Study Note - 1

BASIC CONCEPTS OF ECONOMICS

This Study Note includes

1.1   **Definition & Scope of Economics**

1.2   **Few Fundamental Concepts.**

1.3   **Demand**

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1.1 DEFINITION & SCOPE OF ECONOMICS

1.1.1 Definition of Economics

The analysis of economic environment requires the knowledge of economic decision making and hence the study of "Economics" is significant.

There are 4 definitions of Economics.

(i)   Wealth Definition:

Adam Smith defined "Economics as a science which inquired into the nature and cause of wealth of Nations".

According to this definition —

- Economics is a science of study of wealth only;
- It deals with production, distribution and consumption;
- This wealth centered definition deals with the causes behind the creation of wealth, and
- It only considers material wealth.

Criticisms of this definition:

(a)   Wealth is of no use unless it satisfies human wants.

(b)   This definition is not of much importance to man and welfare.

(ii)   Welfare definition:

According to Alfred Marshall "Economics is the study of man in the ordinary business of life". It examines how a person gets his income and how he invests it. Thus on one side it is a study of wealth and on the other most important side, it is a study of well being.

Features:

(a)   Economics is a study of those activities that are concerned with material welfare of man.

(b)   Economics deals with the study of man in ordinary business of life. The study enquires how an individual gets his income and how he uses it.

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(c)   Economics is the study of personal and social activities concerned with material aspects of well being.

(d)   Marshall emphasized on definition of material welfare. Herein lies the distinction with Adam Smith's definition, which is wealth centric.

(iii) Scarcity definition

This definition was put forward by Robbins. According to him "Economics is a science which studies human behavior as a relationship between ends and scarce means which have alternative uses.

Features:

(a)   human wants are unlimited

(b)   alternative use of scarce resources

(c)   efficient use of scarce resources

(d)   need for optimisation

(iv) Growth Oriented definition

This definition was introduced by Paul. A. Samuelson. According to the definition "Economics is the study of how man and society choose with or without the use of money to employ the scarce productive resources, which have alternative uses, to produce various commodities over time and distributing them for consumption, how or in the future among various person or groups in society." It analyses costs and benefits of improving patters of resource allocation.

1.1.2 Scope of Economics

Traditional Approach	• Economics is a social science. • It studies man's behaviour as a rational social being. • It considered as a science of wealth in relation to human welfare. • Earning and spending of income was considered to be end of all economic activities. • Wealth was considered as a means to an end – the end being human welfare.
Modern Approach	• An individual, either as a consumer or as a producer, can optimize his goal is an economic decision. • The scope of Economics lies in analyzing economic problems and suggesting policy measures. • Social problems can thus be explained by abstract theoretical tools or by empirical methods. • In classical discussion, Economics is a positive science. • It seeks to explain what the problem is and how it tends to be solved. • In modern time it is both a positive and a normative science. • Economists of today deal economic issues not merely as they are but also as they should be. • Welfare economics and growth economics are more normative than positive.

1.1.3 Subject Matter of Economics

The subject matter of economics is presently divided into two major branches. Micro Economic and Macro Economics. These two terms have now become of general use in economics.

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Micro Economics

- Micro economics studies the economic behaviour of individual economic units.
- The study of economic behaviour of the households, firms and industries form the subject-matter of micro economics.
- It examines whether resources are efficiently allocated and spells out the conditions for the optimal allocation of resources so as to maximize the output and social welfare.
- For example, micro economics is concerned with how the individual consumer distributes his income among various products and services so as to maximize utility.
- Thus, micro-economics is concerned with the theories of product pricing, factor pricing and economic welfare.

Macro Economics

- Macro economics deals with the functioning of the economy as a whole.
- For example, macro economics seeks to explain how the economy's total output of goods and services and total employment of resources are determined and what explains the fluctuation in the level of output and employment.
- It deals with the broad economic issues, such as full employment or unemployment, capacity or under capacity production, a low or high rate of growth, inflation or deflation.
- It is the theory of national income, employment, aggregate consumption, savings and investment, general price level and economic growth.

Interdependence between Micro Economics and Macro Economics

- Micro Economic analysis and Macro Economic analysis are complementary to each other;
- They do not complement but supplement each other.
- The basic goal of both the theories is same: the maximization of the material welfare of the nation.
- From the micro economic point of view, the nation's material welfare will be maximized by achieving optimal allocation of resources.
- From the macro economic point of view, the nation's material welfare will be maximized by achieving full utilisation of productive resources of the economy.
- The study of both is equally vital so as to have full knowledge of the subject-matter of economics.
- The contemporary economists are concerned with both micro economics and macro economics.

1.1.4 Nature of Economics

Nature of economics refers to whether economics is a science or art or both, and if it is a science, whether it is positive science or normative science or both.

Economics as a Science —

- We have often stated that economics is a social science.
- Economics as a social science studies economic activities of the people.
- Economics is a systematic body of knowledge as it explains cause and effect relationship between various variables such as price, demand, supply, money supply, production, national income, employment, etc.
- Economic laws, like other scientific laws, state what takes place when certain conditions (assumptions) are fulfilled.

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- This is the traditional Deduction Method where economic theories are deduced by logical reasoning.
- The law of demand in economics states that a fall in the price of commodity leads to a large quantity being demanded 'given other things', such as income of the consumer, prices of other commodities, etc., remaining the same.
- In economics we collect data, classify and analyse these facts and formulate theories or economic laws.
- The truth and applicability of economic theories can be supported or challenged by confronting them to the observations of the real world.
- If the predictions of the theory are refuted by the real-world observations, the theory stands rejected.
- If the predictions of the theory are supported by the real-world events, then the theory is formulated.
- The laws of economics or economic theories are conditional subject to the condition that other things are equal.
- Economic theories are seldom precise and are never final; they are not as exact and definite as laws of physical and natural sciences.
- The laws of physical and natural sciences have universal applicability, but economic laws are not of universally applicable.
- The laws of physical and natural sciences are exact, but economic laws are not that exact and definite.

Economics as an Art —

- Various branches of economics, like consumption, production, distribution, money and banking, public finance, etc., provide us basic rules and guidelines which can be used to solve various economic problems of the society.
- The theory of demand guides the consumer to obtain maximum satisfaction with given income.
- Theory of production guides the producer to equate marginal cost with marginal revenue while using resources for production.
- The knowledge of economic laws helps us in solving practical economic problems in everyday life.

Economics as a Positive Science —

- A positive science is that science in which analysis is confined to cause and effect relationship.
- Positive economics is concerned with the facts about the economy.
- It studies the economic phenomena as they exist.
- It finds out the common characteristics of economic events.
- It specifies cause and effect relationship between them.
- It generalizes their relationship by formulating economic theories and makes predictions about future course of these economic events.

Economics as a Normative Science —

- The objective of Economics is to examine real economic events from moral and ethical angles and to judge whether certain economic events are desirable or undesirable.
- Normative economics involves value judgment.
- It deals primarily with economic goals of a society and policies to achieve these goals.
- It also prescribes the methods to correct undesirable economic happenings.

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Economics as a Science and an Art —

- Being a systematized body of knowledge and establishing the cause and effect relationship of a phenomenon, Economics is a scientific study.
- The laws of economics are conditional.
- Economics cannot predict with so much certainty and accuracy as the subject deals with the behaviour of human beings as such controlled experiment is not possible.
- Some economists prefer to treat economics as an art.
- Every science has an art or a practical side.
- Every art has a scientific side which is theoretical.
- Economics deals with both theoretical aspects as well as practical side of many economic problems we face in our daily life.
- Thus, Economics is both science as well as an art.

1.1.5 Central Problem of all Economies

- In case of any economy, whatever the economy required cannot be satisfied fully.
- Economic resources or means of production are limited and they can be put to alternative uses.
- Every economy faces some common problems.

What to produce?	• A country cannot produce all goods because it has limited resources.
	• It has to make a choice between different goods and services.
	• Every economy has to decide what goods and services should be produced.
How to produce?	• As an economy decides to produce certain goods, it faces the problem to decide how these goods will be produced.
	• The problem arises because of unavailability of some resources.
	• It also involves the choice of technique of production.
	• A country may produce by labour intensive methods or by capital intensive methods of production, depending upon its stock or man power.
For whom to produce?	• Goods and services are produced for people who have the means to pay for them.
	• A country may produce mass consumption goods at a large scale or goods for upper classes.
	• All it depends upon the policies of the government as well as private producing units.

1.1.6 Economic Organizations

It refers to the arrangements of a country's economy in terms of production, distribution and consumption of goods and services.

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1.2 FEW FUNDAMENTAL CONCEPTS

1.2.1 Wealth

By wealth we mean the stock of goods under the ownership of a person or a nation.

(i) Personal wealth	• It means the stock of all goods like houses and buildings, furniture, land, money in cash, money kept in banks, clothes, company shares, stocks of other commodities, etc. owned by a person. • Health, goodwill, etc., can also be considered to be parts of an individual's wealth. • In Economics, they are transferable goods (whose ownership can be transferred to another person). • These are considered to be components of wealth.
(ii) National wealth	• It includes the wealth of all the citizens of the country. • There are public properties whose benefits are enjoyed by the citizens of the country but no citizen personally owns these goods. • Natural resources (mineral resources, forest resources, etc), roads, bridges, parks, hospitals, public educational institutions and public sector projects of various types (public sector industries, public irrigation projects, etc.) are example of public properties. • There is some personal wealth which is to be deducted from national wealth. • Example, if a citizen of the country holds a Government bond, it is personal wealth. But from the point of view of the Government, it is a liability and, hence, it should not be considered as a part of the nation's wealth.

1.2.2 Wealth and Welfare

• Welfare means the satisfaction or the well-being enjoyed by society.

• Social welfare depends on the wealth of the nation.

• In general, wealth gives rise to welfare, although they are not same.

• If wealth of society increases, but the distribution among the citizens of the country is very unequal, this inequality may create social jealousy and tension.

• Economists, however, assume that when wealth increases, welfare increases too.

• Similarly, when wealth decreases, welfare is assumed to decrease.

1.2.3 Money

• Anything which is widely accepted in exchange for goods, or in settling debts.

• In Barter System, goods were used as medium of exchange.

• When general acceptability of any medium of exchange is enforced by law, that medium of exchange in called the legal tender, (example, the rupee notes and coins).

• When some commodity is used as a medium of exchange by custom, it is called customary money, (example, the rupee notes and coins).

Constituents of money supply

In any economy, the constituents of money supply are as follows:

(a)   Rupee notes and coins with the public,

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(b) Credit cards,

(c) Traveller's cheques, etc.

1.2.4 Markets

- A system by which the buyers and sellers of a commodity can come into touch with each other (directly or indirectly).

- In Economics, a market for a commodity is a system.

- Here, the buyers and the sellers establish contact with each other directly or indirectly.

- They have a view to purchasing and selling the commodity.

Functions of a market

The major functions of a market for a commodity are : (i) to determine the price for the commodity, and (ii) to determine the quantity of the commodity that will be bought and sold. Both the price and the quantity are determined by the interactions between the buyers and the sellers of the commodity.

The market mechanism

When economists talk of the market mechanism, they mean the totality of all markets (i.e., the markets for all the goods and services in the economy). The market mechanism determines the prices and the quantities bought and sold of all the goods and services.

1.2.5 Investment

Investment means an increase in the capital stock. For a country, as a whole, investment is the increase in the total capital stock of the country. For an individual, investment is the increase in the capital stock owned by him.

Real investment and portfolio investment

Economists talk of two types of investment : real investment and portfolio investment.

(a) Real investment : Real investment means an increase in the real capital stock, i.e., an addition to the stock of machines, buildings, materials or other types of capital goods.

(b) Portfolio investment : Portfolio investment essentially means the purchase of shares of companies. However, it is only the purchase of new shares issued by accompany that can properly be termed as investment (because the company will use the money for expanding its productive capacity, i.e., the company's real capital stock will increase). Purchase of an existing share from another shareholder is not an investment because in this case the company's real capital stock does not increase.

Gross investment and net investment

In any economy, the aggregate investment made during any year is called gross investment. The gross investment includes (a) inventory investment and (b) fixed investment. Investment in raw materials, semi-finished goods and finished goods is referred to as inventory investment. On the other hand, investment made in fixed assets like machineries, factory sheds etc. is called fixed investment.

By deducting depreciation cost, of capital from the gross investment, we get new investment.

So, Net investment = Gross investment – depreciation cost.

1.2.6 Production

- Production means "creation of utility".

- It also refers to creation of goods (or performance of services) for the purpose of selling them in the market.

DEPARTMENT: COMPUTER SEMESTER: 4ᵗʰ
SUBJECT NAME: PEM
SUBJECT CODE: 3140709
FACULTY NAME: Ms. Amisha Parkar

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- There was a time when production meant the fabrication of material goods only.
- A tailor's activity was considered to be production but the activity of the trader who sold clothes to the purchasers was not considered as production.
- At present, both material goods and services are considered as production.
- Production must be for the purpose of selling the produced goods (or, services) in the market.

Factors of production

The goods and services with the help of which the process of production is carried out, are called factors of production. Economists talk about four main factors of production : land, labour, capital and entrepreneurship (or organization). They are also called as the inputs of production. On the other hand, the goods produced with the help of these inputs, are called as the output.

1.2.7 Consumption

By consumption, we mean satisfaction of wants. It is because we have wants that we consume various goods and services. Moreover, it is assumed that, if we have wants, these can be satisfied only through the consumption of goods and services. Thus, consumption is defined as the satisfaction of human wants through the use of goods and services.

Other determinants of consumption

Present income	It is the main determinant of consumption
Expected future income	• Most people try to save for the future.
	• People display a low average propensity to consume when they are young.
	• A low propensity to save when they are old.
Wealth	• A person may have a low income, but he may be wealthy
	• He may have a great amount of accumulated wealth,
	• In this case, he may have high consumption expenditure.

1.2.8 Saving

- Saving is defined as income minus consumption.
- Whatever is left in the hands of an individual after meeting consumption expenditure is the individual's saving.
- The sum-total of funds in the hands of an individual is obtained by accumulating the saving of the past years.
- Saving is generated out of current income of an individual.
- Savings are created out of past income of an individual.

1.2.9 Income

The income of a person means the net inflow of money (or purchasing power) of this person over a certain period. For instance, an industrial worker's annual income is his salary income over the year. A businessman's annual income is his profit over the year.

Wealth and income

The difference between wealth and income must be clearly understood. A person (or a nation) consumes a part of the income and saves the rest. These savings are accumulated in the form of wealth. Wealth is a stock. It is stock of goods owned at a point of time. Income is a flow; it is the inflow of money (or

purchasing power) over a period of time.

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1.2.10 Consumer Surplus

- The concept was introduced by Prof. Marshall in Economics.
- The excess satisfaction or utility that a consumer can enjoy from the purchase of a thing when the price that he actually pays is less than the price he was willing to pay for it.
- It is the difference between individual demand price and market price.
- The price that a man is willing to pay is determined by the marginal utility of the thing to him.
- The concept is derived from the Law of Diminishing Marginal Utility.
- As a man consumes successive units of a commodity, the Marginal Utility from each unit goes on falling.
- It is often argued that the surplus satisfaction cannot be measured precisely.
- It is difficult to measure the marginal utilities of different units of a commodity consumed by person.

1.2.11 Capital

- In a fundamental sense, capital consists of any produced thing that can enhance a person's power to perform economically useful work.
- Example, a stone or an arrow is capital for a caveman who can use it as a hunting instrument.
- Capital is an input in the production process.
- It refers to financial resources available for use.
- Capital is different from money.
- Money is used simply to purchase goods and services for consumption. Capital is more durable and is used to generate wealth through investment.
- Capital is something owned which provides ongoing services.
- Economic capital is used for measuring and reporting market and operational risks across a financial organization.

1.2.12 Utility

- Utility, or usefulness, is the ability of something to satisfy needs or wants.
- Utility is an important concept in economics because it represents satisfaction experienced by the consumer of a good.
- Utility is a representation of preferences over some set of goods and services.
- One cannot directly measure benefit, satisfaction or happiness from a good or service, so instead economists have devised ways of representing and measuring utility in terms of economic choices that can be counted.
- Economists consider utility to be revealed in people's willingness to pay different amounts for different goods.
- Total utility is the aggregate sum of satisfaction or benefit that an individual gains from consuming a given amount of goods or services in an economy.
- The amount of a person's total utility corresponds to the person's level of consumption.
- Usually, the more the person consumes, the larger his or her total utility will be.
- Marginal utility is the additional satisfaction, or amount of utility, gained from each extra unit of

consumption.

- Total utility usually increases as more of a good is consumed.
- Marginal utility usually decreases with each additional increase in the consumption of a good.
- This decrease demonstrates the law of diminishing marginal utility.

1.2.13 Law of Diminishing Marginal Utility

- This Law is a fundamental law of Economics.
- It relates to a man's behaviour as a consumer.
- The Law states that as a man gets more and more units of a commodity, marginal utility from each successive unit will go on falling till it becomes zero or negative.
- Marginal utility means the additional utility obtained from one particular unit of a commodity.
- It is expressed in terms of the price that a man is willing to pay for a commodity.
- The basis of the Law is satiability of a particular want.
- Although human wants are unlimited in number yet a particular one can be fulfilled.

The Law can be explained in the following illustration:

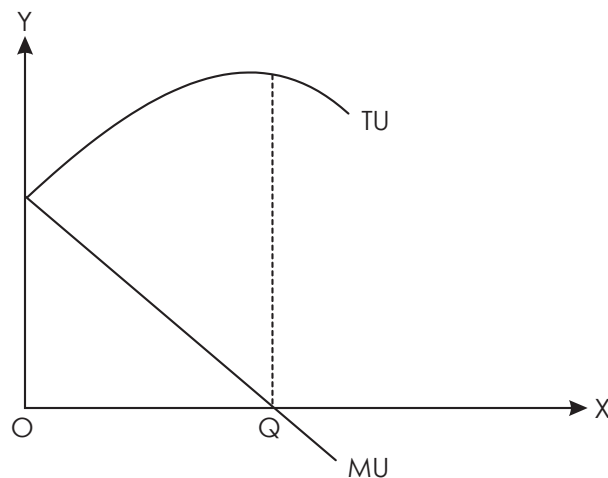| Units of goods	Total utility (TU)	Marginal utility (MU)
1	4	–
2	5	1
3	6	1
4	6	0
5	5	-1

The above table can be shown by the following graph —

Fig 1.1 : Marginal Utility and Total Utility Curve

In this graph the curve MU is Marginal Utility curve. It has a negative slope denoting the fact that as

the quantity of a commodity increases, marginal utility goes on following. At Q it is zero and after it, it becomes negative.

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The Law is based upon certain assumptions —

- It is assumed that the different unit consumed should be identical in all respects.
- Further it is assumed that consumer's habit taste, preference remain unchanged.
- Thirdly, there should be no time gap or interval between the consumption of one unit and another unit.
- Lastly, the different units consumed should consist of standard units which are not too small or large in size.

Notion of the Law

The Law of Diminishing utility is not applicable in some cases. The Law may not apply to articles like gold, money where more quantity may increase the lust for them. Further the Law does not apply to music, hobbies. Thirdly, Marginal utility of a commodity may be affected by the presence or absence of articles which are substitutes or complements.

1.2.14 Demand Forecasting

In modern business, production is carried out in anticipation of future demand. There is thus a time-gap between production and marketing. So production is done on the basis of demand forecasting. The success of a business firm depends to a large extent upon its successful forecasting.

The following methods are commonly used in forecasting demand.

(a) **Expert opinion method –** experts or specialists in the fields are consulted for their opinion regarding future demand for a particular commodity.

(b) **Survey of buyers' intentions –** generally a limited number of buyers' choice and preference are surveyed and on the basis of that the business man forms an idea about future demand for the product it is going to produce.

(c) **Collective opinion method –** the firm seeks opinion of retailers and wholesalers in their respective territories with a view to estimate expected sales.

(d) **Controlled experiments –** the firm takes into account certain factors that effect demand like price, advertisement, packaging. On the basis of these determinants of demand the firm makes an estimate about future demand.

(e) **Statistical methods –** More often firms make statistical calculations about the trend of future demand. Statistical methods comprising trend projection method, least squares method progression analysis etc. are used depending upon the availability of statistical data.

1.2.15 Production Posibility Curve (PPC)

In economics, a **production–possibility curve (PPC)**, is also called a **production–possibility frontier (PPF)**, **production-possibility boundary or product transformation curve**, is a graph that compares the production rates of two commodities that use the same fixed total of the factors of production. Graphically bounding the production set, the PPF curve shows the maximum specified production level of one commodity that results given the production level of the other. By doing so, it defines productive efficiency in the context of that production set.

Let us consider the shape and use of the production possibility curve. In our discussion we make the following assumptions:

(1) Only two goods, X and Y, are being produced.

(2) Only one factor of production is used in the production. That factor of production is labour. Supply of labour in the economy is fixed and total amount of labour is fully employed.

(3)   The two goods can be produced in various ratios. This means that the country can produce more of X and less of Y or less X and more of Y.

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(4)   In the production of both goods, law of increasing cost operates. This means that if the production of one good rises, its marginal cost will rise.

(5)   There is no change in production process or production technology.

With the help of these assumptions we can explain how the production possibility curve can be obtained.

•   Suppose the country can produce different alternative combinations of X and Y with its given amount of labour.

•   Those combinations are shown with the help of the following hypothetical schedule:

<div align="center">

Production Possibility Schedule

Good X	Good Y
0	10
1	9
2	7
3	4
4	0

</div>

•   From this schedule we see that if the country produces only Y and no amount of good X, then it can produce a maximum of 10 units of Y. So, we get a combination (0, 10) on the production possibility curve.

•   Again, if the country does not produce good Y and devote its entire resources in the production of X, then it can produce a maximum of 4 units of X. Hence, point (4, 0) will be a combination of two goods on the production possibility curve.

•   In this way, employing the entire resource (labour), the country can produce 1 unit of good X and 9 units of good Y, or 2 units of good X and 7 units of good Y, etc.
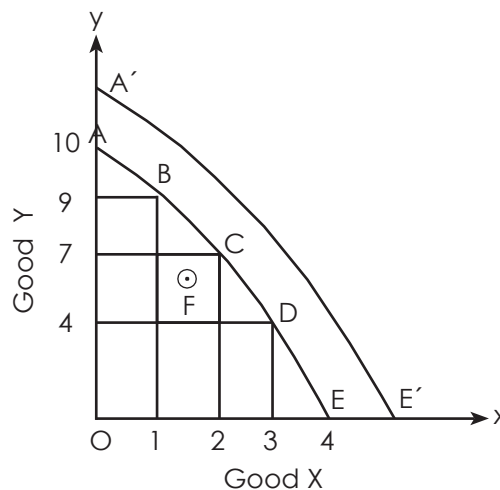

<div align="center">Fig. 1.2</div>

- In our figure, we plot the amount of good X (say, x) on the horizontal axis and the amount of good Y (say, y) on the vertical axis.

- In this figure, AE is the production possibility curve.

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- At A on this curve, x = 0 and y = 10 i.e., point A expresses the combination (0, 10). Similarly, point B represents the combination (1, 9), point C represents the combination (2, 7), point D represents the combination (3, 4) and point E expresses the combination (4, 0).

- With the given amount of labour, the country can produce any product combination on the production possibility curve AE. This curve is downward sloping.

- It implies that, given the amount of labour, if the country increases the production of one good, it must reduce the production of the other.

- The country can produce any combination below AE but it cannot produce any combination lying to the right of AE.

- Let F be a point to the left of AE. At this point, some amount of labour will remain unutilised. By full employment of labour, the country can move from F to any point on AE where the production of at least one commodity will increase.

- Again, if it is found that there is full employment of labour but output is obtained as represented by F, then it should be understood that production has not been done efficiently.

- In that case, it is possible to increase the production of both goods by efficient utilisation of labour.

- If the given amount of labour is fully utilised, the country can produce any combination of X and Y on AE.

- Hence, to determine the production levels of two goods means to determine the point on the production possibility curve at which the country will stay.

1.3 DEMAND

- In the ordinary sense, demand means desires.

- Demand in Economics means both the willingness as well as the ability to purchase a commodity by paying a price and also its actual purchase.

- A man may be willing to get a thing but he is not able to pay the price. It is not demand in the economic sense.

- Demand is related to price.

- Generally demand for a commodity depends upon the price of the commodity.

- Generally the relation between price and demand is inverse.

- When price of a particular commodity goes up, its demand falls and vice-versa.

- But in exceptional cases the two variables may move in the same direction.

- There are other factors that may influence the quantity demanded for a quantity.

- One such factor is the income of the consumer.

- If a man's income increases, obviously he will be able to demand more of the goods at a given price.

- Except that, demand for a commodity depends upon the taste and preference of the consumers, the price of substitute goods etc.

1.3.1 Law of Demand

The law of demand expresses the functional relationship between the price of commodity and its quantity demanded. It states that the demand for a commodity tends to vary inversely with its price this implies that the law of demand states- Other things remaining constant, a fall in price of a commodity will lead to a rise in demand of that commodity and a rise in price will lead to fall in demand.

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Assumption:

(i)   Income of the people remaining unchanged.

(ii)   Taste, preference and habits of consumers unchanged.

(iii)   Prices of related goods i.e., substitute and complementary goods remaining unchanged

(iv)   There is no expectation of future change in price of the commodity.

(v)   The commodity in question is not consumed for its prestige value.

Importance of Law of Demand

1. **Basis of the Law of Demand :** The law of Demand is based on the consumers that they are prepared to buy a large quantity of a certain commodity only at a lower price. This results from the fact that consumption of additional units of a commodity reduces the marginal utility to him.

2. **Basis of consumption Expenditure :** The law of Demand and the law of equi-marginal utility both provide the basis for how the consumer should spend his income on the purchase of various commodites.

3. **Basis of Progressive Taxation :** Progressive Taxation is the system of Taxation under which the rate of tax increase with the increase in income. This implies that the burden of tax is more on the rich than on the poor. The basis of this is the law of Demand. Since it implies that the marginal utility of Money to a rich man is lower than that to a poor man.

4. **Diamond-water paradox :** This means that through water is more useful than diamond. Still the price of diamond is more than that of water. The explanation lies in law of diminishing marginal utility. The price of commodity is determined by its marginal utility. Since the supply of water is abundant the marginal utility of water is very low and so its price. On the contrary, supply of diamond is limited so the marginal utility of diamond is very high, therefore the price of diamond is very high.

1.3.2 Demand Schedule

It is a numerical tabulation, showing the quantity that is demanded at selected prices. A demand schedule can be of 2 types; Individual Demand Schedule, Market Demand Schedule

1.3.2.1 Individual Demand Schedule : It shows the quantity of a commodity that one consumer or a particular household will buy at selected prices, at a given time period.

Price of x (`)	Quantity demanded of x (units)
100	4
50	2
20	10
10	15
5	20

1.3.3.2 Market Demand Schedule : When we add the individual demand schedule of various household, we get the market demand schedule. For example, there are four households in the market and their demand schedule at different prices are given below :

Price	Quantity Demanded				Market Demand
	A	B	C	D	
100	1	2	1	2	6
50	2	5	2	4	13
20	10	10	5	10	35
10	15	15	10	15	55
5	20	20	15	20	75

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1.3.3 Demand Curve : Demand curve is a diagrametic representation of the demand schedule when we plot individual demand schedule on a graph, we get individual demand curve and when we plot market schedule, we get market curve. Both individual and market demand curves slope downward from left to right indicating an inverse relationship between price and quantity demanded of goods.

Y

D

P

P$_1$

D´

X
Quantity Demanded

O   Q   Q$_1$

Fig.1.3 : Demand Curve

The demand curve is downward sloping because of the following reasons.

1) Some buyer may simply not be able to afford the high price.

2) As we consume more units of a product, the utility of that product becomes less and less. This is called the principle of diminishing Marginal Utility.

The quantity demanded rises with a fall in price because of the substitution effect. A low price of x encourages buyer to substitute x for other product.

1.3.4 Substitution effect - As the relative price of the commodity decreses, the consumer purchases more of the cheaper commodity and less of the dearer ones. Hence, with the fall in relative prices, the demand for the commodity rises. Due to inverse relation, the substution effect is negative.

1.3.5 Determinants of demand - There are many factors other than price that can affect the level of quantity demanded. This defines demand function.

(i) **Price of the Commodity :** There is an inverse relationship between the price of the commodity and the quantity demanded. It implies that lower the price of commodity, larger is the quantity demanded and vice-versa.

(ii) **Income of the consumers :** Usually there is a direct relationship between the income of the consumer and his demand. i.e. as income rises his demand rises and vice-a-versa. The income demand relationship varies with the following three types of commodities :

(a) Normal Goods : In such goods, demand increases with increase in income of the consumer. For eg. demands for television sets, refrigerators etc. Thus income effect is positive.

(b) Inferior Goods : Inferior Goods are those goods whose demand decrease with an increase in consumes income. For e.g. food grains like Malze , etc. If the income rises demand for such goods to the consumers will fall. Thus income effect is negative.

(c) Giffen goods : In case of Giffen goods the demand increases with an increase in price but it decreases with the rise in income. Thus income effect is negative.

(iii) **Consumer's Taste and Preference :** Taste and Preferences which depend on social customs, habit of the people, fashion, etc. largely influence the demand of a commodity.

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(iv) **Price of Related Goods :** Related Goods can be classified as substitute and complementary goods.

(v) **Substitute Goods :** In case of such goods, if the price of any substitute of commodity rises, then the commodity concern will become relatively cheaper and its demand will rise. The demand for the commodity will fall if the price of the substitute falls. eg. If the price of coffee rises, the demand for tea will rise.

(vi) **Complementary Goods :** In case of such goods like pen and ink with a fall in the price of one there will be a rise in demand for another and therefore the price of one commodity and demand for its complementary are inversely related.

(vii) **Consumer's Expectation :** If a consumer expect a rise in the price of a commodity in a near future, they will demand it more at present in anticipation of a further rise in price.

(viii) **Size and Composition of Population :** Larger the population, larger is likely to be the no. of consumers. Besides the composition of population which refers to the children, adults, males, females, etc. in the population. The demographic profile will also influence the consumer demand.

1.3.6 Movement and Shift of Demand

(a)   Movement of Demand curve or Extension and Constriction of Demand or change in quantity. demanded.

In the quantity demanded of a commodity increases or decreases due to a fall or rise in the price of a commodity alone, ceteris paribus. It is called movement along the demand curve which occurs only due to change in price of that commodity, ceteris paribus, Extension of Demand or movement along the demand curve to the right.

When the quantity demanded rises due to fall in price of that commodity, and other parameters remaining constant it is called extension of demand which is shown in the following diagram.
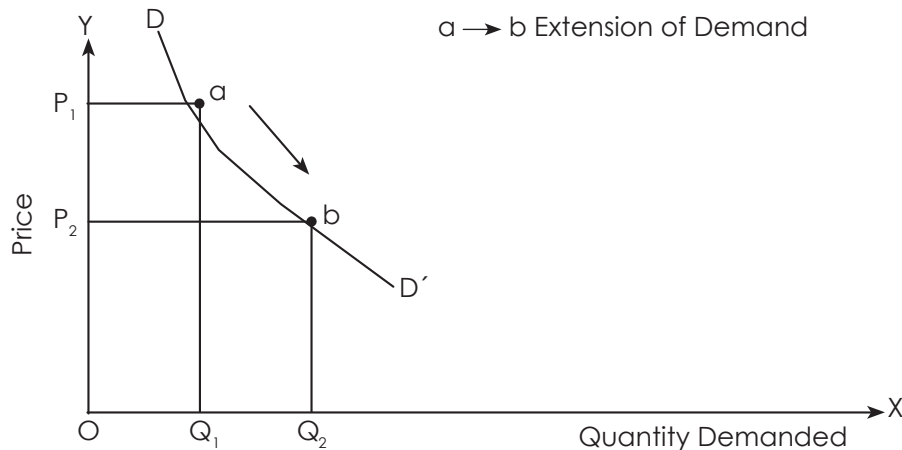
Fig.1.4 : (a) Movement along Demand Curve (Decreasing)

In the diagram, we find that the quantity demanded has increased from Q_1 to Q_2 due to a fall in price from P_1 to P_2, Ceteris Paribus. This is shown by a movement along a demand curve toward the right from point a to b.

Contraction or Movement towards left of demand curve : When the quantity demanded of a commodity falls due to rise in the price of that commodity it is called contraction of demand and is shown in the following diagram.
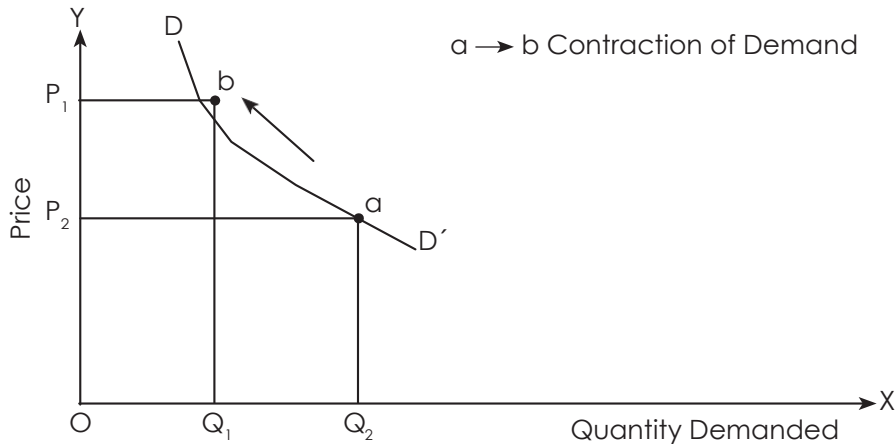
Fig.1.4 : (b) Movement along Demand Curve (Increasing)

In the diagram, when the price was P_2, quantity demanded was Q_2. As the price rises to P_1 the quantity demanded falls to Q_1. Such a fall in demand is shown by a movement along the same demand curve towards the left from point a to b.

Both the situation of extension and contraction can be shown in a single diagram as below :
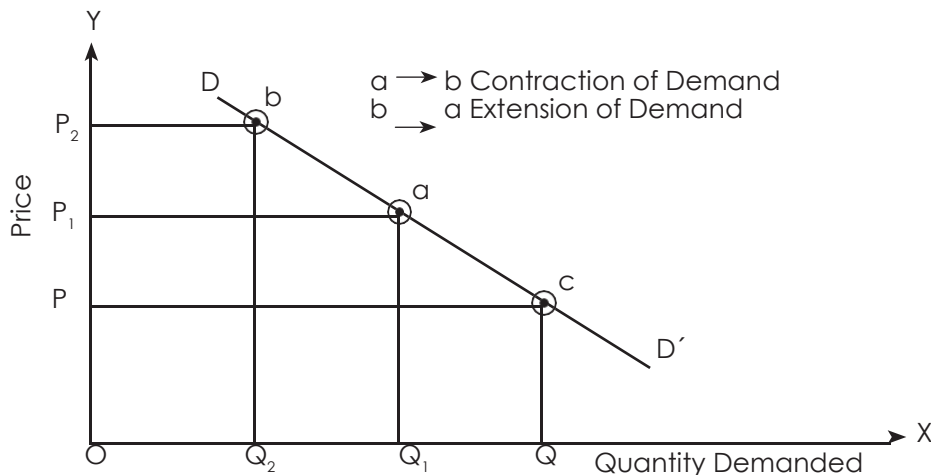
Fig.1.4 : (c) Movement along Demand Curve

(b) Change in Demand or shift of demand or Increase and Decrease in demand : When the quantity demanded of a commodity rises or falls due to change in factors like income of the consumer, price of related goods, etc. and keeping the price of the commodity to be constant, it is called shift in Demand.

(i) Increase in Demand or Shift of Demand Curve towards the Right : When the quantity demanded of a commodity rises due to change in factors like income of the consumable etc. price of the commodity remaining unchanged it is called increase in demand.

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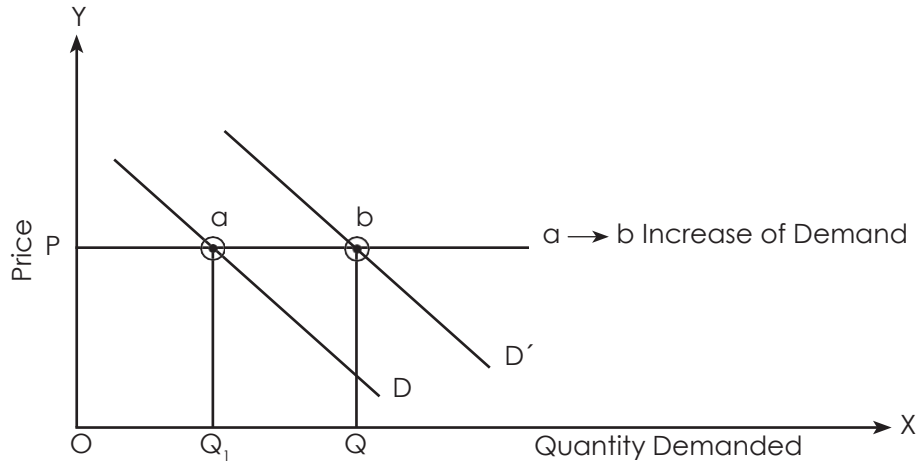
Fig.1.5 : Shift of Demand Curve (Rightward)

In the above diagrams, we see that quantityty demanded has increased from Q_1 to Q, the price remaining unchanged to OP.

D_1 Increase in Demand or Shift of Demand Curve towards right.

(ii) Decrease in Demand or shift of Demand Curve towards the left : When the demand for a commodity falls due to other factors, the price remaining constant, it is termed as decrease in demand or shift of demand curve towards the left.
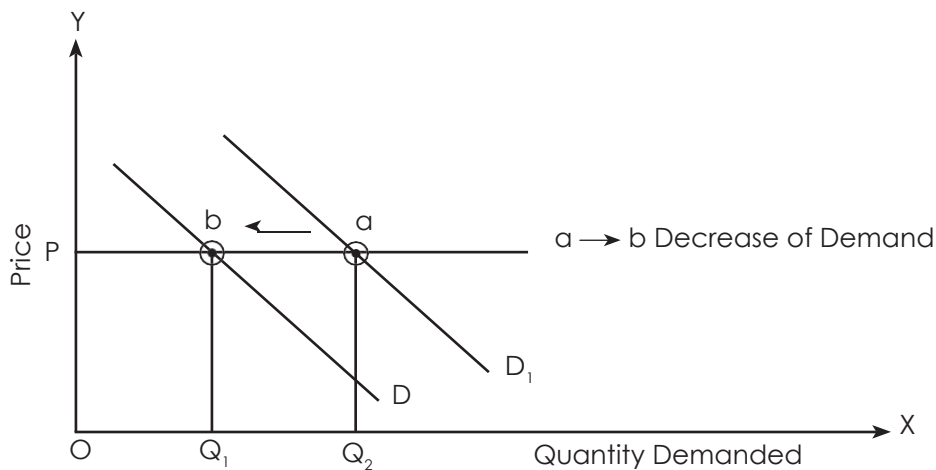
Fig.1.6 : Shift of Demand Curve (Leftward)

1.3.7 Causes of downward slope of demand curve :

(i) **Law of Diminishing Marginal Utility :** This law states that when a consumer buys more units of same commodity, the marginal utility of that commodity continues to decline. This means that the consumer will buy more of that commodity when price falls and when less units are available, utility will be high and consumer will prefer to pay more for that commodity. This proves that the demand would be more at lower prices and less at a higher price and so the demand curve is downward sloping.

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(i) **Income effect :** As the price of the commodity falls, the consumer can increase his consumption since his real income is increased. Hence he will spend less to buy the same quantity of goods. On the other hand, with a rise in price of the commodities the real income of the consumer will fall and will induce them to buy less of that good.

(iii) **Substitution effect :** When the price of a commodity falls, the price of its substitutes remaining the same, the consumer will buy more of that commodity and this is called the substitution effect. The consumer will like to substitute cheaper one for the relatively expensive one on the other hand, with a rise in price the demand fall due to unfavorable substitution effect. It is because the commodity has now become relatively expensive which forces the consumer's to buy less.

(iv) **Goods having multipurpose use :** Goods which can be put to a number of uses like coal, aluminum, electricity, etc. are eg. of such commodities. When the price of such commodity is higher, it will not used for a variety of purpose but for use purposes only. On the other hand, when price falls of the commodity will be used for a variety of purpose leading to a rise in demand. For eg : if the price of electricity is high, it will be mainly used for lighting purposes, and when its price falls, it will be needed for cooking.

(v) **Change in number of buyers :** Lower the price, will attract new buyers and raising of price will reduce the number of buyers. These buyers are known as marginal buyers. Owing to such reason the demand falls when price rises and so the demand curve is downward sloping.

1.3.8 Exceptions to the law of demand:

(i) **Conspicuous goods :** These are certain goods which are purchases to project the status and prestige of the consumer. For e.g. expensive cars, diamond jewellery, etc. such goods will be purchased more at a higher price and less at a lower price.

(ii) **Giffen goods :** These are special category of inferior goods whose demand increases even if with a rise in price. For eg. coarse grain, clothes, etc.

(iii) **Share's speculative market :** It is found that people buy shares of those company whose price is rising on the anticipation that the price will rise further. On the other hand, they buy less shares in case the prices are falling as they expect a further fall in price of such shares. Here the law of demand fails to apply.

(iv) **Bandwagon effect :** Here the consumer demand of a commodity is affected by the taste and preference of the social class to which he belongs to. If playing golf is fashionable among corporate executive, then as the price of golf accessories rises, the business man may increase the demand for such goods to project his position in the society.

(v) **Veblen effect :** Sometimes the consumer judge the quality of a product by its price. People may have the expression that a higher price means better quality and lower price means poor quality. So the demand goes up with the rise in price for eg. : Branded consumer goods.

1.3.9 Elasticity of Demand

Whenever a policy maker wishes to examine the sensitivity of change in quantity demanded due to the change in price, income or price of the related goods, he wishes to study the magnitude of this response with the help of "elasticity" concept. Thereby, the concept is crucial for business decision-making and also for forecasting future demand policies.

Determinants of Elasticity of demand:

(i) **Nature, necessity of a commodity :** The demand for necessary commmodity like rice, wheat, salt, etc is highly inelastic as their demand does not rise or fall much with a change in price.

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On the other demand for luxuries changes considerably with a change in price and than demand is relatively elastic.

(ii) **Availability of substitutes :** The Demand for commodities having a large number of close substitute is more elastic than the commodities having less or no substitutes. If a commodity has a large no. of substitutes its elasticity is high because when there is a rise in its prices, consumers easily switch over to other substitutes.

(iii) **Variety of uses :** The Product which have a variety of uses like steel, rubber etc. have a elastic demand and if it has only limited uses, then it has inelastic demand. For eg. if the unit price of electricity falls then electricity consumption will increase,more than proportionately as it can be put to use like washing, cooking, as the price will go up, people will use it for important purposes only.

(iv) **Possibility of postponement of consumption :** The commodities whose consumption can easily be postponed has more elastic demand and the commodities whose consumption cannot be easily postponed has less elastic demand for eg. for expensive jewellery, perfume it is possible to postpone consumption in case the price is high and so such goods are elastic on the other hand, the necessities of life cannot be postponed and so they are inelastic in demand.

(v) **Durable commodities :** Durable goods like furniture's, etc, which will last for a longer time have valuably inelastic demand. This is because in such case, a fall in price will not lead to a large increase in demand and a rise in price again will not load to a huge fall in demand. But in case of perishable goods, the demand is elastic is nature.

1.3.9.1 Price Elasticity of Demand

It is defined as the degree of responsiveness of quantity demanded of a commodity due to change in its price when other factor remaining constant. Price elasticity of Demand is usually measured by the following formula :

Price elasticity of demand = % Change in Quantity Demand / % Change in Price

$$e_d = (dq/q) \times 100 / (dp/p) \times 100$$

$$= dq/dp \times p/q$$

Where dq = change in quantity demanded

dp = change in price,

p = Original price,

q = Original quantity

If $e_d > 1$, we call it relatively elastic demand.

If $e_d = 1$, we call it unitary elastic demand.

If $e_d < 1$, we call it relatively inelastic demand.

If $e_d = \infty$, we call it perfectly elastic demand.

If $e_d = 0$, we call it perfectly inelastic demand.

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Types of Price Elasticity

(a) **Perfectly Elastic Demand :** That is $[e_d = \infty]$. When the quantity demanded of a commodity changes infinitely due to a slight or no decrease in price, such goods are said to have perfectly elastic demand.
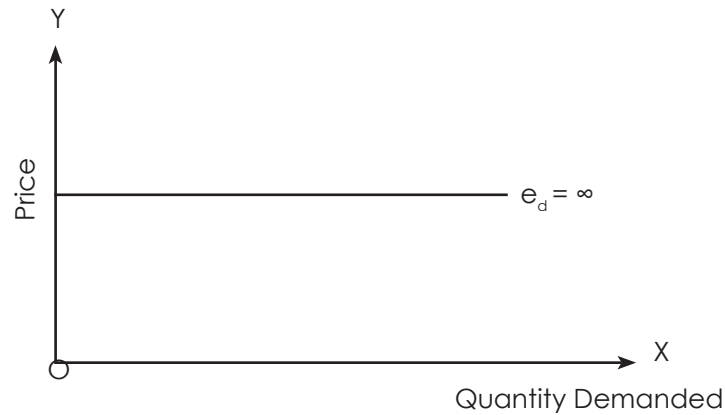
Fig.1.7 : Perfectly Elastic Demand Curve

A perfectly Elastic Demand Curve is a straight line parallel to X–axis.

(b) **Relatively Elastic Demand :** In such type of goods the percentage change in quantity demanded of a commodity is more than proportionate to the percentage change in price, eg. luxury car.
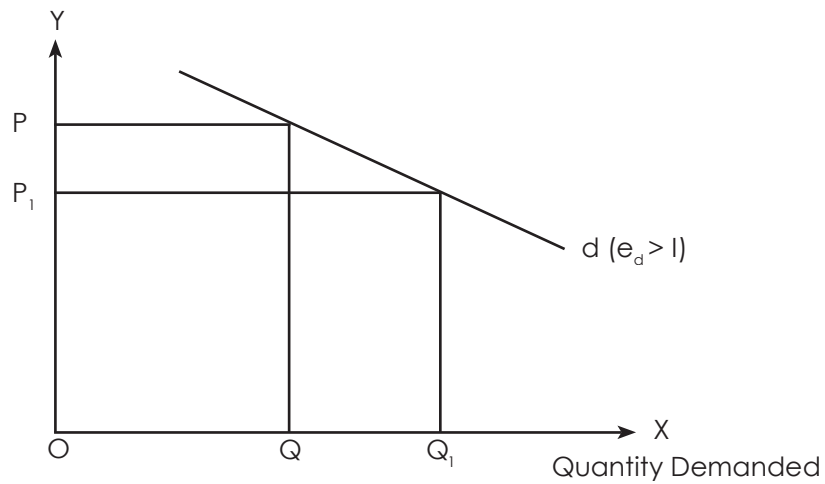
Fig.1.8 : Relative Elasticity of Demand Curve

In the diagram we see that change in quantity demanded QQ_1 is more than proportionate to the change in price PP_1.

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(c) **Unit Elastic Demand (e_d = 1)**

Here the rate of change in demand is exactly equal to the rate of change in price.

Therefore the products or service with unit elasticity are neither elastic nor inelastic.
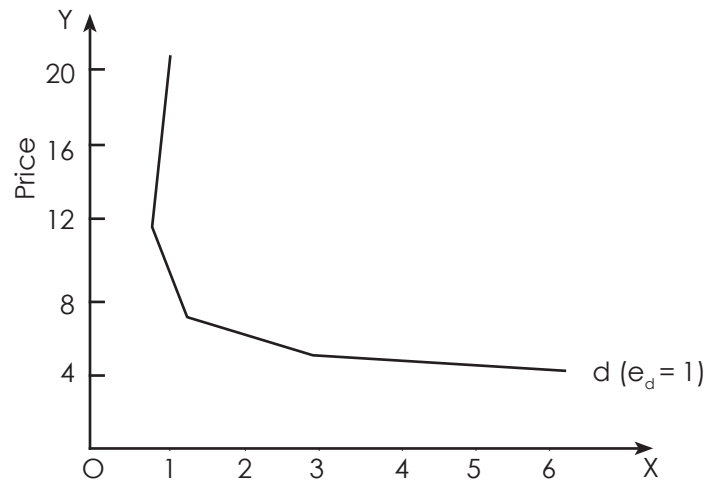
Fig. 1.9 : Unit Elasticity of Demand Curve

A Unit elastic Demand curve is a rectangular - hyperbola as shown above

(d)   Relatively Inelastic Demand ($e_d < 1$)

In this type of goods and services the proportionate change in quantity demand is less than the change in price. These are mostly essential goods of daily use like rice, wheat etc.
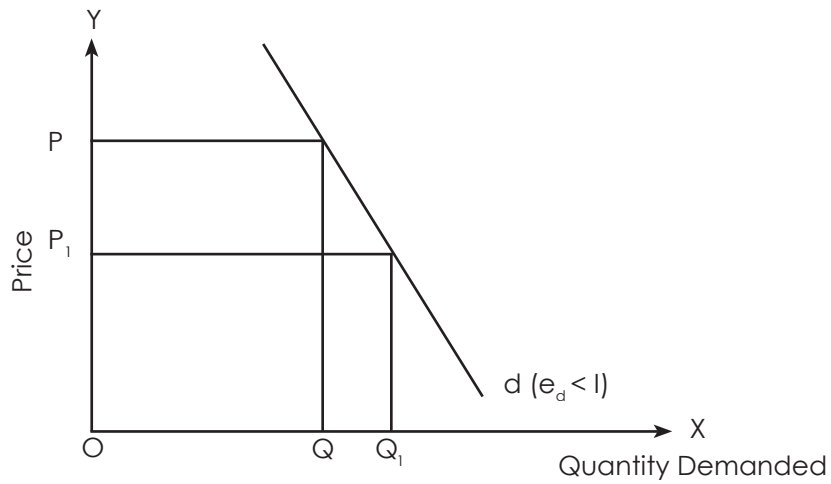
Fig.1.10 : Relatively Inelastic Demand Curve

In the diagram change in quantity QQ_1 is less than proportionate to the change in price PP_1.

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(e) **Perfectly Inelastic Demand :** These are certain goods like salt, match box etc. whose demand neither increase nor decrease with a change in price.

Fig.1.11 : Perfectly Inelastic Demand Curve

A perfectly inelastic demand curve is a vertical straight line parallel to Y –axis which shows that whatever may be the change in price the demand will remain constant at OQ.

Importance of Price Elasticity of Demand :

(i) **Business decisions :** The concept of price elasticity of demand helps the firm to decide whether or not to increase the price of their product. Only if the product is inelastic in nature, then raising of price will be beneficial. On other hand, if the product is elastic in nature, then a rise in price might lead to considerable fall in demand. Therefore the price of different commodities are determined on the basis of relative elasticity.

(ii) **To monopolist :** A monopolist often practices price discrimination. Price discrimination is a process in which a single seller sells the same commodity in two different markets at two different prices at the same time. The knowledge of price elasticity of the product to the monopolist is important because he would charge higher price from those consumers who have inelastic demand and lower price from those consumers who have elastic demand.

(iii) **Determination of Factor Price :** The concept of elasticity of demand also helps in determining the price of various factors of production. Factor having inelastic demand gets higher price and factors having elastic demand gets lower price.

(iv) **Route for International Trade :** If demand for exports of a country is inelastic, that country will enjoy a favorable terms of trade while if the exports are more elastic than imports, then the country will lose in the terms of trade.

(v) **The Govt :** Elasticity of demand is useful in formulation Govt. Policy particularly taxation policy and the policy of subsides if the Govt. wants to impose excise duty, or sales tax, the Govt. should have an idea about the elasticity of the product. If the product is elastic in nature, then the burden of the tax is shifted to the consumer and the demand might fall remarkably: on the other hand, if the demand is inelastic in nature, then any extra burden of indirect tax will not affect the demand to that extent.

Application of Price Elasticity of Demand :

• An individual spends all his income to two goods X and Y. If with the rise in the price of good X, quantity demanded of good Y remain unchanged, what is price elasticity of demand for X?

Hint: Quantity purchased of good Y will remain the same even when the price of good X rises. This implies that the expenditure on good X remain constant. This concludes that the price elasticity of demand for good X equals one.

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• The price elasticity of demand for colour TV is estimated to be -2.0. If the price of the colour TV is reduced by 20% then what the rise in quantity sold do you expect?

Hint: The price elasticity of demand being equal to -2.0 means that one percent change in price causes 2.0% change in quantity demanded or sold. Thus 20% reduction in price will cause 2.0 × 20 = 40 percent rise in quantity demanded or sold.

• The initial price and quantity for a commodity X are ` 50 and 500 units respectively. If the price reduces to ` 40,The quantity demanded rises to 1,000 units Compute the price elasticity of demand.

Solution:

Given, Po   =   ` 50
       Qo   =   500 units
       P1   =   ` 40/-
       Q1   =   1,000 units

Hence, for price elasticity,

$$|e_p| = \left| \frac{(Q_1 - Q_o)/ Q_o}{(P_1 - P_o)/ P_o} \right|$$

$$= \left| \frac{(Q_1 - Q_o)}{P_1 - P_o} \times \frac{P_o}{Q_o} \right|$$

$$= \left| \frac{(1000 - 500)}{(40 - 50)} \times \frac{50}{500} \right|$$

$$= \left| \frac{500}{10} \times \frac{50}{500} \right| = 5 > 1$$

Hence, the demand is highly price elastic.

Measurement of Price Elasticity

Elasticity of demand can be measured using three methods namely, arc elasticity, point elasticity and total outlay method.

(i) **Arc elasticity :** This is the average measure of the elasticity on the arc of the demand cure.
Here within the entire demand curve, two points A & B are considered. Joining them, we get an arc, and on average, the elasticity is measured.
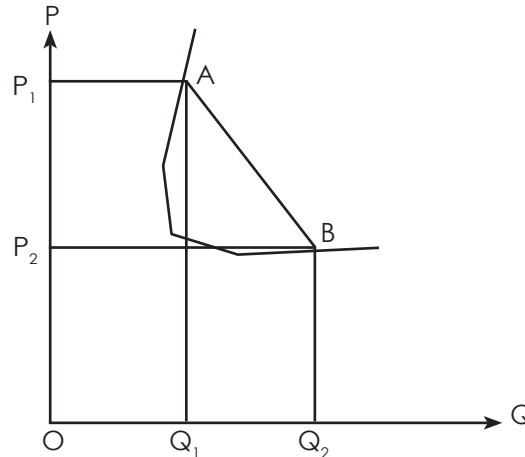

Fig.1.12 : Arc Elasticity Demand Curve

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i.e. initial price = $\dfrac{P_1 + P_2}{2}$

initial quantity = $\dfrac{Q_1 + Q_2}{2}$

∴ Price elasticity = $\dfrac{dQ}{dP} \cdot \dfrac{P}{Q}$

$= \dfrac{dQ}{dP} \cdot \dfrac{(P_1 + P_2)/2}{(Q_1 + Q_2)/2}$

(ii) **Point Elasticity Method :** This method is more acceptable and prime than the previous one. In case of arc elasticity, initial price and quantity are not appr calculated since, they do not have single points. But in case of point elasticity, a single price – quantity combination exist. Here the price elasticity varies along various points on the linear demand curve. It may be considered as the approximation of extreme case of an arc of the demand curve.

It is measured by the formula = $\dfrac{\text{Lower Segment}}{\text{Upper Segment}}$

Elasticity at E = $\dfrac{\text{Lower Segment}}{\text{Upper Segment}}$

$= \dfrac{ED_1}{ED}$

Cases:

1. If E is the midpoint, e_p at E = 1 (∵ ED = ED)

2. At E', $e_P > 1$ ($E'D_1 > DE'$)

3. At D, $e_p = \alpha$ ($DD_1 / O \square \alpha$)

4. At E″, $e_p = \dfrac{D_1 E''}{DE''} < 1$

p

D

O q₁ ₁ q

Fig. 1.13 : Point Elasticity of Demand Curve   **5.**   At D_1 , $e_p = \dfrac{O}{DD_1} = 0$

Hence the upward movement along the demand curve (linear) generates higher values of price elasticity and downward movement reduces the value of price elasticity.

(iii) Total Outlay method:

The relation between the price elasticity of demand and the total revenue explains the total outlay method.

The three possible cases may be considered:

1. With the fall in price, quantity demanded will increase in such a way that total expenditure remain constant.

2. With the fall in price, total expenditure rises or demand is relatively elastic.

3. With the fall in price, total expenditure falls or the demand is relatively inelastic.

Eg. inelastic commodities, the producer seldom goes for price cut – This is became, a larger reduction in price will not stimulate higher increase in quantity demanded and hence total expenditure will not rise. So, or prices cut more obtain is not a rational decision.

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- **If the total expenditure falls with the fall in price elasticity?**

  Hint: A fall in price is not conduce to the rise in total expenditure and hence the price elasticity is less than unity.

- **If the price elasticity is |0.4|, what can you comment?**

  Hint: The demand is inelastic in nature eg. necessities.

Problems on Elasticity

Problem 1 : Yesterday, the price of envelopes was ` 3 a box, and Julie was willing to buy 10 boxes. Today, the price has gone up to ` 3.75 a box, and Julie is now willing to buy 8 boxes. Is Julie's demand for envelopes elastic or inelastic? What is Julie's elasticity of demand?

Solution:

To find Julie's elasticity of demand, we need to divide the percent change in quantity by the percent change in price.

% Change in Quantity = (8 - 10)/(10) = - 0.20 = -20%

% Change in Price = (3.75 - 3.00)/(3.00) = 0.25 = 25%

Elasticity = |(-20%)/(25%)| = |-0.8| = 0.8

Her elasticity of demand is the absolute value of -0.8, or 0.8. Julie's elasticity of demand is inelastic, since it is less than 1.

Problem 2 : If Neil's elasticity of demand for hot dogs is constantly 0.9, and he buys 4 hot dogs when the price is ` 1.50 per hot dog, how many will he buy when the price is ` 1.00 per hot dog?

Solution:

This time, we are using elasticity to find quantity, instead of the other way around. We will use the same formula, plug in what we know, and solve from there.

Elasticity = in the case of John, % Change in Quantity = (X – 4)/4

Therefore : Elasticity = 0.9 = |((X – 4)/4)(% Change in Price)|

% Change in Price = (1.00 - 1.50)/(1.50) = -33%

0.9 = |(X – 4)4)/(-33%)|

|((X - 4)/4)| = 0.3

0.3 = (X - 4)/4

X = 5.2

Since Neil probably can't buy fractions of hot dogs, it looks like he will buy 5 hot dogs when the price drops to ` 1.00 per hot dog.

Problem 3 : Which of the following goods are likely to have elastic demand, and which are likely to have inelastic demand?

- Home heating oil
- Pepsi
- Chocolate
- Water
- Heart medication
- Oriental rugs

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Solution:

The goods can be classified as under :

Elastic demand: Pepsi, chocolate, and Oriental rugs

Inelastic demand: Home heating oil, water, and heart medication

Problem 4 : If supply is unit elastic and demand is inelastic, a shift in which curve would affect quantity more? Price more?

Solution:

Shifting the demand curve would affect quantity more, and shifting the supply curve would affect price more.

Problem 5 : Katherine advertises to sell cookies for ` 4 a dozen. She sells 50 dozen, and decides that she can charge more. She raises the price to ` 6 a dozen and sells 40 dozen. What is the elasticity of demand? Assuming that the elasticity of demand is constant, how many would she sell if the price were `10 a box?

Solution:

To find the elasticity of demand, we need to divide the percent change in quantity by the percent change in price.

% Change in Quantity = (40 - 50)/(50) = -0.20 = -20%

% Change in Price = (6.00 - 4.00)/(4.00) = 0.50 = 50%

Elasticity = | (-20%)/(50%) | = | -0.4 | = 0.4

The elasticity of demand is 0.4

To find the quantity when the price is `10 a box, we use the same formula:

Elasticity = 0.4 = | (% Change in Quantity)/(% Change in Price) |

% Change in Price = (10.00 - 4.00)/(4.00) = 1.5 = 150%

Remember that before taking the absolute value, elasticity was -0.4, so use -0.4 to calculate the changes in quantity, or you will end up with a big increase in consumption, instead of a decrease!

-0.4 = | (% Change in Quantity)/(150%) |

| (%Change in Quantity) | = -60% = -0.6

-0.6 = (X - 50)/50

X = 20

The new demand at ` 10 a dozen will be 20 dozen cookies.

Problem 6 : Usually, when gas prices go up in the U.S., it is the result of some action by OPEC. How would you explain this, verbally and graphically, using elasticity as part of your argument?

Solution:

When OPEC decreases supply, moving the supply curve inwards, it results in an increase in price and a decrease in consumption. What makes this situation even worse is that in the short run, American demand for gasoline is relatively inelastic, so that when the supply curve shifts inwards, consumption doesn't decrease much, but the price increases by a lot, since the demand curve is so steep.

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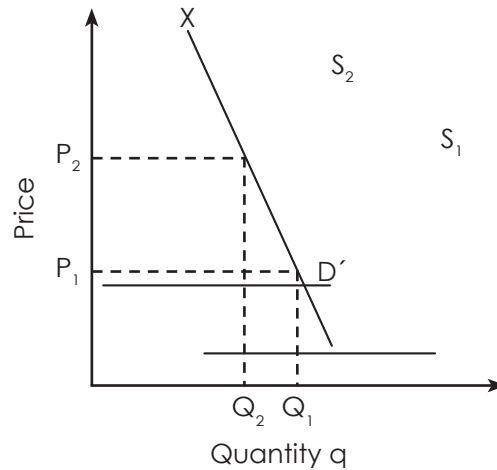
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Figure 1.14 : The Effects of Tightened Oil Supply on the Market for Gasoline

Problem 7 : How is it possible for the elasticity of demand to change over time (in the long run)?

Solution:

In the short run, demand can often be inelastic, as people are not willing to immediately change their consumption habits with increases in price. If they see that prices are permanently higher, however, they may take steps to change their consumption patterns in order to save money. For instance, if John buys a cup of gourmet coffee every morning at the same coffee shop, and the prices go up, he may continue buying coffee there, making his demand inelastic: he still buys coffee at the same rate even at a higher price. After a few weeks, however, he notices that it's starting to cost him a lot more to buy coffee every morning. So he might go buy a coffee maker and make his coffee every morning. In the long run, his elasticity of demand is quite high, even though his demand was inelastic in the short run.

Problem 8 : Why would a government tax on cigarettes be an ineffective method to decrease consumption of cigarettes if demand for cigarettes is inelastic?

Solution:

Putting a tax on cigarettes would have the effect of increasing the price of cigarettes. If demand is inelastic, however, smokers will still buy the same amount of cigarettes, or show a very small decrease in consumption, regardless of the increase in price. The net result of the tax would be a large jump in price with a smaller-than-desired decrease in consumption.

Problem 9 : Anna owns the Sweet Alps Chocolate store. She charges ` 10 per pound for her hand made chocolate. You, being an economist, have calculated the elasticity of demand for chocolate in her town to be 2.5. If she wants to increase her total revenue, what advice will you give her and why? Explain your answer.

Solution:

Anna should lower her price. Her price elasticity of demand for chocolate is elastic (greater than one) and therefore, when she lowers her price she will sell a lot more chocolate. The greater quantity sold will make up for her lower price, increasing her total revenue. In other words, she is selling at a lower price but making up for it in volume of sales.

Problem 10 : A 10 percent increase in income brings about a 15 percent decrease in the demand for

a good. What is the income elasticity of demand and is the good a normal good or an inferior good? Be able to explain your answer.

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Solution:

-15%/10% = - 0.15/0.10 = -1.5. Remember the elasticity is always read as the absolute value or a positive number, so it is 1.5 (elastic, or greater than one). The good is an inferior good because the sign is negative, indicating that an increase in income will bring a decrease in the demand for the good.

Problem 11 : If the price of a good increases by 8% and the quantity demanded decreases by 12%, what is the price elasticity of demand? Is it elastic, inelastic or unitary elastic?

Solution:

-12%/8% = - 0.12/0.08 = -1.5. Again, drop the negative sign, so the elasticity is 1.5. This means it is elastic (greater than one).

Problem 12 : Discount stores sell relatively elastic goods. Ceteris paribus, explain why selling at a relatively low price is profitable for them?

Solution:

It is profitable because with elastic goods, dropping the price lower can bring them a lot more business. Therefore, at the low prices they can sell a large volume of goods, making up for the lower prices and bringing in more revenue (P x Q).

Problem 13 : For each of the following pairs of goods, state which good you expect to have the more elastic demand and explain why.

(a) Required textbooks or mystery novels.

(b) Beethoven recordings or classical music recordings in general.

(c) Heating oil during the next six months or heating oil during the next five years.

Solution:

(a) Mystery novels will have a more elastic demand because they are not necessities relative to required textbooks. Textbooks are required, regardless of price, creating a relatively inelastic demand.

(b) Beethoven recordings will have a more elastic demand because it is a more narrowly defined market than that for classical music recordings. Markets that are more narrowly defined have more close substitutes, resulting in a relatively more price-sensitive demand.

(c) Heating oil over the next five years has a more elastic demand because demand elasticity increases as time horizon increases. It will be possible to find more substitutes for heating oil over the next 5 years than over the next 6 months, creating greater price-sensitivity for heating oil over the longer time horizon.

Problem 14 : Suppose vacationers and business travelers have the following demand for airline tickets from New York to Boston:

Price (`)	Quantity Demanded (Business Travelers)	Quantity Demanded (Vacationers)
150	2,100	1,000
200	2,000	800
250	1,900	600
300	1,800	400

(a) As the price of tickets rises from ` 200 to ` 250, what is the price elasticity of demand for (i) business

travelers and (ii) vacationers?

(b) Why might vacationers have a different elasticity than business travelers?

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Solution:

(a) $(\Delta_q/q) / (\Delta_q/p)$ = (100/2000) / (50/200) = 100/2000 × 200/50 = 2/10 = 1/5 < 1, so inelastic for business travelers. (200/800) / (50/200) = (1/4) / (1/4) = 1 for unitary elasticity for vacationers.

(b) Vacation travelers face a more elastic demand for airline tickets because travel for them is less of a necessity compared to air travel for business travelers. Therefore, vacationers are more price-sensitive with respect to airline ticket prices. Vacationers might also have a longer time horizon over which to travel; business travelers face more severe deadlines and have shorter time horizons. Vacationers may also view cruise ship rides or car trips as suitable substitutes.

Problem 15 : Two drivers - Tom and Jerry - each drive up to a gas station. Before looking at the price, each places an order. Tom says, "I'd like 10 gallons of gas." Jerry says, "I'd like `10.00 of gas." What is each driver's price elasticity of demand?

Solution:

Tom has a perfectly inelastic demand - he is not price sensitive at all because he wants 10 gallons of gas regardless of price. Jerry has a perfectly elastic demand – he wants ` 10 dollars worth of gas, and he is completely price sensitive.

1.3.9.2 Income and Cross Elasticity

(a) Income Elasticity : It expresses the responsivenses of quantity demand of any commodity due to a change in the income of the consumer. It is also defined as a percentage change in quantity demand due to percentage change in money income of the consumers.

e_y = % change in quantity demanded / % change in Income

$$= dq/q \div dy/y$$

$$= dq/dy \times y/q$$

Where d = change

q = Original Quantity.

y = Original Income

The income elasticity of demand is positive for all normal goods because the consumer demand for a good changes in the same direction as change in his income. In case of inferior goods, the income elasticity is negative i.e. as the income rises the demand for inferior goods will fall. The different types of the income elasticity are shown in the following diagram.
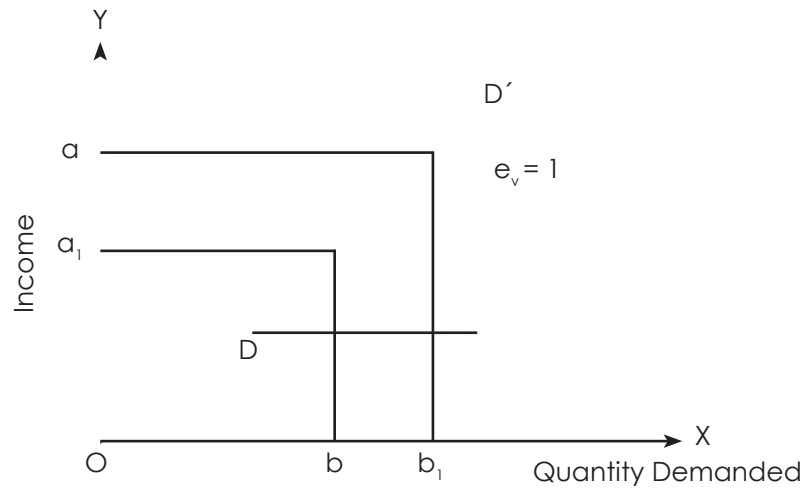
Fig.1.15 (a)

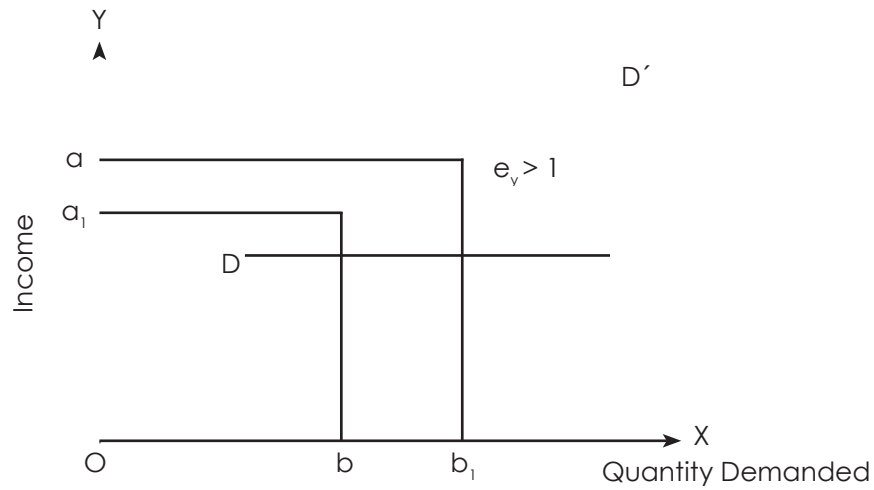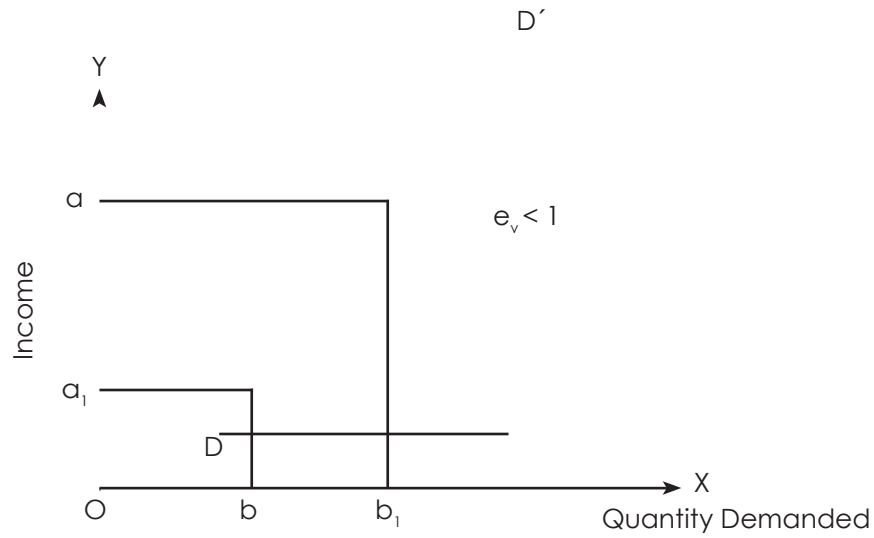> 1.30 I FUNDAMENTALS OF ECONOMICS AND MANAGEMENT

Fig.1.15(b)

$e_v > 1$

D´

a

a_1

D

Income

O   b b_1 X

Quantity Demanded

Fig.1.15(c)

D´

$e_v < 1$

a

a_1

D

Income

O   b b_1 X

Quantity Demanded

$e_v = 0$

Income

O   D   X

Quantity Demanded

Fig.1.15(d)

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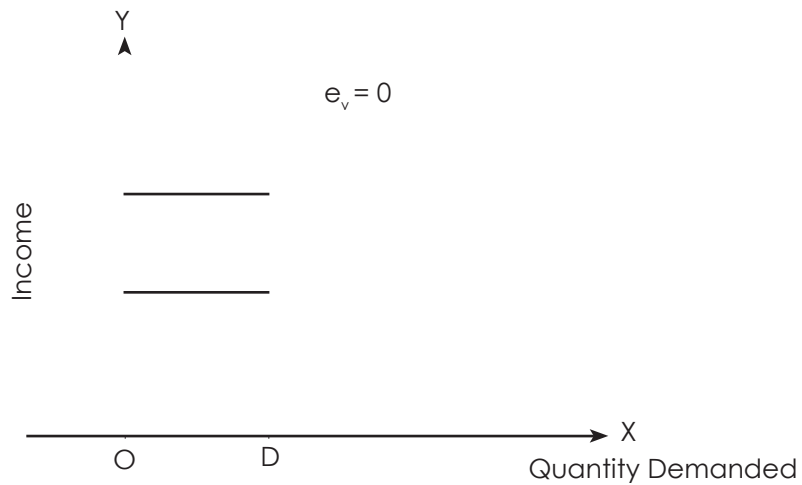
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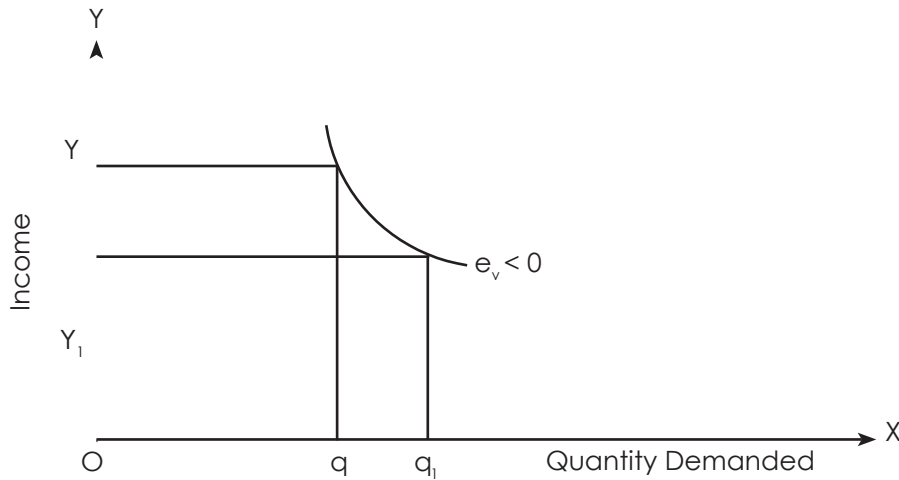
Fig.1.15(e)

In Fig (1.15a) we see that change in quantity demanded is exactly same in proportion to the change in income. Therefore, the income elasticity is unitary ($e_y = 1$)

In Fig (1.15b) the change in quantity demand is more than proportion to the change in income. This shows that the commodity in highly income elastic. ($e_y > 1$)

In fig (1.15c) the change in quantity demanded is less than proportionate to the change in income and it is called relatively income inelastic ($e_y < 1$)

In fig (1.15d), a rise in income does not lead to any change in demand such commodities are called perfectly income inelastic ($e_y = 0$)

In fig (1.15e), we see a negatively sloping income demand curve. In this case, the commodities concern are inferior goods here if the income increases, the demand falls which is indicated in the diagram.

(b) Cross Price Elasticity : Cross price elasticity of demand is defined as the ratio of proportionate change in quantity of a commodity say x due to change in price of another relative commodity say y.

e_{xy} = % change in quantity demanded for x % change in price of y

$= dq_x / q_x \div dp_y / p_y$

$= d\, q_x / dp_y \times p_y / q_x$
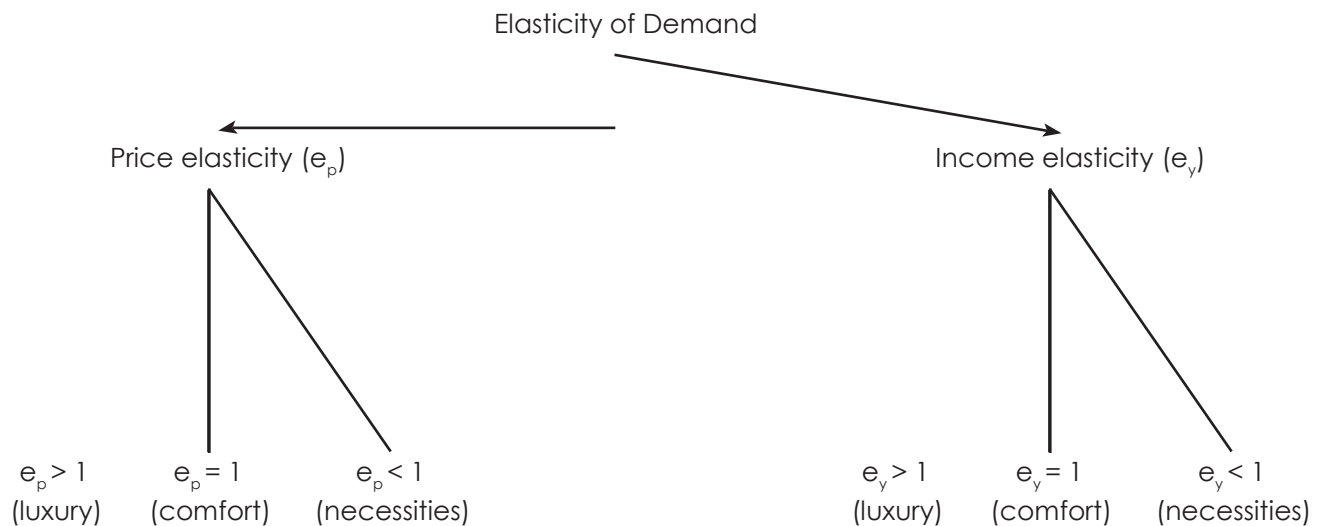
Where d = change

qx = Original quantity demanded of x.

py = Original Income of y.

In case of substitute goods, the cross elasticity of demand is positive i.e. if the price of one good changes, the demand for the other changes in the same direction. For eg. if the price of tea rises, the demand for coffee will also rise, since coffee has now become relatively cheaper.

The cross elasticity of demand is negative in case of complementary goods.

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At a glance :

Analysis

Elasticity of Demand

Price elasticity (e_p)   Income elasticity (e_y)

| $e_p > 1$ | $e_p = 1$ | $e_p < 1$ | | $e_y > 1$ | $e_y = 1$ | $e_y < 1$ |
| (luxury) | (comfort) | (necessities) | | (luxury) | (comfort) | (necessities) |

Application:

• The demand function for commodity x is stated as,

  $Q_x = 80 - 0.5P_x + 0.2P_y + 0.3M$

  Where, P_x $\Rightarrow$ Price of Commodity x

  P_y $\Rightarrow$ Price of related good y

  M $\Rightarrow$ Money income

  Q_x $\Rightarrow$ Quantity demanded for good x

  (i)   Interpret the demand function

  (ii)   Comment on the demand curve.

  (iii)   If money income rises, what would be the impact demand curve?

  (iv)   Comment on the relation between x and y

  (v)   If income elasticity is 2.1, what can you comment about x ?

Hint:

Gain, Qx = 80 – 0.5 p_x + 0.2p_y + 0.3 M

(i)   Here 80 is autonomous quantity independent of prices and income which the consumer   always enjoys.

  The relation between price and quantity demanded is increases (due to 0.5). The income rises, Q_x also rises.

(ii)   The demand curve is downward sloping due to (-0.5 < 0).

(iii)   If money income rises, the demand curve shifts rightward at same price. This is because as income effect is positive, a rise in income increases the quantity demand.

(iv)   Here as p_y rises, the demand for Q_x rises because x & y are substitutes.

(v)   The commodity x is a Luxury since income elasticity = 2.1 > 1.

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Problem 16 : If the cross elasticity of demand between peanut butter and milk is -1.11, then are peanut butter and milk substitutes or complements? Be able to explain your answer.

Solution:

Peanut butter and milk are complements because a negative cross price elasticity of demand means that as the price of milk goes up, the demand for peanut butter goes down. This would indicate that when the price of milk goes up, we buy less milk and we are also buying less peanut butter (so we must buy these together — they are complements).

1.4 SUPPLY

Supply is defined as a quantity of a commodity offered by the producers to be supplied at a particular price and at a certain time.

1.4.1 Individual Supply and Market Supply

Individual supply	• It refers to the quantity of a commodity which a firm is willing to produce and offer for sale.
	• An individual supply schedule shows the different qualities of a commodity that a producer of a firm would offer for sale at different prices.
Market Supply	• The quantity which all producers are willing to produce and sell is known as market supply.
	• A market supply schedule shows the various quantities of a commodity that all the firms are willing to supply at each market price during a specified time period.

1.4.2 Law of Supply

If the price of commedity rises, the level of quantity supplied rises, after factors remaing constant.
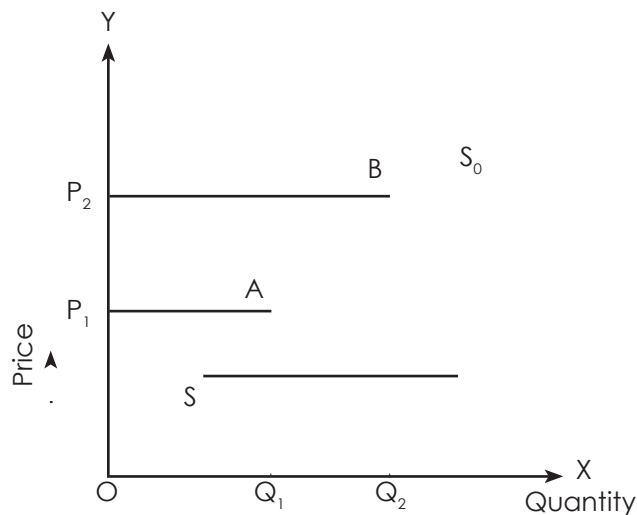

Fig.1.16 : Supply Curve

Supply Curve: in the grophical representation of supply schedule when ither factors affecting supply remain constant.

- Movement from A to B: Extension in Supply
- Movement from B to A: Contraction in Supply

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1.4.3 Factor Determining Supply or Supply Function:

(i) **Price of the commodity:** When the price of a commodity in the market rises, seller increases the price. The cost of production remaining constant the higher will be the profit margin. This will encourage the producers to supply more at higher prices. The reverse will happen when the price fall.

(ii) **Goals of the firm :** Firms may try to work on various goals for eg. Profit maximization, sales maximization, employment maximization. If the objective is to maximize profit, then higher the profit from the sale of a commodity, the higher will be the quantity supplied by the firm and vice-versa. Thus, the supply of goods will also depend upon the priority of the firm regarding these goals and the extent to which it is prepared to sacrifice one goal to the other.

(iii) **Input Prices :** The supply of a commodity can be influenced by the raw materials, labour and other inputs. If the price of such inputs rise leading to a lower profit margin becomes less. This will ultimately lead to a lower supply. On the other hand, if there is a fall in input cost firm, will be ready to supply more than before at a given price level.

(iv) **State of Technology :** If improved and advanced technology is used for the production of a commodity, it reduces its cost of production and increases the supply. On the other hand, the supply of those goods will be less whose production depend on unfair and old technology.

(v) **Government policies :** The impostion of sales tax reduces supply and grant of subsidy on the other hand increases the supply.

(vi) **Expectation about future prices :** If the producers expect an increase in the price of a commodity, then they will supply less at the present price and hoard the stock in order to sell it at a higher price in the near future. This will be opposite in case if they anticipate fall in future price (eg. fruit seller)

(vii) **Prices of the other commodities :** Usually an increase in the prices of other commodities makes the production of that commodity whose price has not risen relatively less attractive we thus, expect that other things remaining the same, the supply of one commodities falls as the price of other goods rises. For eg. suppose a farmer produces wheat and pulses in his firm. If the price of pulses increases he grows less wheat. Hence the supply of wheat decrease.

(viii) **Number of firms in the market :** Since the market supply is the sum of the suppliers made by individual firms, hence the supply varies with changes in the number of firm in the market and increases the supply. An decreases in the number of firm reduces the supply.

(ix) **Natural factor :** In case of natural disorders flood, drought, etc. the supply of a commodity specially agricultural products is adversely affected.

1.4.4 Movement & Shift of Supply Curve

The quantity supplied of a commodity may change broadly due to two reasons :

When the quantity supplied changes due to change in the price of that commodity it is called change in quantity supplied or movement along the supply curve or extension and contraction of supply.

On the other hand when the supply changes due to change in other factors, price of the commodity remaining unchanged, such a change in supply curve, increase and decrease of supply or change in supply.

(a) Movement along the supply curve or extension or contraction of supply or change in quantity

supplied:

(i)   Extension of Supply : When the quantity supplied of a commodity rises with a rise in price of that commodity other determinants of supply remaining unchanged. It is known as extension of supply or movement along the same supply curve towards the right.
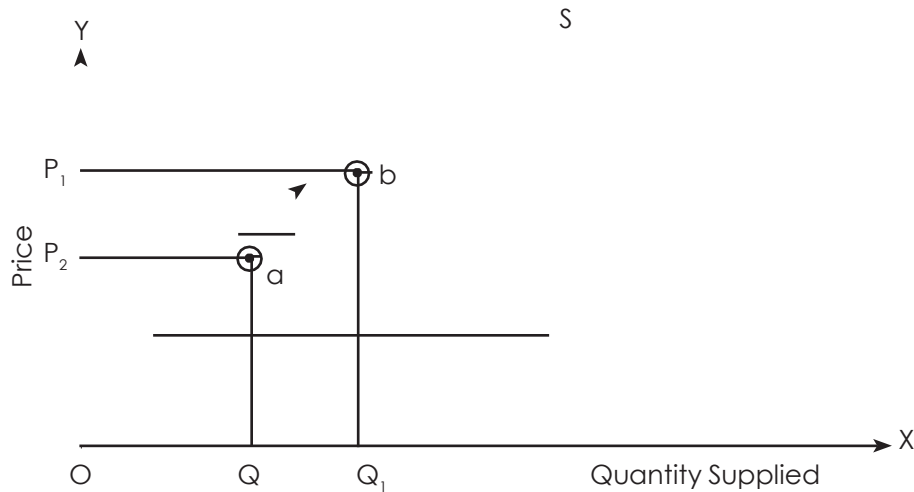
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Fig.1.17:(a) Movement along Supply Curve (rising price)

In the diagram as the price rises from P2 to P1 the quantity supplied Q to Q_1. This is shown by a movement along the supply curve from point a to point b (towards the right). It is called extension of supply.

(i)   Contraction of supply : When the quantity supply of a commodity falls with a fall in its price, other factors remaining comtant, it is known as contraction of supply.
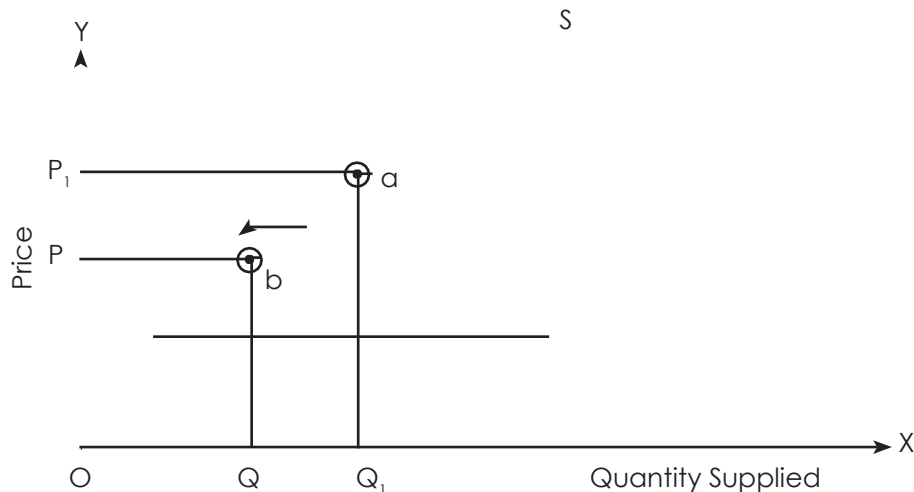
Fig. 1.17: (b) Movement along Supply Curve (falling price)

Here, the quantity supplied as fallen from Q_1 to q due to a fall in price of the commodity from P_1 to P. This is shown by a movement along the supply curve S from point a to point b (towards the left).

The extension and contraction of a supply can be shown together in a single diagram.
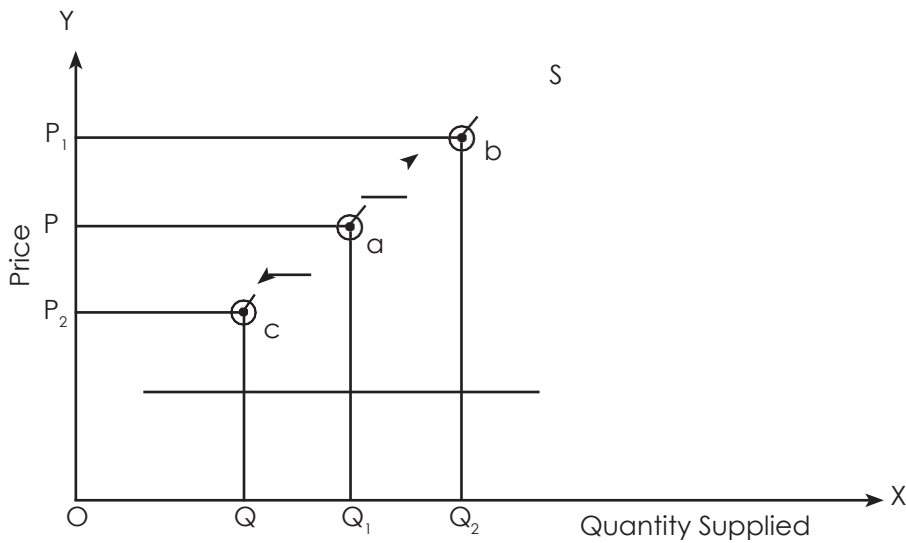
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Fig.1.17: (c) Movement along Supply Curve

(b) Shift of Supply Curve or Increase & Decrease of supply curve or change in supply :

(i) Increase in Supply : When the quantity supplied increase due to other determinants of supply price remaining constant it is called increase in supply.
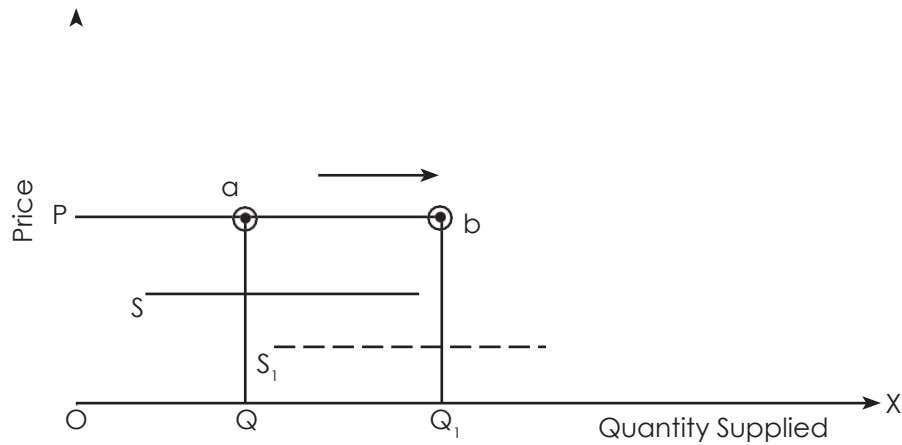
Fig.1.18 : Shift of Supply Curve (rightward)

In the diagram we see that quantity supplied has increased from Q to Q_1, the price of the commodity remaining constant at OP. This is shown by the shift of the original supply curve S to the right to from a new supply curve S_1.

(ii) **Decrease in Supply :** When quantity supplied of the commodity decrease due to change in factors determining supply but for price. It is termed as decrease in supply or shift of supply curve towards the left.

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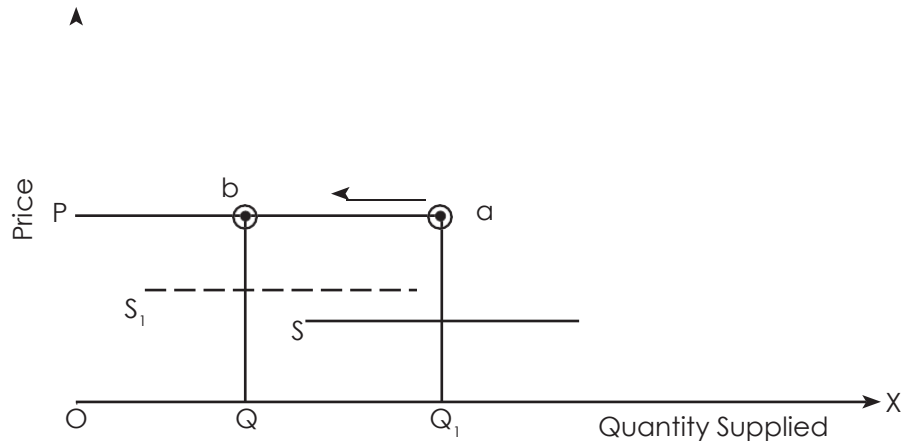
Fig.1.19: Shift of Supply Curve (leftward)

In the diagram we see that supply has fallen from Q_1 to Q, the price remaining constant at P. this is shown by a shift of the original supply curve S to the left to form a new supply curve S_1.

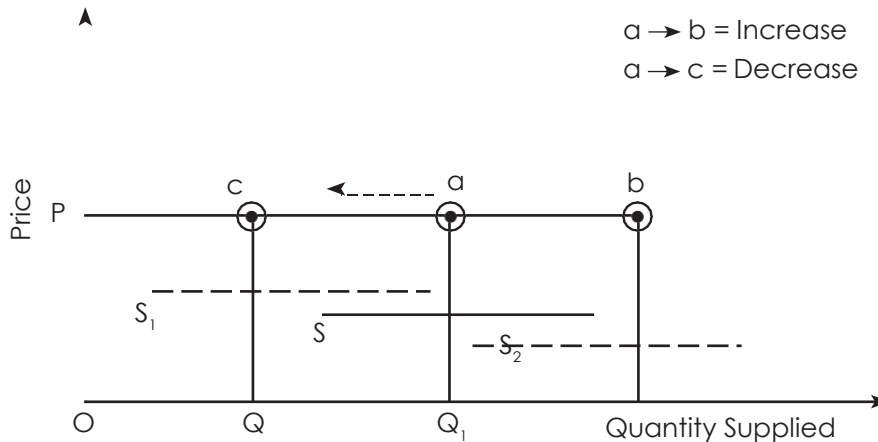Both the Increase and Decrease in supply can be shown in a single diagram.

$a \rightarrow b$ = Increase
$a \rightarrow c$ = Decrease

Fig.1.20: Shift of Supply Curve

1.4.5 Exceptions to the Law of Supply:

(i)   **Agricultural Goods :** In case of such goods the supply cannot be adjusted to market conditions. The production of agriculture goods is largely dependent on natural phenomenon and therefore its supply depends upon natural factors like rainfall, etc. Moreover the supply of such goods is mostly seasonal and therefore it cannot be increased with a rise in price.

(i)   **Rare objects :** These are certain commodities like rare coins, classical paintings old manuscripts, etc. whose supply cannot be increased or decreased with the change in price. Therefore, such goods are said to have inelastic supply and the supply curve is a vertical straight line parallel to Y – axis.
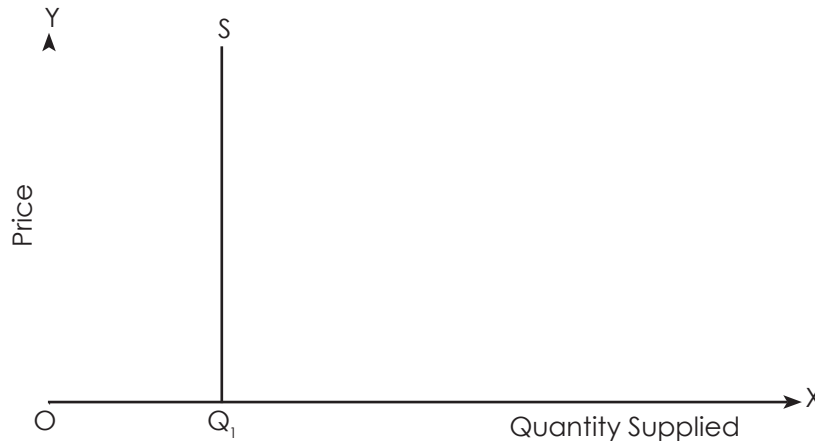
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Fig.1.21: Inelastic Supply Curve

In the diagram, the supply remains constant at OQ with respect to any change in price.

(ⅱ)   Labour Market : In the labour market, the behavior of the supply of labour goes against the law of supply.

In case of such labourers, if the wages rise the workers will work for less hour, so as to enjoy more leisure. This is explained with the following diagram:
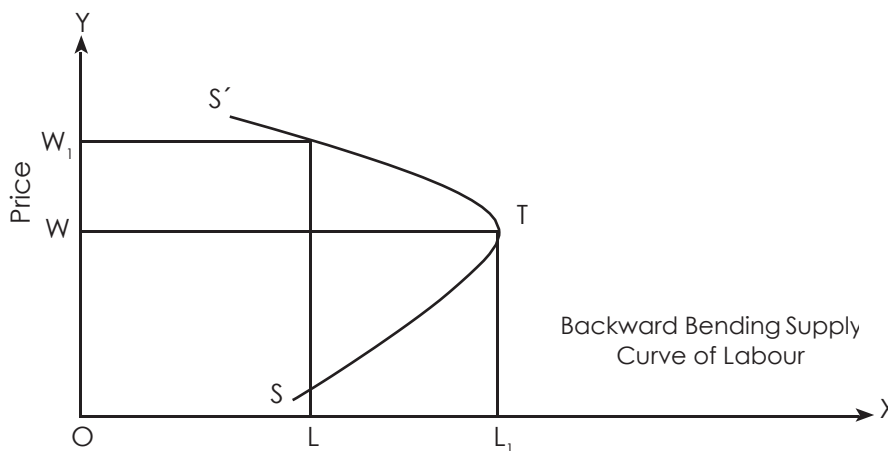

Fig.1.22: Supply Curve of Labour Market

In the diagram we measure labour supply along the X-axis and wages along the Y – axis. When wages was OW the labour supply was OL. Now, when the wages rise to OW_1, the labour supply instead of rising falls to OL_1. As a result, the supply curve S moves to the left instead of rising any further. Hence the labour market remains an exception to the law of supply.

1.4.6 Elasticity of Supply

Elasticity of supply is defined as the degree of responsiveness of quantity supplied of a commodity due to change in its price. Elasticity of supply is expressed as :

e_s = % changes in qty. supplied / % changes in price

= (dq/q x 100) /(dp/p x 100)

= (dq/dp x p/q)

Where d = change, q = original quantity supplied, p = original price.

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Determinants of Elasticity of Supply

(i) **Nature of the commodity :** The supply of durable goods can be increased or decreased effectively in response to change in price and hence durable goods are relatively elastic.

On the other hand the perishable goods cannot be stored and thus supply cannot be altered significantly in response to change in their price. Hence the price of the perishable goods are relatively less elastic.

(ii) **Time Factor :** A price change may have a small response on the quantity supplied because output may change by small quantity in the short period since the production capacity may have been limited. Therefore, in the short run supply tends to be relatively inelastic.

On the other hand in the long run production capacity may be increased or supply may also be raised therefore in the long run supply is elastic.

(iii) **Availability of facility for expanding output :** If producers have sufficient production facilities such as availability of power, raw materials, etc, they would be able to increase their supply in response to rise in price.

On the other hand if there is a shortage of such facilities then expansion of supply will not be possible due to rise in price.

(iv) **Change in cost of production :** Elasticity of supply depends upon the change in cost. If an increase of output by a firm in an industry causes only a slight increase in the cost then supply will remain fairly elastic.

On the other hand if an increase in output bring about a large increase in cost due to rise in price of inputs etc, then supply will be relatively inelastic.

(v) **Nature of inputs :** Elasticity of supply depend upon the nature of inputs for the production of a commodity. If the production requires inputs that are easily available, then its supply will be relatively elastic.

On the other hand, if it uses specialized inputs then its supply will be relatively inelastic.

(vi) **Risk Taking :** If entrepreneurs are willing to take risk, then supply will be more elastic and if they are reluctant to take risk then supply would be inelastic.

Problems of Supply :

Problem 17 : Tom's supply equation for selling handmade mugs is as follows:

Q = 5 + 1.5P

How many mugs will he sell if the price is ` 2 per mug? What if the price is ` 4 per mug?

Solution:

To find out how many mugs Tom is willing to supply, we simply plug in the price into Tom's supply equation. When the price is ` 2 per mug, we find that Q = [5 + 1.5(2)] = 8 mugs

When the price is ` 4 per mug, Tom is willing to sell Q = [5 + 1.5(4)] = 11 mugs

Problem 18 : Tom's supply equation for his handmade mugs is now:

Q = -5 + 2P

At what price will he no longer be willing to sell mugs?

Solution:

Tom's supply equation is Q = -5 + 2P

To find the price at which Tom will no longer sell any mugs, we set Q equal to 0 and solve for P.
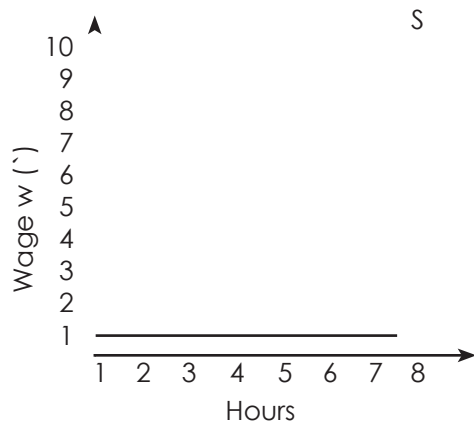
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That is:

Q = -5 + 2P

P = 5/2 = ` 2.50

Tom will not sell any mugs if the price drops to ` 2.50 per mug.

Problem 19 : If Jean's supply curve for babysitting looks like this:


What is the minimum amount you would have to pay her if you wanted her to babysit for 2 hours? 5 hours? (Remember that wage is the hourly rate of pay).

Solution:

If we look for Jean's minimum wage at 2 hours on the graph, we find that it is ` 4. Since ` 4 is only the hourly pay, you have to multiply it by the number of hours worked to see how much you actually have to pay Jean. For 2 hours of babysitting, you will have to pay Jean at least

(2 hours) x (`4/hour) = `8

Similarly, to get Jean to work for 5 hours, you have to pay her at least ` 8 an hour, giving a total pay of (5 hours) x (` 8/hour) = ` 40
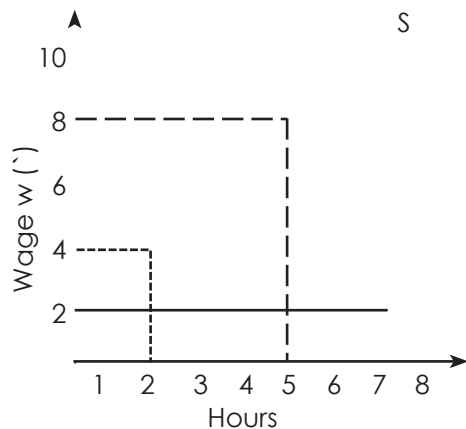
Problem 20 : Jeff and Luke both sell baseball cards. Jeff's supply function is

Q = 2P

Luke's supply function is

Q = -5 + 3P

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If you wanted to buy 50 cards total, how much would you have to offer per card? At what price will Jeff no longer sell any cards? At what price will Luke no longer sell any cards?

Solution:

To find out how much you would need to pay to get 50 cards, you first need to combine Jeff and Luke's supply functions by adding them together :

$$Q = 2P$$
$$+ Q = -5 + 3P$$
$$\overline{Q = -5 + 5P}$$

Now we set Q equal to 50, since we want to buy 50 cards, and we get:

50 = - 5 + 5P

Solve for P, and get

P = 55/5 = `11 per card

To find Jeff's no-sell price, we set Q equal to 0 in his supply function and solve for P.

0 = 2P

 In this case, we find that Jeff's no-sell price is ` 0.

We do the same thing for Luke, plugging 0 in for the quantity in his supply equation:

0 = - 5 + 3P

P = 5/3 = ` 1.67 per card

Problem 21 : Jody owns a used CD store, where she buys and sells used CDs. Which of the following will cause a movement along her supply curve, and which will cause a shift in her supply curve?

(a) Another CD store opens down the street that also buys used CDs, so she now has to pay more for the used CDs before she can sell them again.

(b) The landlord now includes utilities in her rent payment, so she no longer has to pay for electricity.

(c) There is an Elvis revival, and the market price of used Elvis CDs goes up.

Solution:

(a) This will cause an inwards shift (a shift towards the y-axis) of Jody's supply curve. Because she has to pay more for each CD, she makes less profit on each sale. This means that for any given price, she will be willing to sell fewer CDs.

(b) This will cause an outwards shift (a shift away from the y-axis) of Jody's supply curve. Because she no longer has to pay for electricity in her store, Jody's costs are lower, and so she will be willing to sell more CDs at any given price.

(c) This causes a movement up the supply curve. Because the market price of used Elvis CDs has gone up, she will be willing to sell more CDs.

1.5 EQUILIBRIUM

The price at which the quantity demanded of a commodity equals the quantity supply is known as equilibrium price.

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The determination of equilibrium price can be explained with the help of a following diagram:
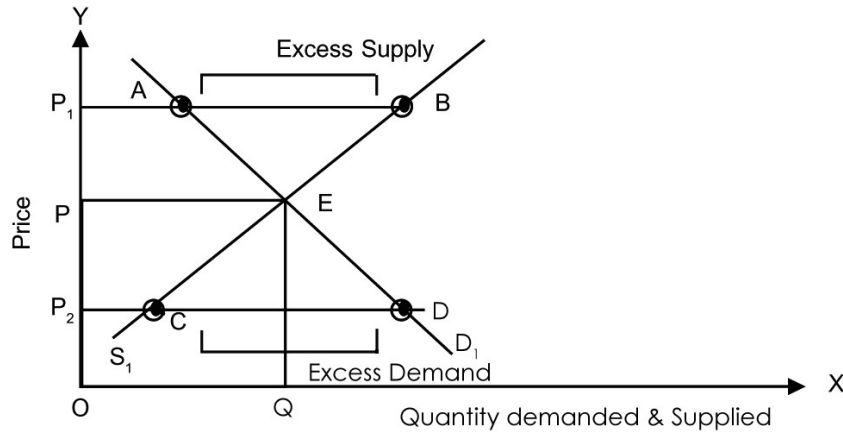

Fig.1.23: Equilibrium of Demand and Supply

In the diagram, along the X-axis we measure quantity demanded and supplied and along the Y-axis price per unit. D_1 is the demand curve, S_1 is the supply curve, both intersect at point E which is the equilibrium point. At the equilibrium point E, the quantity demanded equal to the quantity supplied of the commodity and therefore OQ is the equilibrium quantity and OP is the equilibrium price.

At the price OP_1 the quantity demanded decreases from PE to P_1A and the quantity supplied increases from PE to P_1B. Due to the law of supply the quantity supplied has increase with a rise in price. Such increase in supply and decrease in demand will create a situation of excess supply AB. Such excess supply will induce the seller to reduce the price from OP_1. Now when price falls to OP_2, due to the law of demand the quantity demanded will rise to P_2D and due to law of supply the quantity supplied will fall to P_2C which will create a situation of Excess Demand. This will induce the sellers to increase the price from OP_2 towards OP.

Finally the equilibrium price remains in the market.

1.5.1 Change in Equilibrium Price due to Shift in Demand, the Supply Remaining Constant:

Increase in Demand rises the price and decrease in demand lowers the price of a commodity, if supply remains unchanged.
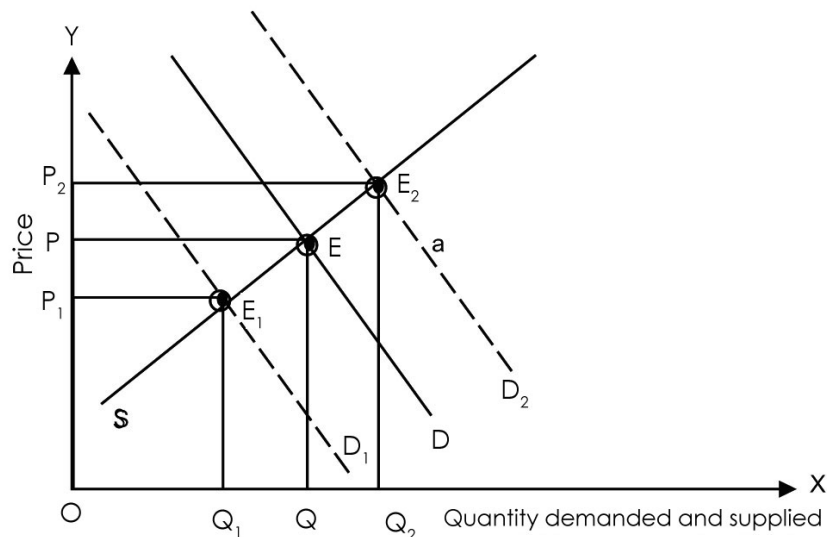
Fig.1.24: Change in Equilibrium due to shift in Demand

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In the diagram D and S are original demand and Supply curve and E is the initial equilibrium point OP. The equilibrium price and OQ is the equilibrium quantity. The supply remaining constant, as the demand curve shifts to the right from D to D_2. It indicates an increase in demand. The new equilibrium point is E_2 and the equilibrium price is raised at P_2 and quantity to Q_2.

Now again, if supply is kept constant and the demand decreases from D to D_1, the new equilibrium will E_1, the new equilibrium price and quantity will be OP1 and OQ_1 respectively.

1.5.2   Change in Equilibrium Price due to Shift in Supply where the Demand Remains Constant:

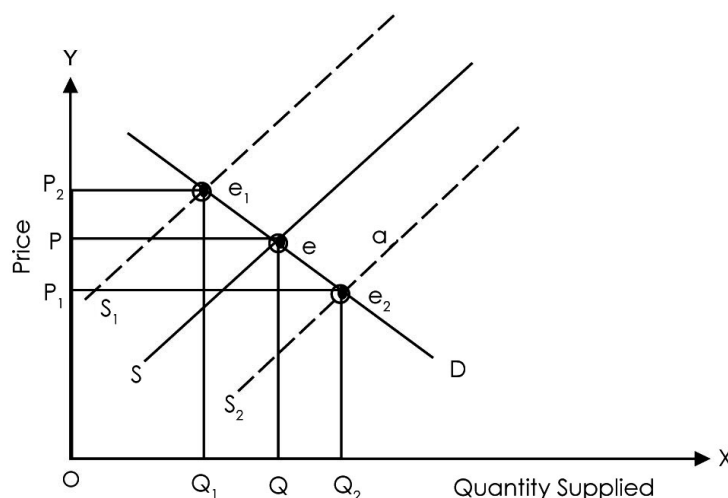Increase in supply lower the price and Decrease in supply raises the supply if demand remains constant.

Fig.1.25: Change in Equilibrium due to shift in Supply

Here the original demand curve D, Original Supply Curve is S, initial equilibrium point e, equilibrium price OP and equilibrium quantity OQ.

In the supply curve shifts from S to S_2 the new equilibrium point will be e_2, the quantity will rise to Q_2 and the price will fall to P_1. Similarly, when supply falls from S to S_1, equilibrium price will be OP_2, and equilibrium

quantity will be OQ_1.

1.5.3 Change in Equilibrium Priced due to Shift in both Demand and Supply :

Situation 1 : If demand and supply change by equal proportion, equilibrium price will remain unchanged.
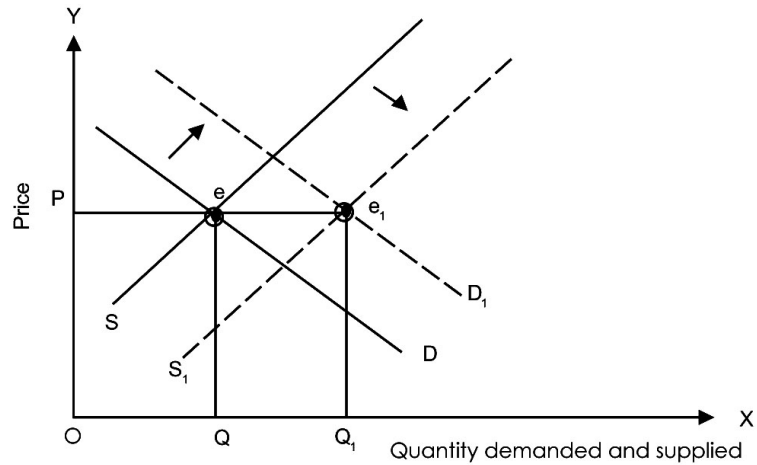

Fig.1.26: (a) Change in Equilibrium due to shift in both Demand and Supply

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In the above diagram we see equal change in demand and supply i.e. D to D_1 and S to S_1 respectively. As a result equilibrium point e. shifts to e and quantity rises from Q to Q_1 which equilibrium price remains unchanged at OP.

Situation 2 : If the change in demand is greater than in proportion to the change in supply.
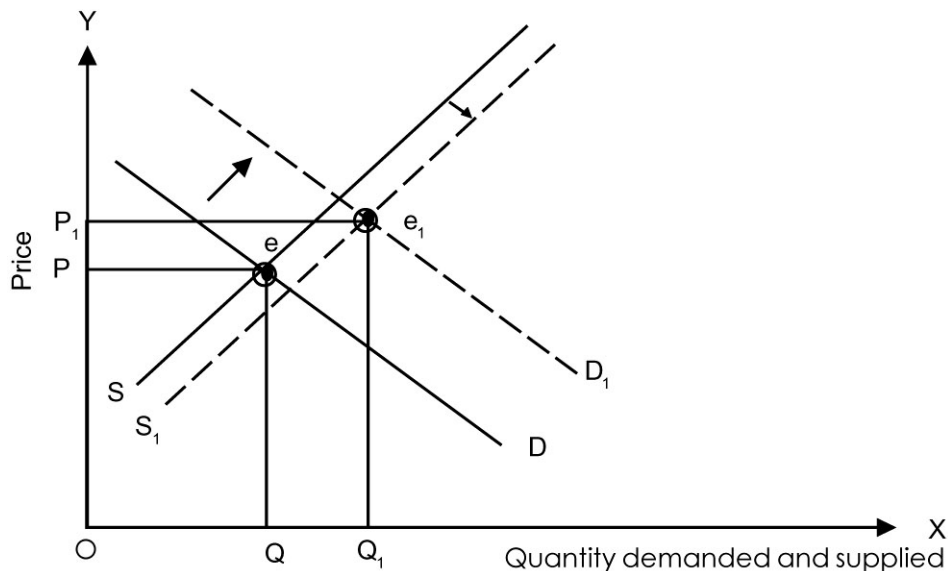
Fig.1.26 (b): Change in Equilibrium due to shift in both Demand and Supply

In the diagram when the demand increase then supply and price will rise. Here, the relative increase in demand i.e. DD_1 is greater than relatively increase in supply SS_1. As a result equilibrium price rises from OP to OP_1, equilibrium quantity rises from OQ to OQ_1. The equilibrium point. shifts from e to e_1.

Situation 3 : If the change in supply is greater than in proportion to change in demand
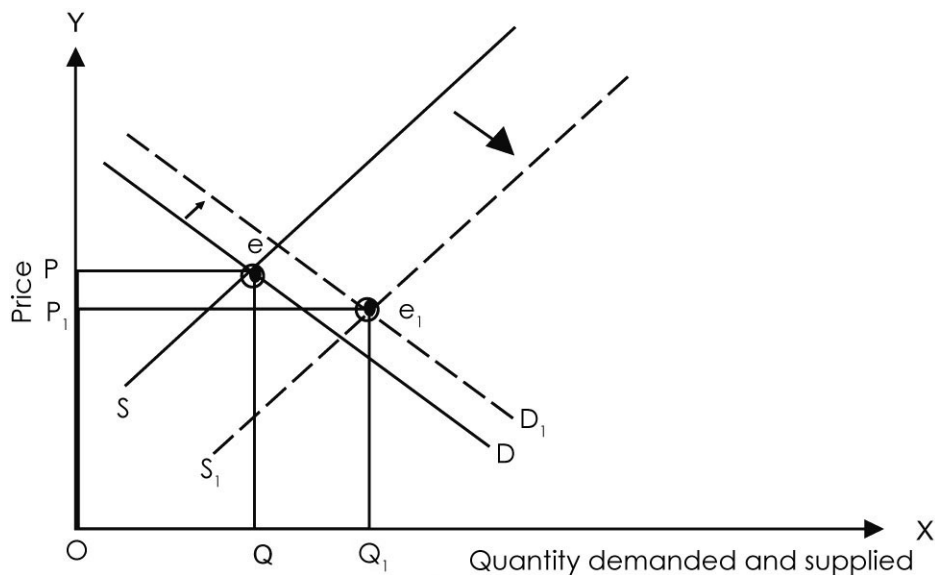
Fig.1.26: (c) Change in Equilibrium due to shift in both Demand and Supply

In the above diagram when the supply increase than demand i.e. $SS_1 > DD_1$, the equilibrium point will shift from e to e_1, the equilibrium price will fall from P to P_1 and equilibrium quantity will rise from Q to Q_1.

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1.6 THEORY OF PRODUCTION

1.6.1 Production-Function

- In economics, the technical law, relating inputs to outputs, has been given the name of production-function.

- In simple words, production - function expresses the relationship between the physical inputs and physical output of a firm for a given state of technology.

- The production-function is a purely technical relation that connects factor-inputs and outputs.

- The production-function can be written mathematically as follows:

$q_x = f(F_1, F_2, F_3 .... F_n)$

Here, q_x = the quantity of x commodity

$F_1, F_2, F_3 .... F_n$ = Different factor-inputs

- This equation tells that the output of x depends on the factors $F_1, F_2, F_3 .... F_n$, etc.

- There is functional relationship between factor-inputs and the amount of goods x.

- For example, the output of cloth depends on cotton, thread, machine, labour, chemicals, etc. Hence the relationship between factor-inputs (e.g. thread, machine, labour, chemicals, etc.) and the output of cloth can be shown with the help of production-function.

1.6.2 Types of Production-Function

Before analyzing the types of production-function it will be useful to understand the meaning of following important terms :

A. Fixed Factors and Variable Factors

Factors of production are broadly classified into two categories i.e. fixed and variable factors:

(i) **Fixed Factors -** The factor inputs which cannot be varied in the short-period, as and when required are called fixed factors.

Examples of Fixed Factors are : Plant, machinery, heavy equipments, factory building, land etc.

(i) **Variable Factors -** The factor inputs which can easily be varied, in the short-period as and when required, are called variable factors.

Examples of variable factors are : labour, raw material, power, fuel etc.

The distinction between fixed factors and variable factors appears only in the short-period. In the long-run, all the factors of production become variable factors.

B. **Short period and Long period**

The time-period during which a firm in order to make changes in its production can change only in its variable factors but not in its fixed factors, is termed as short-period. In the short-period, a firm cannot change its scale of plant.

The time period in which a firm can change all the factors of production and its scale of plant, is termed as long-period.

In economics, we study two types of production-functions. In other words, there are two kinds of input-output relations in production-functions. These are:

(i) **Short-run Production-functions or the Law of Variable Proportions -** In the short period, some factors are fixed and some of them are variable. What happens when additional units of one variable factor of production are combined with a fixed stock of some factors of production, is discussed under short-run production-functions. The law which tells about this relation is called the law of variable proportions or returns to a factor. Since it is related to a short-period, it is called short-run production-function.

(i) **Long-run Production-function or Returns to Scale –** In the long run, all factor-inputs can be varied. It means, that in the long-run, we can expand or reduce the scale of production as well. The way in which the output varies with the changes in the scale of production is discussed in the long-run production-functions. The law which states this relationship is also called returns to scale.

Since it is related to the long-period, it is called long-run production-function.

In this context we have to define three key terms :-

(1) **Total Product -** It refers to the total output of the firm per period of time

(2) **Average Product -** Average Product is total output per unit of the variable input. Thus Average Product is total product divided by the number of units of the variable factor.

AP = Q/L where Q is Total Product, L is the quantity of labour.

(3) **Marginal Product -** Marginal Product is the change in total product resulting from using an additional unit of the variable factor.

MP = dQ/dL, where d is the rate of change

1.6.3 Law of Variable Proportions or Returns to a Factor

• **Meaning and Definition**

 • The law of variable proportions has an important place in economic theory.

 • This law exhibits the short-run production-functions in which one factor is variable and others are fixed.

 • The extra output obtained by applying extra unit of a variable factor can be greater than, equal to or less than the output obtained by its previous unit.

- If the number of units of a variable factor is increased, the way wherein the output changes is the concern of this law.

- Thus it refers to the effect of changing factor-ratio on the output.

- In short, the law which exhibits the relationship between the units of a variable factor (keeping all other factors as constant) and the amount of output in the short-run is known as returns to a variable factor.

- Thus the law of variable proportions is also named as (or returns to a factor) returns to a variable factor.

- The law states that with the increase in a variable factor, keeping other factors constant, total product increases at an increasing rate, then increases at diminishing rate and finally starts declining.

- **Reason as to why it is called the Law of Variable Proportions:**

  - The factor- proportion (or factor-ratio) varies as one input varies and all others are constant.

  - This can be understood with the help of an example.

  - Suppose in the beginning 10 acres of land and 1 unit of labour are taken for production, hence land-labour are taken for production, hence land-labour ratio was 10: 1. Now if the land remains the same but the units of labour increases to 2, now the land-labour ratio would become 5: 1.

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- Thus, this law analyses the effects of change in factor-proportions on the amount of output and is, therefore, called the law of variable proportions.

- **Explanation of the Law**

The law of variable proportions can be illustrated with the help of the following example and diagram :

Example

Fixed Factor : Land (Acres)	Variable Factor: Land (Units)	TPP (Total Physical Product) (Quantity)	MPP (Marginal Physical Product) (Quantity)	
1	0	0	-	
1	1	2	2	Stage I
1	2	6	4	
1	3	12	6	
1	4	16	4	Stage II
1	5	18	2	
1	6	18	0	
1	7	14	-4	Stage III
1	8	8	-6	

In this example, we assume that land is the fixed factor and labour is a variable factor. The table shows the different amounts of output obtained by applying different units of labour to one acre of land which continues to be fixed.

Diagram

The law of variable proportions can be explained with the help of diagram below. In order to make

simple presentation we have drawn a TPP (Total Physical Product) curve and a MPP (Marginal Physical Product) curve as smooth curves in the diagram, againt the variable input, labour.
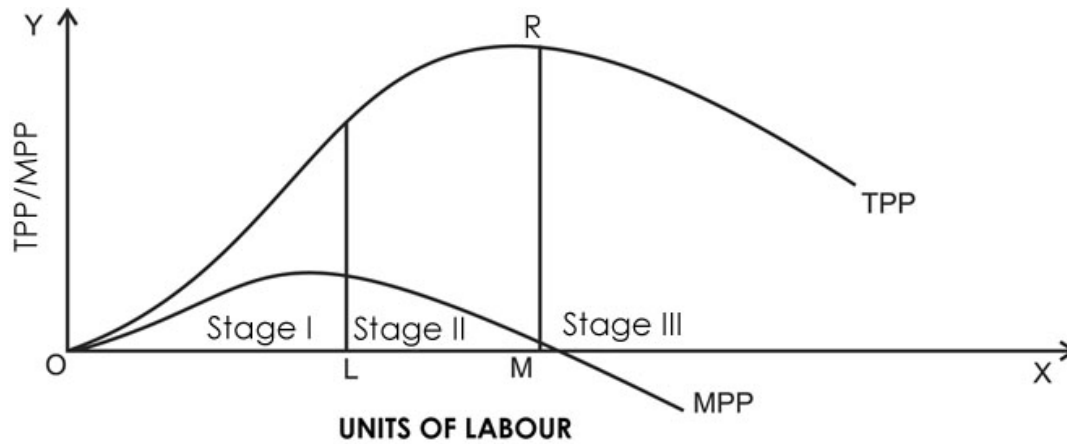

Fig.1.27: Production Functions

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- **Three Stages of the Law**

Stage I	• Here TPP increases at an increasing rate and MPP also increases. • Since MPP increases with the increase in the units of a variable factor, it is called the stage of increasing returns. • In the example, the stage I of the law runs upto 3 units of labour and in the diagram it is between O to L.
Stage II	• Here TPP continues to increase but at a diminishing rate and MPP diminishes but remains positive. • MPP decreases with the increase in the units of a variable factor, it is termed as the stage of diminishing returns. • In the example, stage II runs between 4 to 6 units of labour and in the diagram it is between L to M. • This stage goes to the point when TPP reaches the maximum (18 in the example and point R in the diagram) and MPP becomes zero.
Stage III	• In this TPP starts declining and MPP decreases and becomes negative. • Since in this stage MPP becomes negative, it is called the stage of negative returns. • In the example, stage III runs between 7 to 8 units of labour and in the diagram it starts from the point 'M' onwards.

1.6.3.1 Two ways to explain the Law of Variable Proportions

The law of variable proportions can be explained in two separate ways :

(i) in terms of total physical product and (ii) in terms of marginal physical product. It is explained as under:

(i) Law of Variable Proportions - in terms of TPP

The law of variable proportions shows the relationship between units of a variable factor and total physical product. According to this law, keeping other factors constant, when we increase the units of a variable factor, the TPP first increases at an increasing rate, then at a diminishing rate, and in the last, it declines. Thus the law has following three stages :

Stage I : TPP increases at an increasing rate

Stage II : TPP increases at a diminishing rate

Stage III : TPP declines.

This is shown with the help of following example and diagram.

Example

Unit of Labour (Units)	TPP (Quantity)	
0	0	
1	2	Stage I
2	6	
3	12	
4	16	Stage II
5	18	
6	18	
7	14	Stage III
8	8	

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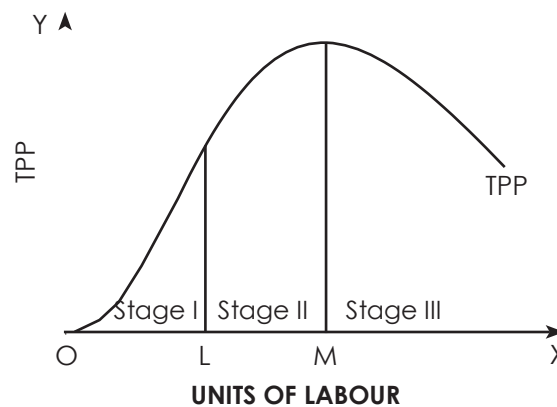
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Diagram

Fig.1.28

(ii) Law of Variable Proportions in terms of MPP

The law of variable proportions states that with the increase in the units of a variable factor, keeping all other factors constant, the marginal physical product increases, then decreases and finally becomes negative. Thus this law has three following stages :

Stage I :   MPP increases

Stage II : MPP decreases but remains positive

Stage III : MPP continues to decrease and becomes negative.

The law is shown with the help of following example and diagram below :

Example

Unit of Labour (Units)	MPP (Quantity)	
1	2	
2	4	Stage I
3	6	
4	4	
5	2	Stage II
6	0	
7	-4	Stage III
8	-6	

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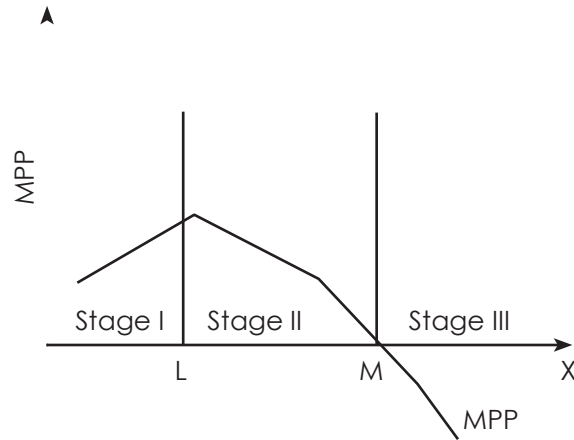
Diagram

Fig.1.29

1.6.3.2 Significance of the Three Stages of the Law

With the knowledge of the three stages of the law, a producer can choose the appropriate stage of its operation.

Stage III	• A rational producer would not like to operate in Stage III.
	• In this stage total product declines and marginal product becomes negative.
	• A producer can always increase his output by reducing the amount of variable factor.
	• If he operates in stage III, he incurs higher costs on the one hand, and gets less revenue on the other.
	• Thus, it reduces his profits.
Stage I	• A producer does not operate in stage I.
	• Here marginal product increase with the increase in a variable factor.
	• There is a scope for more efficient utilization of fixed factors by employing more units of a variable factor.
	• A rational producer would not therefore, like to stop in stage I but will expand further.
Stage II	• A rational producer never chooses first and third stages for production.
	• He, therefore, likes to operate in the stage II, the stage of diminishing returns.
	• In this way this stage of the law of variable proportions is the most relevant stage of operation for a producer.

1.6.3.3 Reason for Operation of the Law

- In the short-period all factors of production cannot be varied.

- Here one is variable factor and others are fixed factors.

- There is an optimum combination of different factors that gives the maximum output.

- When there is increase in the units of a variable factor before the point of optimum combination, the factor proportion becomes more suitable and fixed factors are more efficiently utilized.

- Hence it increases the marginal physical product.

- In the initial stages the total product may rise at an increasing rate when we employ more units of a variable factor to the fixed factors.

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- But later, when we employ more units of a variable factor beyond this optimum combination, the factor proportion becomes unsuitable and inefficient; hence the marginal product of that variable factor declines.
- The quantity of the fixed factor-input per unit of the variable input falls as more and more of the latter is put to use.
- Successive units of the variable input, therefore, must add decreasing amounts to the total output as they have less of the fixed input to work with.

1.6.4 Returns to Scale

- In the long run, all factors are variable.
- The expansion of output may be achieved by varying all factor-inputs.
- When there are changes in all factor-inputs in the same proportion, the scale of production (or the scale of operation) also gets changed.
- Thus, the change in scale means that all factor inputs are changed in the same proportion.
- The term returns to scale refers to the changes in output as all factor-inputs change in the same proportion in the long run.

- The law expressing the relationship between varying scales of production (i.e. change of all factor-inputs in the same proportion) and quantities of output.
- The increase in output may be more than, equal to, or less than proportional to the increase in factor-inputs.
- Accordingly, returns to scale are also of three types - increasing returns to scale, constant returns to scale and diminishing returns to scale.

The law of returns to scale with its all the three stages (or types) is shown in the following example and diagram below:

Example

Combination	Scale of operation Machine + Labour	Total Product : Returns to scale (Units)
A	1 Machine + 2 Labour	100 ⎤
B	2 Machine + 4 Labour	250 Increasing
C	4 Machine + 8 Labour	600 ⎦
D	8 Machine + 16 Labour	1200 Constant
E	16 Machine + 32 Labour	2400 ⎤
F	32 Machine + 64 Labour	4000 Diminishing
G	64 Machine + 128 Labour	7000 ⎦

Returns to scale	Analysis
Increasing	- From A to C is the increasing returns to scale. - The combination of A with 1 Machine + 2 Labour produces 100 units of output. - When we double the factors-inputs in combination of B with 2 machines + 4 Labour, it produces 250 units of output which is more than double of the output of combination A. - Again from B to C, the factor-inputs are doubled and the output is more than doubled (from 250 to 600 units).

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Constant	• From C to E is the constant return to scale.
	• When we move from combination C to D and D to E, each time the factor-inputs are doubled and the resultant outputs are also doubled (from 600 to 1200 units in the case of C to D; and from 1200 to 2400 units in the case of D to E).
Diminishing	• The combinations from E to G in the table indicate diminishing return to scale.
	• The movement from the combination E to F indicates that the factor-inputs are doubled but the output is less than doubled (from 2400 to 4000 Units).
	• Similar is the case when we move from F to G.

The law of returns to scale can also be shown with the help of a very simple diagram which is given below.
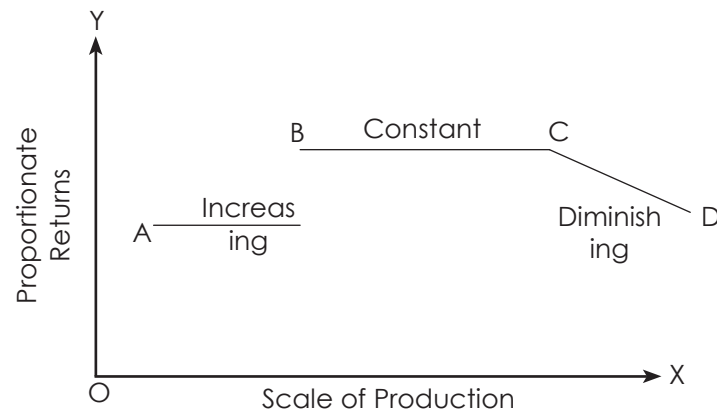

Fig.1.30: Returns to Scale

From A to B in the diagram is the stage of increasing returns; from B to C constant returns, and from C to D is the diminishing returns to scale.

1.6.4.1 Causes for the Operation of Returns to Scale

Returns to scale occur mainly because of two reasons :

(i) Division of Labour	• When tasks are allocated according to the specialization of workers, it is termed division of labour.
	• Thus division of labour and specialization are identical concepts.
	• They are possible more in large-scale operations.
	• Different types of workers can specialize and do the job for which they are more suited.
	• This results in a sharp increase in output per man with the increase in scale in the initial stages.
	• This brings increasing returns to scale.
	• But after a certain level of output, top management becomes eventually overburdened and, hence, less efficient.
	• It brings diminishing returns to scale.
	• With the increase in the scale of operation certain advantages or economies of large volume or large size may occur.
	• This results in increasing returns to scale.
	• For instance when the scale of operation is increased a firm has to procure raw materials in a larger quantity.

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(ii) Volume Discounts	• In this situation the firm may bargain for more discounts on purchase of the large volume of raw materials.
	• Similarly the per unit selling cost may also fall with the increase in output.
	• In the initial stages a firm may receive technical economies, marketing economies and economies related to transport and storage costs etc.
	• All these result into increasing returns to scale.
	• But after a certain limit, diseconomies of volume crop up with the increase in output.
	• This brings diminishing returns to scale.

Thus, the main reason for the operation of the different forms of returns to scale is found in economies and diseconomies.

— When economies exceed the diseconomies → the stage of increasing returns operate

— When economies equal diseconomies → the stage of constant returns to scale

— when diseconomies exceed the economies → stage of diminishing returns to scale

1.6.5 Distinction between Returns to a Variable Factor (or Law of Variable Proportions) and Returns to Scale

The main differences between returns to a variable factor and returns to scale are as indicated below:

Returns to a Variable Factor	Returns to Scale
1. Operates in the short run or it is related to short-run production-function.	1. Operates in the long-run or it is related to long-run production-function.
2. Only the quantities of a variable varied.	2. All factor-inputs are varied in the same factor are proportion.
3. There is change in the factor-proportion. Suppose on 1 acre land 1 labour is employed, then the land labour ratio is 1 : 1. Now if we add one more unit of labour on the 1 acre land, then land-labour ratio would become 1 : 2.	3. There is no change in factor-ratio. For instance, if a firm is employing 1 unit of labour and 2 units of capital, then the labour-capital ratio is 1 : 2. Now if the firm increases its scale of operation and employed 2 units of labour and 4 units of capital, the labour-capital ratio still remains the same as 1 : 2.
4. No change in the scale of production. Because here all the factor-inputs are not changed.	4. There is change in the scale of production because here all the factor-inputs are varied in the same proportion.

1.7 THEORY OF COST

1.7.1 Various Concepts of Cost

The term "Cost" is used in many sense and hence has many concepts. All these need to be properly and clearly understood.

1. **Real Costs**

   • real cost included the following two basic elements:

     — exertions of all kinds of labour;

     — waiting and sacrifices required for saving the capital

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- It is more a psychological concept and cannot be measured.
- Therefore, it is not applied in actual practice.

2. **Economic Costs**

The total expenses incurred by a firm in producing a commodity are generally termed as its economic costs. Economic costs are generally referred to as production costs as well.

The total economic costs include:

(i) Explicit Costs	• Actual payments made by a firm for purchasing or hiring resources (or factor-services) from the factor-owners or other firms are called explicit costs.
	• These are actual money expenses directly incurred for purchasing the resources.
	• These are the costs which a Cost Accountant includes under the head expenses of the firm.
	• Accounting costs include all costs incurred by the firm in acquiring various inputs from outside suppliers.
	• Examples - payments for raw materials and power; wages to the hired workers; rent for the factory-building; interest on borrowed money; expenses on transport and publicity, etc.
(ii) Implicit Costs	• It refers to the imputed costs of the factors of production owned by the producer himself which are generally left out in the calculation of the expenses of the firm.
	• Besides purchasing resources from other firms, a producer uses his own factor-services also in the process of production.
	• He generally does not take into account the costs of his own factors while calculating the expenses of the firm.
	• But these costs should also be taken into account.
	• They are called implicit costs because producers do not make payment to others for them.
	• Example, rent of his own land, interest on his own capital, and salary for his own services as manager, etc.
(iii) Normal Profit	• Economists consider an entrepreneur as a separate and independent factor of production.
	• An entrepreneur is a factor of production.
	• An entrepreneur can engage himself in the work of production of a commodity only when he hopes to get a minimum amount of remuneration as profit.
	• The minimum amount which is required to keep an entrepreneur in the production is known as normal profit.
	• This normal profit is in a way reward or remuneration for an entrepreneur and, therefore, should be treated as costs.

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Thus,

Total economic costs = Explicit costs + Implicit costs + Normal profit.

Generally economic costs include the following:

Cost of the raw materials, wages, interest, rent, management costs, depreciation of capital equipment, expenditure on publicity and advertisements, transport costs, costs of the producer's own resources, normal profit, other expenses etc.

3. **Opportunity Cost**

- The concept of opportunity cost occupies a very important place in modern economic analysis.
- Factors of production are scarce in relation to wants.
- When a factor is used in the production of a particular commodity, the society has to forgo other goods which this factor could have produced.
- This gave birth to the notion of opportunity cost in economics.
- Suppose a particular kind of steel is used in manufacturing war-goods, it clearly implies that the society has to give up the amount of utensils that could have been produced with the help of this steel.
- Hence we can say that the opportunity cost of producing war-goods is the amount of utensils forgone.
- Opportunity cost is the cost of the next-best alternative that has been forgone.
- From the meaning of opportunity cost two important points emerge:

  (i) The opportunity cost of anything is only the next-best alternative foregone and not any other alternative.

  (ii) The opportunity cost of a good should be viewed as the next-best alternative good that could be produced with the same value of the factors which are more or less the same.

The concept of opportunity cost can better be explained with the help of an illustration. Suppose a price of land can be used for growing wheat or rice. If the land is used for growing rice, it is not available for growing wheat. Therefore the opportunity cost for rice is the wheat crop foregone. This is illustrated with the help of the following diagram:
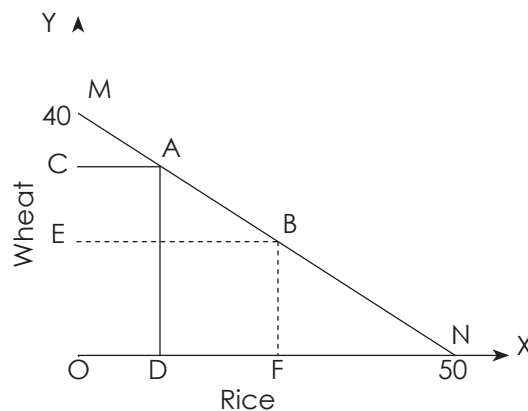

Fig.1.31

- Suppose the farmer, using a piece of land can produce either 50 quintals (ON) of rice or 40 quintals (OM) of wheat.

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- If the farmer produces 50 quintals of rice (ON), he cannot produce wheat.
- Therefore the opportunity cost of 50 quintals (ON) of rice is 40 quintals (OM) of wheat.
- The farmer can also produce any combination of the two crops on the production possibility curve MN.
- Let us assume that the farmer is operating at point A on the production possibility curve where he produces OD amount of rice and OC amount of wheat.
- Now he decides to operate at point B on the production possibility curve.
- Here he has to reduce the production of wheat from OC to OE in order to increase the production of rice from OD to OF.
- It means the opportunity cost of DF amount of rice is the CE amount of wheat.

Thus, opportunity cost for a commodity is the amount of other next-best goods which have to be given up in order to produce additional amount of that commodity.

Applications of Opportunity Cost

The concept of opportunity cost has been widely used by modern economists in various fields. The main applications of the concept of opportunity cost are as follows –

(i) **Determination of factor prices** - The factors of production need to be paid a price that is at least equal to what they command for alternative uses. If the factor price is less than factor's opportunity cost, the factor will quit and get employed in the better-paying alternative.

(ii) **Determination of economic rent** - The concept of opportunity cost is widely used by modern economists in the determination of economic rent. According to them economic rent is equal to the factor's actual earning minus its opportunity cost (or transfer earnings).

(iii) **Decisions regarding consumption pattern** - The concept of opportunity cost suggests that with given money income, if a consumer chooses to have more of one thing, he has to have more of one thing, he has to have less of the other. He cannot increase the consumption of all the goods simultaneously. Hence with the help of opportunity cost he decides the consumption pattern, that is, which goods should be consumed and in what quantities.

(iv) **Decisions regarding production plan** - With given resources and given technology if a producer decides to produce greater amount of one commodity, he has to sacrifice some amount of another commodity. Thus on the basis of opportunity costs a firm makes decisions regarding its production plan.

(v) **Decisions regarding national priorities** - With given resources at its command a country has to plan the production of various commodities. The decision will depend on national priorities based on opportunity costs. If a country decides that more resources must be devoted to arms production then less will be available to produce civilian goods. In this situation a choice will have to be made between arms production and civilian goods. The concept of opportunity cost helps in making such choices.

1.7.2 Cost-Function

The functional relationship between cost and quantity produced is termed as cost function.

$C = f(Q_x)$

Here, C = Production-cost

Q_x = Quantity produced of x goods

Cost-function of a firm depends on two things: (i) production-function, and (ii) the prices of the factors of production. Higher the output of a firm, higher would be the production-cost. That is why it is said that the cost of production depends on the quantum of output.

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1.7.3 Time element and Cost -

Time element has an important place in the analysis of cost of production. In the theory of supply we usually take three kinds of time-period. They are:

(i)　**Very Short-period** - Very short-period is defined as the period of time which is so short that the output cannot be adjusted with the change in demand. In this period, the supply of a commodity is limited to its stock, hence during this period supply remains fixed.

(ii)　**Short Period** - Short period is defined as the period of time during which production can be varied only by changing the quantities of variable factors and not of fixed factors; Land, factory building, heavy capital equipment, services of management of high category are some of the factors that cannot be varied in a short period. That is why they are called fixed factors.

There are some factor-inputs that can be varied as and when required. They are called variable factors. For instance, power, fuel, labour, raw materials, etc. are the examples of variable factor-inputs.

(iii)　**Long Period** - Long period is defined as the period which is long enough for the inputs of all factors of production to be varied. In this period no factor is fixed, but all are variable factors.

1.7.4 Short-run Costs

In the short-run, a firm employs two types of factors : fixed factors and variable factors. Costs are also of two types : fixed costs and variable costs.

(i)　**Fixed Costs** - Fixed costs (also known as supplementary costs or overhead costs) are the costs that do not vary with the output. These are the expenses incurred on the fixed factors of production.

Examples : Rent; interest; insurance premium; salaries of permanent employees, etc.

(ii)　**Variable Costs** - Variable costs (or prime costs) are the costs that vary directly with the output. These are the expenses incurred on the variable factors of production.

Examples: Expenses on raw materials, power and fuel; wages of daily labourers, etc.

1.7.5 Distinctions between Fixed Costs and Variable Costs

Fixed Costs	Variable Costs
1. Fixed costs do not vary with quantity of output.	1. Variable costs vary with the quantity of output.
2. They are related with the fixed factors.	2. They are related with the variable factors.
3. They do not become zero. They remain same even when production is stopped.	3. They can become zero when production is stopped.
4. A firm can continue production costs are not recovered even fixed costs.	4. Production should at least recover the variable cost.

1.7.6 Total Cost Curves in the Short Run

There are three concepts concerning total cost in the short period : Total fixed cost; total variable cost and total cost.

(i)　**Total Fixed Cost (TFC)** – Total Fixed Costs are those costs that do not vary with the output. They continue to be the same even if output is zero or 1 unit or 10 lakhs units. Thus, they are totally unaffected by the changes in the rate of outputs. These costs are also often referred to as supplementary costs or overhead costs or unavoidable costs. Examples of fixed costs are : (i) Initial establishment expenses, (ii) Rent of the factory, (iii) Expenses on maintenance of Machinery; (iv)

Wages and salaries of the permanent staff, (v) Interests on bonds, (vi) Insurance premium.

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TFC = quantities of the fixed productive service x factor price.

Total fixed cost of a firm is illustrated in the following table and diagram :

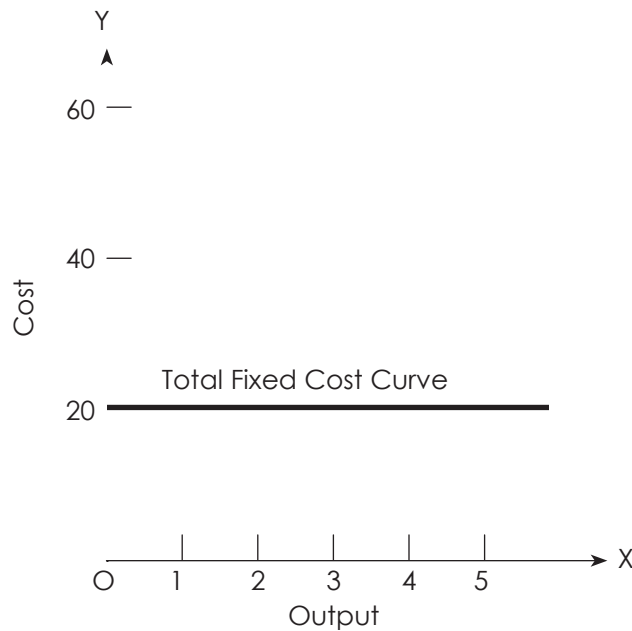| Units of output	TFC (`)
0	20
1	20
2	20
3	20
4	20
5	20

Fig.1.32: Total Fixed Cost Curve

TFC curve is a horizontal line parallel to the x-axis which explains total fixed cost remains the same at all levels of output.

(i) **Total Variable Cost (TVC)** – The costs that vary directly with the output and rises as more is produced and declines as less is produced, are called total variable costs. They are also referred to as prime costs or special costs or direct costs or avoidable costs. Examples of variable costs are : (i) wages of temporary labourers; (ii) raw materials; (iii) fuel; (iv) electric power, etc.

TVC = quantities of the variable factor service × factor price.

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Total Variable Cost is illustrated in the following table and diagram :

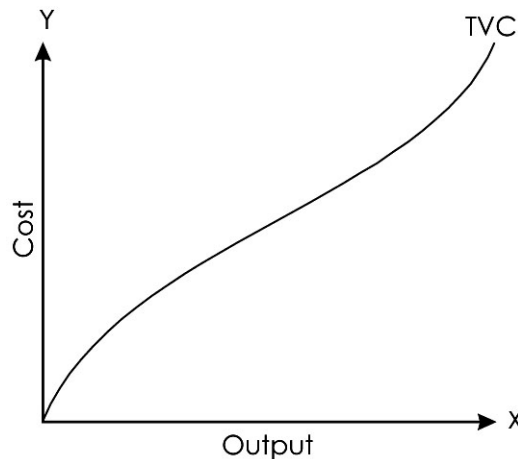| Units of output	TVC (`)
0	0
1	18
2	30
3	40
4	52
5	65
6	82
7	106
8	140

Fig.1.33: Total Variable Cost Curve

Our above table and diagram indicate that total variable cost varies directly with the volume of output. TVC curve starts from the origin, up to a certain range remains concave from below and then becomes convex. It shows that in the beginning, total variable cost rises at a diminishing rate and thereafter, it rises at increasing rates.

(ii) **Total Cost** – Total Cost means the total cost of producing any given amount of output. When we add total fixed and total variable costs at different levels of output, we get the corresponding total costs.

Thus, TC = TFC + TVC

Since, fixed costs are constant and variable costs necessarily rise as output rises, total costs also rise with the output or, to put the point more technically, TC is a function of total product and varies directly with it : TC = f(q).

TC (Total Cost) curve can be obtained by adding TFC and TVC curves vertically at each point.

Again, since the total fixed cost, by definition remains constant, the changes in the total costs are

entirely due to the changes in total variable costs. In other words, the rate of increase of total cost is the same as of total variable cost, as one of the two components of total cost remains constant. TC and TVC curves, therefore, have the similar shapes, the only difference is that TVC curve starts

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from origin (O) while TC curve starts above the origin. Initially TC will include the amount of TFC and hence it starts from the positive intercept.

The relationship between these three – TFC, TVC and TC is illustrated in the following table and diagram :

Example:

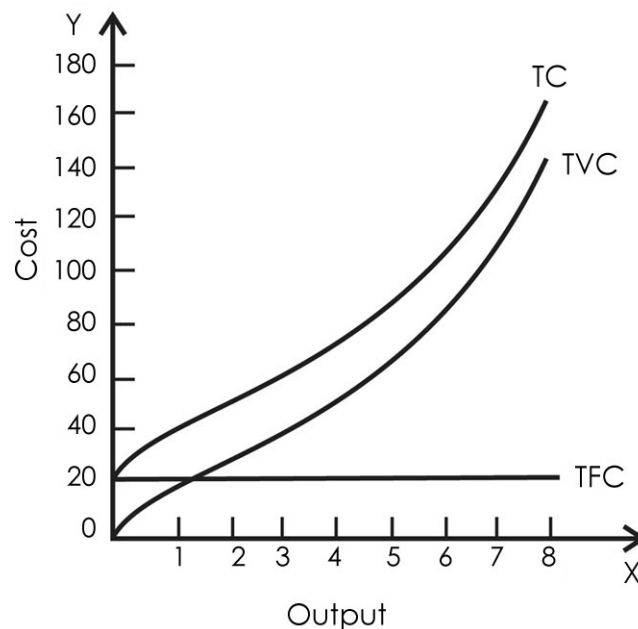| Units of Output	TFC (`)	TVC (`)	TC (`)
0	20	0	20
1	20	18	38
2	20	30	50
3	20	40	60
4	20	52	72
5	20	65	85
6	20	82	102
7	20	106	126
8	20	140	160

Fig.1.34: Cost Curves

1.7.7 Unit Cost Curves in Short-Run

The short-run unit cost curves are : Average Fixed Cost (AFC) curve; Average Variable Cost (AVC) curve; Average Total Cost (ATC) or Average Cost (AC) curve; and Marginal Cost (MC) curve. For price and output determination, per unit cost curves are more useful than the total costs just discussed.

(i) **Average Fixed Cost (AFC)** – Average fixed cost can be obtained by dividing total fixed cost (TFC) by the quantity of output (Q),

AFC = TFC/Q

Since total fixed costs remain the same, as output rises, average fixed cost diminishes but never becomes zero.

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Features of AFC – (i) As output rises, the average fixed cost (AFC) goes on declining. The AFC curve is, therefore, a downward sloping curve, (ii) As output approaches zero, average fixed cost approaches infinity, but AFC curve never touches the y-axis. On the other hand, as output reaches very high levels, average fixed cost approaches zero, but it never becomes zero, it always remains positive. Hence the AFC curve never touches the x-axis. Thus it follows that AFC curve never touches either of the axis. Actually AFC curve takes the shape of rectangular hyperbola which shows that the area under the curve (i.e. total fixed cost) always remains the same.

AFC is illustrated in the following table and diagram.

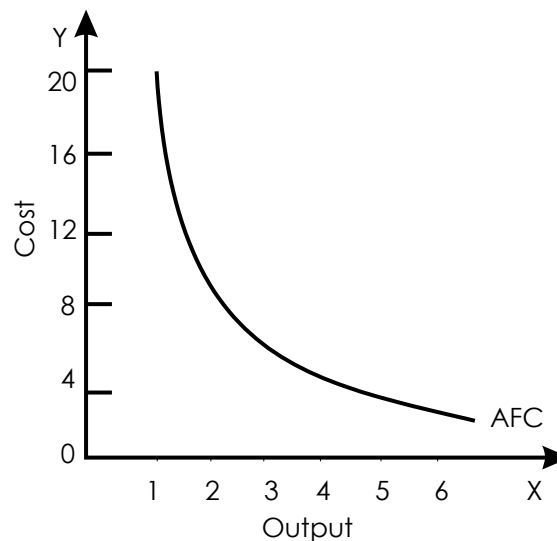| Units of Production	TFC (`)	AFC (`)
0	20	-
1	20	20
2	20	10
3	20	6.67
4	20	5
5	20	4
6	20	3.33

Fig.1.35: Average Fixed Cost Curve

(i) **Average Variable Cost (AVC)** – Average variable cost can be obtained by dividing the total variable cost (TVC) by the quantity of output (Q).

$$AVC = TVC/Q$$

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This is illustrated in the following example and diagram :

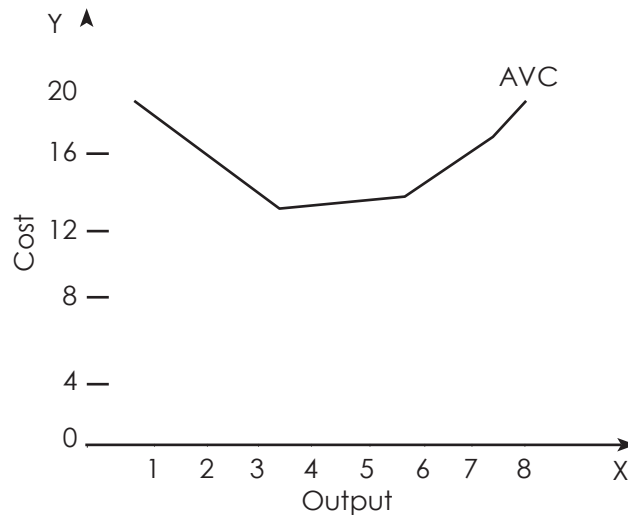| Units of Production	TVC (`)	AVC (`)
0	0	-
1	18	18
2	30	15
3	40	13.33
4	52	13
5	65	13
6	82	13.67
7	106	15.14
8	140	17.5

Fig.1.36: Average Variable Cost

As output rises, the AVC curve first falls, reaches a minimum and then begins to rise. Thus, AVC curve has a U-shape. In above example, AVC falls up to 5 units of output, thereafter, it starts to rise.

(II) **Average Total Cost (ATC) or Average Cost (AC)** – Average total cost (ATC) is obtained by dividing the total cost (TC) by the quantity of output (Q). Thus, average cost (AC) is the per unit cost of production of a commodity. Or, alternatively, it can also be obtained by adding average fixed cost (AFC) and average variable cost (AVC).

$$ATC = TC/Q$$

$$Or, ATC = AFC + AVC$$

Diagrammatically the vertical summation of average fixed cost and average variable cost curves gives us the average total cost curve. The ATC curve is also a U-shaped curve.

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(iv) **Marginal Cost (MC)** — Marginal cost is the increase in total cost resulting from one unit increase in output. In short, it may be called incremental cost. Thus,

$$MC = dTC/dQ$$

Or, $MC = TC_n - TC_{n-1}$

Here,   MC = Marginal Cost

TC$_n$ = Total Cost of n units of output

TC$_{n-1}$ = Total Cost of n-1 units of output

Suppose the total cost of 4 units of output is ` 72 and the total cost of 3 units is ` 60, then the marginal cost of 4 units level of output will be ` 12 (` 72 – ` 60).

Actually, MC is marginal variable cost since marginal fixed cost in absurd.

i.e. $MC = \dfrac{\Delta TVC}{\Delta Q}$

Again,   TC = TFC + TVC

Taking changes in TC with respect to output Q,

$$\dfrac{dTC}{dQ} = \dfrac{dTVC}{dQ}$$

or MC = MVC

Since a change in total cost is caused only by a change in total variable cost, marginal cost may also be defined as the increase in total variable cost resulting from one unit increase of output. Thus, marginal cost has nothing to do with the fixed costs.

Suppose the total variable cost of 4 units of output is ` 52 and the total variable cost of 3 units is ` 40, then the marginal cost will be ` 12 (52-40).

The estimation of marginal cost (MC) from total cost (TC) and total variablce cost (TVC) is indicated in the table below:

Units of output	TFC (`)	TVC (`)	TC (TFC + TVC) (`)	MC ($TC_n - TC_{n-1}$) (`)
(1)	(2)	(3)	(4)	(5)
0	20	0	20	-
1	20	18	38	18
2	20	30	50	12
3	20	40	60	10
4	20	52	72	12
5	20	65	85	13
6	20	82	102	17
7	20	106	126	24
8	20	140	160	34

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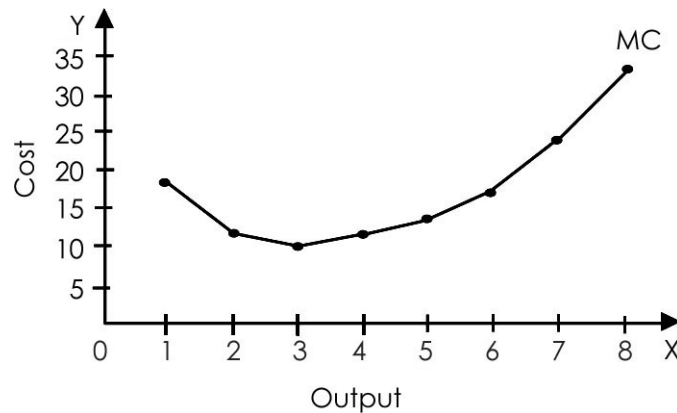The marginal cost curve based on the above table is depicted in the figure below:

Fig.1.37

The different short-run cost are illustrated in the following table and diagram below :

1.7.7.1 Why is MC curve U-shaped in the short-run?

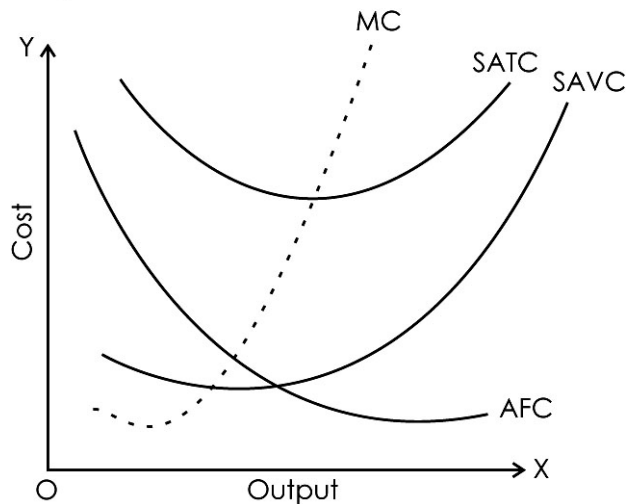| Units of Outpt	TVC (`)	AVC (`)	MC (`)
0	0	-	-
1	18	18	18
2	30	15	12
3	40	13.33	10
4	52	13	12
5	65	13	13
6	82	13.67	17
7	106	15.14	24
8	140	17.5	34

Diagram

Fig.1.38: Cost Curves

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- From the table and diagram, as output rises, the MC curve first falls reaches a minimum and then begins to rise.

- Thus, MC curve has a U-shape.

- The reason behind the U-shape of the MC curve is the operation of the law of variable proportions.

- The law states that with the increase in a variable factor, keeping other factors constant, the marginal physical product (MPP) first increases, and then after a certain level of production, it starts to decline.

- In the beginning the stage of increasing returns operates which increases the MPP, and after a certain point, the stage of diminishing returns starts to operate which reduces the MPP.

- On the basis of this in output, initially, the rate of increase in the requirement of variable factor is less and less, and, after a certain point, it is more and more.

- This implies that initially in the stage of increasing returns marginal cost (i.e., the rate of increase in the variable cost) diminishes with the increase in output.

- Then, after reaching a certain limit, in the stage of diminishing returns marginal cost rises with the further increase in output.

- Thus the marginal cost curve becomes U-shaped.

1.7.7.2 Why are AVC and ATC curves U-shaped?

- The shapes of AVC and ATC curves are influenced by the shape of MC curve in the short-run.

- The shape of MC curve is U-shaped because of the operation of the law of variable proportions.

- Consequently, AVC and ATC curves are also U-shaped.

- Initially, in the stage of increasing returns when marginal cost curve falls, the AVC and ATC curves also fall.

- After a certain level of output in the stage of diminishing returns when marginal cost curve rises, the AVC and ATC curves also rise.
- Thus, because of the operation of law of variable proportions as output rises, the AVC and ATC curves first fall, reach their minimum and the begin to rise.
- So, in the short-run, MC curve, AVC curve and ATC curve all are U-shaped.

1.7.7.3 Relationship between AC and MC

Recall the meaning of AC and MC which we have discussed earlier.

Average Cost is simply the total cost (TC) divided by the number of units produced (Q) or it is the cost per unit.

On the other hand, marginal cost is defined as the increment of total cost that comes from producing an increment of one unit of output.

The relationship between AC and MC is illustrated in the following table and diagram below:

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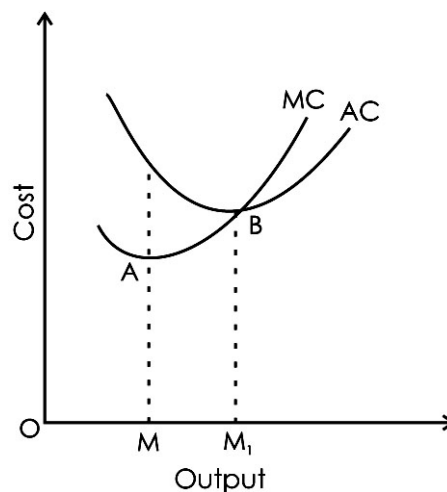| Units of Outpt	TC	AC	MC
0	20	-	-
1	38	38	18
2	50	25	12
3	60	20	10
4	72	18	12
5	85	17	13
6	102	17	17
7	126	18	24
8	160	20	34

Fig.1.39

The table and diagram reveal the relationship between AC and MC as under :

(i) When MC is less than AC (or MC curve remains below AC curve), the AC curve falls. For example

units 1 to 5 and diagram up to point B (or OM_1 output) show this situation.

(ii) When MC is equal to AC, AC becomes constant. This is the minimum point of AC, and it is at this minimum point, that MC curve cuts AC from below. In this regard 6th unit in the example and point B in the diagram may be seen. This confirms that MC passes through the minimum point of AC.

(iii) When MC is higher than AC (or MC curve rises above the AC curve), AC starts rising. It is shown as 6th unit and thereafter in the example and point B onwards in the diagram

Thus, AC-MC relationship can be summarized as follows: So long as MC is below AC, it keeps on pulling AC down; when MC gets to be just equal to AC, AC neither rises nor falls and is at its minimum; and when MC goes above AC, it keeps on pulling AC up.

1.7.8 Long - Run Cost

In the long-run, a firm can vary its scale of plant as and when it requires. All factor-inputs are thus variable in this period. Therefore, there are no fixed cost curves in the long-run. All cost curves in the long-run are basically variable cost curves. Here we find the following cost curves : Long-run Total Cost (LTC) curve; Long-run Average Cost (LAC) curve; and Long-run Marginal Cost (LMC) curve.

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Long-run Average Cost Curve:

- A firm has a fixed scale of plant in the short-run.

- A short-run Average Cost (SAC) curve corresponds to a particular scale of plant.

- In the short-run, the firm can operate only on a particular scale of plant.

- In the long-run a firm can choose among possible sizes of plant or it can move from one scale of plant to the other scale of plant.

- The choosing of the scale of plant is depends on the quantity of output that a firm wants to produce.

- A firm would like to produce a given level of output at the minimum possible cost.

- The firm would like to build its scale of plant in accordance with the quantity of output in such a way that it can minimise its average cost.

- Suppose a firm can have three possible scales of plant which are shown by SAC_1, SAC_2 and SAC_3 curves in the diagram.

- In the long-run, a firm can choose any scale of plant out of these three plants.

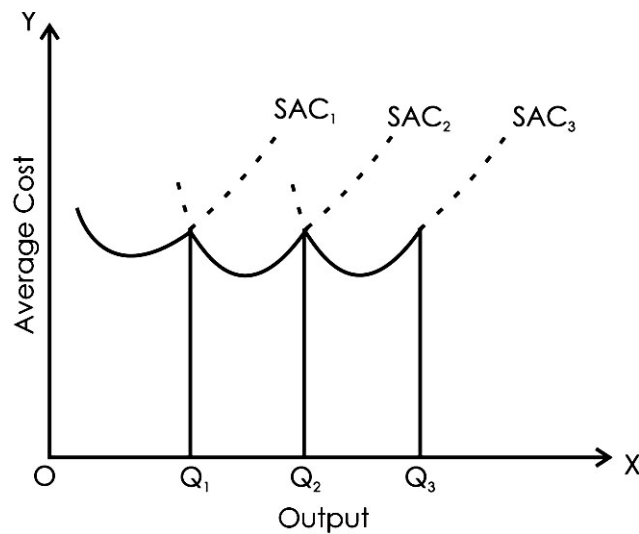- The choice of the scale of plant will depend on the quantity of output.

Fig.1.40

- Upto OQ_1 quantity of output, the firm will operate on the SAC_1 scale of plant because it gives the minimum average cost.

- The output larger than OQ_1 but less than OQ_2 will be produced at SAC_2 scale of plant.

- If the firm wants to produce the output larger than OQ_2 (say OQ_3) then it will operate on SAC_3 scale of plant.

- In the long-run a firm will choose that scale of plant which yields minimum possible average cost for producing a given level of output.

- Given that only three sizes of plants (as shown in the diagram above) are possible, then the bold dark portion of these SAC curves forms long-run average cost curve.

- Thus each point on this LAC represents the least average cost for producing that level of output.

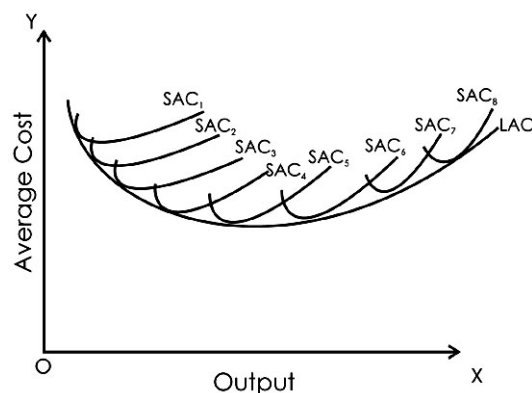> 1.68 I FUNDAMENTALS OF ECONOMICS AND MANAGEMENT

Fig.1.41

- Suppose instead of three plant sizes, there are infinite number of plants corresponding to which there will be numerous short-run average cost curves.
- Here the long-run average cost (LAC) curve will be a smooth and continuous line as shown in the diagram above.
- The curve will be tangent to each of the short-run average cost curves.

- The curve shows the least possible average cost of producing any output, when the scale of plants can be varied.
- The LAC curve is also called 'envelop curve' as it envelopes a family of short-run average cost curves from the below.
- The LAC curve is also termed as 'planning curve' because a firm plans to choose that short-run plant which allows it to produce the expected output at the minimum cost in the long-run.

Long-run Marginal Cost Curve

Long-run marginal cost indicates the increase in long-run total cost resulting from one unit increase in output. Thus,

$LMC = LTC_n - LTC_{n-1}$

Here, LMC = Long-run marginal cost

LTC_n = Long-run total cost of n units of output

LTC_{n-1} = Long-run total cost of n-1 units of output.

1.7.8.1 Relationship between LAC and LMC

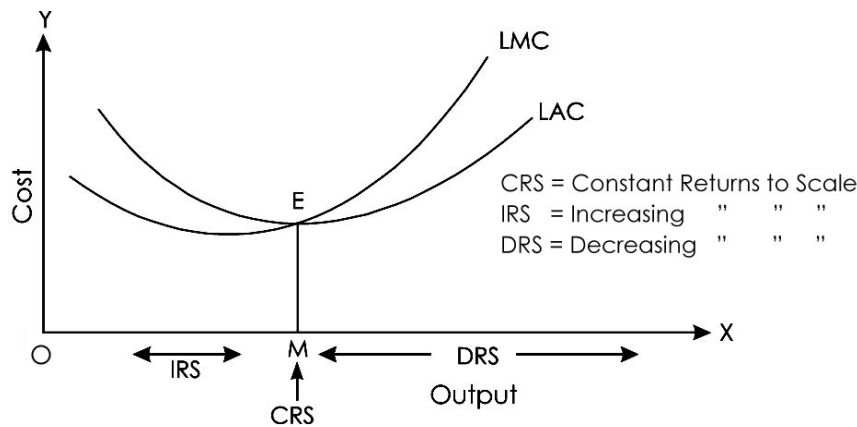It should also be noted here that the relationship between LAC curve and LMC curve is the same as that

CRS = Constant Returns to Scale
IRS = Increasing " " "
DRS = Decreasing " " "

Fig.1.42

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between SAC curve and SMC curve. Thus, when LMC curve lies below the LAC curve, the latter will be falling and when the LMC curve lies above the LAC curve, the latter will be rising. And the LMC curve cuts the LAC curve at its minimum point. LAC and LMC curves are also U-shaped curves. But they are flatter than the short-run cost curves. This is shown in Fig. 1.42.

1.7.8.2 Why is LAC curve U-shaped?

Increasing Returns to Scale	• The LAC curve is U-shaped to scale. • As we increase the scale of operation in the initial stages we get increasing returns to scale (IRS) as a result of economies of scale. • IRS means that the increase in output is more than proportionate to the increase in factor-inputs. • It implies that for a given rate of increase in output (say 20%) the requirement of increase in factor-inputs is definitely less than proportionate (say 15%). • Hence the LAC falls as output is increased. • It happens in the output range O to M in the diagram.
Decreasing Returns to Scale	• Beyond a certain point we get decreasing returns to scale (DRS) as a result of diseconomies of scales. • Now LAC rises with the increase in output. • It happens at output levels higher than M in the diagram.
Constant Returns to Scale	• Increasing returns to scale and economies cause the LAC to fall in the initial stage. • After a certain point, decreasing returns to scale and diseconomies cause the LAC to rise. • When economies and diseconomies of scale offset each other, it is the stage of constant returns to scale (CRS). • Here LAC also becomes constant and does not change with the change in output. • It happens at M level of output.

1.7.9 Economies and Diseconomies of Scale

We have already said that the U-shape of LAC curve is because of returns to scale. And returns to scale is the result of economies and diseconomies of scale. With the expansion of the scale of production firms get certain advantages, these are termed as economies of large scale production. But when the scale of production exceeds a certain limit, it leads to disadvantages or diseconomies of scale to the firms. Thus the firms get economies and diseconomies of scale with the expansion of output. These are termed as economies and diseconomies of large scale production. Economies refer to the saving in per unit cost as output increases. On the other hand, diseconomies refer to the disserving in the per unit cost as output increases.

Economies and diseconomies of scale are broadly classified into two groups:

(A)   Internal economies and diseconomies

(B)   External economies and diseconomies.

These are discussed as below:

(A) Internal Economies and Diseconomies

Economies and diseconomies that accrue to a firm out of its internal situation when its scale increase are termed as internal economies and diseconomies. Now we shall discuss them in detail.

- **Internal Economies**

  Internal Economies that accrue to a particular firm with the expansion of its output and scale are termed is internal economies. Internal economies of a firm are independent of the action of other firms. They are internal in the sense that they are limited to a firm when its output increase. They are not shared by other firms in the industry. Following are the main types of internal economies:

  (i) **Labour Economies** – Division of labour and specialization are possible more in large-scale operations. Different types of workers can specialize and do the job for which they are more suited. A worker acquires greater skill by devoting his attention to a particular job. As a result of this quality and speed of work both improve.

  (ii) **Technical Economies** – The main technical economies result from the indivisibilities. Several capital goods, because of the strength and weight required, will work only if they are of a certain minimum size. There is a general principle that as the size of a capital good is increased, its total output capacity increases far more rapidly than the cost of making it.

  (iii) **Marketing Economies** – Marketing economies arise from the large scale purchase of raw materials and other inputs. A firm may receive large discounts on the purchase of bigger volume of raw materials and intermediate goods. Marketing economies can also be reaped by the firm in its sales promotion activities. Advertising space (in newspapers and magazines) and time (on television and radio), and the number of salesmen do not have to rise proportionately with the sales. Thus per unit selling cost may also fall with the increase in output.

  (iv) **Managerial Economies** – Managerial economies arise from specialization of management and mechanisation of managerial functions. Large firms make possible the division of managerial tasks. This division of decision—making in large firms has been found very effective in the increase of the efficiency of management.

  (v) **Financial Economies** – Large firms can easily raise timely and cheap finance from banks and other financial institutions and also from the general public by issue of shares and debentures.

  (vi) **Risk-bearing Economies** – A large firm can more successfully withstand the risks of business. With the product diversification and by operating in several markets a large firm can withstand the risk of changing consumer's tastes and preferences.

  (vii) **Economies Related to Transport and Storage Costs** – Large firms are able to enjoy freight concessions from railways and road transport. Because a large firm uses its own transport means and large vehicles, the per unit transport costs would fall. Similarly, a large firm can also have its own storge godowns and can save storage costs.

  (viii) **Other Economies** – A large firm may also enjoy some other economies with the expansion of its output. Prominent among them are economies on conducting research and development activities and economies of employee welfare schemes.

  As a result of all these internal economies firm's long-run average and marginal cost decline with the increase in output and scale of production.

DEPARTMENT: COMPUTER SEMESTER: 4th
SUBJECT NAME: PEM
SUBJECT CODE: 3140709
FACULTY NAME: Ms. Amisha Parkar

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- **Internal Diseconomies**

Internal Diseconomies are those disadvantages which are internal to the firm and accure to the firm when it over expands its scale of production. The main internal diseconomies of scale are as follows : -

(i) **Management Diseconomies and Diseconomies Related to Division of Labour** – These diseconomies occur primarily because of increasing managerial difficulties with too large a scale of operations. It becomes difficult for the top management to exercise control and to bring about proper coordination.

(ii) **Technical Diseconomies** – If a firm frequently changes in it technologies and uses new technologies and new machines, it may increase its costs. After a certain limit, the large size or volume of the plant and machinery may also prove disadvantageous.

(iii) **Risk-taking Diseconomies** – The business cannot be expanded indefinitely because of the "principle of increasing risk". The risk of the firm increases because of reduction in demand, change in fashion and introduction of new substitutes in the market.

(iv) **Marketing Diseconomies** – A large firm is forced to spend more on bringing and storing of raw materials and selling of finished goods in the distant markets.

(v) **Financial Diseconomies** – A large firm has to borrow a large amount of money even at higher rate of interest. It imposes a burden on the financial position of the firm.

- **Impact of Internal Economies and Diseconomies on the LAC Curve**

When a firm accrues internal economies with the expansion of its scale of output, the LAC curve would fall. And when after a certain point, a firm receives internal diseconomies with the expansion of its scale of output, the LAC curve would rise.

Thus, internal economies causes the LAC to fall and internal diseconomies cause the LAC to rise. Hence the internal economies and diseconomies are responsible for the U-shaped of the LAC curve. It is shown in the diagram.
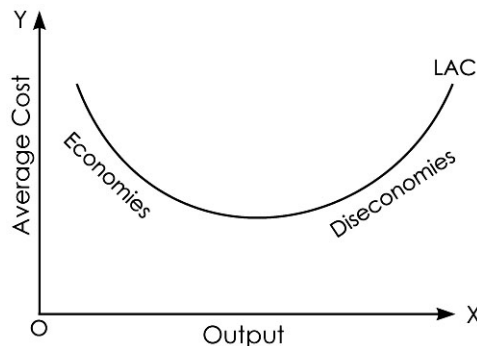

Fig.1.43

(B) External Economies and Diseconomies

Economies which accrue to the firms as a result of the expansion in the output of the whole industry are termed external economies. They are external in the sense that they accrue to the firms not out of its internal situation but from outside it i.e., from expansion of the industry. Jacob Vinor has defined external economies as 'those which accrue to particular concerns as the result of expansion of output by the industry as a whole and which are independent of their own individual output'. Following are the main forms of external economies.

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(i) **Economies of Localisation/Concentration** - When an industry develops in a particular region, it brings with it all the advantages of localization. All the firms of this industry get the following main advantages:

(a) Easy availability of skilled manpower;

(b) Improvement in transportation and communication facilities;

(c) Availability of banking, insurance and marketing services;

(d) Better and adequate sources of energy-electricity and power;

(e) Development of ancillary industries.

(ii) **Economies of Disintegration/Specialisation** – The industry can have advantages from the economies of specialization when each firm specializes in different processes necessary for producing a product. For instance in a cloth industry some firms can specialise in spinning, others in printing etc. As a result of specialisation all the firms in the industry would be benefited.

(iii) **Economies related to Information Services** – Firms in an industry can jointly set-up facilities for conducting research, publication of trade journals and experimentation related to industry. Thus, besides providing market information, the growth of the industry may help in discovering and spreading improved technical knowledge.

(iv) **Economies of Producer's Organisation** – Firms of an industry may form an association. Such an association can have their own transport, own purchase and marketing departments, own research and training centres. This will help to reduce costs of production to a great extent and shall be mutually beneficial.

• **External Diseconomies**

Diseconomies which accrue to the firms as a result of the expansion in the output of the whole industry are termed external diseconomies. The main external diseconomies are as follows:

(i) **Increase in input price** – When the industry expands, the demand for factor-inputs increases. As a result the input prices (such as wages, prices of raw materials and machinery equipments, interest rates, transport and communication rates etc.) shoot up. This causes the cost of production to rise.

(ii) **Pressure on Infrastructure Facilities** – Concentration of firms in a particular region creates undue pressure on the infrastructure facilities – transportation, water, sanitation, power and electricity etc. As a result, bootlenecks and delays in production process become frequent which tend to raise per unit costs.

(iii) **Diseconomies due to Exhaustible Natural Resources** – Diseconomies may also arise due to exhaustible natural resources. Doubling the fishing fleet may not lead to a doubling of the catch of fish; or doubling the plant in mining or on an oil-extraction field may not lead to a doubling of output.

(iv) **Diseconomies of disintegration** – When the production of a commodity is disintegrated among various processes and sub-process, it may prove disadvantageous after a certain limit. The problem and fault in any one unit may create limit. The problem and fault in any one unit may create problem for whole of the industry. Coordination among different concerns also poses a problem.

As a result of external diseconomies, the LAC curve of the firms in an industry shifts upward.

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Basic Concepts of Economics

- **Impact of External Economies and Diseconomies on the LAC Curve**

    (i)   As a result of external economies, the LAC curve of the firms shifts downwards. It is shown in the diagram below that because of external economies, LAC curve shifts downward from LAC1 to LAC_2.

    (ii) As a result of external diseconomies, the LAC curve of the firms shifts upwards. It is shown in the diagram below that because of external diseconomies, LAC curve shifts upwards from LAC1 to LAC_3.
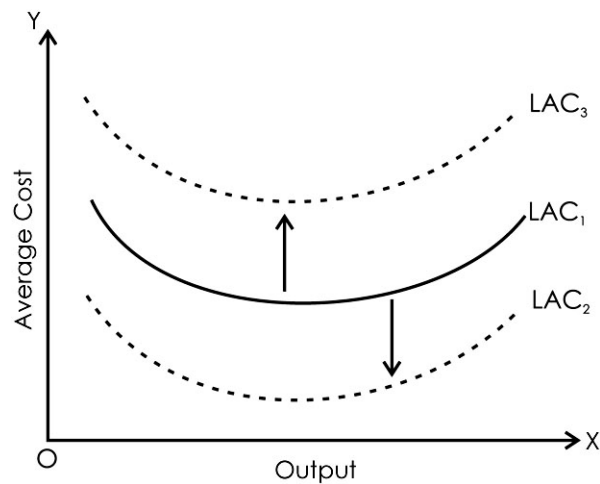

Fig.1.44

Thus in short, internal economies and diseconomies of scale affect the shape of the LAC curve and make it U-shaped. On the other hand, external economies and diseconomies cause the LAC curve to shift downward or upward, as the case may be.

EXERCISE

1. Define the subject 'economics'. Give the definition of economics, as given by 'Adam Smith', Alfred Marshall, Lionel Robbins.

2. Why is economics a science and an art?

3. Why is economics called a positive and normative science?

4. Define micro and macro economics.

5. Define the terms : Utility, wealth.

6. Distinguish between total and marginal utility.

7. What is the difference between income and wealth?

8. Name the four factors of production.

9. What is 'demand function'?

10. State the 'law of demand'

11. Explain the 'law of demand' with the help of a demand schedule & demand curve.

12. State the major assumption to the law of demand.

13. Explain the exceptions to the law of demand.

14. Why is the demand curve negatively sloped? State any 6 causes.

15. What are giffin goods?

16. State with the help of diagrams the concept of 'movement along the demand curve' and 'shift of the demand curve'.

17. Define elasticity of demand. State the methods of measuring price elasticity of demand.

18. What are the types of price elasticity of demand?

19. Devine income and Cross elasticity of demand.

20. State the determinants of price elasticity.

21. State the law of diminishing marginal utility.

22. Define 'supply'. How is supply different from stock?

23. Show the concept of movement and shift of supply.

24. State the meaning of elasticity of supply.

25. What do you mean by the term 'equilibrium price' and how is it determined with the help of demand and supply.

26. What do you mean by production function? Name the 2 types of production function.

27. State the different items of cost.

28. What is the meaning of 'opportunity cost'?

29. What are implicit costs and explicit costs?

30. How are 'fixed costs' different from 'variable costs'?

31. What is the meaning of economics and diseconomicsof scale? Explain the 'law of variable proportions' and state the differences between this law and the laws of 'returns toscale'.