price downwards to OP_2. In short, we reach the following conclusions:

- All demand curves have negative slopes throughout their entire range.

- All supply curves have positive slopes throughout their entire range.

- Prices change if and only if, there is excess demand or excess supply.

- Prices rise, if there is excess demand and fall if there is excess supply.

In short, market price has a tendency to be equal to the equilibrium price. This is called **stable equilibrium.**
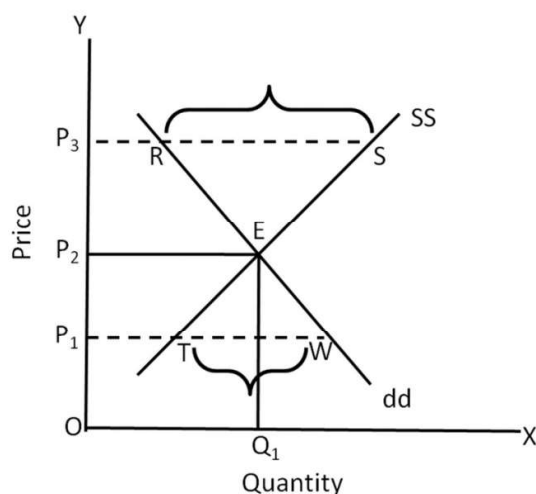

Fig. 4.2

The essential condition for stable equilibrium is that the demand curve should have a negative slope and the supply curve a positive slope. Otherwise, it will not be a stable equilibrium, this would be what can be called **unstable equilibrium.**

Let us illustrate the situation of unstable equilibrium with the help of Fig. 4.3.
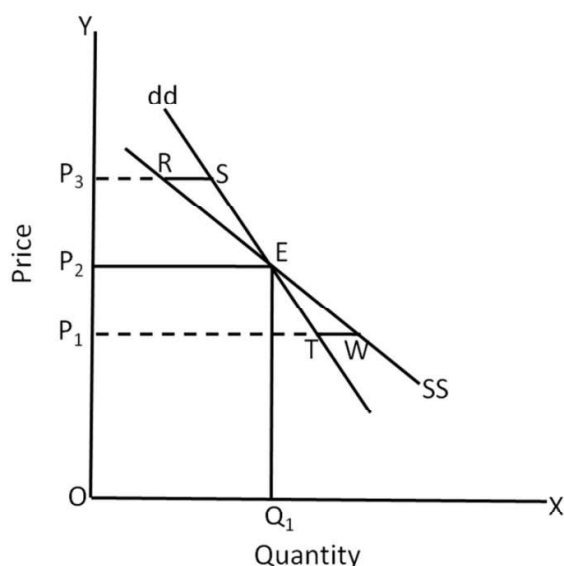
Fig. 4.3

We have plotted a negatively sloped demand curve and a negatively sloped supply curve. Equilibrium is determined at point E. If the market price were to fall to Op_1 quantity supplied > quantity demanded, and therefore the market price should fall further (rather than rise).

Similarly, if market price were to be Op_3, quantity supplied < quantity demanded, and hence the price should still rise further (rather than fall to back to equilibrium).

Thus, in this situation there is unstable equilibrium. The condition for stable equilibrium is that above the equilibrium point surplus must exist ($Q^s > Q^d$) and below the equilibrium point shortage must exist ($Q^d, > Q^s$). In case this condition is not fulfilled, we get unstable equilibrium.

Can there be a stable equilibrium when supply curve is downward sloping?

Yes, there can be a stable equilibrium even if supply curve is downward sloping. This is illustrated with the help of Fig. 4.4. At price Op_2, which is more than the equilibrium price Op_1 there exists surplus to the extent of SR, which creates competition among sellers, as such price falls to Op_1.
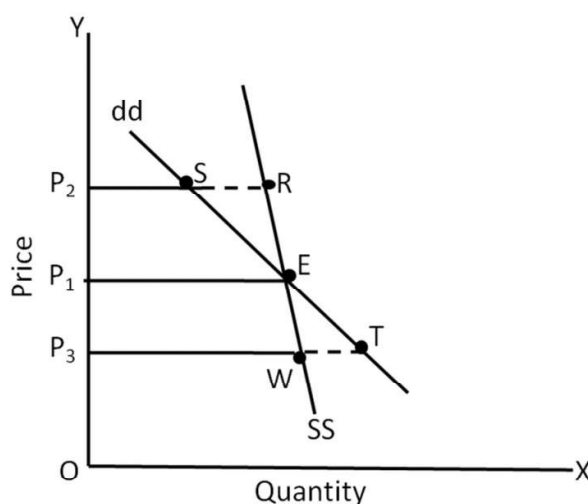
Fig. 4.4

At price Op_3, which is less than equilibrium price Op_1 there exists shortage to the tune of WT, which creates competition among buyers, this causes the price to increase to Op_1 Thus, we get stable equilibrium.

This is also known as the **Walrasian Equilibrium.** The Walrasian stability condition can be stated as follows:

Above the equilibrium price, the supply curve must be to the right of the demand curve; and below the equilibrium price, the supply curve must be to the left of the demand curve.

It would be seen that whereas the Marshallian adjustment process works through a change in quantities, the Walrasian adjustment process works through a change in price.

4.3   EFFECTS OF SHIFT IN DEMAND AND SUPPLY ON EQUILIBRIUM

In the method of comparative statics we start from a position of equilibrium and then introduce the change to be studied. The new equilibrium position is determined and compared with the original one. The differences between the

two positions of equilibrium must result from the change that was introduced, by keeping everything else as constant.

1)   **Shift in Demand Curve**

A shift in demand curve (the supply curve remaining unchanged) will affect the equilibrium price and equilibrium quantity, as shown in Fig. 4.5.
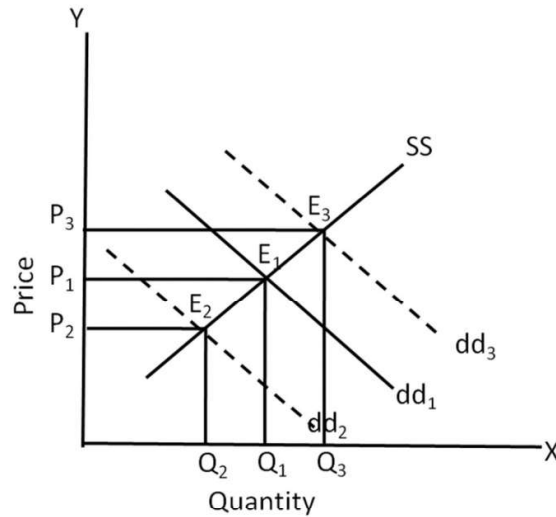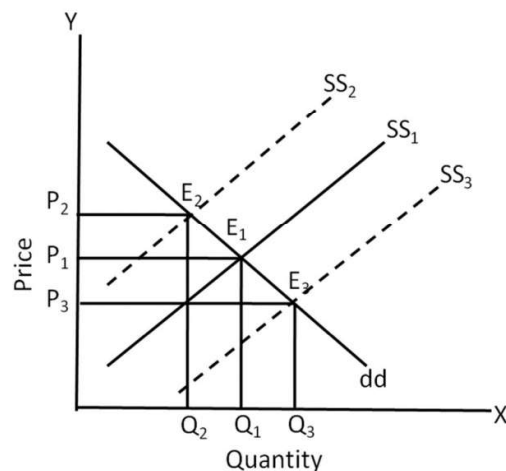

Fig. 4.5

An increase in demand would result in:

* an increase in the equilibrium price
* an increase in the equilibrium quantity.

Conversely, a decrease in demand would result in:

* a decrease in the equilibrium price
* a decrease in the equilibrium quantity.

2)   **Shift in Supply Curve**

A shift in supply curve (the demand curve remaining unchanged) will also affect both, the equilibrium price and equilibrium quantity, as shown in Fig. 4.6.

Fig. 4.6

An increase in supply would result in:

- a fall in the equilibrium price

- an increase in the equilibrium quantity.

A decrease in supply would result in:

- a rise in the equilibrium price

- a fall in the equilibrium quantity.

3)   **Simultaneous Shift**

We may also examine if both demand and supply curves shift simultaneously. The combined result would be determined as we have analysed above.

The net result would depend upon the relative change in demand and supply.

The various results can be briefly summarised as follows:

When one of the demand or supply curves shifts, the effect on both the price (P) and quantity (Q) can be determined:

- An increase in demand (a shift rightward in the demand curve) raises P and increases Q.

- A decrease in demand (a shift leftward in the demand curve) lowers P and decreases Q.

- An increase in supply (a shift rightward in the supply curve) lowers P and increases Q.

When both the demand and supply curves shift the effect on the price or the quantity can be determined but without information about the relativity of the shifts, the effect on the other variable is ambiguous.

- If both the demand and supply curves increase (shift rightward), the quantity increases but the price may rise, fall or remain the same.

- If the demand decreases (shifts leftward) and the supply increases (shifts rightward) the price falls but the quantity may increase, decrease, or not change.

4.3.1   Determination of Equilibrium: A Mathematical Presentation

We begin with a simple numerical example:

$$q^d = 100 - 2p \qquad (1)$$

$$q^s = 3p \qquad (2)$$

$$q^d = q^s \qquad (3)$$

We solve the system by substituting (1) and (2) into (3):

$$100 - 2p = 3p = 100 = 3P + 2P$$

or $\qquad\qquad\qquad 5p = 100$

or $\qquad\qquad\qquad p = 20$

by putting P value in equation (1) we get,

$$q^d = 100 - 2(20)$$

$$q^d = 60$$

and $\qquad\qquad q^s = q^d = 60$

If we let the demand curve shift to the right so that 60 more units are bought at each price, (I) becomes

$$q^d = 160 - 2p \qquad\qquad\qquad (1')$$

Substituting (1') and (2) into (3) yields p = 32 and $q^d = q^s = 96$.

In this manner we could solve the equations every time.

Algebra allows us, however, to find the solution to any linear demand supply system. To do this, we substitute letters, called **parameters**, for the numbers in the above system:

$$q^d = a + bp, \; a > 0, \; b < 0 \qquad\qquad (4)$$

$$q^s = c + dp, \; c < a, \; d > 0 \qquad\qquad (5)$$

$$q^d = q^s \qquad\qquad\qquad\qquad (6)$$

The restrictions on the parameters ensure that a positive amount is demanded at a zero price (a > 0), that the demand curve has a negative slope (b < 0), and the supply curve has a positive slope (d > 0). The restriction on c is a little more complex. If c is less than zero a positive price is required to call forth any supply. If c exceeds zero, some amount is supplied at a zero price. In that case, we need less to be supplied than demanded at a zero price (a > c) if we are to get a positive equilibrium price. If c > a, supply exceeds demand at a zero price and the linear model solves for a negative price.

To avoid this, we need the added condition that p = 0 whenever c > a.

Once again, we solve by substituting the equations (4) and (5) into (6). This gives

$$a + bp = c + dp$$

Simple manipulation produces

$$p = \frac{a-c}{d-b} \qquad\qquad\qquad (7)$$

Now, whenever we encounter a numerical example, we can substitute the numbers directly into (7) and obtain the answer.

4.3.2 Uniqueness of Equilibrium and Multiple Equilibria

So far, we have examined the situations in which a unique equilibrium is established, i.e., a single price (or single quantity) corresponding to a single quantity (or single price).

We can also conceive of a situation in which there is no such unique price or unique quantity. This is illustrated with the help of Fig. 4.7 and Fig. 4.8.
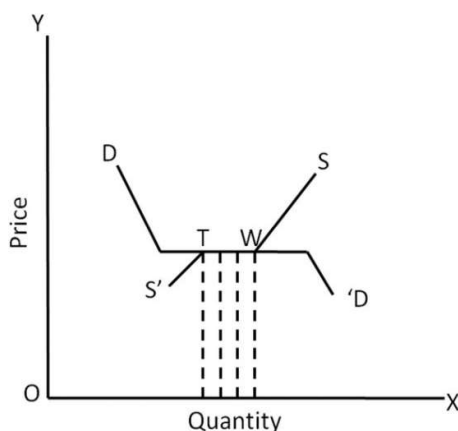

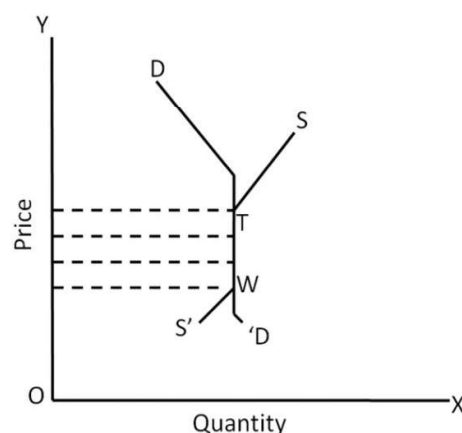**Fig. 4.7**   **Fig. 4.8**

In Fig. 4.7, both the demand curve and the supply curve have horizontal segments.

As a result of this, though the equilibrium price is uniquely determined, there is no unique quantity. It lies in the range TW.

In Fig. 4.8 similarly, both the demand curve and the supply curve have vertical segments. Though a unique quantity is determined, there is no unique price. The equilibrium price lies in the range TW.

This is also known as **multiple equilibria.**

Check Your Progress 1

1) Given the following demand and supply functions, find the equilibrium price and quantity in the market

$$q^s = -5 + 3P, \ q^d = 10 - 2P$$

2) From the following equation find the equilibrium price and output $q^d = 6 - P, \ q^s = 3P - 2$

3) State whether following statements are true or false:

   i) All demand curves have positive slopes

   ii) Prices change if and only if there is excess demand or excess supply

   iii) Prices fall if there is excess demand

   iv) The Walrasian equilibrium adjustment process works through change in quantity

   v) The quantity increases in case of both demand and supply curve shift rightwards.

4) There are 1000 identical individuals in the market for commodity X given the individual demand function $q^d = 12 - 2P$ and 100 identical producers of commodity given the individual producer supply function $q^s = 20P$. Find the equilibrium price and quantity.

4.4   APPLICATIONS

4.4.1   Rationing and the Allocation of Scarce Goods

Rationing implies fixation of price controls. Price control means that a ceiling has been imposed on the prices of such commodities as are covered under the price-control measures. Fixation of ceiling on prices means that the free operation of the forces of demand and supply is not being permitted.

Let us see what will happen in such a situation. This can be illustrated with the help of Fig. 4.9. DD and SS are the original demand and supply curves respectively for a commodity. R is the equilibrium point, corresponding to which OQ quantity is being demanded and supplied at the price OP per unit. Suppose the Government decides to interfere with the free operation of the market forces, i.e., it decides to impose price controls. Price controls, as already stated, take the form of ceiling on prices. Ceiling could be fixed at a price (a) higher than the equilibrium price, say at OK, (b) equal to the equilibrium price, i.e., OP, and (c) less than the equilibrium price, say at OH.
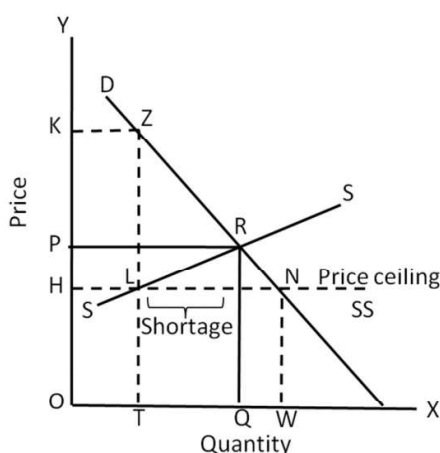

Fig. 4.9

- Ceiling price more than the equilibrium price will have no effect on the market. At a higher price say OK, OT quantity of the commodity will be demanded. The suppliers, on the other hand, would be waiting in their wings to supply more than the quantity being presently demanded. There will be a tendency for the price to fall down to the equilibrium level.

- If ceiling price equals the equilibrium price, OP, it will leave the market unaffected.

- If ceiling price is less than the equilibrium price, it will create conditions which need our further attention. Suppose, in Fig. 4.9, the Government imposes ceiling at OH per unit. The equilibrium price, OP, would no longer be legally obtainable. Prices must be reduced from OP to OH. At the lower price, OH, quantity demanded will expand to HN or OW. But at this reduced price, suppliers will be ready to supply only HL or OT quantity of goods. As a result, a shortage of this commodity (equal to quantity demanded minus quantity supplied) will emerge. This shortage is being represented by the line segment LN.

We reach the following conclusion about the effect of price control in free market: The setting of minimum prices will either have no effect (maximum price set at or below the equilibrium) or it will cause a shortage of the commodity and reduce both the price and the quantity actually bought and sold below their equilibrium values.

Consequences of Price Controls (ceiling below the equilibrium price). Imposition of ceiling below the equilibrium price will have the following major implications:

1) **Shortages:** The quantity actually sold and bought in the market will shrink. As a result, a large chunk of consumer's demand will go unsatisfied. The situation, as it arises, has been explained in Fig. 4.9.

2) **Problem of allocation of limited supplies among large number of consumers:** As already observed, shortage of a commodity means that all those consumers who demand the commodity at the ruling price cannot be satisfied. In other words, a large number of potential consumers of the commodity will be denied its use.

Here question arises how to allocate the limited supplies among large numbers of consumers?

One general way is that it is left at the retail shops to arrange for the distribution of the scarce product. For example, in our country, we have often witnessed such products as kerosene, edible oils, sugar, onions, etc., going scarce in the market. More generally, the consumer is left at the mercy of the local retailer, who more often than not chooses I: serve his regular customers in preference to others.

Among all others, the scarce product may be distributed on the basis of first-come-first-served. The latter situation often develops in the formation of long unmanageable queues at the retail centres, so that the persons lining up at the tail of the queue have only a little chance of getting the desired good. To avoid these problems which may often arise from the free marketing of the scarce product, Governments generally couple price controls with distribution controls. The most effective form of distribution control is rationing.

Rationing implies that a ceiling is imposed on the quantity which can be bought and consumed by a consumer. A consumer with less utility may choose not to purchase the rationed product. But those consumers for whom the rationed product has fairly large marginal utility are assured of some quantity at least, which possibly might not have been available to them in free marketing conditions. Rationing thus will increase the aggregate utility derived by the community from the consumption of the commodity. In such a situation, in all probabilities, rationing will replace first-come-first-served method of distribution.

We reach the conclusion:

Where there is a feeling against allocation on the basis of first-come-first-served and seller's preferences, effective price ceiling will give rise to strong pressure for a central (administered) system of rationing.

3) **Black Marketing:** It is a direct consequence of price controls. Black marketing implies a situation in which the controlled commodity is sold unlawfully, below the desk, at a price higher than the lawfully enforced ceiling price.

This situation arises largely because of the fact that (i) the number of potential consumers of the commodity is more than what can be served by the available supplies of the commodity, and, (ii) there are consumers who are willing to pay more than the ceiling price. This latter phenomenon is more important in creating black market and sustaining it.

In Fig. 4.9, OH is the ceiling price. At this price only OT quantity is being supplied and therefore actually bought in the market. We can see from DD curve in Fig. 4.9 that OT quantity would be demanded even at the price TZ or OK, which is substantially higher than the ceiling and the equilibrium price. Those buyers, who are willing to pay more than the ceiling price, will prefer to indulge in underhand transactions rather than go without the commodity since none of the free market methods of distribution can assure these consumers that the desired supplies would be coming.

Thus, we reach the interesting conclusion:

Black marketing in a commodity whose price has been controlled by the authorities will invariably arise since there are consumers who are willing to pay more than the controlled price.

4.4.2 Price Support Measures

Price support means a floor has been fixed on the prices of such commodities as are covered under the price-support measures.

Producers of these commodities need not sell at prices lower than the floor prices (i.e., the minimum prices) fixed by the Government. Fixation of floor on prices means that the free operation of the forces of demand and supply is being interfered with. Let us see what will happen in such a situation.

In Fig. 4.10; R is the equilibrium point determined by the intersection of demand and supply curves, OQ quantity is being supplied and demanded at OP price. Suppose, the Government decides to impose price supports. Price supports mean that the Government imposes a floor on prices. Floors could be fixed at a price (a) lower than the equilibrium price, say at OH; (b) equal to the equilibrium price, OP; and (c) more than the equilibrium price, say at OK.
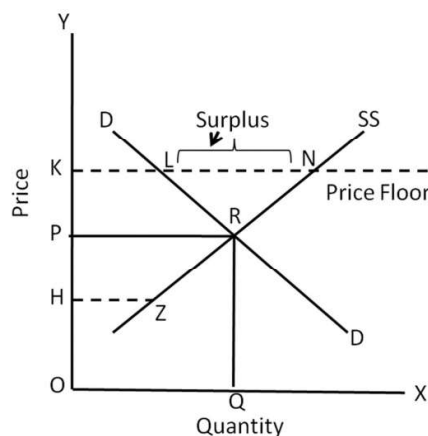

Fig. 4.10

Floor Price Lower than the Equilibrium Price: If floor price is less than the equilibrium, it will have no effect on the market. At a lower price, say OH, HZ quantity will be supplied. The consumers, on the other hand, would be willing to pay a higher price. The price will move upwards towards the equilibrium level.

Floor Price Equal to the Equilibrium Price: If floor price equals the equilibrium price, OP, it will leave the market unaffected.

Floor Price Higher than the Equilibrium Price: If floor price is more than the equilibrium price, it will need our further attention. Suppose, in Fig. 4.10, the Government imposes the price floor at OK per unit. The equilibrium price OP would no longer be legally obtainable. Price must be raised to OK. At the higher price, OK, quantity demanded will contract to KL. But at this price suppliers will be ready to supply KN quantity. As a result, a surplus will emerge; surplus is shown by the line segment LN.

We reach the following conclusion about the effect of price support in a free market:

The setting of minimum prices will either have no effect (minimum price set below the equilibrium) or it will cause surplus of the commodity to develop with the actual price being above its equilibrium level but the actual quantity bought and sold being below its equilibrium level.

Consequences of Price Support (Floor above equilibrium price): Imposition of floor prices above equilibrium price will have the following major implications:

1) **Surpluses:** The quantity actually bought and supplied will shrink as a direct consequence of price support. As a result, large chunk of producer's stocks will remain unutilised. The situation, as it arises, has been explained in Fig. 4.10 where the surplus has been shown equal to LN.

2) **Buffer Stocks:** In order to maintain the support price, the Government would have to design some such programme as to enable producers to dispose of their surplus stocks. One such programme can take the form of buffer stocks. The Government purchases the surplus stocks available with the producers, these stocks are released if and when the production of the supported commodity suffers. The buffer stock operations benefit the producers as a group. But who bears this cost? First, consumer who has to pay higher prices for the product. Second, the people in general who have to pay taxes to support this programme.

3) **Subsidies:** To offset the loss to the consumers, the Government may undertake to subsidise the product. By subsidy we mean that the Government purchases the product at the support price and sells the product to consumers below its cost of procurement. The difference between cost and price is borne by the Government.

Before we leave this discussion of price floors and ceilings, the reader should note that such terms as surplus and shortage are defined with reference to a specific price.

4.4.3 Minimum Wage Legislation

Minimum wage legislation is similar to fixing of floor prices. Governments, at times, are known to have interfered in the factor markets also. Legislation may be enacted whereby in the market, employers may be prohibited from paying less than the minimum wage fixed by the Government. The effect of fixing the minimum wage would be the same as that of fixing the minimum price of a commodity. Let us illustrate this effect diagrammatically, as in Fig. 4.11.
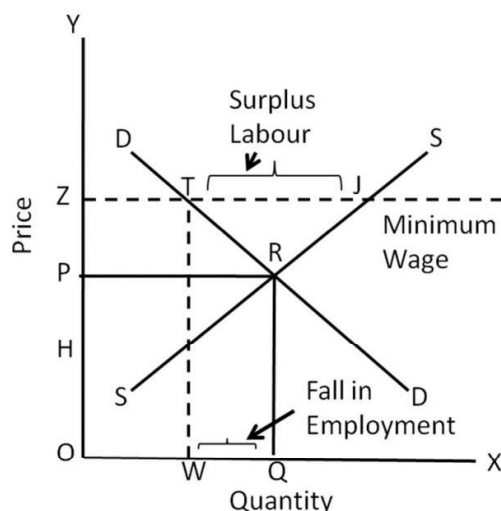

Fig. 4.11

In Fig. 4.11, OQ quantity of labour is being demanded and supplied at the equilibrium wage rate OP. If the wage rate is fixed at OZ by Government legislation, or by trade union agreement, the following consequences will follow:

1) Where the law or the agreement is effective, it will raise the wages of that labour which remains in employment, from OP to OZ.

2) Minimum wage will lower the actual amount of employment; at the new minimum wage rate only ZT or OW labour would be demanded, whereas at the equilibrium wage OQ labour was being supplied and demanded. Employment will fall by WQ.

3) Minimum wage will create a surplus of labour which would like to work, but cannot find a job. The surplus labour would equal TJ.

4) Some of the unemployed workers may be tempted or forced to offer themselves for work at the wage rate below the floor rate. Some sort of clandestine transaction in the labour market will begin to take place.

4.4.4 Arbitrage

Arbitrage is an operation involving simultaneous purchase and sale of a commodity in two or more markets between which there are price differentials or discrepancies. The arbitrageur aims to profit from the price difference; the effect of his action is to lessen or eliminate it.

Suppose fresh mushrooms are being sold in New Delhi and Noida. Geographically separate markets are illustrated in Fig. 4.12.
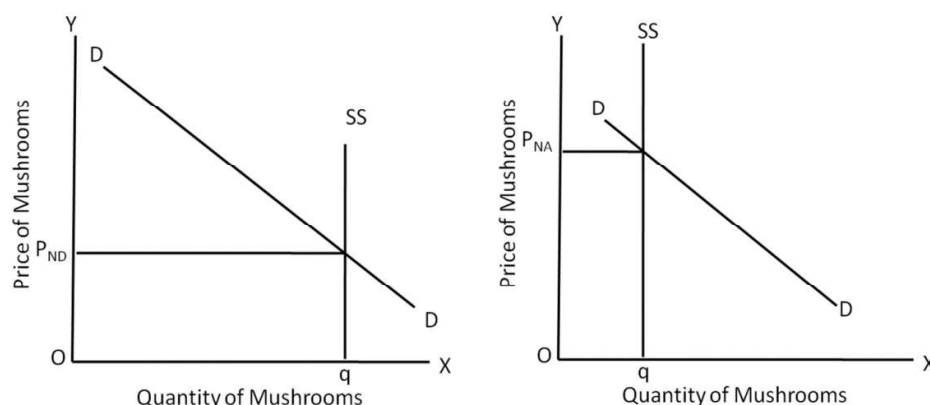
Fig. 4.12

New Delhi (ND) and Noida (NA) are separate markets with separate demand curves. The vertical supply curve in each city represents the quantity of mushrooms now available in each place. The equilibrium price in New Delhi is labelled P_{ND} and in Noida, P_{NA}.

If the equilibrium price in New Delhi is much less than that in Noida, a trucker might buy a load in New Delhi and sell them in Noida. As long as the price differential is greater than the cost of transporting the mushrooms, it will pay truckers to buy and sell in this way. As mushrooms are bought in New Delhi for sale in Noida, the price in New Delhi will increase, while that in Noida will fall. Thus the transport of mushrooms from New Delhi to Noida tends to narrow the price gap between the two cities. This process is called arbitrage.

Arbitrage will stop when the price differential becomes equal to or less than the cost of transportation between the two points. If transportation costs are small relative to the price of the good, the price differentials between cities will remain small.

Arbitrage narrows the dispersion of prices. If commodities are easily transported, geographic variations in price are small. If a commodity is easily stored, seasonal variations in price are insignificant. When markets are well-organised, with information about prices in different places and times readily available, arbitrage works easily. Any dealer can act as an arbitrageur by deciding when and where to buy. If, however, information about prices in different times and places is expensive to get, the dispersion of prices will then be greater.

Case Study

A few years ago The New York Times carried a dramatic front page picture of the President of Kenya setting fire to a large pile of elephant tusks that had been confiscated from poachers. The accompanying statement explained that the burning was intended as a symbolic act to persuade the world to halt the ivory trade. One may well doubt whether the burning really touched the hearts of criminal poachers. However, one economic effect was clear. By reducing the supply of ivory in the world markets, the burning of tusks forced up the price of ivory which raised the illicit rewards reaped by those who slaughter elephants. They could only encourage more poaching – precisely the opposite of what the Kenyan government sought to accomplish!

4.4.5 Sharing of Tax Burden

Who bears the tax burden under following situations:

a)   When demand is perfectly elastic and supply is of normal shape.

b)   When demand is perfectly inelastic and supply is of normal shape.

c)   When supply is perfectly elastic and demand is of normal shape.

d)   When supply is perfectly inelastic and demand is of normal shape.

a)   When demand is perfectly elastic, the whole tax burden is borne by the producer himself as is illustrated in the Fig. 4.13. Before imposition of tax, equilibrium point is E which gives equilibrium price as OP. After the imposition of per unit tax, the equilibrium point shifts to giving equilibrium price as OP which is same as before the imposition of tax. Hence the whole tax burden is borne by the producer.
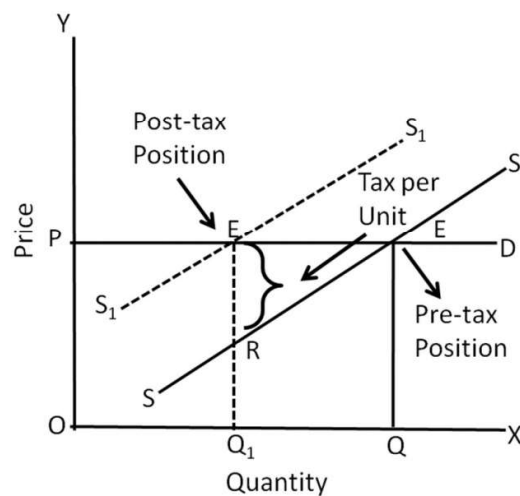

Fig. 4.13

b)   When demand is perfectly inelastic, the whole tax burden is borne by the consumer because in this case the price rises by the full amount of tax as shown in the Fig. 4.14. The equilibrium point before imposition of tax is E which gives the equilibrium price as OP. After the imposition of tax per unit, the equilibrium point shifts to E_1 which gives equilibrium price as OP_1 Thus, price rises by the full amount of tax.
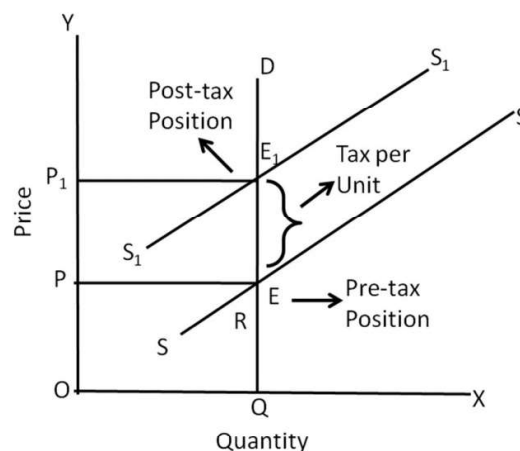

Fig. 4.14

c) When supply is perfectly elastic, the whole tax burden is borne by the consumer as illustrated in the Fig. 4.15. Before imposition of tax, the equilibrium point is E giving equilibrium price as OP. After the imposition of tax, the equilibrium point shifts to E_1 showing equilibrium price as OP_1. Thus the whole tax burden is borne by the consumer.
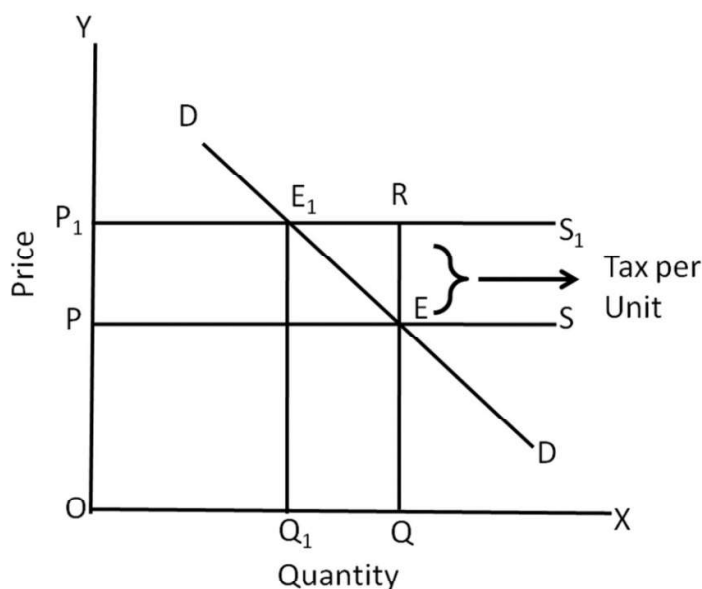

Fig. 4.15

d) When supply is perfectly inelastic, the whole tax burden is borne by the seller as the pre-tax equilibrium position and post-tax equilibrium remains unchanged, as shown in Fig. 6.16. Since supply is perfectly inelastic, with the imposition of tax the supply curve remains unchanged as such equilibrium price remains unchanged. So the tax burden falls on producer.
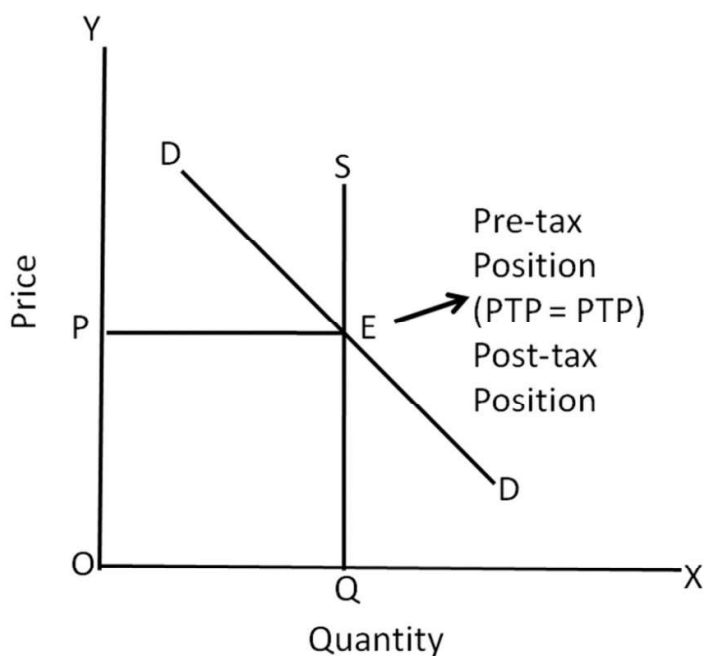

Fig. 4.16

- Show that as the demand curve becomes steep (arid hence inelastic) as greater amount of the tax is passed on to the consumer.

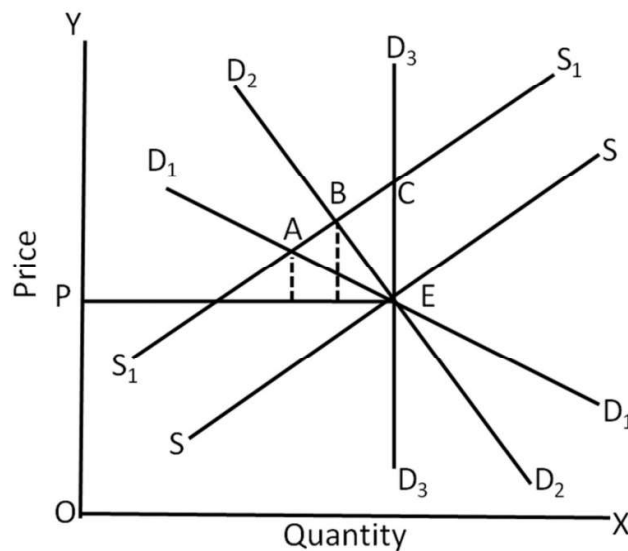We take three different demand curves with different elasticities as shown in Fig. 4.17.

Fig. 4.17

All the three curves are drawn through the point E in order to facilitate comparison. Let the imposition of tax shift the supply curve to S_1S_1. The post-tax equilibrium position is shown by three points, A, B or C depending upon whether the relevant demand curve is D_1D_1, D_2D_2 or D_3D_3 respectively. The length of vertical line segment from points A, B or C to the line PE shows the amount of increase in the consumer price that will occur, given the respective demand curves. Examining the relationship between the amount of the price increase and the slope of the demand curve, we note that as the demand curve becomes steep (and hence elastic) a greater amount of the tax is passed onward to the consumer.

Check Your Progress 2

1) The price of a personal computer has continued to fall in the face of increasing demand. Explain.

2) New cars are normal goods. Suppose that the economy enters a period of strong economic expansion so that people's incomes increase substantially. Determine what happens to the equilibrium price and quantity of new cars.

3) State whether following statements are true or false:

   i) If ceiling price equals the equilibrium price, it will affect the market.

   ii) The minimum wage Act lowers the actual employment of workers.

   iii) Arbitrage widens the dispersion of prices.

   iv) When the demand is perfectly elastic, the whole burden is born by the consumer.

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4) Suppose that the policy makers decide that the price of a pizza is too high and that not enough people can afford to buy pizza. As a result, they impose a price ceiling on pizza that is below the current equilibrium price. Are consumers able to buy more pizza: before the price ceiling or after?

5) Suppose that demand for a good is subject to unpredictable fluctuations. Explain how speculators help reduce the price variability of the good.

4.5   LET US SUM UP

Basics of demand and supply enables us to appreciate the relevance of economics in day to day life. Market price is determined at a point where quantity demanded is equal to quantity supplied. The characteristics of demand and supply may differ from one situation to another and from one market to another. These market forces influence the prices and quantity over a period of time. Marshalian equilibrium is attained through the process of change in quantity whereas Walrasian adjustment process works through a change in price.

Imposition of ceiling below the equilibrium price have implications of shortage of supply, black marketing and hence the need for central administered system of rationing. The imposition of floor prices may cause the surpluses of the commodity, hence need for buffer stocks and selling of the product to the consumers at subsidised prices.

The impact of minimum wage legislative is similar to fixing of floor prices.

The Arbitrage narrows the dispersion of prices.

4.6   REFERENCES

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4.7   ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) $P = 3$, $q^d = 4$

2) $p = 2$, $q = 4$

3) (i) False   (ii) True   (iii) False   (iv) false   (v) True

4) $P = 3$, $q = 6000$

Check Your Progress 2

1) Personal computers have fallen in price although the demand for them has increased because the supply has increased more rapidly.

2) Because new cars are a normal good, an increase in income increases the demand for them. Hence the demand curve shifts rightward. As a result, the equilibrium price rises and the equilibrium quantity also rises.

3) (i) False   (ii) True   (iii) False   (iv) False

4) As a result of a price ceiling, the sellers would offer less quantity for sale in the market. The consumers would end up consuming less of the pizzas. There would be a large unmet demand.

5) Speculators buy the product to exploit any potential profit opportunities. In particular, speculator- aim to sell the good from their inventories if the current price is higher than the expected future price and they strive to buy the good to be added to their inventories if the current price is below the expected future price.

The first profit opportunity – selling when the current price is higher than the expected future price – reduces the current price. The second profit opportunity – buying when the current price is lower than the expected future price – raises the current price.

Selling, if the price is higher than, or buying, if the price is lower than the expected future price, means that the price will not deviate much from the expected future price.

Thus, speculators help reduce price fluctuations and make the price less variable.

4.8   TERMINAL QUESTIONS

1) Given the following supply and demand equations

$$Q^u - 100 - 5P$$

$$Q^s - 10 + 5P$$

a)   Determine the equilibrium price and quantity.

b)   If the government sets a minimum price of Rs. 10 per unit, how many units would be supplied and how many would be demanded?

c)   If the government sets a maximum price of Rs. 5 per unit, how many units would be supplied and how many would be demanded?

d)   If demand increases to

$$Q^{d1} = 200 - 5P$$

determine the new equilibrium price and quantity.

2) Discuss the likely effects of the following:

a)   Rent ceilings on the market for apartments.

b)   Floors under wheat prices on the market for wheat.

Use supply-demand diagrams to show what may happen in each case.

3) The demand and supply curves for T-shirts in the tourist town, Bengaluru, are given by the following equations:

$$Q^d = 24,000 - 500\ P$$

$$Q^s = 6,000 + 1,000\ P$$

a)   Find the equilibrium price and quantity algebraically.

b)   If tourists decide they do not really like T-shirts that much, which of the following might be then demand curve?

$$Q^d = 21,000 - 500\ P$$

$$Q^d = 27,000 - 500\ P$$

Find the equilibrium price and quantity after the shift of the demand curve.

c)   If, instead, two more new stores that sell T-shirts open up in town, which of the following might be the new supply curve?

$$Q^s = 3,000 + 1,000\ P$$

$$Q = 9,000 + 1,000\ P$$

Find the equilibrium price and quantity after the shift of the supply curve.

4) Under which condition will a shift in the demand curve result mainly in a change in quantity? In price?

5) Under which condition will a shift in the supply curve result mainly in a change in price? In quantity?

6) Suppose the market demand for pizza is given by $Q^d = 300 - 20\ P$ and the market supply for pizza is given by $Q^s = 20\ P - 100$, where P = price (per pizza).

a)   Graph the supply and demand schedules for pizza using Rs. 5 through Rs. 15 as the value of P.

b)   In equilibrium, how many pizzas would be sold and at what price?

c)   What would happen if suppliers set the price of pizza at Rs 15? Explain the market adjustment process.

d)   Suppose the price of hamburgers, a substitute for pizza, doubles. This leads to a doubling of the demand for pizza (at each price consumers demand twice as much pizza as before). Write the equation for the new market demand for pizza.

e)   Find the new equilibrium price and quantity of pizza.