Microeconomics

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SYLLABUS - BOOK MAPPING TABLE

Microeconomics

Syllabus	Mapping in Book
Unit I: **Consumer Behaviour**: Nature and scope of microeconomics – approaches to studying economics – comparison of cardinal and ordinal analysis – importance and limitations of microeconomics – role and limitations of free market economy – demand and law of demand – utility analysis and derivation of demand – ordinal approach in difference curve – consumer equilibrium – price, income and substitution effect (Hicks and Slutsky) – derivation of demand curve analysis – Giffin goods – elasticity of demand: price, income and cross – consumer's surplus – Engel curve.	**Unit I:** Consumer Behaviour **(Pages 1 – 74)**
Unit II: **Theory of Supply and Production:** Supply and law of supply – elasticity of supply – production decision – factors of production – production function – law of variable proportion – returns to scale – economies of scale – iso-quant approach and producer's equilibrium – factor substitution – elasticity of factor substitution.	**Unit II:** Theory of Supply and Production **(Pages 75 – 122)**
Unit III: **Theories of Cost and Revenue:** What are costs? – production and costs – cost curves and their shapes – the relationship between short-run and long-run average total cost – elasticity of cost – average and marginal revenue – relation between AR and MR curves – interactions of cost and revenues – conditions of equilibrium of a firm – conditions of equilibrium of a firm.	**Unit III:** Theories of Cost and Revenue **(Pages 123 – 156)**
Unit IV: **Market Structure and Equilibrium:** Market concept – types – perfect and imperfect forms – importance of time element in price theory – firm and industry – equilibrium of a firm under perfect competition, monopoly, monopolistic competition, duopoly and oligopoly – price discrimination – control and regulation of monopoly – collusive price leadership – kinked demand curve – comparison of various markets.	**Unit IV:** Market Structure and Equilibrium **(Pages 157 – 204)**
Unit V: **General Equilibrium and Welfare Economics:** Concept of equilibrium – static, dynamic and neutral equilibrium – partial vs. general equilibrium – Walrasian general equilibrium theory – Welfare economics – problems in measuring welfare – classical welfare economics – Pigovian welfare condition – Pareto's criteria – value judgment – concept of a social welfare function – compensation principle – the Kaldor – Hicks criterion.	**Unit V:** General Equilibrium and Welfare Economics **(Pages 205 – 228)**

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Unit I   Consumer Behaviour

Learning Objectives:

By the end of this unit the learners would be able to understand:
- Nature and scope of microeconomics
- Cardinal and ordinal analysis
- Supply of goods
- Demand and law of demand
- Indifference curve
- Consumer equilibrium
- Giffen goods
- Engel curve

Structure:

1.1 INTRODUCTION

In this unit, initially we shall focus on the central theme of Consumer theory, i.e., the utility maximizing behaviour of consumer. And gradually as the unit advances, concept of law of demand, consumer's surplus and elasticity of demand etc. have also been illustrated graphically in a systematic manner.

1.2 NATURE AND SCOPE OF MICROECONOMICS

Economics is one of the many helpful and essential disciplines of knowledge. Despite the fact that economics is utilised to start and accelerate global economic growth as well as to end hunger, poverty, and unemployment, economics has recently come to have greater significance. Apart from that issues like inflation, food, stagnation, adverse balance of payments etc. That are confronted in our economy cannot be dealt without the adequate knowledge of economics.

Only 200 years have passed since the beginning of economics as we know it today, and it has come a long way since then. We will cover the fundamentals of microeconomics in this book. But it will be advantageous to clarify the subject matter of microeconomics before we begin the study of its principles.

Microeconomics and macroeconomics are the two subfields of economics. Ragnar Frish first used the term, which was later embraced by economists all around the world. The term "microeconomics" comes from the Greek word "mikros," which means "little," and it deals with study of things like individual customers, businesses, etc. According to K.E. Boulding, the study of individual businesses, houses, etc.

1.2.1 Nature and Scope

Microeconomics is the study of the economic activities of single units and small groups of single units, as was previously said. In microeconomics we study how different units of any organization i.e., consumers, producers or firms, suppliers in any economy carries on economic actions and attains equilibrium. In microeconomics, we examine the economy at a very small scale. Microeconomics thus examines the economy under a microscope to determine how various economic components interact – the individuals/households as consumers or producers – acts. For instance, in microeconomics demand of a consumer for a product constitutes individual demand and from the individual demand, we derive market demand, i.e., demand of a group of individuals of the said good. In microeconomics, price and output are also determined by how individual enterprises behave and is followed by under changed circumstances of different demand and supply conditions. From there, every company will find it simpler to implement price-output fixing. An industry is a collection of businesses that produce related goods.

Microeconomics thus determines the processes by which various economic units arrive at their equilibrium positions, working its way up from the individual units to a specifically specified group. Since it does not examine all of the units as a whole, microeconomic analysis works with specific groups. On the other hand, microeconomics does not cover the study of the entire economy.

1.2.2 Microeconomics and Allocation of Resources

Microeconomics fall within the purview of microeconomics. The product pricing theory, distribution theory considering total quantity of given resources, and clarifies how respective allocation of resources for production of different products

is done. Indeed it is allocation of resources which helps to decide what products shall be produced/manufactured and procedures to be adopted. In a free-market economy, the distribution of resources to produce different goods depends on the costs of those goods and other factors. Thus, to clarify the strategy for resource allocation, microeconomics analyses how relative prices of products/factors are decided. Therefore, theories of product prices, factor prices, or distribution fall under the ambit of microeconomics. The relative prices of food grains, jute, kerosene oil, vanaspati ghee, and other commodities are established according to the product pricing theory. The distribution theory explains how decisions about salaries, rent, interest rates, and profits are made. As a result, microeconomic theory includes the theories of product pricing and factor pricing.

Goods prices are influenced by supply and demand. Product demand is influenced by the purchasing habits of consumers, and supply of products depend on production cost and firm's behaviour. To understand prices of goods and production inputs, demand and supply sides must be considered. Therefore, there are two components to the price theory: the theory of demand and the theory of production.

1.2.3 Microeconomics and Economic Efficiency

The analysis of product pricing, production costs, and resource allocation all depend on the pricing mechanism. When resources are used to maximise customer happiness, efficiency in resource allocation is achieved. There are three types of economic efficiency: allocative economic efficiency, efficiency in production, and efficiency in the distribution of goods among people (efficiency in consumption) (efficiency in direction of production). Microeconomic theory demonstrates prerequisites, factor responsible for deviations to achieve efficiencies and consequent decline of satisfaction of consumer.

Efficiency in production involve manufacturing of maximum goods from available resources. Once it is achieved reallocation no longer takes place. Efficiency in consumption implies distribution of goods/services among people to maximise total satisfaction. Once such efficiency in redistribution of products among the people is attained, it is not possible – to improve the lives of some without harming those of others. Allocative economic effectiveness occurs when different products are such manufactured that it maximises satisfaction of the consumer.

It may also be possible that even if efficiency is obtained, goods distributed among people are not preferred by them. On contrary, goods preferred by people may not be produced. In a nutshell, when resources are distributed to the production of various goods in such a way that maximum satisfaction is possible, allocative efficiency/optimum direction of production is accomplished. Once this is obtained, manufacturing few products more and others less by rearranging resources implies loss of satisfaction/efficiency. Indeed economic efficiency is an issue of theoretical welfare. Welfare economics is a vital division of Microeconomics.

Four basic issues namely:

1. What to produce, how much of it,

2. How to make,

3. who to produce for, and

4. Whether the manufacture and distribution of goods falls within the purview of microeconomics. The concept of microeconomics is presented in the following chart.

Chart 1.1

Microeconomics Theory

- Product Pricing
  - Theory of Demand
  - Theory of Production and Cost
- Factor Pricing
  - Wages
  - Rent
  - Interest
  - Profits
- Theory of Economic welfare
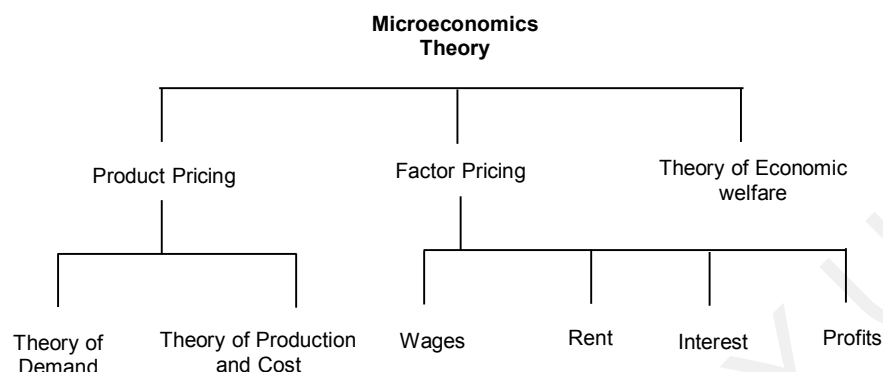
Microeconomics is concerned with the following questions:

1. How consumer incurs his income to the purchase of various products/ services i.e., theory of demand.

2. How producer uses quantity of factors i.e., theory of production.

3. How to minimise cost of production i.e., theory of cost.

4. The theory of product pricing describes how the prices of goods are determined.

5. How the produced output is shared or distributed among various factors i.e., theory of distribution.

6. Whether allocation of resources are to be done i.e., welfare economics.

Check Your Progress
1. Explain scope of Microeconomics.
2. What do you understand by 'allocative economic efficiency'?

1.3 APPROACHES TO STUDYING (MICRO) ECONOMICS

1.3.1 Microeconomics Undertakes Microscopic Study of an Economy

Microeconomics discusses the issue of resource allocation in society and evaluates the effectiveness of the same, making it clear that it performs analysis of an economy as a whole. Both microeconomics and macroeconomics examine the economy from a micro level, analysing how different economic units behave, how they interact, and how equilibrium levels change. This process is referred to as general equilibrium analysis.

Thus, partial equilibrium analysis—which examines the equilibrium of specific economic units while holding other variables constant—is conducted in microeconomics. Microeconomics analyses general equilibrium analysis of an economy, by explaining how all units, products market, factor market, money, capital market are inter-related/interdependent and they attain general equilibrium by adjustments. Thus, on the way to economic efficiency each individual will adjust himself to be in equilibrium. Subsequently, adjusted cells are readjusted again as per quantity supplied and demanded and also price level, which in turn upsets the adjustment again and so on. The study of how all individual cells are adjusted simultaneously is known as general equilibrium analysis, as opposed to partial equilibrium analysis, and it is a crucial component of microeconomics. General equilibrium analysis is a microscopic examination of the interactions between the various components of our economy. Only a certain component of this examination focuses on overall economic efficiency.

Check Your Progress

3. Explain the approach of Microeconomics.
4. What do you mean by General equilibrium analysis?

1.4 COMPARISON OF CARDINAL AND ORDINAL ANALYSIS

Basis	Ordinal	Cardinal
Assumption	When a consumer uses a variety of goods and services, this is known as ordinal utility.	According to cardinal utility, a customer gets satisfaction by consuming one thing at a time.
Meaning	The utility in which consumer happiness with a product is measured according to preference but cannot be quantified.	The utility that can be stated in numerical units and from which user satisfaction is derived.
Approach	Qualitative	Quantitative
Evaluation	Ranks	Utils
Examination	Indifference curve analysis	Marginal utility analysis
Promoted by	Traditional and Neo-Classical economists, viz., Prof. John and J.R. Hicks	Modern economists, viz., Prof. Alfred Marshall
Realistic	More i.e., less practical.	Less, i.e., more practical and sensible.

Check Your Progress

5. What is the assumption of ordinal utility?
6. What is the assumption of cardinal utility?

1.5 IMPORTANCE AND LIMITATIONS OF MICROECONOMICS

1.5.1 Importance of Microeconomics

Microeconomics is the study of an individual economic unit or variable, and it is crucial to the understanding of contemporary economic theory. Following issues explain the importance of modern Macroeconomics:

1. **Price determination:** It discusses how product pricing are established as well as how producers are compensated and dispersed.

2. **Business decision making:** Microeconomics help entrepreneur to fix price policy, get highest level of output and attain highest possible productivity from different factor combinations.

3. **Business and Production planning:** To increase productivity, microeconomics can be used to help with the strategic planning of business policies, business growth, and investment strategies.

4. **Helps in International Trade:** Gains from domestic and international trade, foreign exchange, the balance of payments, disequilibrium, and exchange rate fixing are all explained by microeconomics that is the core concept of microeconomics. It advises yardstick of the strategy to get it, and in turn, improves the living standard of common man.

5. **Basis of welfare economics:** The entire structure of microeconomics has been based on price theory.

6. **Required by Government:** Microeconomics helps government to frame policies viz. taxation, public expenditure, price policy etc., helps government to achieve predetermined objective of effective resource allocation and economic welfare.

1.5.2 Limitations of Microeconomics

Some of the important limitations of microeconomics are listed below:

The main disadvantages or limitations of microeconomics can be highlighted as follows:

(a) **Unrealistic Assumptions:** Microeconomics is based on unrealistic assumptions like laissez faire economy, perfect competition, full employment.

(b) **Incomplete Study:** It studies only behaviour of individual unit thus does not provide the complete picture.

(c) **No Aggregate Analysis:** Microeconomics does not provide aggregate analysis of employment, fiscal and monetary policy, which are very important to study national economy.

(d) **Limited Scope:** Scope of microeconomics is limited or narrow while compared to macroeconomics.

(e) **Static Analysis:** It is based upon static analysis where variables are assumed to be constant. So, it may lead to wrong conclusion.

(f) **Less Reliable:** Because of false assumptions, incomplete study and static analysis, it is less reliable than macroeconomics.

Check Your Progress

7. How is Microeconomics used in International Trade?
8. Why is Microeconomics required by Government?

1.6 SUPPLY OF GOODS

The quantity that the producer makes available for sale at a specific price and during a specific period of time is referred to as the supply of any good. Like demand, it also has three elements or essentials as under:

(a) Quantity of a product which a seller is prepared for sell.

(b) Supply is always related to price.

(c) The amount supplied must refer to some period of time.

Thus supply implies quantity of a product which is a seller is prepared to sell at a specific price and time. Producers may offer different quantities of any product for sale at different price level. Therefore, it can also be called as schedule of quantities which is offered for the purpose of sell at different price levels.

1.6.1 Features

Following are the main features of supply:

(a) **Desired quantity:** Supply is a desired quantity, how much producers are willing to sell at a price and at a particular time and not the quantity they actually sell.

(b) **Relation with price:** Supply always has its reference to price, similarly the supply at a price. For instance, a farmer/producer may not be prepared to sell his produce (say wheat) at a prevailing market price of ₹ 600 per quintal. But he may be ready to sell if the price rises to ₹ 700 per quintal.

(c) **Flow variable:** Like demand, supply is a flow variable. Therefore supply is the amount which an entrepreneur is ready to sell at a particular time i.e., per day, per month or per annum.

(d) **Supply is different from quantity supplied:** Economists sometimes distinguish between supply and quantity of product supplied. According to them, supply implies whole set of quantities of a product ready to sell at different specific price.

Check Your Progress

9. What do you mean by Supply of commodity?
10. Differentiate between Supply and quantity supplied.

1.7 ROLE AND LIMITATIONS OF FREE MARKET ECONOMY

1.7.1 Role

In contrast to a government-regulated economy, where factors of production and resource use are planned by a central government agency, which also sets prices, a free market economy is governed by the market forces of supply and demand. Companies and resources in a free market economy are held by private persons or entities that are allowed to trade with one another. According to economists, a free market economy is one in which buyers and sellers voluntarily exchange goods. Paying a worker a pay on a regular basis is a solid example of an economic trade.

Sellers of various things have the freedom to offer their products for sale at any price they want in a free or pure market economy. Although that hardly ever occurs in reality. Barriers to a free market include taxes on imports and exports, age restrictions on alcoholic beverages, and other legal limitations.

As an alternative, in a free market economy, there is little to no central government control over the production and sale of products and services. Therefore, at whatever price, a free market economy permits the linkages between product supply and consumer demand.

1.7.2 Limitations

1. **Limited Product Ranges/Merit Goods:** Since commercial entities are free to pursue profit however they see fit, products and services that are not profitable will not be developed, which restricts the variety of products available to consumers and has a disproportionately negative impact on a small number of consumer groups.

2. **Dangers of Profit Motive:** In free market economy, primary objective for any manufacturer is to earn profit. They may even sacrifice worker safety, environmental standards and also adopt selfish motive to reduce their costs.

3. **Market Failures:** If the free market economy spirals out of control, the repercussions could be disastrous.

4. **Dominancy of firms:** Large enterprises can still dominate few markets, even under competition. So they maximize respective profits by exploiting suppliers by reduced (purchasing?) price and consumers by higher selling price level.

5. **Unemployment and Inequality:** Few people in a free market economy will be unable to find employment, such as the elderly, children, and others whose talents are not in demand. So, without government intervention, there is no way that these unemployed individuals can be held at par with the benefited sections and consequently inequality prevails.

1.8 DEMAND AND LAW OF DEMAND

Demand is an important force which determines price. The consumption of a consumer, or a consumer's economic activity, is related to the theory of demand. Demand is the method through which a consumer obtains the goods and services he desires to purchase.

1.8.1 Meaning of Demand

In common sense, the terms desire, want, and demand are interchangeably used. But in economics, all these terms have different meaning. Simply wanting something is what is meant by desire. Suppose you wish to have a motor-bike. It relates to both the desire to purchase and capability to pay for that commodity. Demand only develops when willingness and ability to pay are present with desire. If you have the money to buy one but don't want to buy a motorcycle, your want will turn into a want rather than a demand. Only when you are willing to spend money to satisfy your want will it turn into a demand. Demand is hence the desire or readiness of consumers to purchase products and services. Consumers must have enough money to buy the goods at the range of potential prices for their demand to be effective.

So, demand of a product/service depends on consumers – as upon their willingness and capability to purchase it, is in the words of economics termed as quantity demanded. The quantity demanded is measured at a certain price over certain periods, of say, the number of oranges bought per week, the number of chocolate bars per month, the amount of television per year. For example, if we say that a household is ready to buy 2 litres of milk per day @ ₹ 25 per litre, then 2 litres of milk will be called quantity demanded because it has all the three essentials of demand viz., quantity, price and time. In general, people demand more at lower prices and less at higher prices. Thus, the phrase "demand" denotes that the entire schedule of consumer demand displays different amounts of a product that consumers want and are willing to purchase at various conceivable costs, but the term "quantity demanded" denotes a specific quantity purchased at a certain price.

1.8.2 Features of Demand

The following are the main characteristics of demand:

(a) **The utility of the commodity affects demand:** Products are in high demand because they can fulfil consumer needs. A commodity will only be in demand from a national customer if it is useful to him.

(b) **Demand always equals real demand.:** Only when a desire is supported by purchasing power and a willingness to spend will it develop into a demand. Thus, there are three components that make up demand: the

want for a good or service, the ability to satisfy that need, and the willingness to make a purchase.

(c) Price and time are the references for demand: Demand always has a relationship to price and timing. Given that demand is stated as a function of temporal units like days, weeks, and months, etc. For instance, 5,000 motorbikes are demanded per month at a price of ₹ 40,000. Therefore, demand is a flow idea.

1.8.3 Determinants of Demand

Demand for a product depends on a number of variables. These elements could be political, social, or economic. The influence of these factors on demand is called demand function. corresponding to the market's and individuals' demands, respectively. Two categories of demand exist:

1. Individual Demand
2. Market Demand.

1. Individual Demand: Quantity of a product that any person demands at a specific price during a particular time is known as individual demand. The following variables affect the individual demand:

(a) Price of the commodity: The most important factor influencing demand is price. Any product's demand often rises as its price decreases and *vice versa.*

(b) Price of Related goods: Products that are related can be alternatives or complements.

(c) Substitute goods: Products that are substituted for the original product include Pepsi and Coca-cola, as well as tea and coffee. The price of tea fluctuates, which affects how much coffee people want. The demand for tea will increase as coffee prices rise. Customers will switch to tea instead of coffee when coffee prices rise since tea has just become more affordable. Thus, there will be a rise in tea demand. In this case, the price of coffee is increasing, not because tea's price is decreasing.

(d) Complementary goods: The term "complementary goods" refers to products that are jointly required to meet a specific need, such as bread and butter, gasoline and cars, and CDs and players. In such commodities, the price of one product and the amount requested for the other have an inverse relationship. For instance, if automobile prices increase, fewer people will buy cars, which will result in a decrease in gasoline consumption. When a result, as the price of cars rises, so does the demand for both cars and gasoline.

(e) Income of the consumer: Consumer income is a significant factor that affects demand. Demand will increase in response to an increase in people's income, whereas demand will decrease in response to a decrease in income. But increased incomes may result

in demand of certain goods to fall. These goods are called inferior goods. Take an example of pure milk and toned milk. Pure milk is a normal commodity while toned milk is an inferior commodity. A consumer will demand more pure milk when his monthly income goes up. If his income rises, the demand for toned milk, a lower-quality good, would undoubtedly decline. He would like to substitute pure milk (a superior commodity) for toned, an inferior commodity.

(f) **Tastes and Preferences:** The level of demand for a commodity also depends on the preferences and tastes of the consumer. When we begin to like certain commodities, their demand will surely increases. Reverse will happen if we start disliking them. Consumer's tastes and preferences are also affected by advertisements.

(g) **Future Expectations:** Even if the current price remains unchanged, demand will alter if customers anticipate future price fluctuations in the commodity. For instance, if a consumer anticipates a price-rise in future, he will like to buy more of it today. Contrary to it, if he anticipates fall in price, he will buy less today. Likewise, if consumer expects rise in his income in near future, he may start demanding more right now.

1.8.4 Market Demand

Market demand refers to the overall amount of a product that consumers desire at any given price throughout time. Market demand for a product depends on the following factors:

1. **Population:** Increase in population increases the the demand and *vice versa*. The demand is impacted by both its composition and population numbers. The distribution of the population by sex, age, and other factors is referred to as its composition. The nature of demand for certain commodities is impacted by changes in population composition. For instance, increase in female population would increase the demand for cosmetics, sarees etc. Likewise, if the population composition goes in favour of children, then demand for toys, toffees etc. will increase. Demand is also influenced by place of residence particularly urban and rural. There will be difference in demand made by urban population and rural population.

2. **Season and Weather:** The seasonal and weather conditions also have effect on consumers' demand. For instance, demand for woollen clothes goes up during winter. Fans, coolers etc. are demanded more during summer. Similarly, during the rainy season, umbrellas and rain-coats are in great demand.

3. **Government Policy:** The Government of a country also makes an impact on demand of a particular commodity or commodities. It may decrease

demand of a product by imposing tax on it or increase the demand by lowering its price through subsidies. Imposition of taxes on commodities will increase the prices of the taxed commodities. As a result, their demand will fall. On contrary, if the government gives subsidies to certain producers, the costs of production and hence prices will come down. As a result, demand for subsidised goods will increase.

4. **State of business:** The prevailing business conditions in a country also affect the level of demand. For example, during boom period market demand will increase. On contrary, the level of demand goes down during the period of depression.

5. **Income Distribution:** The demand for needs will increase if the distribution of the national income is more equitable. There will be a greater demand for luxury products like vehicles, colour TVs, air conditioners, etc. if income distribution is unequal.

6. **Consumer–credit Facility:** If credit facilities from the sellers, banks etc. are available, consumers would be encouraged to spend more money than they otherwise would have been able to. Credit availability mostly influences consumer demand for pricey durable items. For example in India demand for cars has partly increased because people are able to get loans from banks.

1.8.5 Other Kinds of Demand

(a) **Composite Demand:** Composite demand is the demand for a good that has many uses. For instance, coal can be used to operate railroad engines, cook, and heat homes. It is a case of composite demand. Likewise, milk is used for preparing cheese, butter, curd, sweets, tea etc. So, demand for milk is also an example of composite demand. Once more, the demand for power is a composite demand as it is demanded by several types of consumers viz., households, agriculture, industry etc.

(b) **Direct Demand:** The demand for such directly purchased commodities by consumers for satisfaction of his want is known as direct demand, such as demand for food, cloth, house etc. Such demand is termed as direct demand because it directly satisfies human wants.

(c) **Derived Demand:** If a thing is needed for producing some other goods, which we actually need, it is known as derived demand. For instance, the need for workers by a cycle factory is derived demand because these worker's will be helpful in cycle production whose demand is direct. Likewise, the demand for bricks, cement, iron, wood etc. is derived while constructing a house.

(d) **Alternative Demand:** Demand is known as alternative demand, when it is satisfied by alternative ways. For instance, demand for food can be satisfied either by rice or chappatis or fruits, etc.

(e) **Competitive Demand:** When the demand for two products is nearly equivalent, the demand for one will decline as the other's demand

increases. All such commodities are in competitive demand with one another. It is because the purchase of more of one thing necessitates the purchase of others. For instance, an increased demand for coffee might decrease demand for tea. Similarly, a change in demand for fish might affect demand for meat.

(f) Individual Demand and Market Demand: Individual demand for a commodity is the quantity of that commodity that any individual requests at a particular price during a particular time. For example, Gaurav purchases 2 litres of milk @ ₹ 15 per kg everyday, it is individual demand. It should be mentioned that in economics, every consumer is referred to as a household. Consequently, a person's demand and household demand are the same thing.

Market demand refers to the total amount of a good that all buyers purchase at a particular price during a particular time. The total of all individual demands make up this. For example, suppose, suppose there are three consumers of milk viz., Vishal, Gaurav and Pratyush in the market, @ ₹ 15 per litre their individual demands are of 3 litres, 2 litres and 1 litre per day respectively then the market demand will be of 6 litres of milk.

1.8.6 Law of Demand

The law of demand explains the inverse relationship between a commodity's price and its quantity of demand. In accordance with this law, demand for a product moves in the opposite direction from price, other factors being equal. In other words, demand for a product decreases as price rises and increases as price lowers, given all other factors remain constant. It should be remembered that variations in price are the only reason why the quantity demanded changes. Due to the substitution impact and the income effect, more units of a product are bought at lower prices. When the price of a commodity decreases, people typically purchase more of it because they are more inclined to switch to other products whose prices have not changed. The substitution effect is this. Additionally, when a product's price declines, the consumer can now purchase a greater number of the good with the money he has available. The income effect is this. Keep in mind that the law of demand only predicts the direction of change, not the size of the change in demand. Furthermore, the relationship between price and demand is not proportional.

1.8.7 Assumptions of the Law

The term "other things staying the same" has been utilised in the law's statement. It reveals the underlying presumptions of the law of demand. Other things refers to variables other than price that affect demand. They are assumed to be constant during the given study periods. They include:

(a) Consumer income remains unchanged;

(b) No alteration in the cost of connected goods;

(c) Consumer tastes, nature, or fashion remain unchanged;

(d) No anticipation of the commodity's price changing in the future;

(e) No population change;

(f) No modification to the total assets.

1.8.8 Explanation of the Law

According to the law of demand, there is only a relationship between a product's price and the amount demanded, if all other variables remain constant. Consequently, the demand function can be used to express the law as shown below::

Dx = f (Px; Pr; Y; T; W; P)

In law of demand, relationship between price of the commodity (Px) and its demand (Dx) is established. Price of related goods (Pr), income of the consumer (Y), tastes and preferences (T), wealth (W), population (P) etc. are assumed to be constant. The sign of bar (−) put on these other factors indicate their constancy.

1.8.9 Features of Law of Demand

1. The price of a product and the amount it is demanded are inversely related.

2. The law indicates the direction and not the magnitude of change in demand.

3. Law of Demand does not set up proportionate relationship between price and demand.

4. The law simply explains how a change in price affects demand, not how a change in demand affects a change in price.

5. Normal goods are subject to the law of demand. It does not apply to necessities that are of lower quality.

6. It is a factual law of consumption. Generally every consumer behaves according to this law.

A demand schedule and a demand curve can be used to explain the law of demand.

Demand Schedule: The information on prices and quantities sought is tabulated in the demand schedule. It displays distinct demand peaks for a product through time at various prices for a unit of the good.

Demand schedules can be either market or individual schedules.

1.8.10 Individual Demand Schedule

The individual demand schedule displays the varying amounts of demand for a commodity made by a certain person at various prices at any given time as shown table 1.1.

Table 1.1: Hypothetical Individual Demand Schedule

Price of Sugar (₹ Per kg)	Quantity of Sugar (Kg)
15	1
14	2
13	3
12	4
11	5

The table above demonstrates that consumers want more sugar for less money. Other things being equal, he only wants 1 kg of sugar at a price of ₹ 15 per kg, but he's willing to buy 2 kg at ₹ 14, 3 kg at ₹ 13, and so on. This suggests that demand and price are inversely connected.

1.8.11 Market Demand Schedule

The quantities of a given product that all consumers will buy at all potential prices at a given time are referred to as the market demand schedule. The same picture is also shown in table 1.2 below, which shows the market demand schedule, i.e., it also testifies the law of demand. As shown in table 1.2, when price declines from ₹ 15 to ₹ 14 per kg, market demand increases from 6 kg to 9 kg and 9 kg to 12 kg, when price declines from ₹ 14 to 13 and so on.

Table 1.2: Hypothetical Individual and Market Demand Schedules

Price of Sugar (per kg)	Demand by Consumer A (in kg)	Demand by Consumer B (in kg)	Demand by Consumer C (in kg)	Market Demand (kg) A + B + C
15	1	2	3	6
14	2	3	4	9
13	3	4	5	12
12	4	5	6	15
11	5	6	7	18

1.8.12 Demand Curve

Demand curve is the term for the demand schedule's graphic representation. According to R.G. Lipsey, the term "demand curve" refers to the graph that depicts the relationship between a commodity's price and the quantity that consumers want to buy. We can build the individual demand curve (Fig. 1.1) in accordance with the individual demand schedule and the market demand curve (Fig. 1.2) in accordance with the market demand schedule.
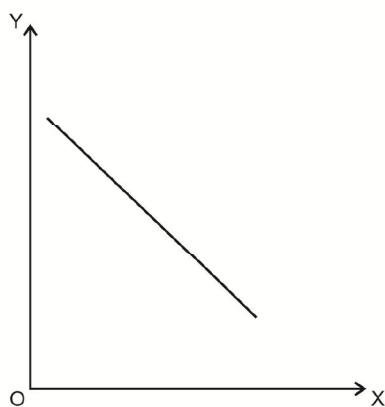
Fig 1.1: Individual Demand Curve
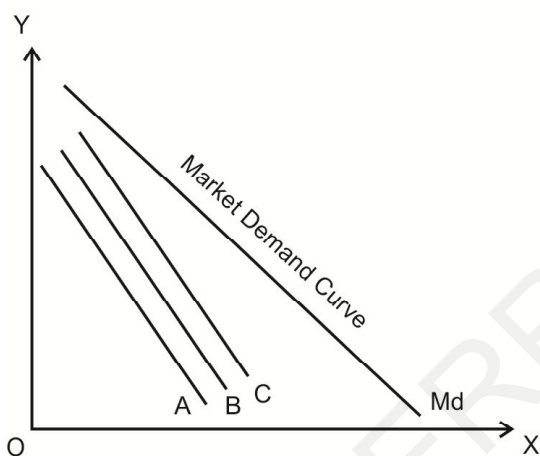
Fig 1.2: Individual and Market Demand Curve

1.8.13 Cause of Operation of Law of Demand

Why does demand curve slope downwards to the right? Downward sloping demand curve shows inverse relationship in price and demand, i.e., law of demand.

Now the question before us is: What causes the law of demand to work? Or, why does the demand curve slope rightward and downward? The primary factors behind this inverse link between price and demand are as follows:

(a) Law of Diminishing Marginal Utility

(b) Income effect

(c) Substitution effect

(d) Entry and Exit of Customers

Check Your Progress

13. Differentiate between demand and quantity demanded.

14. Define the term Market demand.

1.9 UTILITY ANALYSIS

Meaning of Utility

The term Utility refers to the power of a commodity or service to satisfy human wants. Generally, utility means satisfaction. However, utility and satisfaction are not the same. Utility of a commodity or goods refers expected satisfaction whereas, satisfaction implies realised satisfaction. While a consumer desires to purchase any commodity, he thinks about utility or amount of satisfaction that he is deserving from it. Only after consumption of that commodity he realises satisfaction and thus it is termed as realised satisfaction.

Classification of Utility

Utility can be classified into following categories:

(i) Initial Utility

(ii) Marginal Utility

(iii) Total Utility
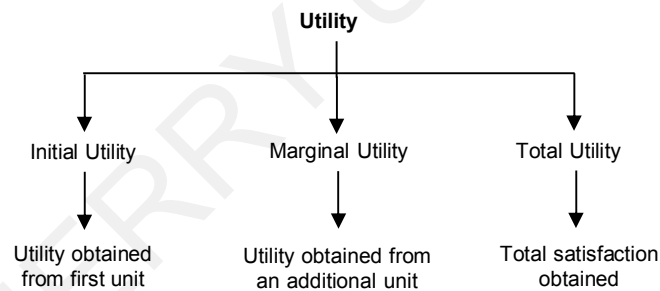
Characteristics

Following are some of the major features or characteristics of utility:

1. Utility is subjective i.e., it can not be qualified.

2. Utility has no social or ethical implication.

3. Utility depends upon intensity of want.

4. Utility can vary. It varies from person to person, location to location, and periodically.

Measurement of Utility

In marginal utility approach it is assumed that utility is measurable like weight of an article, which is measureable. Utility of a product can be measured in money terms. Units of measurement are 'Units'. As an illustration, if someone is willing to spend 100 paisa for a cup of tea, we may say that the utility he receives from that cup of tea is equal to 100 units. A commodity's utility is determined by how much pleasure it can bring the consumer. Disutility indicated agony, while utility suggested pleasure. It is true that this method of studying demand is hedonistic.

Utility Function

Utility function explains relationship between utility of a commodity and units of the commodity consumed.

Symbolically,

$Ux = f(q_x \gtreqless 0)$

Where, U_x = Total utility from consumption of commodity x.

q_x = Quantity of commodity x consumed.

Cardinal Measurement of Utility

Units called utils can be used to measure utility. It can be evaluated using:

(i) Marginal Utility

(ii) Total Utility

(i) Marginal Utility: The phrase marginal utility suggests that utility can be obtained by consuming an additional unit of an item. In the words of Lissey and Chrystal, marginal utility implies change in satisfaction due to consumption of one unit more or one unit less of a product. Hence, it is simply increase or decrease in total utility as a consequence of one unit increase or decrease in consumption.

Symbolically,

$MU_n = TU_n - TU_{n-1}$

Where, MU_n = Marginal unit of the nth unit.

TU_n = Total utility of the nth unit.

TU_{n-1} = Total utility of the (n – 1)th unit.

Alternatively, $MUx = \dfrac{\delta TU_x}{\delta Q_x}$

As a result, the first derivative of the total utility of a commodity x with regard to its quantity is its marginal utility.

(ii) Total Utility: The sum of all utilities calculated from the total number of units used is known as total utility. In contrast, it is the total of the marginal utilities related to the consumption of succeeding units.

Therefore, we may calculate marginal utility for the nth unit if we know the utility derived from n units of a commodity and n – 1 units of a commodity.

$MU_n = TU_n - TU_{n-1}$

Similar to how marginal utilities of several commodities can be added up, total utility can be represented as follows

$TU_n = MU_1 + MU_2 + MU_3 + ... + MU_n$

Where, ΣMU_s = Sum total of marginal utilities from different units of the commodity.

Importance of measurement of the Utility Analysis

The approach of marginal utility forms basis of study of consumer's behaviour, that can be analysed by following two laws:

1. The Law of Diminishing Marginal Utility.
2. The Law of Equimarginal Utility.

But, before proceeding to illustrate the utility analysis let us talk about few assumption of the utility analysis.

Cardinal and Ordinal Utility — Relationship

As we know, utility means satisfaction a consumer derives from commodities he consume. It is a subjective concept as it is related to psychology of consumers. Marshall's analysis is based upon this basic concept. It's usefulness is connected with measurability of utility. There are two ways of explaining the magnitudes in respect of utility. These are:

1. Cardinal Utility
2. Ordinal Utility

1. Cardinal Utility

Cardinal utility analysis assumes that consumers are rational consumers. Rationality means — consumer calculates deliberately, selects consistently to maximise utility. It assumes that consumer buys any commodity for the purpose of balancing its utility with disutility incurred by parting with his money.

Term cardinal and Ordinal are borrowed from mathematics. Number 1, 2, 3, 4 etc. are cardinal members. Number 2, for instance is twice the size of number 1. The notion of Cardinal Utility states that it is feasible to compare and assess the utilities of two commodities. For instance, an apple might produce 40 units of consumer utility, whereas a pineapple may yield 20 units. Form this, it is evident that consumer gets twice as much utility from an apple as from a pineapple. Although units of measurement are imaginary and are termed as utils or units. Marshall and other economists used cardinal number system to utility. They contend that the utility of any good or commodity may be evaluated and contrasted with others.

Assumptions of the Cardinal Utility Analysis

Following are assumptions of the cardinal utility theory:

(a) **Cardinal utility:** Each good has a measurable utility. Utility is a fundamental method, and money is the easy way to quantify utility. The amount of money a consumer is willing to spend on another unit of a given commodity serves as a measure of utility.

(b) **Constant marginal utility of money:** If money is employed as a measure of utility, the concept of continuous marginal utility of money is required. A standard unit of measurement must be constant in order to function. If the money's marginal utility changes along with changes in

income, that is, if income increases or decreases, it will be inappropriate for measurement.

(c) **Rationality:** The assumption is that the consumer is rational, with the only goal of maximising utility under any imposed constraints within his given stipulated income.

(d) **Diminishing marginal utility (Introspective Method):** The axiom of diminishing marginal utility states that as a consumer purchases a commodity in big numbers, its marginal utility decreases.

(e) **The hypothesis of independent utilities:** According to this theory, a consumer's usefulness from a good or service depends solely on how much of it there is in the world. Thus, total utility of bundle of commodities depends upon total sum of separate utility commodities. Hence, the cardinalist school regards utility as additive. Assume that there are n number of commodities in a bundle having quantities $x_1, x_2, x_3, ..., x_n$. Hence total utility will be expressed as.

$$U = f(x_1, x_2, x_3, ..., x_n)$$

2. Ordinal Utility

The idea of ordinal utility holds that utility cannot be measured. Numbers 1st, 2nd, 3rd are ordinal numbers i.e., these are ranked or ordered. For instance, consumer prefers orange than pineapple. Ranking does not express size of the number. There is no difficulty of measuring utility. According to the ordinalists, utility is non-measurable. Prof. J.R. Hicks and R.G.D. Allen used the ordinal system of utility. The indifference curve approach is called as ordinal utility approach.

Utility Theory and Consumer's Equilibrium

1. The Law of Diminishing Marginal Utility: One of the fundamental rules of economics is the law of diminishing marginal value. The behaviour of a consumer is most logically explained by this law. In this case, water is a suitable illustration. Let's say a housewife tries to preserve as much water as she can in remote places without a reliable, consistent source of water. Each bucket of water is therefore valued because its use is restricted. The Law of Diminishing Marginal Utility states that the more of something you have, the less you care about the subsequent units of a commodity. On the other hand, in areas where water is abundantly available, a housewife will use bucketfuls of water for purposes for which only a few cups may be necessary. This illustrates the point. According to this law, utility gained from each additional unit of a commodity consumed decreases with time when consumption of all other commodities remains constant.

This law was initially coined by a German economist H.H. Gossen. Subsequently, it was used by William Stanley, Jivons to clarify the theory of value. But, Alfred Marshall, was famous exponent of the cardinal utility analysis by presenting a systematic formulation of the law of Diminsihing Marginal Utility. He used this law as an example to demonstrate both customer behaviour and demand

analysis. Alfred Marshall postulated that the additional advantage that a person receives from a particular increase in his stock of a certain item declines with each subsequent rise in the stock that he currently possesses. This law is applicable to every consumer goods i.e., durable or non-durable. As a result, the utility he obtains from each subsequent unit of a commodity—or alternatively, the marginal utility of the commodity—will decrease as consumption of all other commodities remains constant. However, total utility will undoubtedly continue to increase until consumption reaches the point of satiety, which is the point at which marginal utility equals zero. Consumption above this point renders the consumer useless.

But, let us imagine a situation where marginal utility may initially increase along with rise in consumption level. It holds true or is valid in situations when the initial intensity of want is so great that a given unit of a given good actually exacerbates the consumer's demand rather than satisfying it. Yet, finally at a stage, the marginal utility will definitely decline.

Therefore, this law is actually based on two essential truths:

(i) First, despite the fact that a man's overall wants are practically limitless, each individual want is satiable. Thus, while satuaration point is attained, marginal utility becomes zero, which indicates that at this stage a particular individual has all the desired amounts of the relevant commodity.

(ii) Second basis of this law is that different commodities are not perfect substitutes for each other as far as satisfaction of various particular wants are considered. Therefore, the intensity of desire decreases with each successive increase in consumption of a good or service. However, if units of that good or service could be used to satisfy other desires while still providing the same level of satisfaction as they did at first to satisfy the initial desire, then the good or service's marginal utility would not have changed. It is clear that this law represents a common, innate human inclination and that it was developed via reflection and careful consideration of how people behave.

Illustration of the Law of Diminishing Marginal Utility

The marginal utility and total utility curves, as shown in fig. 1.3, can graphically depict the relationship between marginal utility and total utility.

In figure 1.3, upper half depicts the overall utility obtained from the consumption of a commodity and lower portion shows marginal utility of a commodity. It is distinctly visible from fig. 1.3 that:

(a) Total utility (TU_x) grows over time when a commodity is consumed, until the marginal utility exceeds zero.

(b) When marginal utility is zero, total utility is at its greatest.

Fig. 1.3: Diminishing Marginal Utility

(c) With further increase in consumption, MU_x becomes negative and begins to fall. At this point, any utility addition resulting from the use of a unit of a commodity is only a detriment. Thus, downward sloping MU_x curve explains the law of diminishing marginal utility.

Analysis of Consumer Behaviour (Cardinal Utility Approach)

Consumer's Equilibrium: Every customer wants to get the most out of his or her available financial resources. The law of diminishing marginal utility helps him to achieve equilibrium stage. Technically, the consumer achieves equilibrium by maximising utility, while allocating his spending so that every penny spent on every good produces the same utility. In order to explain how a consumer attains equilibrium, let us begin with One Commodity Model and then be extended to Multiple Commodity Model.

Consumer's Equilibrium (One Commodity Model): While a consumer purchases a commodity, he will be in equilibrium position at a point where.

Marginal Utility = Price

or $MU = P_x$ ...(1.1)

Where, MU = Marginal utility gained from commodity X.

P_x = Price per unit for commodity X or utility sacrificed.

At this stage, consumer will obtain maximum level of satisfaction and thus tends no tendency to he does not change his consumption pattern.

Fig. 1.3: Diminishing Marginal Utility

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At this stage, consumer will obtain maximum level of satisfaction and thus tends no tendency to he does not change his consumption pattern.

Now, consider, if $MU_x \neq P_x$, then there can be two options:

(a) Either marginal utility is greater than price i.e., $MU_x > P_x$

(b) Or, Marginal utility is less than price i.e., $MU_x < P_x$.

Here, the customer can choose to either spend his money income on commodity X or save it as an asset because both the money income and commodity X are useful to him.

If $MU_x > MU_m$, then the consumer who wants to maximise utility will exchange his income for commodity X. We already know that the marginal utility of money (MU_m) is constant but MU_x is susceptible to diminishing returns.

Thus, consumer will spend his money income on commodity X till

$MU_x > P_x (MU_m)$ [$MU_m = 1$ (constant)]

Therefore, utility maximising consumer attains equilibrium when he gets maximum level of satisfaction and thus, we can rewrite expression (1.1) as,

$MU_x = P_x (MU_x)$

In other words, consumer arrives at equilibrium, when

$$\frac{MU_x}{P_x(MU_m)} = 1$$
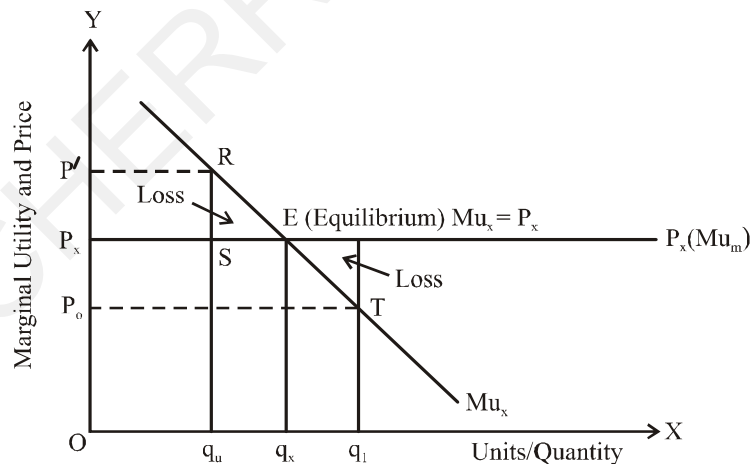
Fig. 1.4: Consumer's Equilibrium (One Commodity Model)

Consumer's equilibrium in a single commodity model is shown in fig. 1.4. Here, horizontal line $P_x(MU_m)$ indicates constant utility of money weighted by price of commodity $X(P_x)$. MU_x curve shows diminishing marginal utility of commodity X. Here, $P_x(MU_m)$ line and MU_x curve interact at point E, which shows quantity Oq_x consumed.

Thus, $MU_x = P_x(MU_m)$

So, consumer is in equilibrium at point E.

Now, at any point on MUx curve above point E i.e., at point R

$MU_x > P_x (MU_m)$

So, if consumer exchanges his money for commodity X, he will increase his total satisfaction, as his gain in terms of MU_m.

Thus, at point R, consumer gains;

$MU_x = Mq_o$ and price he pays Sq_o.

So, Marginal gain $(RS) = Rq_o – Sq_o$.

This situation persists till he arrives at point E.

Likewise, at any point below E (i.e., T in fig. 1.4)

$MU_x < P_x (MU_m)$

Thus, if consumer consumes more than Oq_x, He is a net loser because he loses more utility than he gains. Thus, by reducing his consumption, the consumer might raise his level of satisfaction. It suggests that the consumer's overall pleasure is below maximum at any point other than E.

Point E is therefore the equilibrium point. The consumer's best interest is served by consuming Oq_x quantity of commodity.

Consumer's Equilibrium: Multiple Commodity Model : (Principle of Equi-marginal Utility)

By making an unreal assumption up until this point, we have explored the consumer's equilibrium in the case of the single commodity model. However, in real life, a consumer consumes a lot of both products and services. Consequently, the question of how a consumer will achieve this equilibrium emerges.

In cardinal utility analysis, the idea of equi-marginal utility plays a significant role. Commodities are consumed by a logical and utility-maximizing consumer in the sequence of their relative utilities. He keeps shifting his spending from one good to another until he reaches a point where the marginal utility of each good is equal for every unit of spending, which forms the foundation of the law of equi-marginal utility.

In a multi-commodity model, the law of equi-marginal utility makes the consumer's equilibrium clear. In accordance with this model, a rational consumer spends his money on a variety of goods so that each rupee is equivalent to the marginal utility of that good.

Let's now examine the equilibrium of consumers in a multi-commodity scenario. For simplicity, suppose only a two commodity case:

  I. Classical version of the law of Equi-Marginal Utility.

 II. Modern version of the Law of Equi-Marginal Utility.

I. Classical version of the Law of Equi-Marginal Utility: Graphically, consumer's equilibrium has been shown by utility curves as in fig. 1.4. Here, different curve has been drawn for every commodity. According to fig. 1.5, two commodities X and Y have been considered for simplicity. Here, marginal utility is evaluated along the vertical axis, or Y-axis, and units of commodity X and Y are

measured along the X-axis. Here, the marginal utility of goods X and Y are represented by two curves.
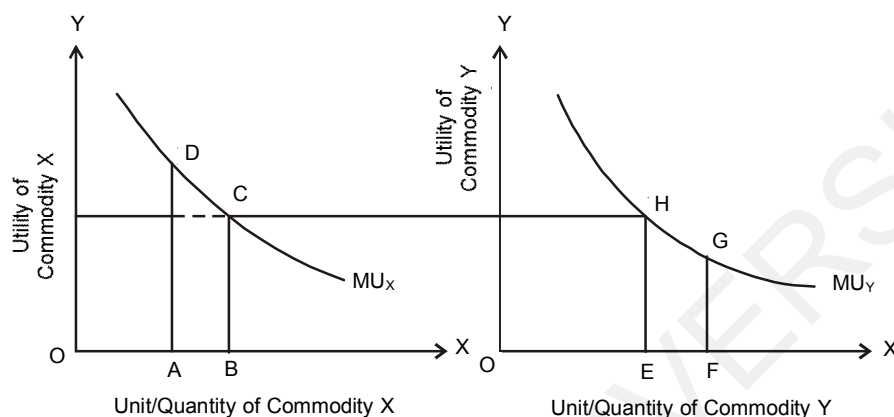
Fig. 1.5: Classical Version of the Law of Equi-Marginal Utility

At equilibrium, a consumer purchases OB and OE quantity of commodity X and Y respectively because marginal utilities of both commodities are equal. Here,

$\qquad$ BC = Marginal Utility of Commodity X

$\qquad$ EH = Marginal utility of commodity Y

Thus, BC = EH

Now, Let us consider that consumer curtails consumption of commodity X by one unit and substitutes by an equivalent additional quantity of commodity Y and hence, loss sustained by consumer is compensated by gain secured due to substitution. Consequently, optimum combination will be at the point where

$MU_x = MU_y$

i.e., marginal utilities of both commodities are equal.

Here, two commodities are assumed to serve as the generalisation of the consumer equilibrium rule for a consumer consuming a vast number of goods and services with a fixed income and at various prices. Supposing, there are n number of goods and services. Thus, consumer's equilibrium can be expressed as

$\qquad MU_x = MU_y = ... = MU_n$

Where $\quad$ n = Number of commodities.

II. Modern Version of the Law of Equi-Marginal Utility (Law of Proportional Marginal Utility): The Law of Equi-Marginal Utility as formulated by the classical economists, was criticized severly. One of the basic criticism was it considered same price per unit of every commodity, which is not practical. The Law of Proportional Marginal Utility is a new interpretation of this law put forth by contemporary economists.

Modern Version of the Law of Equi-Marginal Utility (Law of Proportional Marginal Utility)

Consider a scenario where consumers only have to spend a certain amount of money on the two commodities x and y. Now, two things will influence consumer behaviour:

(i) Marginal utilities of the commodities.

(ii) Price of two commodities.

The law of equi-marginal utility holds that if the prices of two commodities remain constant, the consumer would allocate his income between them in a way that ensures the utility obtained from the last rupee spent on each commodity is equal. As an alternative, the customer will reach equilibrium if the marginal utility of the money spent on each good is the same. As a result, the amount of money spent on each good is equal to the good's marginal utility divided by its price.

Symbolically,

$$MU_m = \frac{MU_x}{P_x}$$

Where, MU_m = Marginal utility of money.

MU_x = Marginal utility of commodity X.

P_x = Price of commodity X.

As a result, in accordance with the law of equi-marginal utility, a customer will spend his income on a variety of goods in a way that ensures the marginal utility of each good is equal to its price. To put it another way, the customer will be in a position of equilibrium with regard to the purchase of two items, X and Y, while $= \frac{MU_x}{P_x} = \frac{MU_y}{P_y}$

Now, assume, if $\frac{MU_x}{P_x}$ and $\frac{MU_y}{P_y}$ are not equal and $\frac{MU_x}{P_x}$ is greater than $\frac{MU_y}{P_y}$ then, the consumer will swap out commodity X for commodity Y. As a result, commodity x's marginal utility will decrease while commodity y's marginal utility will rise. This process will go on till marginal utility of both commodities will becomes equal i.e., $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$. At this stage consumer will be in equilibrium. The Law of equi-marginal utility also known as Law of Substitution and Law of Maximum Satisfaction.

Then, in short, every ratio in respect of every goods must be equivalent to marginal utility of money. Thus, we may arrive at a principle which will ensure maximum utility or satisfaction to the consumer i.e.,

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

Now, consider that, price of commodity x and y as ₹ 2 and ₹ 3 respectively. Thus, by dividing MU_x/P_x, we get table 1.3.

Table 1.3

Unit	$\dfrac{MU_x}{P_x}$	$\dfrac{MU_y}{P_y}$
1	10	9
2	6	8
3	8	7
4	7	6
5	6	5

From table 1.3, it is distinctly visible that, consumer will be in equilibrium when he maximises his utility.

i.e., $\dfrac{MU_x}{P_x} = \dfrac{MU_y}{P_y} = MU_m$

$\Rightarrow \quad \dfrac{12}{2} = \dfrac{18}{3} = 6$

It implies, while consumer buys 6 units of commodity x and 4 units of commodity y, he will attain equilibrium position as shown in fig. 1.5(a).
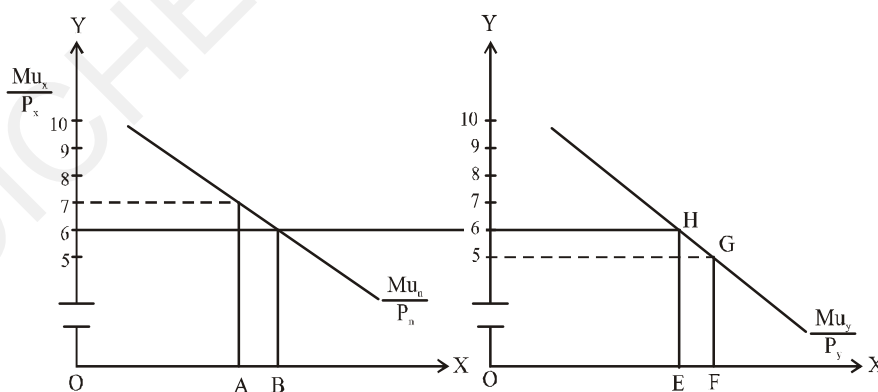
Fig. 1.5(a): Equi-Marginal Principle and Consumers Equilibrium (Modern Version of the Law) [or Law of Proportional Marginal Utility]

According to fig. 1.5(a), consumer attain equlibrium while he buys 6 units of commodity x and 4 units of commodity y. Suppose if, consumer purchases one unit less of commodity x and substitute for one unit of commodity y he suffers loss equivalent to ABCD as in fig. 1.5(a) (i). Again while he buys 5 units of commodity y instead of 4 units, it implies gain in utility equivalent to area EFGH. Here, two commodities' transactions have been rearranged so that utility loss surpasses utility gain. His overall satisfaction will therefore decrease. The customer will spend his

income on various commodities in such a way that the marginal utility of each good is proportional to its price, according to this law. Hence, we can express it as:

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

Above expression indicates that consumer is in equilibrium when Marginal Utility ratio of any two goods equals their price ratio.

Above, equi-marginal condition for equilibrium of consumer will hold even when he spends his money income on multiple commodities. So, it can be expressed as:

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \text{........} \frac{MU_n}{P_n} = MU_m$$

Which gives us the Law of Equi-marginal utility.

Limitations of the Law of Equi-Marginal Utility

1. The marginal utility of various goods should be considered by the consumer in order to apply the law of equi-marginal utility in real life. However, the majority of consumer behaviour is influenced by habits and customs. As a result, they spend money on a variety of goods whether or not they increase their level of enjoyment.

2. The marginal utility of money spent on some things cannot be compared because of their uniqueness. Suppose, if a consumer buys a car and spend money also on food-grains. Then car costs is indivisible, but foodgrains are divisible. Hence, marginal utility of money cannot be equalised with foodgrains, which is an obstacle to equalise, marginal utility of money from different commodities.

1.10 ORDINAL APPROACH

The term Ordinal has been borrowed from mathematics. The utility of ordinal utility cannot be quantified. First, second, third, and fourth are ordinal numerals. It is possible to rank or order the ordinal numbers. For instance, the consumer prefers apple than mango. The ranking does not tell us the size of the number. There is no trouble of measuring utility. According to the ordinalists, utility is non-measurable. Prof. Hicks and Allen used the ordinal system of utility. Hicks developed the **"Indifference Curve"** as an analytical tool to study customer behaviour. An indifference curve indicates the degree of consumer satisfaction resulting from the combination of two commodities. It is assumed that various combinations give equal satisfaction/utility to consumer.

1.10.1 Uses of Ordinal Utility

1. Edgewirth used the ordinal utility to show the limit within exchange which could take place between individual.

2. Measurements of government subsidies' effects on low-income groups are made using the Ordinal utility.

3. In the world of index numbers, it is employed. The ordinal utility approach can be used to determine the standard of living in two distinct times.

4. It can be used to explain the issues brought about by various rationing systems.

5. The Ordinal utility approach helps in considering the welfare implications of various types of taxes. For instance Income tax Vs Sales tax.

6. It is used to measure consumer surplus. It can be utilised to calculate producer's equilibrium.

Check Your Progress

15. Define the term Ordinal approach.
16. Explain the term 'indiference curve'.

1.11 INDIFFERENCE CURVE

Indifference Curve Approach

Unlike Marshall, Hicks examined consumer behaviour using the concept of ordinal utility. The term "ordinal utility approach" refers to this. Hicks has examined customer behaviour using a different analytical tool called the indifference curved. In this article, we'll first talk about indifference curves and then use them to explain how consumers behave.

Definition

An indifference curve describes the degree of consumer satisfaction resulting from the combination of two commodities. It is assumed that various combinations give equal satisfaction of consumer. Ordinal utility analysis is another name for the analysis of the demand indifference curve.

In other terms, an indifference curve is a collection of points representing various pairings of two goods that provide the same level of overall utility or happiness for the consumer. Every point on an indifference curve yields same total utility as any other point on the same indifference curve. If utility function is given by $U(X_1, X_2, X_3, ..., X_n)$ where X_1 is amount of commodity 1 consumed, X_2 is amount of commodity 2 consumed etc., then an indifference curve is defined as set of all goods basket $(X_1, ..., X_n)$ which satisfies the equation $U(X_1, X_2, X_3, ..., X_n) = k$, where k is constant level of utility for the indifference curves.

Indifference Schedule

A list of combinations of two items that are presented in such a way that the consumer is uninterested in the combinations is known as an indifference schedule i.e., which provides same level of satisfaction to the consumer. According to table

1.4, which contains two indifference schedules. In schedule A, it contains two goods X and Y.

Table 1.4

Schedule A

Goods	Goods
X	Y
10	0
7	1
5	3

Schedule B

Goods	Goods
X	Y
12	0
10	1
8	3

Above table 1.4 represents indifference schedule A and B. According to Schedule A amounts of good X and Y are considered in a manner that the consumer is indifferent among different combinations. Every above combination is equally desirable. Likewise, every combinations of schedule B is equally desirable as any other combinations in same schedule – based upon assumption that more of a commodity is preferable to less, any combination in schedule B is preferred to any combination in Scheduled A.

Graphical Representation of an Indifference Curve

Various combinations provided in table 1.4 or any other schedule can be plotted on a two-dimensional diagram with commodity X on horizontal axis and commodity Y on vertical axis. Now, if all points representing different baskets are plotted and joined we get an indifference curve or ISO-utility curve or Equal utility curve as shown in fig. 1.6.
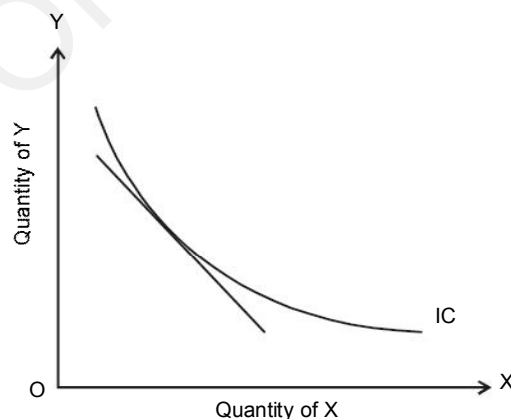
Fig. 1.6: Indifference Curve

Indifference Map

Single indifference curve shows specific level of utility. Likewise several, each indifference curves shows different level of utility separately i.e., every indifference curves showing a specific level of utility may be drawn starting from one close to the origin and moving above and towards right. Lower indifference curve shows lower level of utility and higher one shows higher level of utility. A set of such indifference curves constitutes an indifference map on in fig. 1.7.
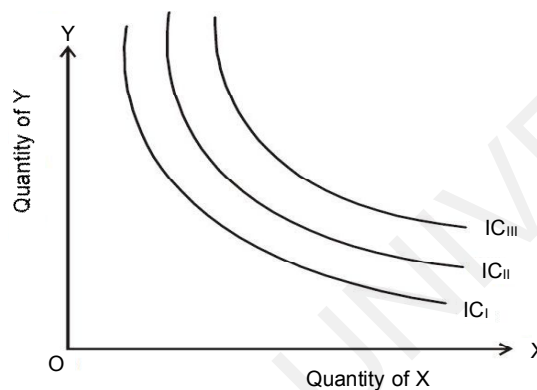
Fig. 1.7: Indifference Map

Assumptions of Indifference Curve

Indifference curve theory of consumer demand is based upon following assumptions:

1. **Rationality:** Consumer is assumed to behave in a rational manner. He is maximising his utility within his money income as well as market prices of goods. Additionally, it is assumed that he is fully aware of any pertinent facts, such as market conditions.

2. **Utility is ordinal:** Utility is assumed to be ordinally measurable in the study of the indifference curve. The consumer's ability to rank his choice at par satisfaction with each combination is taken as given. He need not be aware of his level of satisfaction. He only needs to state his preferences for different product combinations. Therefore, it is not necessary to take into account that utility is cardinally measured. It is sufficient to measure only ordinally.

3. **Diminishing marginal rate of substitution:** Rankings of options or preferences are expressed in terms of indifference curves, which are presumptively convex to the origin. It implies that the indifference curves' slopes are rising. We refer to the marginal rate of substitution of commodities as the slope of the indifference curve.

4. **Non-satiety:** The assumption is that consumer consumption of a commodity has not reached a saturation threshold. Therefore, as long as other factors remain the same, he prefers a greater amount of the commodity to a smaller amount. Therefore, the consumer's overall utility depends on the amount of items they consume.

$U = f(q_1, q_2, q_3, ..., q_n)$

5. **Consistency and transitivity of choice:** It is expected that the consumer makes consistent decisions so far as commodities and services are concerned. If he prefers commodity A to commodity B, i.e., A > B in one period he will not prefer commodity B over A, i.e., B > A in another period or treat them as indifferent, i.e., B = A, ceteris paribus.

6. **Transitivity:** Transitive preferences of consumers exist. In other words, if a consumer chooses product A over product B i.e., A > B and commodity B to C, i.e., B > C, then it follows that, consumer prefers commodity B to commodity C, i.e., A > C. On the other hand, if the consumer feels ambivalent about A and B as well as B and C, then the consumer must also be ambivalent about A and C. Alternatively, it implies that consumer is more unwilling to give up a commodity that is scarce as compared to a situation when it is plentiful.

Properties of Indifference Curves

Indifference curves have following four important properties or features:

1. Every indifference curve always slopes from left to right in a downward direction: While consumers want more of a particular goods, he will have give up other commodities to attain same level of satisfaction. Thus, indifference curve must slope downward towards right. Indifference curve thus can neither be an upward sloping curve nor a horizontal or vertical curve. Therefore, only possibility is, it must curve downwards towards right. if indifference curve slopes positively it would be rising upwards towards right as in fig. 1.8.

According to fig. 1.8(a), When a customer acquires the same amount of commodity y as any amount of commodity x, the indifference curve will be horizontal which is absolutely absurd. As in fig. 1.8(a), while consumer moves from combination a to b, he gets more of commodity x and same of commodity y_1 i.e., combination b ($ox_1 + oy_1$) is preferable than that of (Ox + Oy), i.e., combination A. So, indifference curve cannot be a horizontal line.

According to fig. 1.8(b), if indifference curve is a vertical line, it implies that consumer gets same amount of commodity x, while amount of commodity y in the combination increases, it adds nothing to consumer's total satisfaction, i.e., identical amount of enjoyment, which contradicts the indifference curve's definition. In fig. 1.8(b), while consumer moves from combination a (Ox + Oy) to combination a ($Ox_1 + Oy_1$), he gets more of commodity y and same units of commodity x and hence, his satisfaction level must also increases. So, an indifference curve cannot be vertically upward.

(a) Indifference curve having zero scope

(b) Indifference curve having zero slope

(c) Indifference curve having positive slope
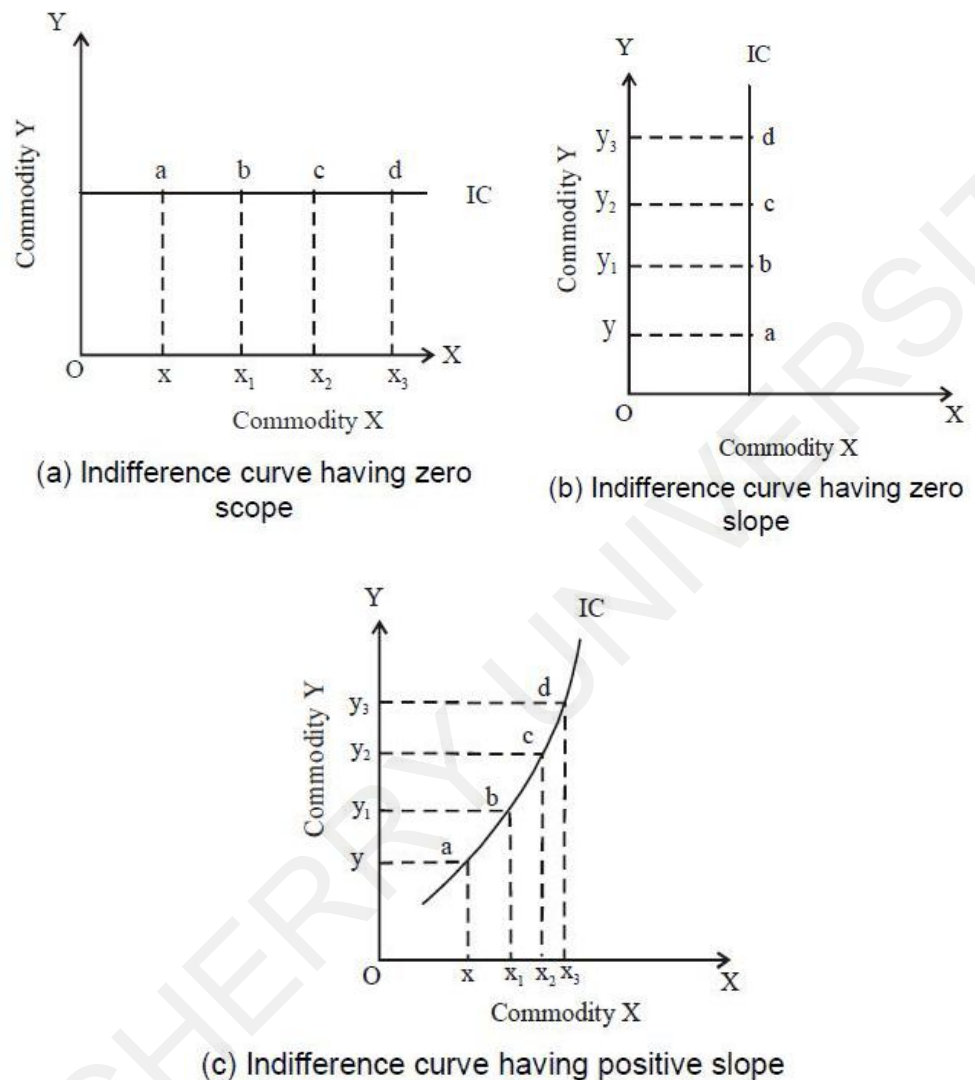
Fig. 1.8

According to fig. 1.8(c), non-satiety assumption accounts for this property which implies that consumer is equally satisfied with larger as well as smaller combinations of x and y as represented by a, b, c, d on indifference curve (IC) respectively. This again is absurd. If indifference curve slopes upwards towards right – indicates that combination $b(Ox_1 + Oy_1)$ contains more of both commodities which derives consumer the same utility as combination $a(Ox + Oy)$, which contains utility as combination $a(Ox + Oy)$, which contains less of both commodities, which is ridiculous. Hence, indifference curve cannot slope upwards towards right.

So, it is safe to infer that all above three cases will be contrary to our definition of indifference curve, i.e., consumer prefers more to less and hence indifference curve must slope downward from left to right or has a negative slope.

2. Indifference curves are convex to the origin: The falling marginal rate of substitution is the foundation for this indifference curve characteristic. If goods are perfect substitute, indifference curves becomes a straight line having negative

slopes as shown in fig. 1.9(a). On the contrary, if goods are complementary, indifference curves will be in the shape of right angle as in fig. 1.9(b).

In first situation, i.e., fig. 1.9(a), consumer spends his entire income in one commodity (not observed in real world) termed as monomania. However, the indifference curve analysis fails when the commodities are complementary since there is no way to substitute one for the other.
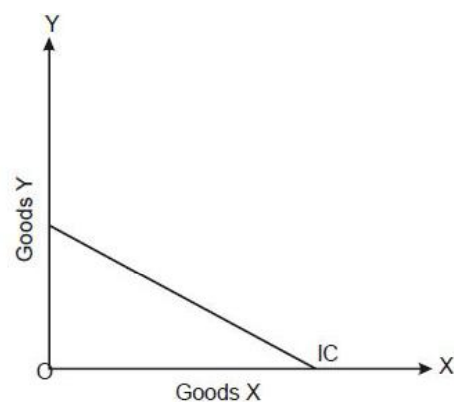
(a) Perfect substitutes commodities
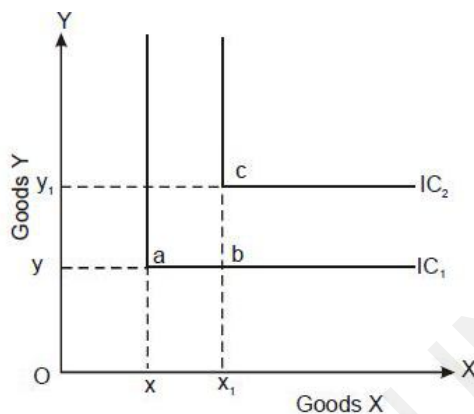
(b) Complementary Commodities
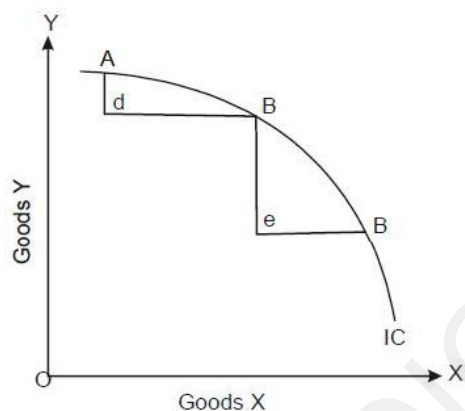
(c) Indifference curve having increasing MRS (Concave to the origin)
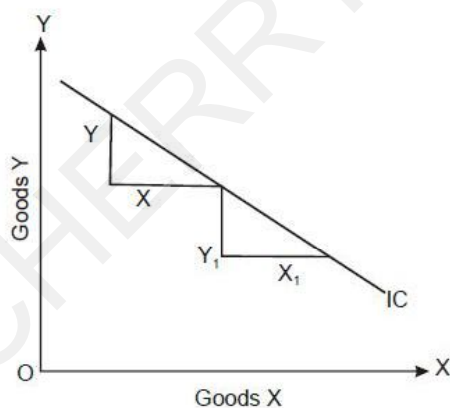
(d) Indifference curve having constant MRS (Straight line curve)
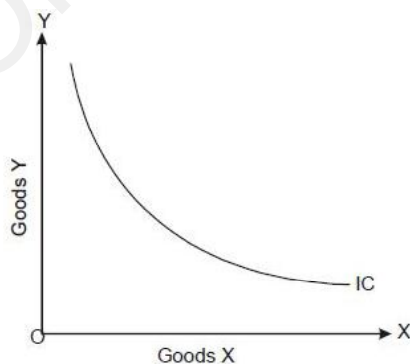
(e) Indifference curve having diminishing marginal rate of substiution (convex to the origin)

Fig. 1.9: Exceptions of Marginal Rate of Substitution

When we discuss the convexity of indifference curves, we mean that as we walk from left to right along the curve, its slope reduces. The law of diminishing marginal rate of substitution is the source of this indifference curve characteristic. The axiom of diminishing marginal rate of substitution states that as more units of commodity X are purchased, fewer units of commodity Y must be sacrificed in order to obtain an additional unit of commodity X in order to retain the same level of happiness. Should the marginal rate of substitution have risen indifference curve would have been concave to the origin as shown in fig. 1.9(c). If marginal rate of substitution remain constant, indifference curve will be a diagonal straight line at 45° angle as shown in fig. 1.9(d). In fig. 1.9(c) sacrifice of units of commodity Y goes on increasing. In fig. 1.9(d) substitution rate is remaining constant. But in fig. 1.9(e) marginal rate of substitution decreases as more unit of commodity X is obtained. As MRS_{xy} will diminish according to the axiom of diminishing marginal rate of substitution, indifference curve can neither be concave as in fig. 1.9(c), nor can it be a straight line as in fig. 1.9(d). Thus, indifference curve has to be convex to the origin as in fig. 1.9(e). Alternately, the convexity of the indifference curve is caused by the falling rate of replacement. Because a concave curve would show an increasing marginal rate of substitution, an indifference curve cannot exist.

3. Indifference curves never intersect each other: If two indifference curves intersects, it implies consistency transitivity. Alternatively, this property is based on the assumption that different indifference curves shows different utilities. Intersection of indifference curve cut each other will be an absurd situation which will yield two impossible conclusions as shown in fig. 1.10(a).

As shown in fig. 1.10(a), according to definition of indifference curve:

(i) Various combinations on IC_1, i.e., a, c, d provide equal satisfaction to consumer. Similarly, different combinations on IC_2, i.e., b, c, e provide equal satisfaction to consumer.

(ii) Level of satisfaction from different combinations on IC_1 is less than the level of satisfaction from different combinations on IC_2. It implies that though satisfaction from three combinations a, c, d is equal, it is less than satisfaction derived from combination b, c, e curve IC_2.

But, combination C is common to both level of satisfaction which is inconsistent with our definition and clearly impossible. As a result, the indifference curve never crosses itself.

4. When compared to a lower indifference curve, higher indifference indicates a higher level of satisfaction: Let us assume, two indifference curves IC_1 and IC_2. IC_2 lies towards right of IC_1.

In fig. 1.10(b), at point p consumer obtains one of commodity X and one commodity Y. At point q quantity of commodity Y remains same but quantity of commodity X increases from om to om1. Satisfaction of the consumer is definitely greater at q than at point p. Thus q shows perfect combination of commodity X and Y than p. It is thus safe to conclude that higher indifference curve shows higher level of satisfaction than lower indifference curve.
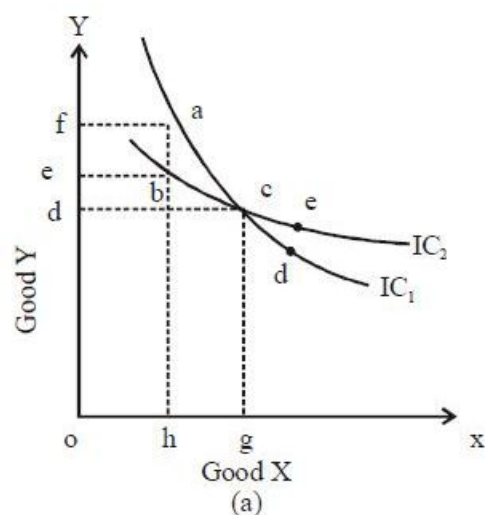
(a) Indifference curve never intersect.

Fig. 1.10(a): Indifference Curve Never Interout
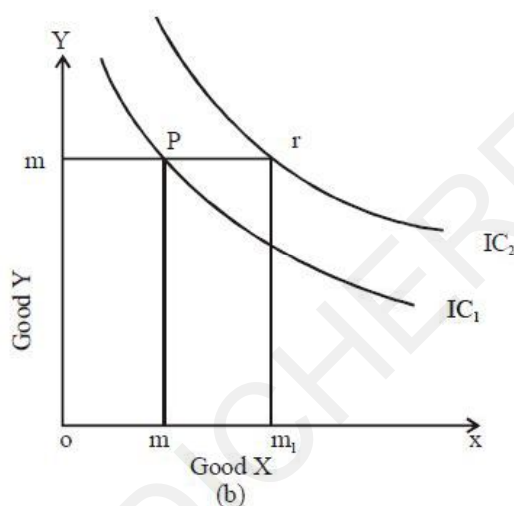
(b) Higher indifference curve represents higher level of satisfaction.

**Fig. 1.10(b): Higher Indifference Curve Represents
Higher Level of Satisfaction**

Income Effect

The term "income effect" refers to the impact that changes in income have on consumer purchases when the price of the commodity remains constant. Consumers move up the indifference curve with every rise in income, and *vice versa*. The Income Consumption Curve traces the income effect. As shown in fig. 1.11, consumer is in equilibrium, at point q in the budget line Sa. Now, as consumer's income increases income price line or budget line shifts upwards to the right. New budget line are represented by S_1 b, S_2 c, S_3 d parallel to each other, but price of two commodities remains same, only income has been increased. As a consequence of rise in income consumer buys more quantities of both commodities and as a

result new equilibrium position will be q_1, q_2, q_3. Now by joining these four equilibrium points Income Consumption Curve is obtained which represents variation of consumption of goods due to change in income of consumer.
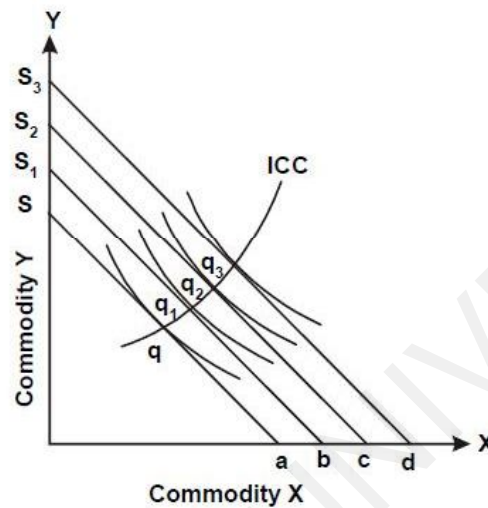
Fig. 1.11: Income Effect

Substitution Effect

Substitution effect refers to the change in demand of two commodities due to relative change in prices, but total utility remains same. Thus, substitution effect takes place only for change in relative prices of commodities but there is compensating variation in income. Usually, consumer will substitute a commodity which is relatively cheaper for a commodity which is relatively dearer and henceforth a movement along an indifference curve takes place. As shown in fig. 1.12, two axis represents two commodities x and y. SM is budget line and equilibrium point is point 'a'. Now, if price of commodity x declines, it will become cheaper and commodity y becomes relatively dearer. Thus, cheapness of one and costliness of the other have compensated one another. As a result, consumer remains on same indifference curve and finds new equilibrium point 'b' on budget line S_1M_1. It is evident that consumer now has more of commodity x and less of commodity y. This movement from 'a' to 'b' or from q to q_1 indicates substitution effect.
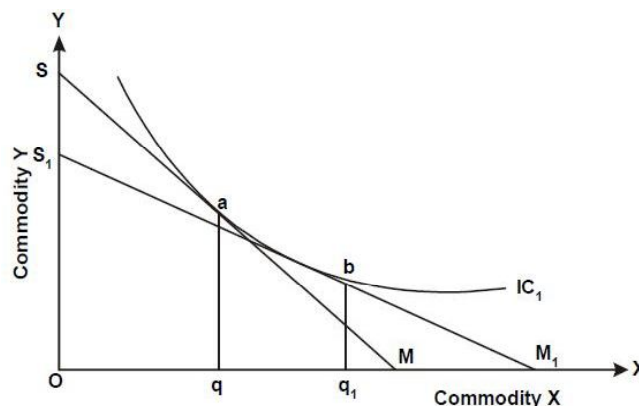
Fig. 1.12: Substitution Effect

Price Effect

Effect of change in price of a commodity on its purchase is known as price effect. Price Consumption Curve traces price effect. If price of one or two commodities changes because of change in price of one commodity, there is a change in the price line. Now, while consumer reaches the equilibrium, moves to another indifference curve – this movement is known as price effect. As shown in fig. 1.13, Pa is initial price line. Indifference curve IC_1 touches price line at q. Consumer will be in equilibrium at q_1 if the price of commodity x continues to decline and new price line Pb is tangent to the next higher indifference curve IC_2 at q_1. If there is any further change in price, new price line Pc will be tangent to indifference curve IC_3 at q_2, and consumer will be in equilibrium at q_2. If we join these three equilibriums we get price consumption curve (PCC).
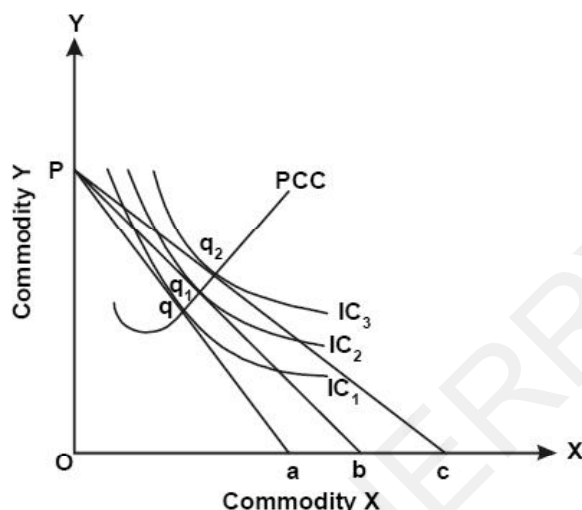
Fig. 1.13: Price Effect

Superiority of Indifference Curves Approach

Superiority of the Utility Analysis Technique over the Indifference Curve Technique:

Because it is based on fewer and more plausible assumptions than the Marhsallian utility analysis, the indifference curve technique created by Professor Allen and Hicks is thought to be superior:

1. **It does away with using cardinal utility measurements:** The foundation of the entire utility analysis is the presumption that utility is a fundamentally quantifiable quality that can be given weights termed "utils."

   If an apple has a utility of 10, a banana has a utility of 20, and a cherry has a utility of 40, then the utility of a banana is twice that of an apple, four times that of an apple, and twice that of a cherry. This is transitivity rather than measurability.

   In actuality, a commodity's utility for a consumer is something subjective and psychological, and as a result, it cannot be quantified. Because the

indifference technique measures utility ordinarily, it is preferable than utility analysis. The consumer places the numerous product combinations in order of preference, with first, second, third, etc. being marked. He can identify which he likes better—the first to the second, the second to the first, or he doesn't care. He is unable to determine how much he prefers one over the other, though. This method is more realistic since it employs the ordinal approach and the transitivity presumption.

2. **Instead of just one good, it investigates combinations of two goods:** When using the utility technique, one commodity is analysed as a single unit, and its utility is viewed as independent of that of the other. Marshall avoided talking about alternatives and complementary products by combining them into a single commodity. Because consumers purchase combinations of items rather than just one item at a time, this presumption is far from true. The indifference curve technique, a two-commodity model, examines customer behaviour when it comes to goods that are complementary, substitutable, and unrelated. Therefore, it is better than utility analysis.

3. **It offers a more accurate division of products into complements and substitutes:** The previous economists defined complements and substitutes in terms of cross demand elasticity. Hicks feels that this is insufficient and explains them after introducing compensating income fluctuations. By doing this, he eliminates the uncertainty that can be found in the usual classification of complements and substitutes.

4. **It discusses the law of diminishing marginal utility without the erroneous utility analysis assumptions:** The law of diminishing marginal utility, which is true for all forms of goods, including money, is predicated by the utility analysis. This law has all the flaws that come with cardinal analysis because it is based on cardinal measurement. This law has been superseded in the choice theory by the falling marginal rate of substitution principle. Prof. Hicks claims that the latter "is not merely translation but rather a constructive alteration." It is scientific and free from the utility analysis's psychological quantitative measurement at the same time. Economics has become more grounded in reality as a result of the application of this idea to the areas of consumption, production, and distribution.

5. **It does not rely on the supposition that the marginal usefulness of money is constant.** The utility analysis makes the assumption that money's marginal utility is constant. Marshall defended it by arguing that a consumer only spends a small portion of his total spending on any one item at a time. The utility theory is unrealistic in a number of ways because of this presumption. It works with a model with a single commodity. It fails to utilise money as a yardstick for gauging how happy a person is after consuming numerous items. The income effect when a

consumer's income fluctuates is instead examined using the indifference curve technique.

6. **This analysis clarifies the pricing effect's dual impact:** The Marshallian utility analysis has several flaws, one of which is that it ignores the income and substitution implications of a price adjustment. When a good's price drops using the indifference curve technique, the consumer's real income rises. The income effect is as shown. Second, the good gets cheaper as the price drops.

   The income effect, which occurs when a consumer's income varies, the price effect, which occurs when the price of a particular good changes, and its dual effect, which takes the shape of the income and substitution effects, make the indifference curve technique clearly superior to utility analysis. It also examines the cross impact, which occurs when the price of one good changes along with a change in the consumer's income.

7. **It provides a clearer explanation of the proportionality rule:** The Marshallian proportionality rule does not adequately describe consumer equilibrium; the indifference curve method does. At a point when his budget line is tangent to the indifference curve, the consumer is in equilibrium. The slope of the indifference curve equals the budget line at this moment, such that

   MRS of X for Y = Price of X/Price of Y   ...(1)

   Consumer equilibrium is determined by Marshall's proportionality rule, which states that

   MU of X/Price of X = MU of Y/Price of Y   ...(2)

   We can conclude that the MRS of X for Y is MU of X/Price of Y because Hicks also expressed the MRS of X for Y as the MU of X in terms of Y.

   Now (1) can be rewritten as,

   MU of X/Price of X = MU of Y/Price of Y

   however without its erroneous presumptions.

8. **It restores the idea of "consumer surplus":** Hicks has explained the concept of consumer's surplus by dispensing with the unrealistic assumption of the marginal utility of money. He regards consumer's surplus "as a means of expressing, in terms of money income, the gain which accrues to the consumer as a result of a fall in price." Thus, the idea of consumer's surplus has been liberated from the introspective cardinalism of utility theory and is no longer a "mathematical conundrum."

9. **It provides a more grounded explanation of the law of demand:** The Marshallian Law of Demand is explained by the indifference curve technique in a variety of ways that are more realistic. It is unaffected by the utility analysis's psychological presumptions. It illustrates how a decrease in the cost of a subpar product affects consumer demand. With

the use of this technique, Giffen products, which remained a paradox for Marshall the entire time, have been effectively explained. The demand for a good varies inversely with its price according to the Marshallian Law of Demand, and the demand curve slopes negatively downward and to the right. However, the indifference analysis accounts for two additional circumstances:

(i) The demand for a commodity does not change as its price declines. It occurs in the situation of subpar products whose income effect precisely balances their substitution effect.

(ii) Demand for the commodity decreases as its price does. In this instance, the demand curve has an upward slope and the income effect surpasses the substitution effect for Giffen commodities.

Marshall was unable to explain these instances. Because of this, the Marshallian introspective cardinalism is obviously outclassed by the indifference curve technique.

MRS Graphical Presentation and the Marginal Rate of Substitution

Notion of an essential tool for indifference curve analysis is the marginal rate of substitution. Ordinal utility theory's fundamental premise is that $MRS_{x, y}$ or $MRS_{y, x}$ declines. The number of units of commodity Y that must be sacrificed or gained for every unit of commodity X in order to maintain a consistent level of satisfaction is thus measured by the marginal rate of replacements of commodity X for commodity Y. Since the marginal rate of substitution at a given position is less than the slope of an indifference curve, we can write

$$*^1 MRS_{xy} = -\frac{dy}{dx} \text{ (Slope of indifference curve)}$$

$$MRS_{yx} = -\frac{dx}{dy} \text{ (Slope of indifference curve)}$$

Marginal Rate of Substitution presented graphically

As seen in fig. 1.14, the marginal rate of substitution can also be represented visually. Ratio of commodities' marginal utilities that have a role in the utility function.

$$MRS_{xy} = \frac{MU_x}{MU_y}$$

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* Student please note that necessary derivation for $MRS_{x, y}$ indicating slope of indifference curve $= -\frac{dy}{dx} = MRS_{xy}$ is outside the scope of this book and thus, if has been omitted here.

Marginal rate of substitution
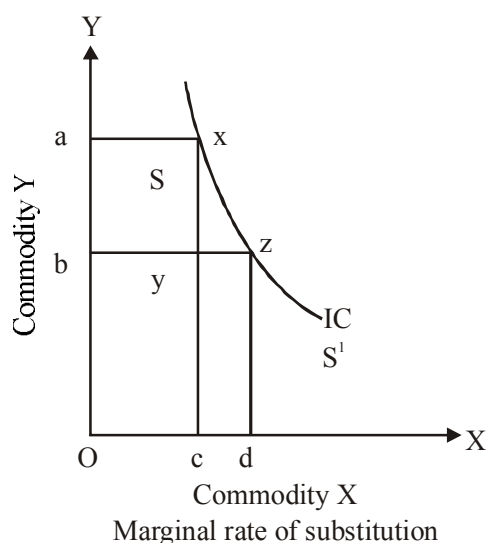
Fig. 1.14

The indifference curve is depicted by curve IC in fig. 1.10. In comparison to bundle Z, which consists of Od > Oc units of commodity X and Ob Oa units of commodity Y, the consumer is unconcerned with bundle x, which includes OC units of commodity X and Ob units of commodity Y. The consumer swaps out units of commodity X (c, d) for units of commodity Y (a, b).

Thus, rate at which he substitutes

$$\frac{O_a - O_b}{O_d - O_c} = \frac{xy}{yz}$$

The aforementioned ratio calculates the typical number of units Y consumers forgo in order to purchase 1 extra unit of commodity X, and vice versa in order to maintain the same level of pleasure.

In fig. 1.14, while point x move along IC towards z ratio $\frac{xy}{yz}$ comes nearer to

slope of tangent ss' at point z. Therefore, the marginal rate of substitution of commodity X for commodity Y is defined as the slope of the integral curve (IC) or its tangent at z.

Check Your Progress

17. Explain the concept of Income effect.
18. Explain the concept of Substitution effect.

1.12 CONSUMER EQUILIBRIUM

When a consumer gets the most out of his limited resources and the market pricing, this is referred to as being in equilibrium. The customer must meet the two requirements listed below in order to be in an equilibrium state.

First order condition: Budget line 1 must be tangent to the indifference curve as the first prerequisite for consumer equilibrium. in order to write.

Budget line slope = slope of indifference curve.

or $MRS_{xy} = \dfrac{P_x}{P_y} \Rightarrow MRS_{xy} = \dfrac{MU_x}{MU_y} = \dfrac{P_x}{P_y}$

It is a requirement, but not a sufficient one, for the equilibrium of the consumer.

Second condition (Supplementary): The requirement that the indifference curve be convex to the origin is satisfied by the principle of diminishing $MRS_{x,y}$.

It is desirable to make the following assumptions to describe how a consumer comes to equilibrium:

1. The consumer's scale of preference for various combinations of items is shown on an indifference map. The preference scale stays the same during the entire analysis.

2. Prices of commodities are given and is constant.

3. Consumers behave logically and work to maximise their level of enjoyment.

4. The consumer can only spend a certain amount of money on two commodities.

Graphical Presentation of Consumer Equilibrium

According to fig. 1.15, price line is perpendicular to indifference curve IC_2 at point e. The consumer will be in equilibrium at this point as it derives him maximum satisfaction and satisfies both necessary and supplementary conditions.

From fig. 1.15, the relationship between any two points on an indifference curve is obvious,

$\delta y \cdot MUy = \delta x \cdot MUx$

hence, the slope of an indifference curve is described as

$\dfrac{y}{x} = \dfrac{MU_x}{MU_y} = MRS_{xy}$

Now, as we know that, slope of the budget line, i.e.,

$\dfrac{Om}{On} = \dfrac{P_x}{P_y}$

and at point e,

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

As a result, at point e, the consumer is in an equilibrium position in fig. 1.15. Here, tangency of IC_2 with the price line (budget line) mn shows the maximum indifference curve, or IC_2, that a consumer can achieve given his financial situation and the prices of his available goods—Ob of commodity X and Oa of commodity Y—is the IC_2.

The first order criterion is thus visually represented in Fig. 1.15 by the tangency of two relevant curves, while the second order condition is represented by the convex shape of the indifference curves. A and B quantities of both goods are purchased by the consumer to obtain his greatest utility. Alternatively, the budget line must be perpendicular to the indifference curve, or the marginal rate of substitution of good X for good Y must match the ratio of the costs of the two goods.
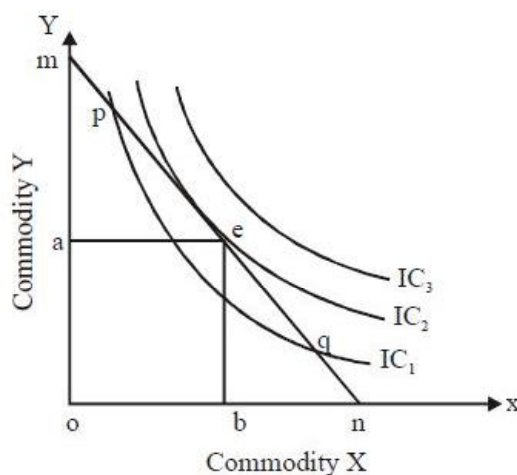
Fig. 1.15: Consumer Equilibrium

Numerical Illustration of Consumer Equilibrium

Let's say the customer has ₹ 200 on him. He wants to buy two items, let's say X and Y, using the money. Commodity X costs ₹ 10, but commodity Y costs ₹ 20. Consumer receives 20 units of commodity X if he spends all of his income on it, while he receives 10 units of commodity Y if he spends all of his income on it. Price line mn in fig. 1.15 shows different combinations of commodity X and Y. We may assign this line as Budget Line.

Check Your Progress

19. Explain the term Consumer equilibrium.
20. What are the conditions to be fulfilled for consumer to be in equilibrium?

1.13 PRICE, INCOME AND SUBSTITUTION EFFECT (HICKS AND SLUTSKY)

There are two methods for separating the effects of price on substitution and income. They follow the Hicksian and Slutsky methods. Hicks chose the two approaches known as compensating and equivalent variations in income. Slutsky used the cost-difference approach to split the price effect in two. The following example shows how price effect can be divided into income and substitution effects:

1. Decomposing Price Effect: Compensating Variation in Income

The consumer is returned to his initial indifference curve, which he had reached before the price change, using this way of decomposing price effect by

compensating variation. We do this by adjusting consumer income to counteract change in satisfaction owing to change in product price. Consider a scenario in which a consumer goes to a new equilibrium position at a higher indifference curve when the price of a product decreases, increasing his satisfaction. To counteract the increase in happiness brought on by the product's price reduction, we must deprive the user of enough money to force him to return to his initial indifference curve. The term "compensating variation in income" refers to the required loss in income through the imposition of a lump sum tax to offset the gain in satisfaction or decrease in welfare caused by a decrease in a product's price. This is so named because it detracts from the increase in satisfaction brought on by a product's price drop. This is shown in fig 1.16.
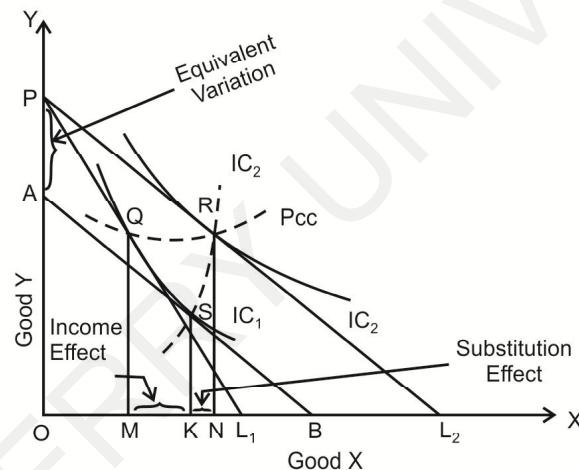
Fig. 1.16: Price Effect split up into Substitution and Income Effects through Compensating Variation Method

In fig. 1.16, the various effects on the purchases of good X are:

Price effect   = MN

Substitution effect = MK

Income effect   =   KN

MN   =   MK + KN

Price effect   =   Substitution effect + Income effect

In this case, the movement from Q to R due to the price impact can be seen as occurring in two steps: first, from Q to S Ps as a consequence of the substitution effect, and then from S to R as a result of the income effect. It is clear from the aforementioned illustration that the price effect is the sum of the income and substitution effects.

2. Decomposing Price Effect: Comparable Income Variation

Price impacts can be further split into substitution and income effects by altering the income approach, as was already discussed. The consumer will be more satisfied with a product if its price decrease results in a gain in his income, with

prices being the same. The consumer's increase in income will allow him to move to a higher indifference curve, which he will really attain with a fall in product price even if product costs will remain the same. As a result, the subsequent indifference curve is used to illustrate this income-variation technique substitution effect rather than the initial IC. Figure 1.17 illustrates how this pricing effect is divided into income and substitution effects using the equivalent variation in income method.
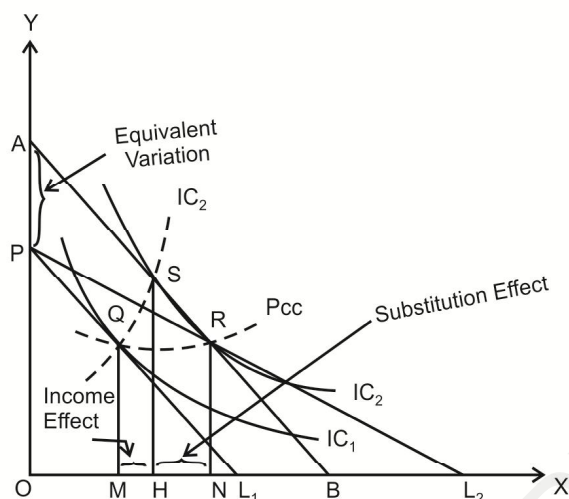
Fig. 1.17: Price Effect Split up into Substitution and Income Effects through Equivalent Variation Method

In fig. 1.17,

Price effect   =   MN

Income effect   =   MH

Substitution effect =   HN

MN   =   MH + HN

Price effect   =   Income effect + Substitution effect

Here, the consumer is in equilibrium at Q on IC_1 with price line PL_1. Assume the cost of product X falls, the cost of product Y stays the same, and his income stays the same. In this case, the budget line becomes PL_2. Consumer will be in equilibrium with PL_2 at R on IC_2. As PL_1 touches IC_2 at S, AB is now drawn parallel to it. It means that a consumer's increased real income or purchasing power due to a drop in the price of X equals PA in terms of Y or L_1B in terms of X. The income effect of the price shift results in the consumer moving from Q on IC_1 to S on IC_2 along the IC curve. However, the consumer will not ultimately reach equilibrium at S. This is as a result of X now being more expensive. Therefore, due to a change in relative costs alone, consumers will move along IC_2 from S to R, demonstrating a substitution effect. As a result, the price effect is divided into income and substitution effects, with substitution being shown in this instance along the succeeding IC.

1.13.1 Slutsky Substitution Effect

This is yet another significant iteration of E. Slutsky's substitution effect. The Slutsky substitution effect occurs when changes to money income are made in a way that maintains the purchasing power of consumers. In Slutsky's approach income is decreased or increased that leaving consumer in the same financial position if he chooses, to purchase the same combination of commodities. Therefore, unlike the Hicksian substitution effect, where income is diminished or increased by compensatory variance, the Slutsky substitution effect is caused by cost difference.

1.13.2 Effect of Slutsky Substitution for Price Decline

As shown in fig. 1.18, with a given income and price of two goods (price line PL), consumer will be in equilibrium at Q on IC_1 purchasing OM of X and ON of Y.
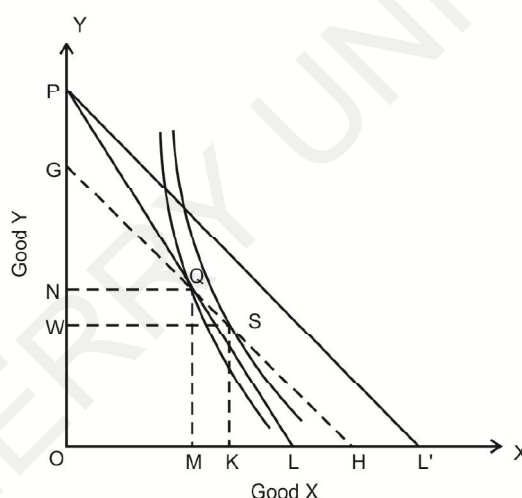
Fig. 1.18: Slutsky Substitution Effect (for a Fall in Price)

Assume that X's price is falling, Y's price is rising, and consumer income is staying the same. Now that the price of X has decreased, the price line has shifted to PL', increasing the consumer's actual income and purchasing power. The consumer's income must now be decreased by adopting a cost difference so that, if he so chooses, he can only afford to purchase the old combo Q.

For this, a pricing line GH parallel to PL' that passes through point Q has been drawn. It means that the consumer has had money taken out of his account equivalent to OG in terms of Y or L'H in terms of X, and as a result, he is now free to purchase combo Q if he so chooses because Q is also on price line GH. In actuality, he won't buy combo Q because X is now comparatively less expensive and Y is comparatively more expensive than before. The consumer will change his purchase strategy for product X and Y and substitute X for Y as a result of the relative price variation. But in this case, he won't follow the same indifference curve IC_1 since the price line GH, which the customer must stay on because of the new price-income conditions, is not tangent to the IC_1. The price line GH at S is perpendicular to IC_2. So, at point S on IC_2, the consumer is in equilibrium. This

change from Q to S demonstrates the Slutsky substitution effect, as the consumer switches from one IC to another rather than staying on the same IC.

Price Increase Slutsky Substitution Effect

Consumer equilibrium will occur at point Q on IC_1, where the prices of two goods and the provided income are depicted in fig. 1.19. Now suppose that X's price increases but Y's price stays the same. Therefore, when price X rises, the price line shifts to the profit line and the consumer's actual income/purchasing power of his given money income declines. Additionally, due to variations in price, product Y has become relatively more affordable and commodity X has become relatively more expensive than previously. In the current scenario, the cost-difference caused by price variation must increase the consumer's income in order to compensate for the increase in X's price in order to estimate the Slutsky replacement effect. For this, GH has created a price line that passes through point Q. Figure 1.19 makes it clear that in this situation, the cost difference is represented by PG in terms of Y or L"H in terms of X. He can now acquire the combo Q, which he was acquiring at the initial price of X, if he so chooses, at price line GH. However, in reality, he won't buy combo Q, since it is on price line GH. There are two methods for separating the effects of price on substitution and income. They follow the Hicksian and Slutsky methods. Hicks chose the two approaches known as compensating and equivalent variations in income. Slutsky used the cost-difference approach to split the price effect in two. The following example shows how price effect can be divided into income and substitution effects.

Since X is significantly more expensive in this situation than it was previously, he will replace some of X with Y, as shown in fig. 1.19. He will achieve equilibrium at S on IC_2 and purchase OK of X and Ow of Y using the budget line GH. NW of Y has taken the place of MK of X. The Slutsky substitution effect causes the movement from point Q to point S. Although the price of commodity X has increased, Slutsky substitution effect on X is a decrease in the quantity MK brought, and Slutsky substitution effect on Y is an increase in the quantity NW brought.
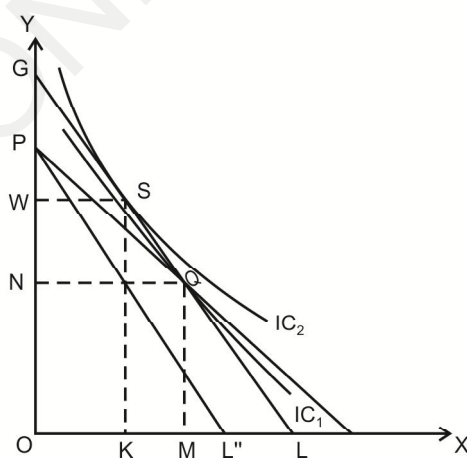
Fig 1.19: Slutsky Substitution Effect (for a Rise in Price)

Therefore, there is a difference between the two techniques of the substitution effect due to the amount of income that is reduced or increased to offset income volatility. The Slutsky approach overcompensates the customer by putting him on a higher IC than the Hicksian approach does by simply restoring his initial satisfaction position.

1.13.3 Derivation of Demand Curve Analysis

Derivation of Demand Curve

Let us now analyse how demand curve is derived in marginal utility analysis. The link between a commodity's price and the quantity it is demanded is known as the demand curve or the law of demand. There are two techniques to derive the law of demand or demand curve:

1. Using the rule of declining marginal utility as a foundation (Single Commodity Model).

2. Based on the equi-marginal utility principle (Multiple Commodity Model).

1. Using the rule of declining marginal utility as a foundation (Single Commodity Model): The law of declining marginal utility states that as a consumer purchases more of a given good or service, the value of that good or service to him as measured in terms of money decreases. Alternatively marginal utility curve of any commodity is a downward sloping curve. Thus, an individual consumer goes on buying a commodity till marginal utility of commodity equals to market price, because, at this position his satisfaction will be at maximum level. While price of commodity falls downward sloping marginal utility curve indicates consumer purchases more of that commodity so that the marginal utility of that good decreases and equals its new price level. As a result, the demand curve has a downward slope according to the diminishing marginal utility curve (fig. 1.20). (a).

In fig. 1.20 (a) marginal utility curve shows the diminishing marginal utility of commodity measured in terms of money.

Assume, OP_1 = Price of commodity (equilibrium price).

Oq_1 = Equilibrium quantity.

Here, marginal utility = price.

Now, Consider, if price declines to OP_2, consumer will purchase more quantity of commodity i.e., Oq_2 will be equal to new price level OP_2.

It is safe to deduce that a commodity's price and quantity of demand are inversely connected. The Marshallian Law of Demand is the name given to this concept.

Quantity

Marginal Utility Curve

(a)
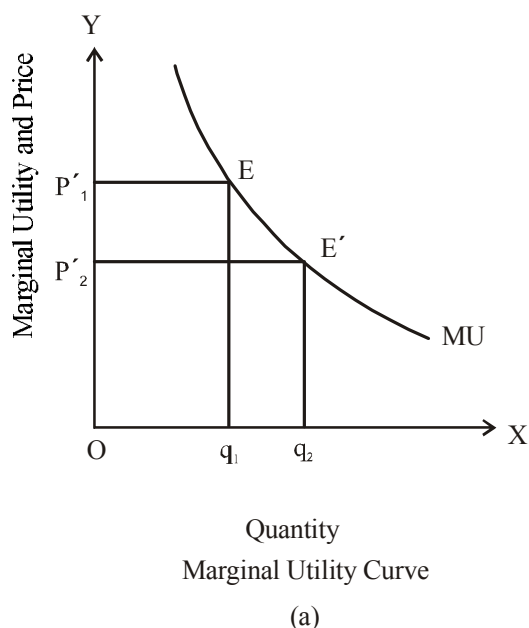
Fig. 1.20 (a)

2. Derivaation of the law of demand based on the equi-marginal utility principle (Multiple Commodity Model): According to the principle of law equi-marginal utility, consumer will attain equilibrium while he is purchasing quantities of two commodities in such a manner, which fulfills following proportionality principle i.e.,

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

Where, MU_m = marginal utility of money.

Assume, price of commodity X declines, price of Y commodity and consumer's income and preference remain same.

Here, $\dfrac{MU_x}{P_x}$ will be more than $\dfrac{MU_y}{P_y}$ and MU_m.

Therefore, to attain equality, MU_x must be reduced and it will be possible only when consumer will buy more of commodity X. Therefore, if all other factors remain the same, the quantity demanded of an item will increase when its price decreases, making the demand curve downward-sloping.
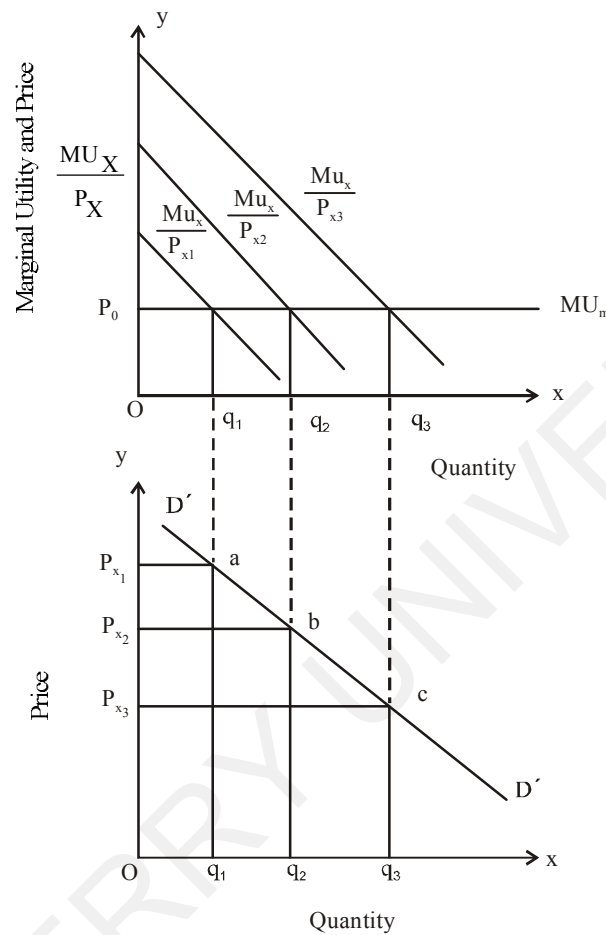
Fig. 1.20 (b)

Fig. 1.20 (b) explains derivation of demand curve. In upper part of fig. 1.20 (b) on vertical axis $\frac{MU_x}{P_x}$ is shown and the quantity required of an item will increase when its price lowers, creating the demand curve downward-sloping, if all other factors remain constant. purchasing Oq_1 of commodity Px_1, as at Oq_1 quantity level marginal utility of money $OP_0 = \frac{MU_x}{P_{x1}}$. Again if, price of commodity X declines, curve will move to new position $\frac{MU_x}{P_{x2}}$, To equalise marginal utility of money OP_0 with $\frac{MU_x}{P_{x2}}$, consumer will increase quantity demanded to Oq_2.

At lower part of fig. 1.20 (b), the demand curve is shown for commodity X. The vertical axis represents price, and the X axis represents quantity. While the analogous curve is Px_1 for commodity X, $\frac{MU_x}{P_{x1}}$, Likewise while price is Px_2 and corresponding curve is $\frac{MU_x}{P_{x2}}$, consumer purchases Oq_2 of X commodity. By

connecting three point a, b, c we get D'D' downward sloping demand curve, which indicates that as price of commodity decreases quantity purchased increases.

Critique of the Cardinal Approach

These are some drawbacks of the cardinalist strategy:

1. Since utility is a subjective concept, it cannot be quantified.

2. Money's marginal utility cannot be assumed to be constant. Because as consumers spend their money on commodities, their overall income declines, marginal utility of money to him increases.

3. Cardinal utility analysis assumes, consumers are rational but in reality consumer purchases commodities under the influence of advertisements, old habits etc.

4. Utility analysis treats every goods as independent. But actually, goods are closely linked with substitutes and complementary goods and thus, this assumption is unrealistic.

5. The amount of the increase in quantity requested that will be caused by the income impact and the amount that will be caused by the substitution effect are not adequately explained by utility analysis. Consequently, does not divide the pricing effect into the income effect and substitution effect.

Check Your Progress

21. What is the Single Commodity Model?
22. What is Multiple Commodity Model?

1.14 GIFFIN GOODS (INFERIOR GOODS)

These are certain goods which are inferior from the consumers' viewpoint. A decline in the price of such commodities may not increase their demand because buyers divert extra purchasing power to purchase superior goods. Consequently, demand for inferior goods falls. Sir Giffen, a British economist, was the first who attracted our attention towards these goods. Gifffen told that the law of demand is not applicable for English workers. He practically showed that decline of price of bread rather reduced the amount of its demand. British workers had two main items of consumption- bread and meat. They could buy the same amount of bread with less money when the market price of bread dropped and saved purchasing power was spent on purchasing more meat—a superior commodity. The income effect was seen in favour of meat and also there was no substitution effect in favour of bread. In India, maize and bajra are Giffen goods whereas wheat and rice are superior goods. Thus, we may say that demand for inferior goods such as coarse grain, coarse cloth, inferior brands of a commodity will not increase even when their prices fall.

Giffen products can be separated from subpar products. Income effects are adverse for both inferior and giffen commodities. However, for giffen items, the

negative income effect is significantly higher than the positive substitution effect, causing demand to decrease when prices do. However, when it comes to subpar items, the income effect is negative but not much more so than the substitution effect. As a result, while giffen goods inherently contradict the law of desire, these products (i.e., inferior goods) do not. Therefore, all giffen products are inferior products, but not all inferior things are inferior.

Check Your Progress

23. Explain the term Giffen goods.
24. Differentiate between Giffen and inferior goods.

1.15 ELASTICITY OF DEMAND: PRICE, INCOME AND CROSS APPROACH

Elasticity of Demand

According to the law of demand, a larger quantity of a product will be demanded at a lower price and a smaller amount will be demanded at a higher price, provided all other factors remain the same. It will not be sufficient to known, while price increase, quantity demanded decreases and *vice versa*, instead, it is more crucial to understand how much demand has changed and to what extent it responds to a given change in casual factor. Different theories of demand elasticity exist. Elasticity in economics denotes the ratio of the change in two quantities.

Elastic Demand

Demand responds to price changes. Demand fluctuates significantly despite only a slight change in price. In that case demand will be considered as elastic. For instance, while price of television declines marginally, consequently demand increases very much then demand of television will be considered as elastic.

Definition

According to Marshall, the quantity needed determines the elasticity of demand in any market, no matter how big or small. For a given price decrease, quantity demanded either rises or falls significantly, depending on the price increase.

Briefly stated, elastic demand is one in which a minor change in price causes a large change in demand. On the other hand, inelastic demand occurs when a large change in price only causes a modest change in demand.

Types of Elasticity of Demand

Although there are many elasticities of demand but major elasticities are:

(a) Price elasticity of demand.

(b) Income elasticity of demand.

(c) Cross elasticity of demand.

Price Elasticity of Demand

The first economist to clearly define price elasticity as the ratio of a relative change in quantity to a relative change in price was Alfred Marshall. It can be exactly described as the proportionate difference between the proportionate change in quantity demanded in response to a modest change in price. Therefore,

$$\text{Price elasticity} = \frac{\text{Pr oportinate change in quantity demanded}}{\text{Pr oportinate change in p r ice}}$$

or

$$\text{Price elasticity} = \frac{\dfrac{\text{Change in quantity demanded}}{\text{Quantity demanded}}}{\dfrac{\text{Change in price}}{\text{Pr ice}}}$$

The point elasticity of demand idea is applied when a very minor price shift occurs. If price changes are significant, the arc elasticity of demand idea is used.

Symbolically,

$$E = E_P = \frac{\dfrac{\delta Q}{Q}}{\dfrac{\delta P}{P}}$$

$$= \frac{\delta Q}{\delta P} \cdot \frac{P}{Q}$$

Where, E_P = Price elasticity of demand

Q = Quantity

P = Price

δ = Infinitesimal change

If demand curve is linear

$Q = b_0 - b_1 P$

If its slope is $\dfrac{\delta Q}{\delta P} = - b_1$ and if we substitute it in the formula of elasticity, we

get

$$E_P = - b_1 . \frac{P}{Q}$$

It shows that the elasticity of the linear demand curve varies at different places.

Because the amount demanded changes in the opposite direction of price change, price elasticity of demand (EP) is negative. However, we typically ignore the negative sign and simply take into account the numerical value of elasticity in order to make it easier to understand the magnitude of the reaction of quantity requested to change in price.

Coefficient of Price Elasticity

Demand is classified into elastic, unitary elastic, inelastic, perfectly inelastic – all depends upon the value of "E" or price elasticity of demand, which is also known as co-efficient of elasticity of demand. While E > 1 demand is said to be elastic. If E = 1, demand will be unit elastic. If $0 < E < 1$ demand is inelastic.

Measurement of Price Elasticity

To quantify price elasticity, economists have developed three new techniques. Which are:

(a) Total cost or way of spending.

(b) Geometrical method or the point method.

(c) Arc method.

(a) Total Outlay or Expenditure Method: Total outlay method is helpful in finding out impact of change in price on total expenditure to measure price elasticity of demand. If

(i) Increase in price $\xrightarrow[\text{to}]{\text{leads}}$ Decline in demand $\xrightarrow[\text{a way}]{\text{in such}}$ Increase total outlay $\rightarrow E_d < 1$

(ii) Increase in Price $\xrightarrow[\text{to}]{\text{leads}}$ Decline in demand $\xrightarrow[\text{a way}]{\text{in such}}$ Total outlay remain unchanged $\rightarrow E_d = 1$

(iii) Increase in price $\xrightarrow[\text{to}]{\text{leads}}$ Decline in demand $\xrightarrow[\text{such}]{\text{in}}$ Decrease in total outlay $\rightarrow E_d > 1$
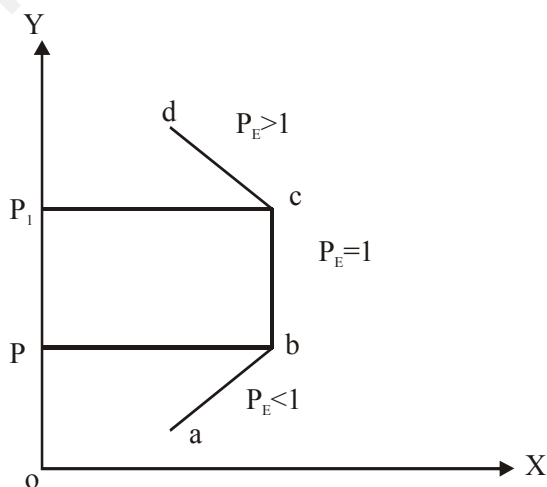
Fig. 1.21: Total Outlay or Expenditure Method

Table 1.5: Price Demand and Total Outlay

Price per unit (₹)	Demand in (units)	Total Outlay (₹)	
10	100	1,000	$E_p > 1$
8	150	1,200	
6	200	1,200	$E_p = 1$
4	240	960	$E_p < 1$

From table 1.5, it is evident that at price of ₹ 10 and having demand level 100 units and thus total outlay is ₹ 1,000. While price is reduced to ₹ 8, demand increases to 150 units and as such total outlay rises to ₹ 1200. Thus,

Reduction in price $\xrightarrow{\text{result}}$ Increase in demand $\xrightarrow{\text{casuses}}$ Increase in total outlay $\xrightarrow{\text{thus}}$ $E_p > 1$

Again, when price decreases further from ₹ 8 to ₹ 6 per unit, according to table 1.5, it results increase in demand from 150 units to 200 units, but total outlay remains the same. Thus,

Reduction in price $\xrightarrow{\text{result}}$ Compensating increase in demand $\xrightarrow{\text{leads to}}$

Total outlay remains same $\xrightarrow{\text{thus}}$ $E_p = 1$

Further, while price decreases again from ₹ 6 to ₹ 4 per unit, results increase in demand from 200 units to 240 units and thus total outlay decreases. Therefore,

Reduction in price $\xrightarrow{\text{result}}$ Increase in demand $\xrightarrow{\text{casuses}}$ Decrease in total outlay $\xrightarrow{\text{thus}}$ $E_p < 1$.

Relationship between changes in price and total outlay is shown in fig. 1.21

In fig. 1.21 abcd represents total outlay curve. If price level increases within the range of OP, total outlay rises and *vice versa* and the elasticity of demand is less than one. In price range PP$_1$, rise or fall in price remains total outlay constant and therefore the elasticity of demand is equal to unity. Price range above of OP$_1$ leads to increase in total outlay and thus the elasticity of demand is more than one.

(b) Geometrical Method or Point Method

(i) **Point elasticity of a linear-demand curve:** A linear demand curve's point elasticity can be represented graphically as the ratio of the line segments to the right and left of a certain point. According to fig. 1.21 (a) elasticity of linear demand curve at point e is $\dfrac{eb}{ae}$.

(ii) **Point elasticity of a non-linear demand curve:** Graphically, point elasticity of a non-linear demand curve is shown in fig. 1.21 (b). In this fig, D$_1$D$_1$ is demand curve. Suppose, points e and e' on demand curve are

such close to each other that if price declines from eQ to e'Q_1 demand rises from OQ to OQ_1. To determine elasticity at point e', let us draw a tangent at e' which meet X axis at point b and Y axis at point a.

Price elasticity of demand (P_E) $= \dfrac{\dfrac{\text{Change in quantity demanded}}{\text{Quantity demanded}}}{\dfrac{\text{Change in price}}{\text{Original Price}}}$

$$= \frac{QQ_1 / OQ}{eR / eQ}$$
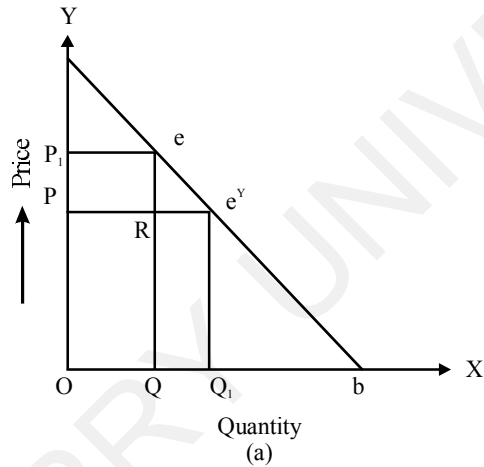
**Geometrical method or point method
(linear demand curve)**

Fig. 1.21 (a)
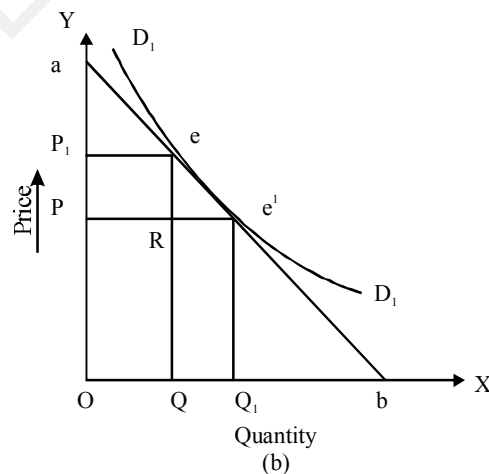
**Geometrical method or point method
(non-linear or demand curve)**

Fig. 1.21 (b)

$$= \frac{QQ_1}{OQ} \times \frac{eQ}{eR}$$

$$= \frac{QQ_1}{eR} \times \frac{eQ}{OQ}$$

$$= \frac{e'R}{eR} \times \frac{eQ}{OQ}$$

(As, $QQ_1 = e'R$)
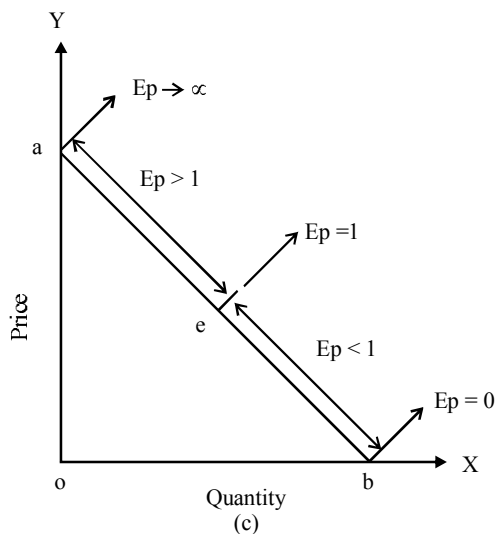
Graphical measurement of point elasticity of demand

Fig. 1.21 (c)

Proof:

In fig. 1.21 (a)

$\delta P = PP_1 = eR$

$\delta Q = QQ_1 = e'R$

If we takes into account infinitesimal changes in P and Q, then if we substitute (them) in the formula of point elasticity of demand, we get

$$E_p = \frac{\partial Q}{\partial P} \cdot \frac{P}{Q} = \frac{QQ_1}{PP_1} \cdot \frac{OP_1}{OQ} = \frac{e'R}{eR} \cdot \frac{OP_1}{OQ}$$

Consider triangles eRe' and eQb. They are equal and thus ratios of their sides are equal.

$$= \frac{e'R}{eR} = \frac{Qb}{eQ} = \frac{Qb}{OP_1}$$

Therefore, $E_p = \frac{Qb}{OP_1} = \frac{OP_1}{OQ} = \frac{Qb}{OQ}$

Again, in triangle aP_1e and eQb are identical and thus

$$= \frac{Qb}{eb} = \frac{P_1e}{ae} = \frac{OQ}{ae}$$

If we rearrange, we can write

$$= \frac{Qb}{OQ} = \frac{eb}{ae}$$

Hence, to the point e price elasticity of demand (E_p) can be written as

$$E_p = \frac{Qb}{OQ} = \frac{eb}{ae}$$
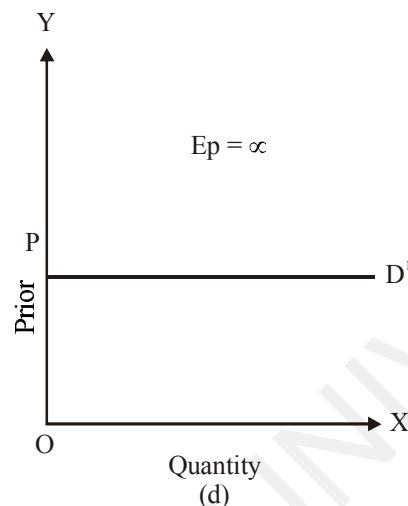
**Perfectly elastic
demand (EP=∝)**

Fig. 1.21 (d)
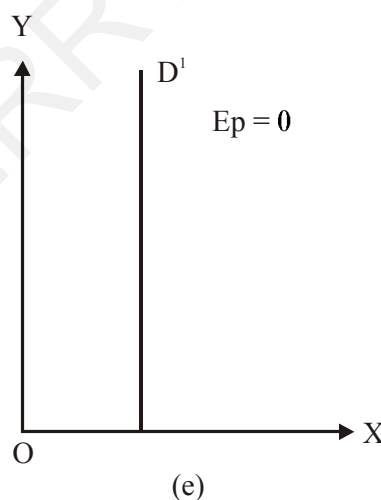
**Perfectly inelastic
demand (EP = 0)**

Fig. 1.21 (e)

As a result, we can utilise the aforementioned ratio to determine the price elasticity of demand at any given time. It should be kept in mind that the demand elasticity along a straight line varies depending on the location. The ratio of the lower to higher section of a straight line defines elasticity at any given position.

Types of Price Elasticity of Demand

It is clear from the point elasticity graph that Ep = 1 corresponds to the centre point of the linear demand curve, i.e., point e in fig. 1.21 (c). If we consider any

point towards right to point e, point elasticity of demand will be less than unity ($E_p < 1$) and towards left of point $e(E_p > 1)$. At point $a(E_p \rightarrow \alpha)$, at $b(E_p = 0)$

Price elasticity of demand is always negative due to inverse relationship between price and quantity by Law of demand. But we ignore negative sign while writing the formula of the price elasticity of demand.

Ranges of price elasticity of demand may be expressed as

$0 \leq E_p \leq \alpha$

Price elasticity of demand is normally classified under five sub-heads:

1. Perfectly elastic demand refers to a situation, where the smallest price increase causes demand for any good to go to zero, the smallest price decrease causes demand for that good to increase indefinitely. Figure 1.21 depicts it (d). In this case, the price elasticity of demand will be infinite. Symbolically

$E_p = \alpha$
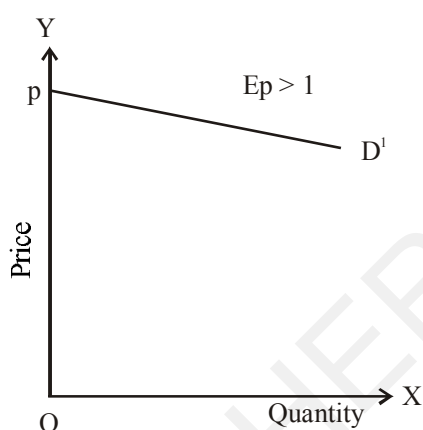
Relatively elastic demand (Ep >1)

Fig. 1.21 (f)
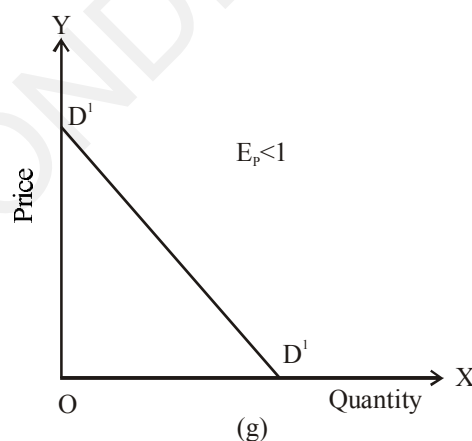
Relatively in elastic demand (Ep < 1)

Fig. 1.21 (g)

2. Perfectly inelastic demand refers to a circumstance where demand is unaffected by price adjustments that are significant. In contrast, while the level of price may change, the amount of a good is still demanded. Figure 1.21 depicts it (e). Price elasticity of demand will be equal to zero in this situation. Symbolically,

$E_p = 0$

3. Relatively elastic demand refers to a circumstance in which a modest proportionate change in an item's price is accompanied by a bigger proportionate change in the amount requested of the good. In contrast, a modest proportionate price reduction is followed by a bigger proportionate rise in demand, and vice versa. Figure 1.21 depicts it (f). Demand elasticity at this price point will be greater than one. Symbolically,

$E_p > 1$
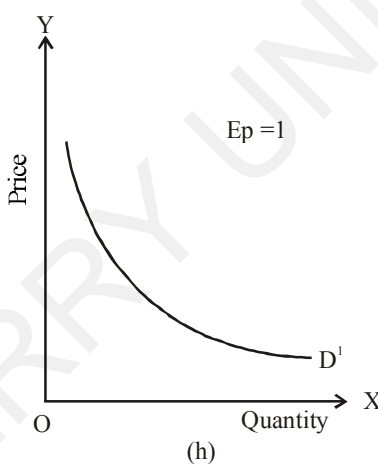
Unitary elastic demand (Ep=1)

Fig. 1.21 (h)
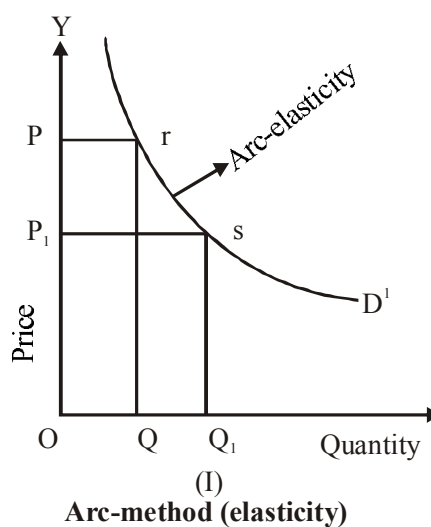
Arc-method (elasticity)

Fig. 1.21 (i)

4. Relatively inelastic demand refers to a situation where a good's price changes significantly but the quantity needed changes significantly less. A

significant proportionate price reduction, on the other hand, may cause a lesser proportionate increase in demand, and vice versa. It is shown in fig. 1.21 (g). Demand elasticity at this price point will be smaller than unity. Symbolically,

$E_p < 1$

5. Unitary elastic demand refers to an instance where the amount sought changes proportionally to a proportionate change in price. In contrast, when a corresponding price decrease is accompanied by a proportionate increase in demand, and vice versa. Figure 1.21 depicts it (h). Price elasticity of demand is equal to one in this situation. Symbolically,

$E_p = 1$

Point is to be remembered is that normally demand curve does not uniform elasticity through out its length and as such it represents different classification to different segments of demand curve. Although exceptions still exists in this above general rule of elasticity. These are:

(i) Perfectly elastic demand. (rare in real life).

(ii) Perfectly inelastic demand. (rare in real life).

(iii) Unitary elastic demand.

Basic Determinants of Elasticity of Demand with Respect to its Own Price

Following are basic determinants of elasticity of demand with respect to its own price:

(i) Nature of requirement of goods i.e., luxury or necessity. In general, luxury goods have elastic prices whereas essentials don't.

(ii) Availability of substitutes.

(iii) The number of uses that a good can be put to.

(iv) Period during which demand is more elastic over time.

(v) Proportion of income allotted to spend on each good.

(c) Arc Method: Arc method or arc elasticity is a technique to study portion or the average elasticity of a section of a demand curve that lies between two points. In other words, elasticity at the mid point of chord or arc which links two points i.e., r and s as in fig. 1.21 (i). It is evident that, arc elasticity is an approximation of true elasticity of portion r and s of demand curve D', which will be implemented only when we will get information of two point r and s of that particular demand curve. But it will not be proper to use for its intermediate ones. It is true that as demand curve will be more convex to the origin, poorer will be the linear approximation obtained by arc method. Formula for measuring arc elasticity is:

$$E_p = \frac{\text{Change in quantity demanded}}{(\text{Original quantity} + \text{New quantity after change})} \div \frac{\text{Change in price}}{(\text{Original price} + \text{New price after change})}$$

Symbolically,

$$E_p = \frac{\Delta Q}{\Delta P} \cdot \frac{\dfrac{P+P_1}{2}}{\dfrac{Q+Q_1}{2}} = \frac{Q}{P} \cdot \frac{(P+P_1)}{(Q+Q_1)}$$

Where, Q   =   Original quantity demanded

       Q_1 =   New quantity after change in price

       P   =   Original price

       P_1 =   New price after change

Income Elasticity of Demand

Demand that is relatively responsive to changes in income is said to have a high income elasticity of demand. To put it another way, it is the proportionate change in quantity requested divided by the proportionate change in income. It shows how sensitive a consumer is when they adjust their purchases of a good in response to a change in their income.

The formula for the demand elasticity of income is,

$$E_y = \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in income}}$$

Symbolically,

$$E_Y = \frac{\dfrac{\delta Q}{O}}{\dfrac{\delta Y}{Y}} = \frac{\delta Q}{\delta Y} \cdot \frac{Y}{Q}$$

Where, E_Y =   Income elasticity of demand

       Q   =   Original quantity demanded

       Y   =   Original income

       ΔQ =   Change in quantity demanded

       ΔY =   Change in income

It's important to keep in mind that for typical goods, income elasticity of demand is positive. However, some authors have divided products into two groups, luxuries and necessities:

(a) In case of luxury commodities → Income elasticity of demand is more than unity i.e.,

$E_Y > 1$

(b) In case of necessary commodities → Income elasticity of demand usually is less than unity i.e.,

$E_Y < 1$

Determinants of Income Elasticity of Demand

Followings are some of the major determinants of the elasticity of demand:

1. Initial level of income of a country. For instance, car is necessity for doctors but luxury for a clark.

2. Time period. As, consumption patterns change with variation in income from time to time.

3. Nature of requirement of the specific commodity. It is based on the principles of the Engel's Law – i.e., along with increase in level of income percentage of income spent on food decreases.

Cross Elasticity of Demand

Normally, commodities are related either on substitutes on complementaries. In case of substitute goods, decrease in price of one leads to larger demands for it but also decrease in demand for another commodity whose price has remained the same. In case of complementaries or joint products, while one becomes cheaper, not only its demand will rise but also that of complementary commodities.

Price Cross elasticity of demand describes how responsively a particular good's quantity is to changes in the price of related goods. Alternatively, it refers to the ratio of the proportional change in the quantity of commodity X required divided by the proportionate change in the price of commodity Y. The cross-elasticity of demand formula is

$$E_{XY} = \frac{\text{Proportionate change in quantity demanded for commodity X}}{\text{Proportionate change in price of commodity Y}}$$

$$= \frac{\text{Change in demand for X}}{\text{Change in price of Y}} \div \frac{\text{Original demand for X}}{\text{Original price of Y}}$$

Symbolically,

$$E_{xy} = \frac{\frac{\delta Q_x}{Q_x}}{\frac{\delta P_y}{P_y}} = \frac{Q_x}{P_y} \cdot \frac{P_y}{Q_x}$$

Where, E_{XY} = Cross elasticity of demand between X and Y.

δQ_X = Change in quantity demanded for commodity X.

Q_X = Original demand for commodity X.

δP_Y = Change in price of commodity Y.

P_Y = Original price for commodity Y.

Cross elasticity of demand measures one of the most important demand relationships. It shows how closely two goods are related. Sign of cross elasticity can be positive or negative or zero. Goods X and Y are replacements if the cross elasticity sign is positive. Goods X and Y are complimentary if the cross elasticity

sign is negative. In any given market, two commodities X and Y are said to be independent of one another if the cross elasticity is zero.

Determinant of Cross Elasticity of Demand

The nature of the items in relation to their user is the primary factor of cross elasticity. Cross elasticity is strong if two items meet identical requirements, and *vice versa*.

Check Your Progress

25. Define the term Elastic Demand.
26. What is Price elasticity of demand.

1.16 CONSUMER'S SURPLUS

Dupit first developed the idea of consumer surplus in 1844 to quantify the social advantages of public infrastructure like canals, bridges, and interstates. This was further outlined and made popular by Marshall in his 1890 book, "Principles of Economics." Old welfare economics was built on the notion of consumer surplus. Cardinal measurability and interpersonal utility comparisons served as the foundation for Marshall's consumer surplus concepts. According to him, any increase in consumer surplus is a sign of a rise in social welfare. Consumer surplus is simply the difference between the price one is willing to pay and the price one ultimately pays for a given good. Thus,

Consumer's surplus = What a buyer is ready to pay minus what he infact pays.

= Σ Marginal utility – (Price × Number of units of a good Purchased)

The law of diminishing marginal utility serves as the foundation for the concept of consumer surplus. A product's marginal usefulness continues to drop as we buy more of it.

Prof. J.R. Hicks through his indifference curve technique measures CONSUMER'S SURPLUS. He has explained this concept in his book 'Value and Capital'. Prof. Hicks through his ordinal method has given the solution for measuring consumer's surplus.

Hicks compares two situations:

Situation-I: Denotes that the consumer has money income. However, he is unaware of the current market price for the material.

Thus, there is no price line. At this point, he can describe his level of commodity preference. We can say that the consumer is prepared to pay ₹ 10 on 10 units of the commodity.

Situation-II: Denotes that consumer knows the price of the commodity, say 80 paise per unit. As such he will have his price line which is shown in Fig 1.22.

We can state that the consumer is willing to pay ₹ 10 for a good or service even though the real cost is ₹ 8 for every 10 units. The difference between these two (₹ 10 – ₹ 8 = ₹ 2) is consumers surplus. Alternatively, we can say that the consumer is prepared to spend AN of money, but the consumer actually spends only AM of money for the same amount of commodity. The difference between AN – AM = NM is the consumer surplus.

Hicks use the following diagram to illustrate his version of consumer's surplus.
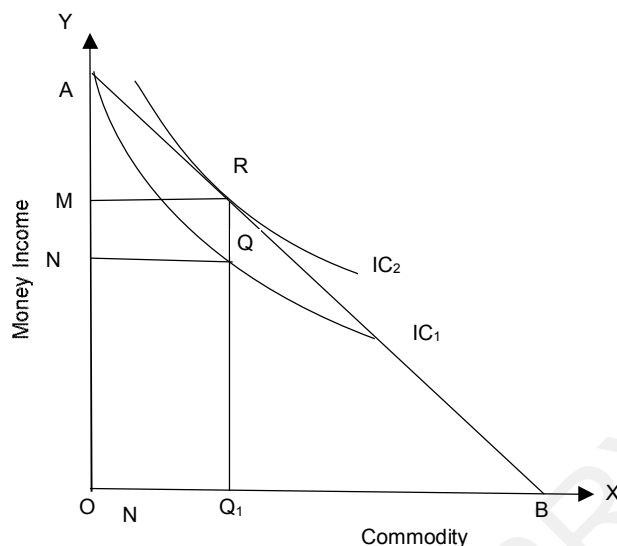
Fig. 1.22: Consumer's Surplus

In fig. 1.22 X-axis represent commodity and Y-axis represent money income. AB is the price line. Then draw the indifference curve, as it originates from point-A on the Y-axis. Then draw IC_2, R at the point of tangency. From R draw a line to X-axis. The Q touches IC_1. In this fig. 1.22 it is clear that consumer's surplus is NM on RQ.

Thus Hicks measures consumer's surplus without making artificial assumption. Hicks has revived the idea of consumer surplus using the indifference curve technique. The strategy for determining consumer surplus using the indifference curve is called quantity-compensating variation method in the Hicksian terminology.

Prof. Hicks technique of measuring consumer's surplus is definitely an improvement over that of Marshallian analysis.

Hicksian version of consumer surplus is considered superior over Marshall's analysis:

(i) It is more realistic than the old approach since demand is studied in terms of two or more goods and not in terms of one commodity alone.

(ii) Marshall does not consider the relation between the price of one good and amount demanded of another commodity. Hicks has explained this relationship.

(iii) Marshallian analysis makes so many assumptions. Hick's analysis makes only few assumptions.

(iv) Hick's analysis has dispensed the unrealistic assumption made by Marshall that money's marginal utility will always remain constant.

(v) Hick's analysis considers the case of Giffen goods, whereas the Marshallian analysis defies the law of demand and is treated as such.

(vi) Hicks analysis explains the income and substitution effects in a simple and clear way. The Marshallian approach has failed to do it.

Check Your Progress

27. Explain the concept of consumer surplus.
28. Who has measured Consumer surplus?

1.17 ENGEL CURVE

An Engel curve explains how changes in household spending on a certain good or service depend on changes in household income. There are two types of Engel curves. Engel curves' explanation of the budget share show how the amount of money spent on a given good varies with household income.

The Engel curve is a correlation between consumer demand and income that bears the name of German statistician Ernst Engel (1821–1966). Former depends on latter.

Engel curve of buyer is obtained from respective ICC. As, each point on ICC is obtained for consumer like this curve as shown in fig. 1.23. It is combination of three items—his income (M), demand for commodity X and Y.
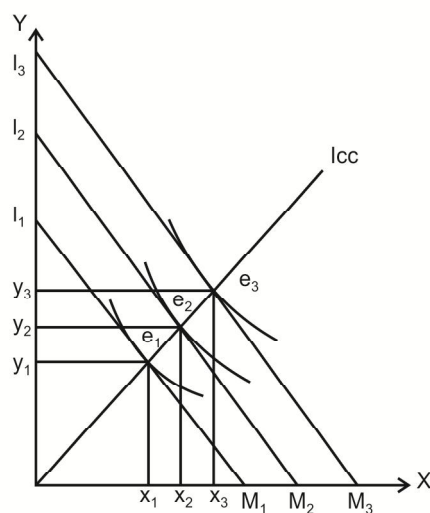
Fig. 1.23: ICC Curve
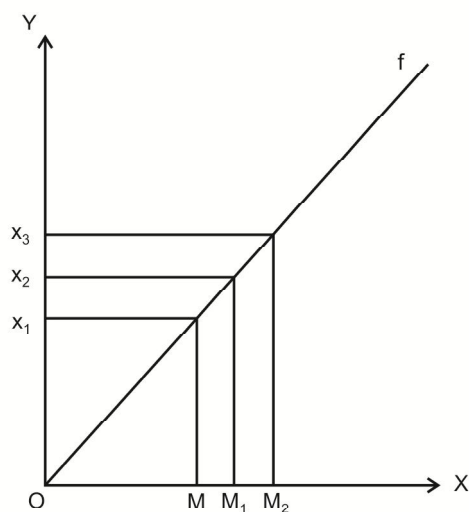
Fig. 1.24: Engel Curve for Commodity X
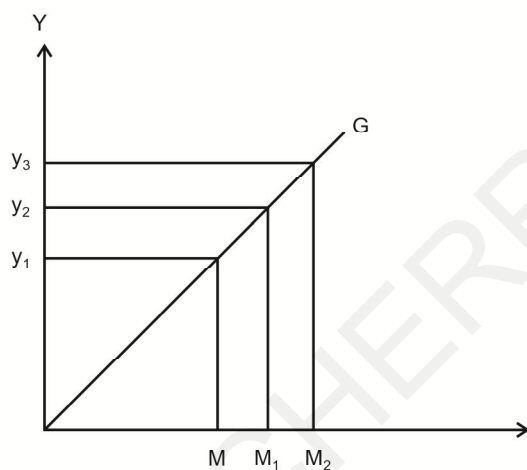
Fig 1.25: Engel Curve for Commodity

X
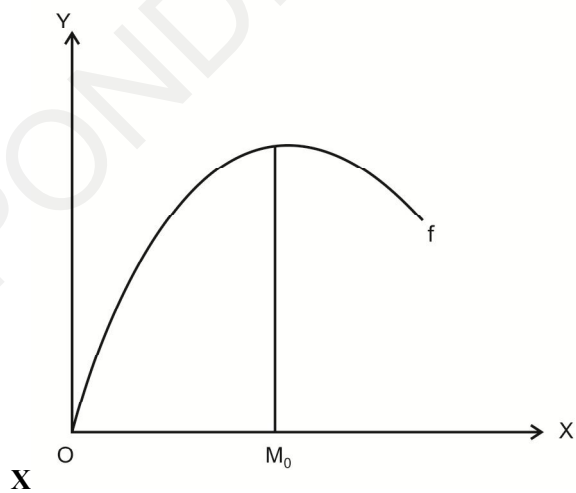
Fig 1.26: Engel Curve for a Commodity that becomes Eventually Inferior

As shown in fig. 1.23, the point e_1 is combination of income l_1M_1 i.e., income shown by price line l_1M_1, demand of commodity $X = x_1$ and the demand of commodity $Y = y_1$, i.e., the point e_1 is a combination of (l_1M_1, x_1, y_1). Similarly, the point e_2 is combination of (l_2M_2, x_2, y_2), and similarly the same will be at point e_3.

As a result, the ICC's points in Figure 1.23 provide a variety of money income and commodity X demand combinations, including (l_1M_1, x_1), (l_2M_2, x_2), etc. and still another group of income and commodity Y demand combinations, like (l_1M_1, y_1), (l_2M_2, y_2).

The first set of combinations, if plotted graphically would give the consumer's Engel curve for commodity X like the one given in fig. 1.24, and second set of combinations would give us the Engel curve for commodity Y—this is given in fig. 1.25.

As ICC in fig. 1.23 is sloping upward towards right, while the prices of both goods remain the same, the buyer purchases more of each.

In figures 1.24 and 1.25, the Engel curves, OF and OG, of the goods X and Y, respectively, show an increasing slope. These curves have been depicted as straight lines for simplicity's sake. Instead, if X or Y becomes a lesser good for the consumer when his money increases over a particular threshold, the ICC bends towards y-or to the x-axis, respectively.

As a result, Engel curve of inferior product (X or Y) bends towards horizontal axis, while it measures quantity of goods along vertical axis. After a certain level, while income increases, the consumer curtails the purchase of goods. This type of an Engel curve has been shown in fig. 1.26.

Check Your Progress

29. Explain the concept of Engel curve.
30. Who has coined the term Engel curve?

1.18 ANSWERS TO CHECK YOUR PROGRESS

1. Microeconomics determines how various individual units obtain equilibrium position.

2. Allocative economic expertise means quantities of various products/services according to the consuming style of individual.

3. Microeconomics deals with an economy but pertains to resource allocation in its community.

4. General equilibrium deals with individual unit and their inter-relationships.

5. Under ordinal utility individual attain utility after consuming a set of products/ services.

6. Under cardinal utility it is presumed that any person attain utility by taking one product one time.

7. Microeconomics clarifies profits from internal/external trade, foreign exchange, BOP, disequilibrium and exchange rate : that is vital issues of microeconomics.

8. Microeconomics is helpful to government to make policies relates to tax, public expenditure, price fixation and so on to achieve objective of effective resource allocation as well as welfare in community.

9. Supply of a product refers quantity provided for sale at a price in any specifies time by any manufacturer.

10. Supply implies entire bundle of product provided for sale at various prices, whereas quantity supplied indicates limited quantity of a good provided for sale at a specific price.

11. In free market economy production/sale of products/services occurs by means of little/no regulation from government.

12. Economists explain free market economy as where commodities are eagerly exchanged between buyer and seller.

13. Economist differentiated in demand and quantity demanded. Demand for a product/service implies where buyers are desires/capable to purchase is termed as quantity demanded for that product/service. Quantity demanded is estimated at a specific price level over specific period i.e., fruits purchased on weekly basis, biscuits on monthly basis, refrigerators on yearly basis.

14. Market demand implies total quantum of products which buyers demand at a specified price level in any particular time.

15. The word Ordinal has been taken from mathematics. Under ordinal utility, satisfaction cannot be determined. Numbers 1st, 2nd, 3rd, 4th are ordinal numbers. Thus they are ordered/ranked.

16. IC implies utility level that buyers attain from a set of products. It is presumed that different sets provide equal utility to consumer.

17. Income effect means effect on purchase of buyer because of income variation.

18. Substitution effect means the variation of demand of two products because of relative price variation. But Total utility remains unaltered.

19. Buyer will be in equilibrium while he attains highest utility from his income as well as prevailing price level.

20. Slope of IC = Slope of price line; IC is convex towards origin—that is met by diminishing marginal utility.

21. Single Commodity Model lies on the principle of DMU.

22. Multiple Commodity Model lies on the derivation of Law of EMU.

23. There are certain goods which are inferior from the consumers' viewpoint. Decline of price of such products may not increase their demand because

consumers start diverting their extra purchasing power to buy superior commodities.

24. Giffen products can be separated from subpar products. Both inferior and giffen types of goods have a negative impact on income level. In contrast, the negative income effect for giffen items outweighs the positive substitution effect, causing demand to decrease as prices rise. Although the income effect is negative, it is not greater than the substitution effect for inferior products.

25. While there is a negligible variation of price, demand changes very much, in that case demand will be considered as elastic.

26. Price elasticity is a ratio of relative change in quantity to relative change in price.

27. Consumer surplus is determined by DMU law. In other words, the marginal usefulness of an item decreases as we purchase more of it.

28. Prof. J.R. Hicks through his IC technique measures consumer's surplus.

29. An Engel curve illustrates the relationship between household spending on a specific good or service and household income. Engel curves can be of two different types.

30. Ernst Engel (1821-96) coned the term Engel curve which shows relation within product demand and income of consumer. The former depends upon the latter.

1.19 SUMMARY

1. Economics has two branches :Microeconomics and Macroeconomcs.

2. Microeconomics is obtained from Greek word mikros implies small.

3. Microeconomics examines the economic behaviour and actions of each individual unit and smaller groupings of individual units.

4. Under microeconomics we study unit wise study of an economy.

5. In terms of price determination, output, and decisions made in response to changes in the demand and supply environment, microeconomics examines the behaviour of a single firm.

6. Product pricing theory and Distribution theory considers total amount of resources available and tries to clarify how allocations are to be done for manufacture of different products.

7. Product pricing theory and Factor pricing theory are part of Microeconomics.

8. The relative prices of fabric, food, jute, kerosene oil, vanaspati ghee, and other commodities are explained by product pricing theory.

9. Distribution theory clarifies the ways how wages, rent, interest and profits are decided.

10. Price of goods is determined/based on demand and supply forces.

11. The buying habits of consumers determine demand for every commodity.

12. Supply of products is determined on production condition, its cost and firm's behavioural pattern.

13. Two parts of the theory of pricing are the theory of demand and the theory of production.

14. Productive efficiency, efficiency in consumption, and efficiency in production direction all fall under the umbrella of economic efficiency.

15. Efficiency in production involves producing the highest quantity of different products form available resources.

16. In order to maximise the overall satisfaction of society, the given quantity of created goods and services must be distributed to millions of consumers for consumption.

17. Optimum economic efficiency includes manufacturing products most opted by individuals.

18. Optimum economic efficiency means production pattern must correspond to expected consumption of individuals.

19. Optimum efficiency is obtained while optimum allocations are done so as to achieve highest possible satisfaction of individual.

20. Microeconomics deals with reduction of wastes that happens due to productive inefficiencies.

21. General equilibrium analysis scrutinisation of units individually in an economy.

22. Microeconomics deals with analysis of external/internal trade, foreign currencies, BOP, disequilibrium, exchange rate.

23. Microeconomics lacks aggregate analysis of employment, policy issues relating to fiscal/monetary aspect which are very important to study national economy.

1.20 KEY TERMS

- **Microeconomics:** Microeconomics examines the economic behaviours and actions of individual units and their small social organisations.

- **Macroeconomics:** Macroeconomics is the branch of economics that examines the actions and choices made by the entire economy.

- **Theory of factor pricing:** Factor pricing is associated price charged by factors of production which a manufacturer pays to them to render their services.

- **The theory of distribution:** The theory of distribution examines how the owners of the three main production factors—land, labour, and capital—share the nation's income.

- **Economic efficiency:** Productive efficiency, efficiency in consumption, and efficiency in production direction are all parts of economic efficiency.

- **General equilibrium:** Microeconomics looks at the economy as a whole from a very small perspective, which entails analysing how different economic units behave, how they interact with one another, and how they adjust their equilibrium with one another to determine how resources are distributed in society. This process is known as general equilibrium analysis.

- **General equilibrium:** Microeconomics analyses an economy unit wise, their inter-relationships, equilibrium adjustment with one another and this entire study is termed as general equilibrium analysis.

1.21 SELF-ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Explain in brief the Nature and scope of microeconomics.
2. Define Microeconomics.
3. Write notes on 'Pareto-optimal conditions'.
4. What are the main features of supply?
5. What are the roles and limitations of free market economy?
6. Define the term Demand and the Law of demand.

Long Answer Questions

1. "Microeconomics fall within the domain of microeconomics." Elucidate.
2. Write notes on 'Microeconomics and Economic Efficiency'.
3. What are the Approaches to studying (micro)economics?
4. Differentiate between cardinal and ordinal analysis.
5. What are the importance of microeconomics?
6. What are the limitations of microeconomics?
7. Write short notes on Giffen goods and Engel curve.

1.22 REFERENCES

1. S.K. Misra & V.K. Puri. 2011. Principles of Microeconomics. Himalaya Publishing House, Mumbai.

Unit II	**Theory of Supply and Production**

Learning Objectives:

By the end of this unit the learners would be able to understand:

- Supply and Law of Supply
- Elasticity of Supply
- Production Decision
- Factors of Production
- Production Function
- Returns to Scale
- Economies of Scale
- Iso-quant Approach and Producer's Equilibrium
- Factor Substitution
- Elasticity of Factor Substitution

Structure:

2.1   INTRODUCTION

In this unit, we shall study Theory of Supply and production. Initially we shall discuss supply and law of supply, elasticity of supply. Gradually, as this unit advances concept of production function, iso-quant will be discussed.

2.2   SUPPLY AND LAW OF SUPPLY

2.2.1 Supply Curves

As demand curve represents buyers' preferences as regards purchasing of commodities, similarly supply curves shows willingness of sellers to provide commodities for sale in the market. Basic idea lies in the fact that as more and more consumer will be ready to pay for any commodity, more interested will be a seller to supply that specific commodity to earn additional revenue.

2.2.2 Definition of Supply Curves

The phrase "supply curves" refers to a graphical representation of a readiness to provide more goods in response to an increase in the selling price.

2.2.3 Individual Firm's Supply Curve

Let us study following table 2.1 and fig. 2.1, which will be helpful to explain Individual firm's supply curve.

Table 2.1

Price (in ₹)	Quantity Supplied
1	1000 units
2	2000 units
3	3000 units
4	4000 units
5	5000 units

It is to be noted from table 2.1 and fig. 2.1 that as the price level increases, sellers' start providing additional quantities of that commodity in the market with the intention of earning additional revenue and as such we get an upward sloping curve S' S'. It suggests that more items will be offered at a higher price. The supply curve travels upward from left to right and has a positive slope.
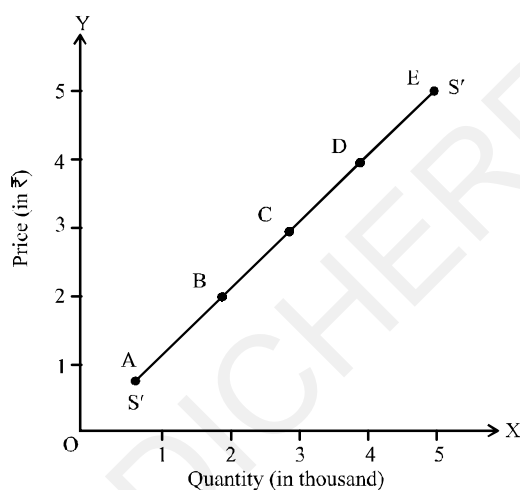
Fig. 2.1: Individual Firm's Supply Curve

2.2.4 Market Supply Curve

Let us study following table 2.2 and fig. 2.2 which will be helpful to clarify market supply curve

Table 2.2

Price (in ₹)	Quantity	Supplied
	Producer A	**Producer B**
1	1000	2000
2	2000	3000
3	3000	4000
4	4000	5000
5	5000	6000

From above table 2.2 and fig. 2.2, it is evident that it is a straight way to go from individual supply curve to market supply curve in the similar manner that is applicable for demand curve. Horizontal sum of supply curves of all firms generate market supply curves. It is because we are interested at market level in total amount supplied at any given price level.

(a)
Supply Curve Seller A

(b)
Supply Curve Seller B

(C)
Market Supply Curve
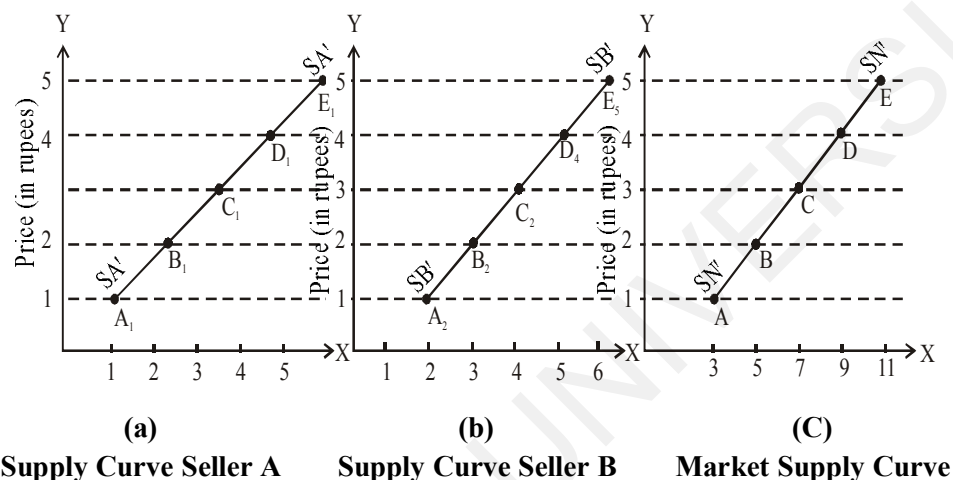
Fig. 2.2: Market Supply Curve

It is also to be noted that market supply curve is smoother than individual supply curve, because some idiosyncrasies of single firm's behaviour is ironed out at aggregate level.

2.2.5 Movements along versus Shifts in the Supply Curve

Like demand curve, separating a change in a supply curve from movement along a supply curve is also necessary.

Any commodity's supply growth causes the entire supply schedule to change. It is regarded as a supply curve shift.
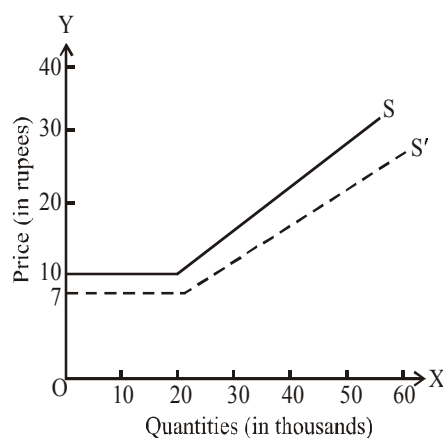
Fig. 2.3: Shift in Supply Curve

Change in quantity supplied or movement along the same supply curve are terms used to describe when the supply of a commodity changes owing to variation in its own price. (fig. 2.3).

In fig. 2.3, quantity is taken on horizontal axis and price is on vertical axis. Here when price of the commodity is ₹ 10 we get supply curve "S". But when price declines to ₹ 7 we get new supply curve "S″". It is shift of supply curve.
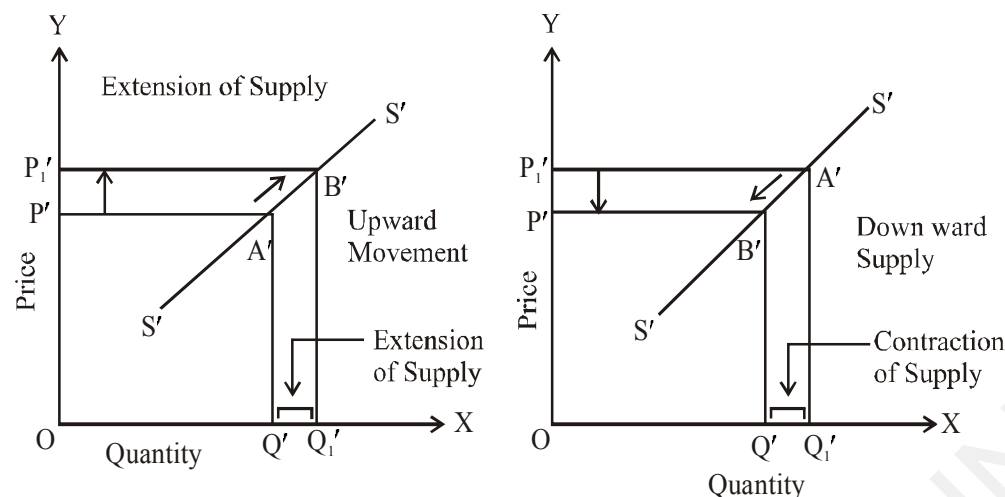
Fig. 2.4: Movement along Same Supply Curve

Again in fig. 2.4, similarly, quantity is taken on horizontal axis and price is taken on vertical axis. Here, when pries increases from ₹ 10, quantity supplied increases from 20,000 to 25,000. This is the case of movement along the supply curve. Here movement occurs on same supply curve "S″".

Essential factors for demand are:

(a) Prices of substitutes and complementary goods.

(b) Income of individual.

Likewise, in case of supply, most essential factors are

(a) Price of factors of production.

(b) Technology factors.

Let's discuss the effects of above two factors of supply one by one.

Let's start by taking a look at the cost of the production inputs. Cost of production will reduce if the price of production factors drops and supply of commodities will increase. There will be a shift in supply curve as shown in fig. 2.4.

Secondly, let us consider technology factors. If price of factors of production remain the same or unchanged but innovation takes place, it will increase the speed of production process and decreases number of labourers/workers in production process. Thus again a shift in supply curve takes place as in fig. 2.4.

2.2.6 Supply and Characteristics of Supply

In economics, supply refers to the quantity of a product that a manufacturer is willing and able to sell at a certain price, holding all other variables constant at a given point in time. Like demand, it also has three elements or essentials as under:

(a) Quantity of a commodity that a seller is ready to sell.

(b) Supply is always related to price.

(c) Amount supplied must refer to some period of time.

Characteristics of Supply: Major features of Supply are as follows:

(a) Desired quantity: Actually, supply is the desired amount that businesses are prepared to sell at a specific price, but not how much they sell actually.

(b) Flow variable: Indeed, supply is a continuous flow of variables over a time. It is basically the quantity that firms or producers or sellers desire or are willing to sell per period of time i.e., per day, per month, per annum.

(c) Relation with price: Supply has its reference to price, e.g., farmer may not be willing to sell rice at ₹ 400 per quintal, but ready to sell when price increases to ₹ 500 per quintal.

(d) Supply is different from quantity supplied: The term "supply" refers to the entire range of quantities of any good that are being sold at all conceivable prices. But quantity supplied implies particular quantity of a commodity offered for sale at a specific price.

Distinction between Stock and Supply

Stock refers to the total amount a company generated over a time period less the amount that was actually sold. But supply refers to the volume of a product that producers are prepared and able to sell at a particular price, while all other variables stay unchanged at that particular moment.

Stock = Unsold stocks + Current production – Current sales.

2.2.7 Laws of Supply

According to the rule of supply, which is a cornerstone of economic theory, an increase in price would, on average, lead to an increase in the quantity supplied. In other words, there is a direct correlation between price and quantity, and quantities react to price changes in the same way. This indicates that producers are eager to increase production as a means of boosting earnings in order to provide more things for sale on the market at greater prices. The upward slope of the supply curve is caused by the Law of Supply, which is a link between quantity supplied and price that is positive.

Mathematical Definition

In non-differentiable terms, the law of supply can be expressed as:

$(p - p')(y - y') \geq 0$

where y is the amount that would be supplied at some price p, and y' is the quantity that would be provided at a different price, p'. Thus for example if $p > p'$ then $y > y'$

2.3 ELASTICITY OF SUPPLY

Supply elasticity is comparable to demand elasticity. The degree to which the supply is responsive to price changes is known as supply elasticity. This can be calculated by taking into account the percentage change in supply caused by the percentage change in price of that specific commodity.

Elasticity of supply (ES) = $\dfrac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$

Symbolically, ES = $\dfrac{\dfrac{\Delta S}{S}}{\dfrac{\Delta P}{P}}$

where,

$\quad$ ES $\;=\;$ Elasticity of supply

$\quad$ ΔS $\;=\;$ Change in quantity supplied

$\quad$ S $\;=\;$ Original supply

$\quad$ ΔP $\;=\;$ Change in Price

$\quad$ P $\;=\;$ Original Price.

Price elasticity of demand shows Consumers' desirability to substitute one commodity to another. But elasticity of supply shows seller's willingness to supply more of that commodity at nearly the same cost.

Degrees/Types of Elasticity of Supply

There are five categories of supply elasticity:

(i) Perfectly inelastic: When the quantity supplied remains constant regardless of how the price changes, as in fig. 3.15.
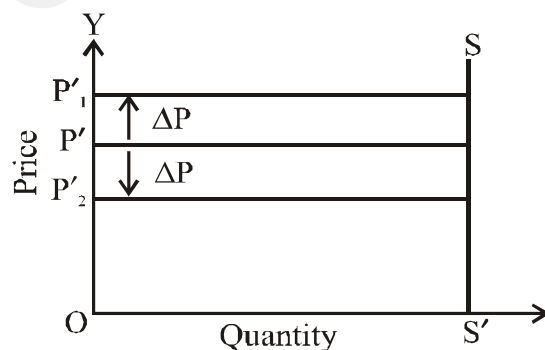
Fig. 2.5: Perfectly Inelastic Supply Curve

(ii) Relatively inelastic: When the quantity supplied changes by a greater percentage than the price changes by a greater percentage, as in fig. 2.6.
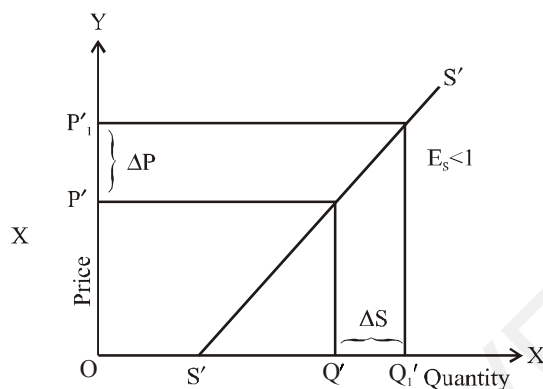
Fig. 2.6: Relatively Inelastic Supply Curve

(iii) Unit elastic: when, as depicted in fig. 2.7, the percentage change in supply is equal to the percentage change in price.
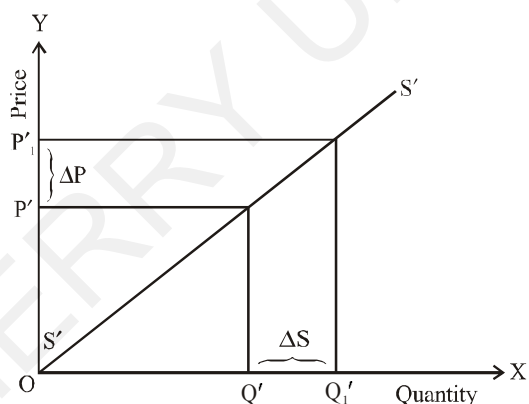
Fig. 2.7: Unit Elastic Supply Curve

(iv) Relatively elastic: When percentage change in supply is greater than percentage change in price as shown in fig. 2.8.
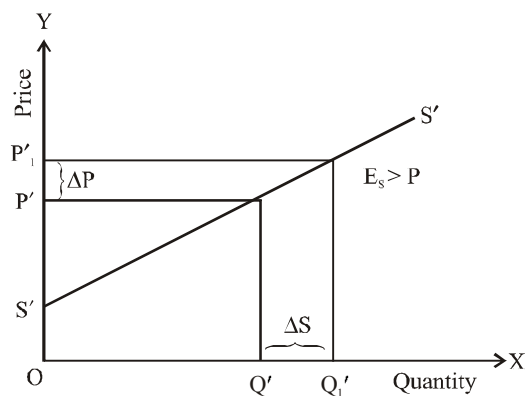
Fig. 2.8: Relatively Elastic Supply

(v) Perfectly elastic: When supply changes i.e., either expands on contracts to any extent irrespective of any change in price as shown in fig. 2.9.
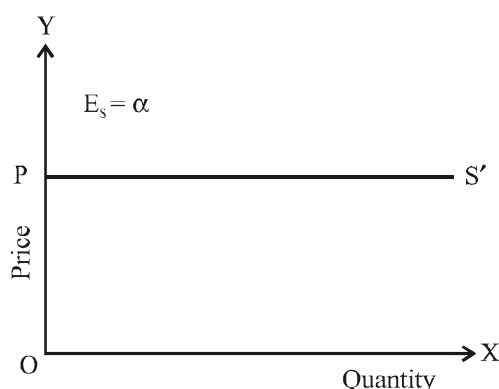
Fig. 2.9: Perfectly Elastic Supply Curve

Table 2.3: Different Price-elasticities of Supply

Sl. No.	Value of Elasticity	Type of Elasticity of Supply	Description
1.	$E_s = 0$	Perfectly inelastic	Price fluctuation has no impact on supply.
2.	$E_S < 1$	Supply is relatively inelastic	Compared to price change, supply change by percentage is less.
3.	$E_S = 1$	Supply is relatively inelastic	Price fluctuation is equal to changes in supply.
4.	$E_S > 1$	Relatively elastic or More than unit elastic	Supply fluctuation as a percentage is greater than price fluctuation as a percentage.
5.	$E_S = \alpha$	Perfectly elastic	Alteration in supply without alteration in price.

Elasticity of Supply in short-run and Long-run

Elasticity of supply is greater in long-run than in short-run, as it is easier to increase quantity produced while the firm has more time to do so. In other words, supply curve is flatter in long-run than in short-run. Long-run provides opportunities to increase output, which is not otherwise possible instantaneously.

Check Your Progress
3. Define the term Elasticity of supply
4. Explain Perfectly inelastic elasticity of supply.

2.4 PRODUCTION DECISION

A company makes both immediate and long-term decisions. Some inputs are fixed while others are changing in the short-term. Consequently, a firm has limited choice in the short-run with respect to allocation of resources. However, with time, all inputs become variable, giving the company a wide range of options open to allocate resources. The ultimate objective of the firm is to find an input-mix which can maximise its output and minimise the cost.

2.5 FACTORS OF PRODUCTION

The usage of factors of production, sometimes referred to as agents of production, is necessary for the production of commodities and services. The availability of different production inputs and their productivity determine the volume of production and, consequently, the level of national revenue. The supply and productivity of the components are essential to the process of economic growth since economic growth consists of an increase in total production or national revenue.

However, what exactly do we mean by a factor of production. The term "factor of production" refers to a class of productive elements, each of which is composed of a set of homogenous, interchangeable units known as the factor. Technically, every unit of a factor can be used in place of every other unit.

Additionally, it should be highlighted that contemporary economists favour discussing productive services or, more lately, merely inputs over traditional production variables like land, labour, capital, and entrepreneur. As a result, the items or services required to produce a good are referred to as inputs, and the goods they create are referred to as outputs. An essential technique for contemporary economic analysis is the input-output analysis.

2.5.1 Classification of Factors of Production

The factors of production—land, labour, capital, and organisation or entrepreneurship—have been categorised as previously described. In economics, "land" refers to all of the space above and below the ground's surface that can be exploited for agricultural output. Similar to this, labour refers to any forms of work that a person performs for pay, whether it be physical or mental. The complete stock of wealth, including the machinery, equipment, raw materials, and other resources used in the production process, is referred to as capital. The said factors are brought by entrepreneurship, which also starts and controls production and takes on risk and uncertainty.

As the sole original or primary factors, land and labour, some economists have divided factors into these two categories. While labour and land combined efforts produced capital, while enterprise is a particular kind of labour, which has no independent origin. The supply of land as a whole is fixed, whereas the enterprise is just a special form of labour, and capital can be increased regardless of its origin. As a separate and independent element from land, it has elevated capital to the status of a significant production factor. Similar to this, the work of an entrepreneur is of a different kind from that of labour, and it is compensated in a different way. As a result, today's grouping of factors into land, labour, capital, and enterprise is still used.

Land: In economics, the word "land" has a specific meaning. It has a far broader meaning than just "dirt," as well. Land alludes to the components and forces that nature freely provides for human assistance, like air, water, light, and heat. Land is a metaphor for all naturally occurring resources that can be sold or that have economic value. Although limited, these materials are valuable.

The greatest helpful ally of man throughout economic evolution has always been nature. At the agricultural stage, the value of land is clear because man cannot grow food without soil, air, and sunlight. Land is still crucial throughout the Industrial period. It serves as the primary producer of wage items like sugar, cotton, and fabric. Each commodity we consume can therefore be linked back to land, either directly or indirectly. Our debt to nature is substantial and clear as a result.

Additionally, the amount and quality of natural resources are crucial to our country's economic growth. Land for agriculture, mineral and oil resources, water, forests, and climate are all examples of important natural resources. The level of product output that can be accomplished is constrained by the amount of natural resources that are present in a nation.

New discoveries of natural resources within a nation and technical advancements that facilitate new discoveries or turn previously useless elements into highly useful ones, such as synthetic alternatives, can boost the supply of natural resources.

Depending on the technology used, natural resources are used and have an impact on economic growth. Mineral reserves abound in emerging nations, yet they go unused because of outdated technology. Natural resources therefore have little direct impact on economic progress. They develop a dynamic personality mostly as a result of human-induced improvements in technology.

2.5.2 Land as a Renewable and Non-renewable Resources

Natural resources are often divided into two categories: (a) the exhaustible resources or non-renewable resources, (b) the renewable resources. The exhaustible resources are those natural resources which used once cannot be renewed. Natural resources like mineral deposits such as iron ore, copper etc. are used by the economy. Their stocks are limited and cannot be renewed/increased. On contrary, renewable resources are those which go on being used again and again and year after year for production. Agricultural land which is a very important natural resource can be cultivated again and again for production of foodgrains and other crops without much loss of productivity. As productivity of land can be maintained and can be significantly improved by human efforts. Therefore, land in its broadest sense comprises all natural resources, some of which are renewable and others of which are not.

2.5.3 Inelastic Supply of Land

An important feature of land is that its quantity is fixed by nature.Whatever the rent, high or low it remains unchanged. Therefore, the supply of land is absolutely inelastic from the perspective of the entire economy. However, the

supply of land to a single consumer or a certain sector of the economy is not completely elastic. The availability of land for any given application is flexible because of the appealing rents that are offered. As a result, the supply curve for land is elastic and slopes higher from left to right for a given application or industry.

Capital: Different meanings of the word "capital" are used in economics. The term "capital" is frequently used in economics and everyday speech to refer to money. However, capital as a factor of production consists of equipment, tools, factories, tractors, etc. that directly support output. Government securities and bonds, as well as the shares and debentures of public limited corporations, do not, however, reflect real capital because they only represent ownership, not productive components.

Therefore, a valid definition of capital is a tool for production. Land and labour, which are regarded as the primary/original factors of production, are distinct from capital. While capital was created by man by collaborating with nature, it is an instrument that was created by man to be used in future production.

Fixed capital and Working capital: A productive tool is, therefore, a valid definition of capital. The primary/original factors of production, such as land and labour, are distinguished from capital. Although man and nature worked together to generate capital, it is an instrument that man constructed to be employed in future production.

Human capital: Human capital refers to the pool of individuals who are healthy, educated, and skilled. The development of human capital has been a major factor in economic prosperity. A man who is educated, trained, and skilled is far more productive than one who is not. Similar to this, a person in good health contributes to output more than someone in poor health who is fragile. The productivity of males is considerably increased by investments in their education, skills, and health. Therefore, just like the rate of physical capital production, a quick rate of human capital formation is a crucial prerequisite for economic progress.

Role of Capital: In the contemporary productive system, capital is essential. Man cannot finish natural resources for him unless he has the equipment and tools for farming, mining, etc. Man's productivity would be low if he had to labour on barren ground with his hands. Therefore, capital increases worker productivity and thereby the economy as a whole. As a result, the foundation of economic progress is capital accumulation.

Capital goods are manufactured manufacturing tools that boost the economy's capacity for output. It enables the use of manufacturing techniques that are indirect or circumstantial and considerably boosts worker output. Therefore, if there is more capital per worker, the worker will be more productive and efficient.

Capital development is significant from the perspective of economic growth because it enables large-scale production and increased levels of specialisation. It is also impossible to extend the scale of production without sufficient capital

accumulation. nor greater specialisation and division of labour in the production process be possible. As diverse technologies are needed for various types of capital commodities, capital accumulation also contributes to the economy's technical advancement. The generation of employment opportunities in the nation during a two-phase period is another significant economic function of capital formation. First, in order to produce capital like factories, machines, etc., some employees must be employed. Second, as capital is employed to produce new things, more and more men must be absorbed into productive activity. Therefore, when capital formation picks up in any economy, employment will rise. Now, if population growth exceeds the rate at which capital is added to the stock, the entire increase in the labour force cannot be absorbed, leading to unemployment and underemployment in both urban and rural areas. As a result, raising the pace of capital formation is necessary to improve employment opportunities, and to absorb employment demands due to population growth.

2.5.4 Human Capital, Education and Economic Growth

The gross domestic product (GDP) of a nation is dependent on productivity, which in turn depends on education, in addition to the number of labour hours employed to produce goods and services. Human capital, as we know, refers to the skills and information that employees acquire through education and training (i.e., investment in people) that is accumulated by human being through education during school/college/universities/specialised professional education like engineering, management etc.

Despite being less tangible than physical capital, human capital resembles it in many respects. First, human capital may boost productivity just like physical capital does. Second, investing in resources like student time, college buildings, books, etc. is necessary to produce human capital. Thirdly, the development of human capital increases worker productivity, which in turn enhances wages. Fourthly, increasing human capital requires giving up current spending in order to increase consumption in the future.

Cost of Human capital: More education is acquired by spending more time in school, college, or university, delaying one's entry into the workforce and sacrificing revenue that one could have earned by working during the time spent pursuing education (opportunity cost).

2.5.5 Labour

The labour force's contribution to the national product and income is influenced not just by its quantity but also by its quality, or productivity. The division of labour is a significant aspect in influencing the effectiveness of a workforce. The following list illustrates labour characteristics:

1. While land and capital can be separated from their owners, or capitalists and landlords, labour cannot be done apart from the worker himself.

2. Efficiency of labour varies a good deal.

3. Since labour is a perishable resource, it cannot be saved for later use.

4. Labour lacks mobility.

5. The worker doesn't market himself. Rather, he just sells his labour.

6. Although the supply of labour is elastic, it takes time to expand it due to population growth and appropriate training/skill.

Division of Labour

An essential component of contemporary industrial organisation is the division of labour. Worker division might be straightforward or complicated. The term "simple division of labour" describes the individual production of a single good. However, the division of labour today is a complex one. It suggests that the creation of an article is divided up into various processes, with each phase being completed by a different person or group of workers. It denotes the introduction of specialised labour into a single action or process, to put it another way. For instance, in a modern tailoring shop, the process of manufacturing a shirt is divided into several steps, including cutting, stitching, adding buttons, etc.

Advantages of Division of Labour

The following are the main benefits of labour division::

1. An increase in output.

2. The ideal candidate for the job.

3. Dexterity and skill, or employees who become more adept at their craft as a result of performing the same task repeatedly.

4. It encourages the development of new ideas and better working methods, hence facilitating inventions.

5. Saving time means that a worker only needs to understand the portion of the process that they will be performing. Training is not needed for so long. It saves money and time both.

6. Goods are produced at a cheaper rate due to large scale of production.

7. Because the production process is divided into short, straightforward processes, the division of labour promotes the employment of machinery.

8. The division of the labour into different processes has led to an increase in entrepreneurs whose job it is to specialise in the art of organising to increase productivity.

9. Efficiency in the use of tools because a worker is only given the tools he needs to complete the portion of the operation that is assigned to him.

2.5.6 Entrepreneur

After discussing the first three factors—land, labour, and capital—the entrepreneur is the fourth and most crucial one. Saying that production is a function of land, labour, and capital is incorrect. To start the production process and take on the associated risk, a factor must combine all three of these components in the proper ratio. The said individual is called as organiser/manager/risk bearer. But now-a-days the role of manager is different from that of Entrepreneur. Therefore,

the entrepreneur's first responsibility is to start the production process, bear risk and uncertainty of business and not the day-to-day affairs of the organisation, which is looked after by hired mangers who get fixed wages.

Functions of the Entrepreneur

There is a controversy about the proper/true functions of the entrepreneur. Various economists have laid stress on different functions of the entrepreneur. However followings are the important functions of the entrepreneurs:

1. **Initiating a commercial venture and coordinating resources:** The primary responsibility of an entrepreneur is to launch a business. He takes all the necessary steps to establish a successful business or new corporation. However, the compensation for the entrepreneur (earnings) is variable. If his preparation or prediction fails, he can even experience a loss (losses).

2. **Risk-taking and coping with uncertainty:** The owner of the business bears primary responsibility for it. The entrepreneur's plans or expectations might not come to pass, and the actual sequence of events might differ from what was anticipated or planned. Changes in the government's tax and interest policy are also possible. All of these changes affect how business enterprises' cost or demand situations are.

3. **Innovations:** The true role of an entrepreneur is to introduce innovations, such as new production techniques, new raw material sources, new raw material sources introduced, etc. For a while, innovations may bring in profits for the business owner, but as others copy them, profits start to fall, necessitating yet more inventions in order to maintain profits. Therefore, when inventive practises increase, the economy's supply of commodities and the pace of technical advancement both increase.

Check Your Progress
7. What are the classifications of factors of production?
8. Define the term Land in economics.

2.6 PRODUCTION FUNCTION

Production

Transformation of inputs into output occurs throughout production. However, economics goes beyond merely bringing about a material's physical transformation to also include the creation or addition of value. Therefore, in economics, manufacturing also includes providing services like that of financing, marketing and transporting. On contrary, the Laws of Production refers to generalisation of relations between inputs and outputs.

Production Function

Production process is technical possible method to transform inputs into output. Land, labour, capital, and businesses are examples of factors like services

that are employed in manufacturing, or "inputs." A measure of output is the quantity of items produced. A commodity can be produced with a specific quantity of input and a specific amount of output, as shown by the production function.

The production function is expressed as

P (a, b, c, d,......., n)

Where, p implies rate of output in a given period of time and a, b, c, d,...., n are quantities of different factors used in production.

Each company has a unique production function that is based on the level of technological knowledge as well as marginal ability of the firm. Economists in the past have formulated several production function. The Cobb-Douglas production function is a prominent illustration. Please take note that the Cobb-Douglas production function is not covered in this book and is not included here.

Factors Affecting Production Function

The production is influenced by a variety of factors as follows:

1. Size of the firm.

2. The way the firm is organised.

3. Relative cost of the production inputs.

4. Production and its contributing elements combined.

5. State of technical know-how.

Managerial uses of Production function:

1. Aid in decision making.

2. Provide guidance in two directions:

    (a) How to get the most output possible from the inputs you have.

    (b) How to combine the fewest possible inputs to produce the specified output.

3. Through Iso-quant and Iso-cost curves*, the minimum outlay for a given output can be found out.

The Laws of Production

Laws of production are only technical strategies to raise output levels. There are two ways to improve output: either in the long-run or in the short-run.

The law of returns to scale states that in the long-run, output may be increased by changing all production parameters.

Short-term research is being done on the relationship between one variable factor and output while keeping the quantities of other factors constant. The law of eventual diminishing returns of the variable factor, or the law of variable proportion,

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* Iso-quant and Iso-cost curves are outside the scope of this book and thus omitted here.

is what it is officially known as in economics. Let's go into greater detail about both long-run and short-run analyses.

Short-run Analysis of Production

It can be studied under following two heads. These are:

(a) Decreasing returns is a principle (Classical version).

(b) Approach to the law of returns in modern times (The law of variable proportions).

(a) The law of diminishing returns (classical version): Like various laws of production, the law of diminishing returns is an oldest universally recognised law. According to this principle, there exists a relationship between input and output and indicates that with every rise in input, output has a tendency to decline in few situations. The classical economists associated this approach with agriculture as they believed that, this principle was more applicable to agriculture, i.e., land, because of niggardliness of nature. Renowned economist Dr. Alfred Marshall, developed this classical approach but still attributed it to agriculture. According to him, unless it corresponds with an improvement in agricultural practise, an increase in labour and capital employed in land cultivation generally results in a smaller than proportionate increase in the amount of produce raised.

Assumptions

Following are few assumptions under which this law operates:

1. This principles is applicable only if one factor of production is kept fixed or constant.

2. Unit of factor used should be identical or homogeneous, i.e., all unit of input are equally efficient.

3. Technique of production is constant. Adoption of new techniques will negate the operation of this approach.

4. Upto a certain extent in earlier stage of cultivation, increasing returns may be obtained. It does not signify that the law is invalid. It implies that land is not efficiently utilised. But after a certain point diminishing returns operate.

2.6.1 Causes for Diminishing Returns

Following reasons are assigned in support of the law operating specifically in agriculture:

1. Fixity of supply of one factor is the cause behind the diminishing returns to set in. It is assumed that the supply of land is fixed. While successive units of input are applied to this fixed factor, it obtains its maximum capacity and thus, if additional inputs are employed beyond this point, fixed factor will be over strained and thus diminishing returns start. Therefore, fixity of land sets the principles of diminishing returns in motion.

2. Organisation as well as supervision possess have their respective limitations, which results diminishing returns. All-round supervision of diverse organisational activities after a certain stage is practically very difficult, complicated as well as cumbersome for a single individual. Eventually, an outcome of diminishing returns set in.

3. Variable factors employed are not perfect substitutes. Land is assumed constant while labour and capital are considered variable. This principle could be held in check provided capital and labour were to be perfect substitutes, practically it is not so. Elasticity of substitution is not infinite and therefore this law operates.

According to the opinion of Mrs. Joan Robinson, this principle operates because of the existence of imperfect substitutes. Alternatively, this approach arises because of its inability to substitute factors of production infinitely. This approach is applicable to all categories of production, industrial or agriculture. But the latter is more suitable subject for the operation of the law.

Operation of the Law : Suppose a farmer possess a plot of land measuring 20 acres. He is interested in raising output from his land by investing more labour and capital.

Let us consider that the unit of labour and capital is valued at ₹ 100. In this case, land is a fixed component whereas labour and capital are variables. Now let us observe how former gets extra output after successively increasing factor inputs by way of the schedule shown in Table 2.4.

Table 2.4: Input-output Schedule (Plot : 20 Acres)

Capital and Labour Invested (per unit)	Output of Paddy in Unit (Total Output)	Average Output of Paddy in Unit	Marginal Output of Paddy in Unit
(1)	(2)	(3)	(4)
1	10	10	10
2	18	9	8
3	24	8	6
4	28	7	4
5	30	6	2
6	30	5	0
7	28	4	– 2

We can differentiate three types of outputs from the above Table 2.4 as follows:

1. Total return or Total output: It is total output of produce from total amount of labour and capital applied as shown in column (2) of Table 2.4.

2. Average return or Average output: It refers to output per unit of labour and capital applied, which is arrived at by dividing total output by total units of input as shown in column (3) of Table 2.4.

3. Marginal return or Marginal output: It refers to output due to an additional unit of input being applied. Alternatively, it is extra output due to extra input invested or applied as shown in column (4) of Table 2.4.

In fig. 2.10, X axis shows input capital and labour and Y axis represents output or returns. Here,

TR = Total Returns

AR = Average Returns

MR = Marginal Returns
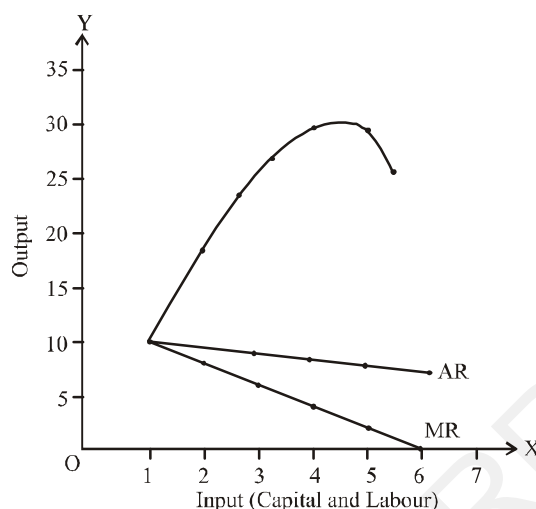
Fig. 2.10: Law of Diminishing Returns

Above three curves show:

 (i)   The pace of growth of total output decreases over time.

 (ii) Marginal and average output decline.

Prof. Stigler asserts that beyond a certain point, product increments will start to drop if the quantity of one productive service is increased by identical increments while the quantities of other productive services stay constant or unchanged.

According to Benham, the marginal and average produce of a factor input will drop as its proportion in a combination of factors increases past a certain point.

According to the opinion of modern economists, the law is applicable not only in agriculture and extractive occupation but also in other sectors like manufacturing industries. The law will be applicable in all sectors where one or two factor inputs are fixed while others are variable. Prof. Edgeworth was the first economist who pointed out universal application of this law, i.e., in both agriculture as well as industry.

Prof. P.A. Samuelson believes that an increase in some inputs compared to other fixed inputs will lead to an increase in output. However, after a certain point, increased output was added because of uniform additions of input will fall gradually. This declining extra output (return) is merely impact of several

application of new combinations of various resources having fewer constant resources to work with.

Hence, it is safe to conclude that there is no doubt that output or return won't change if one factor is stable while other factor inputs are increased. increase in same proportion. This law is universally applicable to both agriculture as well as other sectors.

Modern Approach to the Law of Returns (The Law of Variable Proportions)

The combination of several production factors, including land, labour, capital, and enterprise, determines the level of output for any given organisation. To bring about a transformation in production level, quantities of several factor inputs applied in production process will have to be changed accordingly. A rise in production level can be attained by either increasing all factor inputs' quantities at a time or quantity of some factor input has been increased but remaining factors remains constant. As, all factors of production are not easily available, scarce factors of production generally remain constant and are called fixed factors. On the contrary, factors whose supply can be varied are called variable factors. So to raise output level, producer applies more of the variable factor. The Law of Variable Proportions or the Law of Diminishing Returns is a law that examines the relationship between an input and output while keeping the quantities of the other factors constant. Alternatively the law observes the effects on output of changes in factor proportions.

Many economists have defined the law of changing proportions differently, as follows:

According to G.J. Stigler, additional input from other productive services that are maintained at a constant level is added in an equal increment to one input. After a certain point, the additional product that results will decline or become minor.

The productivity of a variable factor will decline in a homogenous production function with constant or declining returns to scale. Even though it is a rare occurrence, diminishing returns will result from labor's declining marginal product when the production function exhibits growing returns to scale. The productivity of a single variable factor unit is decreasing ceteris paribus.

Assumptions

Following are assumption of the law:

1. The other components are kept constant, while just one factor is changing. If all parameters are altered proportionately, this law will no longer be valid.

2. All units of variable factors are homogeneous.

3. State of technology in production remains constants. In case, there is an advancement in technology, consequently average and marginal output will not decrease but it will increase.

4. The ratios in which factor inputs are merged can be changed. In contrast, the law does not apply when the applied factor inputs are in a fixed ratio to the manufactured good.

5. The entire procedure is only short-term. Long-term, every input is variable.

Prof. P.A. Samuelson believes that a rise in some inputs relative to fixed inputs in a particular technological stage causes an increase in output. However, beyond a certain point, extra input will gradually decrease.

According to Frederic Benham, as the fraction of one component increases in a combination of factor inputs, after a certain point, the marginal product and then the average product of the factor input would both decline.

The aforementioned perspectives make it abundantly evident that the law of variable proportion is nothing more than the behaviour of return when the quantity of one factor is increased while the other remains constant. Additionally, both marginal and average product quality will gradually degrade.

Check Your Progress

9. What is the concept of Production?
10. Define the Laws of Production.

2.7 DIAGRAMMATIC PRESENTATION OF THE LAW OF VARIABLE PROPORTIONS

By drawing a straight line from the origin to any point on the total product curve, and then measuring the slope of that line, one can determine the average product at that location. It is obvious that the slope is calculated by taking the average product Q and dividing the total product Q by the units of labour used. To get AP with respect to Q', divide Q'L$_1$ of total product by OL$_1$ of labour, which gives the slope of line OQ'. Drawing a tangent to the TP curve at any point on the curve will yield the marginal product there. Slope of the tangent provides value of marginal product.

In fig. 2.11 At point Q', the line traced from the origin is also tangential to the total product curve. The slope of the line OQ' and the slope of the tangent to the total product curve at point Q', on the other hand, are equal. Therefore, average product is equivalent to marginal product at point Q'.

Again, no other line from point of origin to any point other than Q' can provide a greater slope than OQ'. Hence value of average product is maximum at Q'.

At point P', TP curve con caves upwards and thereafter it con caves downward and thus total product curve changes its slope here. Point P' is thus known as point of inflexion where total product increases initially at an increasing pace, it thereafter does so at a decreasing rate. At point P' law of diminishing returns set in. On the marginal product (MP) curve, the marginal product is at its maximum at point P', or point S'.
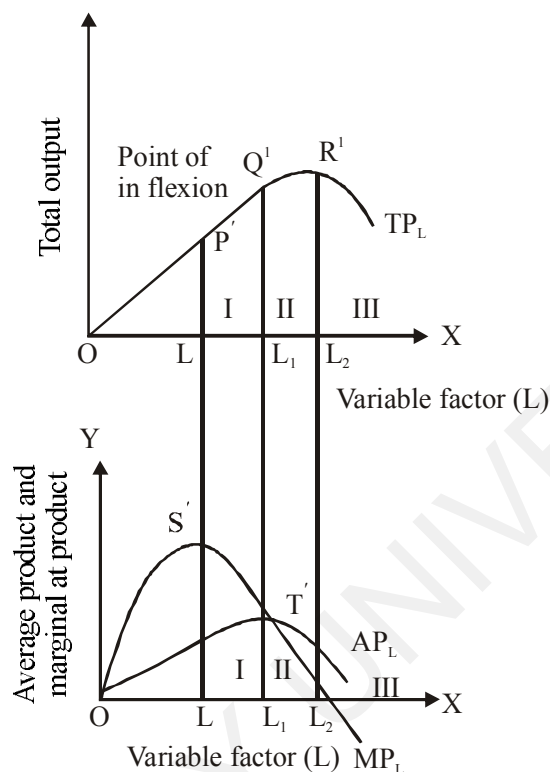
**Fig. 2.11: Three Stage of Law Variable Proportions
(Total, Marginal and Average Product of Labour)**

At point Q' on TP curve marginal product is the same as average product. Thus, in lower panel at point T' corresponding to point Q' on total product curve, the average product curve is cut by the marginal product curve.

At point R', total product reaches its maximum level and thereafter decreases and hence marginal product is equal to zero while total product is at its maximum level. Thereafter, marginal product becomes negative.

2.7.1 Stages of Production

Let us study the three stages of production and the rational stage at which the firm should operate. This can be identified with reference to the points which relate to maximum average product and maximum total product.

Stage I is characterised by increasing average product. At point Q', the average product is at its highest level. Every additional or extra unit of labour used causes a rise in average productivity until the maximum amount of the average product is utilised. It is for the benefit of the firm to continue to employ more units of labour. Hence it will not be proper to stop before maximum average product is obtained.

Stage II is bounded on left by the point of maximum average product and on right by the point of maximum total product. It is seen that during this stage both average and marginal product are declining, but positive.

In stage III, it starts from point of maximum product. At a certain point, total product starts to fall and marginal product starts to turn negative. Negative marginal

returns will result from further labour hiring. Consequently, only the second step of production is possible, i.e., rational stage. As such stage I and stage II are characterised as irrational stages.

Check Your Progress

11. Define the Law of Variable Proportion.
12. Explain in brief about the stages of production.

2.8 RETURNS TO SCALE

When working with fixed factors, a variable factor in the case of changing proportions has been shown to increase total product initially at an increasing pace and then at a decreasing rate over time. Some production elements are relatively limited in the short-run, thus their proportions can be modified but not their scale of production. Whereas over a lengthy period, every factor is variable, and as a result, under such conditions, the manufacturing scale can also be altered.

Assuming that all inputs are varied in the same proportion, returns to scale (long-run method) describes how the overall product will behave. As an alternative, returns to scale make clear how output will behave when the units or quantities of every factor of production are all increased in the same proportion. While the volume of production or all inputs are modified in the same proportion, there are three possible outcomes for the final product:

1. Increasing scale-related profits.
2. Constant returns to scale.
3. Diminishing returns to scale.

Let us explain returns to scale with the help of following Table 2.5

Table 2.5: Returns to Scale

Units (Labour)	Units (Capital)	Increase in Labour and Capital (Percentage)	Total Product (1000 units)	Increase in Total Product (Percentage)	Returns to Scale
1	100	—	100	0	Increasing
2	200	100	220	120	Increasing
3	300	50	350	59	Increasing
4	400	33.33	500	42.9	Increasing
5	500	25	625	25	Constant
6	600	20	750	20	Constant
7	700	16.66	860	14.66	Diminishing
8	800	14.29	940	9.3	Diminishing

One unit of labour and 100 units of capital, as stated in Table 2.5, result in the production of 1,000,000 units. Now imagine that the total output doubles to reach 2,20,000 units, or a 100 percent increase in labour and capital, with capital input

increasing total output by 120 percent. It demonstrates the application of the law of rising returns to scale. According to Table 2.5, till 4th units of labour and capital, The percentage increase in output must be greater than the percentage increase in inputs for the law of increasing returns to scale to apply. Once more, the law of constant returns to scale is in effect in the fifth and sixth units of labour and capital in Table 2.5, where a percentage rise in output corresponds to a percentage increase in input; and finally, in 7th and 8th units of labour and capital, as the percentage increase in output is smaller than the % increase in inputs, the law of diminishing returns to scale is in effect:

1. Increasing Returns to Scale: In this case, the percentage increase in the final result is greater than the percentage increase in the units of all the ingredients used in the same ratio. Assume that the law of growing returns to scale is in operation if labour and capital are raised by 60% and total output is increased by 90%. Figure 2.12(a) illustrates how an increase of 8% in labour and capital yields a 20% increase in overall output. Similarly, a 20% increase in labour and capital leads to a 50% increase in total output.

Reasons for Increasing Returns to Scale: While firm increases its scale of operation by employing all inputs in larger quantities at same proportion, it begins to achieve economies of scale, which is seen in a decline in production unit cost and increasing output per unit of the factor inputs. There are two different kinds of economies of scale: internal economies and external economies.

Internal economies: These are firm specific, and hence individual firm has to make efforts to attain these economies and it comprises of:

(a) Managerial economies,

(b) Financial economics,

(c) Technical economies,

(d) Risk and Survival economies,

(e) Marketing economies.
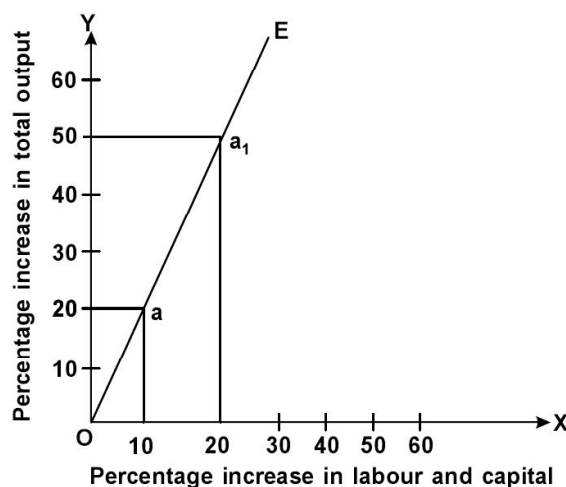
Fig. 2.12: (a) Increasing Returns to Scale

External Economies

These are available to all firms in the industry that arise because of change in environmental factors like cheap credit policy, subsidies, tax concessions, infrastructural facilities etc.

Constant Returns to Scale: In this instance, an identical percentage increase in total output is produced when factor inputs are increased by a specific percentage in the same proportion. As shown in fig. 2.12 (b), 10 per cent increase in all factor inputs results in 10 percentage increase in total output. Similarly, a 20% increase in all factor inputs leads to a 20% rise in overall output.

Reasons for Constant Returns to Scale: Here, while a firm raises its scale of operation, it increases units of all factor inputs in same proportion and thereby starts attaining economies of scale, but simultaneously, diseconomies of scale also creeps in. On the one hand, economies of scale pushes the cost down and per unit of output upwards. On the contrary, diseconomies of scale pulls the cost up and per unit output downwards. As a consequence thereof, balancing of economies as well as diseconomies of scale causes constant returns to scale.

Diminishing Returns to Scale: A given percentage increase in each of the input factors in proportional amounts leads in a less percentage rise in the total output due to the diminishing returns to scale. Figure 2.12 (c) illustrates how a 20% increase in all factor inputs leads to an 8% increase in total output. Once more, a 50% increase in all factor inputs yields a 20% rise in overall output.
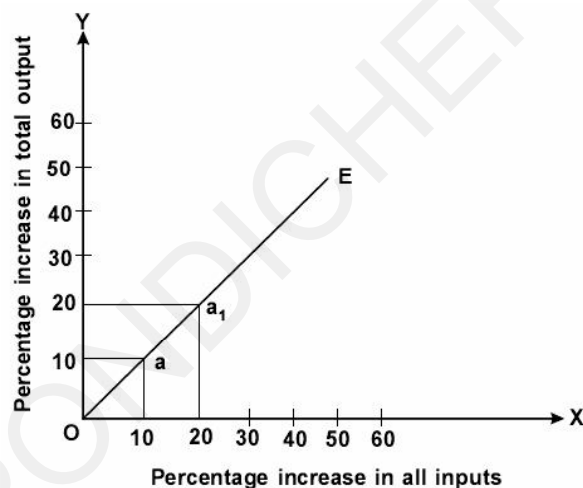
Fig. 2.12: (b) Constant Returns to Scale

Reasons for Diminishing Returns to Scale: In case of every production activity there is an optimum combination of inputs that maximises output and minimises cost. Likewise, suppose if scale is increased or more units of all inputs are used, the firm attains economies of scale. But, as the firm further increases its scale, it will suffer diseconomies of scale such as high maintenance cost of large inventories, managerial inefficiency, higher cost of inputs and so on. The law of diminishing returns to scale is brought about by diseconomies of scale.
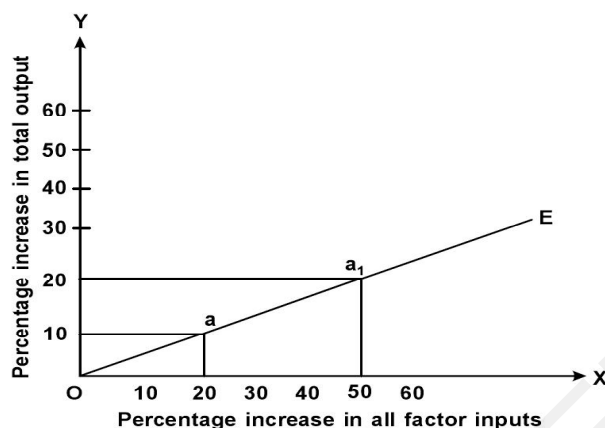
Fig. 2.12: (c) Returns to Scale

Check Your Progress

13. Define the term Returns to Scale.

14. What are the types of Economies to scale?

2.9 ECONOMIES OF SCALE

Economies of scale, in general, refer to gains from increasing the size of a business or decreases in the cost of production per unit. When a business expands its scale of production, it discovers the best ways to use some of the previously underutilised resources. Similar to how an individual member firm will benefit from certain benefits as the sector develops, which will lower its average cost of production. The former are referred to as internal economies, while the latter are referred to as external economies.

It will be convenient to summarise each of these economic kinds in Chart 2.1 before we describe them.

Chart 2.1
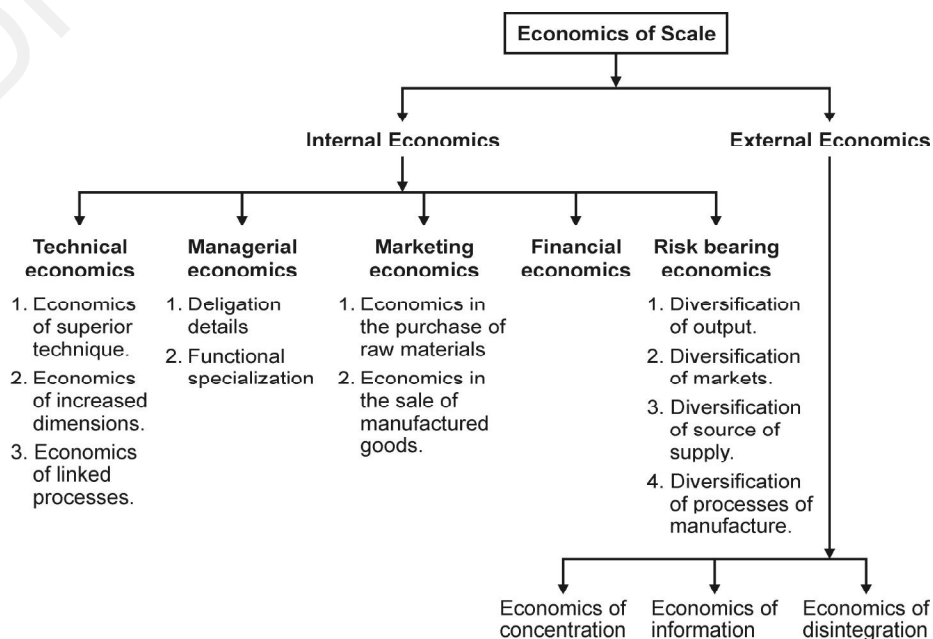
2.9.1 Internal Economies

Individual businesses benefit from internal economies. By increasing its manufacturing size to the ideal level, each company can reduce its cost of production. The company can employ the previously underutilised resources more effectively as a result of the expansion in the volume of production. The huge scale of production also makes it simple for a company to implement better labour division. These economies are unique to the respective companies. They do not encompass the entire industry.

Types of Internal Economies

1. Technical economies: The utilisation of superior plant, machinery, equipment, and industrial methods results in technical economies. The following strategies are available to large businesses to achieve mechanical economies:

(i) **Economies of superior techniques:** When it comes to using complex and expensive machinery and equipment, a large company is better positioned than a small one. A huge output makes it simple to spread out the high cost of machinery. The adoption of improved processes lowers the cost of production per unit while simultaneously increasing overall output.

(ii) **Economies of linked processes:** A huge company has the benefit of creating its own raw material sources, transportation methods, distribution networks, etc. A large-sized company may arrange the raw materials and semi-finished items at a reduced cost in addition to minimising dependence on other businesses and raw material suppliers.

(iii) **Economies of the use of by-products:** A huge company can prevent all types of material waste. It can utilise waste materials to manufacture byproducts, or other products. To employ the sugarcane pulp that is left over after making sugar, for example, a sugar mill could set up a straw-board plant.

(iv) **Economies of specialisation:** A large company benefits from using a higher level of specialisation and division of labour. It is possible to carry out the division of labour to the ideal degree. This lowers the cost of production per unit and boosts labour productivity.

(v) **Economies of increased dimensions:** A large company may benefit from the higher technical economies of scale. An oil business may spend the same amount to build a 10-kilometer pipeline with a 0.5-meter diameter as to build two pipelines with a 0.25-meter diameter each. The previous pipeline, however, will be able to transport more oil, which will reduce the price of doing so. Similar to how playing double-decker buses rather than single-decker buses may be more cost-effective for a transportation firm.

2. Managerial economics: In a small building, the owner manager is responsible for all managerial duties. He is incapable of carrying out all the managerial duties effectively. A large company can hire business executives with

high skill levels to manage the many divisions, including production, maintenance, finance, sales, advertising, etc. The functional specialisation of business staff boosts a company's productivity.

3. Financial economies: A big company can benefit from financial economies while raising money. The company can raise significant amounts of capital by issuing shares and debentures. It must rely on lenders who impose very high interest rates.

4. Marketing economies: Major sales and big raw material purchases can both save money for a large company. A major company is given preference when purchasing raw materials over a small producer. It receives a consistent supply of raw materials at discounted prices since it buys in bulk. Because they receive consistent supplies of completed goods and raw materials from huge corporations, transportation businesses also favour working for them. By establishing its own transportation system, a large company can also reduce the cost of transportation. A huge company can afford to spend a lot of money on marketing, public relations, showrooms, etc., and can also hire highly skilled professionals to handle sales promotion. A huge company can afford to offer different concessions to customers, wholesale and retail dealers, and other parties, which allows it to effectively corner a sizable market.

5. Risk and Survival economies: A major company is in a stronger position than its rival small producer, who must deal with the risks and uncertainties of doing business. A huge company makes a wide range of products. even if the demand for a specific good declines. It is possible to generate excess in other units to make up for losses in one unit. A huge company can conduct research in order to produce new goods, new energy sources, scientific management strategies, new technologies, etc. Research and development give a company the ability to lower production costs, manufacture high-quality products, and take commercial risks.

2.9.2 Causes of Internal Economies

Internal economies are primarily caused by two sources. These are listed below:

1. Indivisibilities: There are some industrial components that cannot be used in pieces. Better utilisation of these production elements is made possible by large scale production. Smaller scale production leaves resources underutilised without providing any benefit to the producer in terms of costs or expenses associated with those resources. As a result, larger scale production benefits from economies of scale.

2. Geometrical relations: This is also called dimensional factors. A firm operating on a large scale may reap the technical economies of increased dimension. Suppose a firm needs container to store some liquid. It uses aluminium sheet to build the container. Now if it is to store more liquid, it will need bigger container. The storage capacity of a container, which is based on its volume rather than its surface area, grows more quickly as its size is raised. In other words, the aluminium

sheet required to produce a larger container will cost less than increase in the storage capacity.

3. Economies of specialisation: A large company has the benefit of using a greater degree of specialisation and division of labour. Large-scale manufacturing has access to more specialised and effective machinery than does smaller-scale production, which increases the specialisation of human work and boosts productivity.

4. One time costs: There are inputs which do not have to be increased as the output of a product is increased. For instance, the research and development costs of designing a car, or a turbine or a super computer have to be incurred only once for each product. Even though the product's production costs eventually climb in line with output, the average total cost, which includes the cost of product development, will decrease as output scale increases.

External economies: External economies have no bearing on a particular firm's internal cost-cutting initiatives. Instead, these economies are shared by all the businesses in a certain sector or region. When a region has to be developed, infrastructure like roads and railroads is created, and commercial services like banking and warehousing are made available. Manufacturers can communicate about issues of shared concern, and as a result—or as a result of the advent of trade, commercial, and technical journals—inventions are encouraged. In the neighbourhood, subsidiary industries emerge to provide accessories and components or to make use of garbage by transforming it into byproducts. Each company in a given industry or group of businesses shares all of these benefits collectively. They observe a decrease in their cost per unit. No one company has a monopoly on these economies. They are shared by all the businesses in the sector or all the sectors within a group of sectors.

2.9.3 Causes of External Economies

The following two factors are the key causes of external economies:

1. Localisation: Localization of industries refers to the concentration of several businesses from a given industry in one location. This concentration of businesses manufacturing related goods in one location could be the result of inherent or acquired advantages that the location offers for the production of a specific good.

2. Specialisation: The division of labour among the various businesses in that region and within that industry is one form of specialisation. For instance, it can be seen that as an industrial region grows, it enables the expansion of a number of businesses that complement one another by consuming waste products and providing one another with ancillaries.

Relationship between Internal and External Economies

The domestic and foreign economies are interconnected and rely on one another. As previously stated, internal economies are those that are unique to a single firm, whereas external economies are benefits that are enjoyed by all of the

companies in an industry collectively. The two sorts of economies rarely differ from one another, though. What might be an internal economy for company Y may end up becoming an exterior economy for firm X. As a result, they appear to be predominantly internal economies when we examine those economies in the context of the overall economy as a whole.

Check Your Progress

15. Define economies of scale.
16. What is the relationship between internal and external economies?

2.10 ISO-QUANT APPROACH AND PRODUCER'S EQUILIBRIUM

Meaning of Iso-quants/Equal Product Curves

Iso-quant technique has been developed to help firms to make national choice of input proportions and its replacement in reaction to a shift in the relative cost of inputs. All potential combinations of the two components that will result in the same final product are represented by the iso-product curve.

Iso is a Greek word that means "equal" or "same," and quant is the abbreviation for amount. In other terms, the producer's indifference curve may be referred to as the equal product curve. An indifference curve measures happiness in physical units, whereas an equal product curve measures output in physical units. On the same equal product curve are all combinations that produce the same level of output.

Iso-quant Schedule and Map

Iso-quant Curve Schedule

Assume that a company is given two variable components, namely labour and capital. An iso-quant schedule for a company producing 100 units of a product using various combinations of these inputs is shown in Table 2.6.

Table 2.6

Combination	Capital (Units)		Labour (Units)	Total Product (Units)
1st	10	+	5	100
2nd	6	+	10	100
3rd	4	+	15	100
4th	3	+	20	100
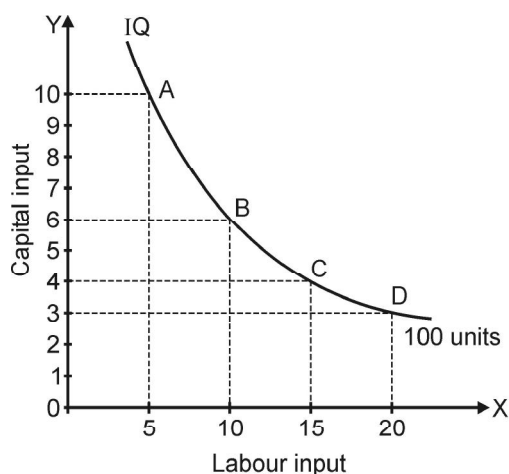
Fig. 2.13: Equal Product Curve (IQ)

Figure 2.13 shows an illustration of Table 2.6 with capital units on the Y-axis and labour units along the X-axis. The first, second, third, and fourth combinations are denoted, respectively, by the letters,, C, and D. When all of these points are connected, an Iso-quant curve results (IQ).

Iso-quant Map

An iso-quant map is a family or a collection of iso-quants that each indicate a different quantity of output. Curves IQ, IO$_1$, and IQ$_2$ in Fig. 2.14 display an iso-quant When labour and capital are combined in entirely different ways, the Units of Labour map produces 100, 200, and 300 units of the product, accordingly.
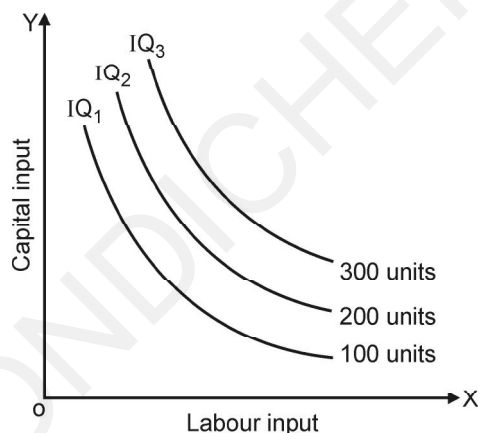
Fig. 2.14: Iso-quant Map

Properties

(i) An Iso-quant is Negatively Sloped/downward to the right: An iso-quant is negatively sloping, or has a downward slope from left to right. Therefore, in order to achieve the same level of output, a firm must use less of one input in order to utilise more of another. It implies that a different factor input must be used in place of a different factor input.

(ii) An Iso-quant is Convex to the Origin/downward to the right: The iso-quant's convexity suggests that the curve is comparatively flat along the X-axis.

The falling marginal rate of technical substitution affects the convexity of iso-quant (MRTS). The amount of capital that can be sacrificed in exchange for an additional unit of labour, denoted by L, is known as the marginal rate of technical substitution between L and K. Mathematically,

MRTS L, K = $\Delta K/\Delta L$

where the symbol denotes an input change. The marginal rate of technical substitution quantifies the degree to which one item or input can be used in place of another. Lesser units of capital input are traded for increasing units of labour, as seen in table 2.7 above. The falling marginal rate of technical substitution between labour and capital is depicted in Figure 2.14. The company sacrifices certain capital units in order to hire more labour. The company is then willing to give up less capital in exchange for an equal increase in labour. The iso-quants are convex to the origin due to the declining MRTS.

(iii) Iso-quants cannot Intersect: Different output levels' iso-quants never cross one other. It suggests that the assertion that iso-quants representing various levels of output at the place of intersection exhibit the same quantity of output is false.

2.10.1 Iso-cost Lines/Budget line/Outlay Line

Alternative factor combinations that can be obtained for a specific outlay are displayed on an iso-cost line.

It displays several pairings of the two factor inputs that a company can purchase using a specified outlay and factor prices.

Iso-cost Schedule

Table 2.7: Iso-cost Schedule

Combination	Units of Labour	Units of Capital
A	10	0
B	8	1
C	6	2
D	4	3
E	2	4
F	0	5

Table 2.7 displays several capital and labour combinations that a business can purchase with a fixed budget line of ₹ 50. In such a case, the iso-cost line is shown as, in fig. 2.15.
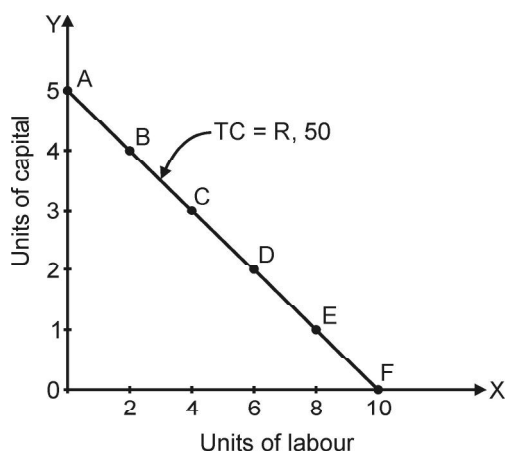
Fig. 2.15: Iso-cost Line

In fig 2.15, AF is the iso-cost line. All the combinations A, B, C, D, E, F lying on this line represent the same total cost of ₹ 50 irrespectieve of whatever combination of labour and capital input. The price-ratio of two factor inputs is also shown by the slope of the iso-cost line.

Symbolically: $M = P_L.Q_L + P_K + Q$

Where,

M = Total outlay/total cost

P_L = Per unit price of labour

P_k = Per unit price of capital

Q_L = Units of labour

Q_K = Units of capital

The slope of the iso-cost line is given by Perpendicular/Base

Iso-quants and Cost Minimisation

A firm always aims at finding the least-cost input combination to maximise its profits. The point of tangency between the pertinent iso-quant and an is-cost line provides a graphic representation of the least expensive technique of creating any given output. Fig. 2.16
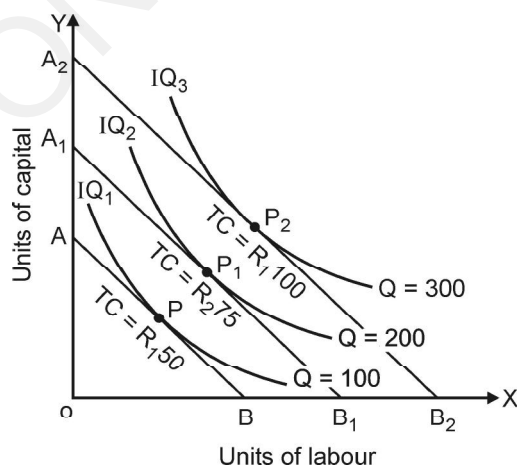
Fig. 2.16: Least Cost Combination of Inputs

Fig. 2.16 shows selection of least-cost combination of inputs to produce a given output. Here, AB, A_1B_1 and A_2B_2 are iso-cost lines showing total costs ₹ 50, ₹ 75 and ₹ 100 respectively. IQ_1, IQ_2, IQ_3 are the corresponding iso-quants. The least-cost combination of labour and capital is attained at point P, where iso-cost line A_1B_1 is tangent to IQ_2. The firm can reduce its cost by substituting labour for capital by moving up along the iso-quant IQ_2 and reach the least-cost combination at point P.

Output-Maximisation for a Given Cost

Iso-quant technique can be used to maximise the output of a firm. Suppose a firm has a cost constraint of ₹ 75 i.e., TC = ₹ 75 and wants to achieve a level of output of 200 units. This can be illustrated graphically in fig. 2.17.
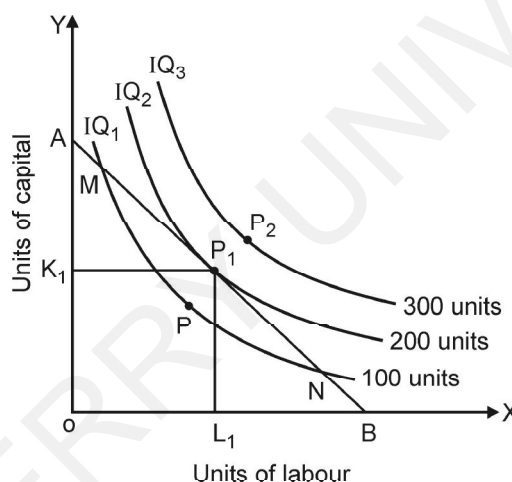
Fig. 2.17: Maximisation of Output

In fig. 2.17, AB is the budget line or iso-cost line of the firm showing cost constant of ₹ 75. IQ_1, IQ_2, IQ_3 are the iso-quants representing output of 100, 200 and 300 units respectively. Firm maximises its output at point P_1 where cost line is tangent to IQ_2, indicating desired level of output. Point P_1 satisfies the condition of output maximisation, which is given below:

$MP_K/MP_L = P_K/P_L$ or $MRTS_{LK} = P_L/P_K$

At point P_2 firm may have a higher level output of 300 units, but because of the cost constraint it is unattainable. At point P the firm does not spend all its budget, and the output of 100 units is less than the desired output. Point M lies on the iso-cost line but the level of output is less than the desired output. Moving downwards from point M along the iso-cost line, the firm can reach point P_1 which represents desired output. Likewise, at point N firm gets an output of 100 units which is less than the desired output. Moving upwards from point N along the iso-cost line, the firm can reach point P_1, which shows the desired level of output.

2.10.2 Expansion Path

Meaning of Expansion Path

The location of tangency points between iso-cost lines and iso-quants is referred to as the expansion path. It displays the least expensive labour and capital combinations required to create certain production levels.
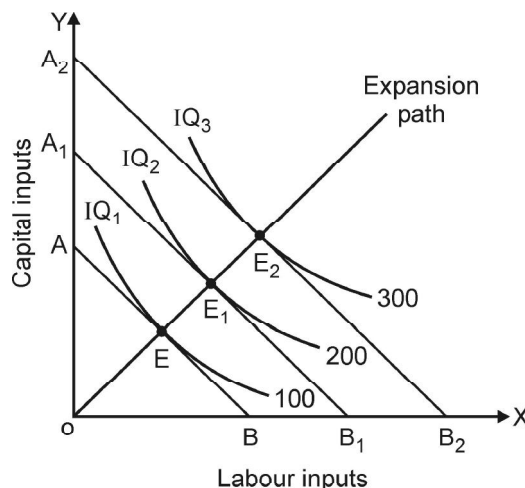
Fig. 2.18: Expansion Path (Scale Line)

Let's say a business becomes financially successful and wants to increase output. Figure 2.18 illustrates that AB, the company's original iso-cost line, is tangent to IQ_1 at point E. As a result, point E represents the firm's initial equilibrium. If the firm's financial resources improve while the factor prices stay the same. By having more money, the company would be able to buy more labour and capital input units. As a result, the iso-cost line will change from AB to A_1B_1, and it will be tangent to a point with a greater iso-quant IQ (indicating a higher amount of production) at point E_1. The Expansion Path curve is created by connecting the three equilibrium points E, E_1, and E_2, and it illustrates how the factor combinations that the business plans its output with will change as the firm increases the volume of its output. Once more, it is sometimes referred to as the scale line because it displays how the entrepreneur modifies the scale of his operations with given relative factor prices.

Types of Expansion Path

From above, we get two types of expansion path, i.e.:

(a) Expansion by Means of Increasing the Level of Expenditure on the Inputs

(b) Expansion by Means of Increasing the Level of Output

Iso-quants and Returns to Scale

The iso-quant technique can be used to study the laws of returns to scale. The steady reduction in the distance between the returns to scale is a sign of growing returns to scale. When the combinations of elements are changed in a specific percentage, it implies the impacts of a change in the scale of inputs upon output through time. In other words, it should be observed that even if we alter the

manufacturing size, the proportions remain the same. Because the iso-quant analysis only considers two factor inputs in the current situation, we will limit our discussion to those two variables.

Increasing Returns to Scale

Increases in total output that are greater than the proportional increases in factor inputs at a particular scale are known as increasing returns to scale.

In other words, returns to scale are said to be increasing if the rise in output is greater than the increase in the amounts of the inputs. As seen in fig. 2.19, a firm will need to grow the factor proportion at a falling pace when the increasing returns to scale is in effect.
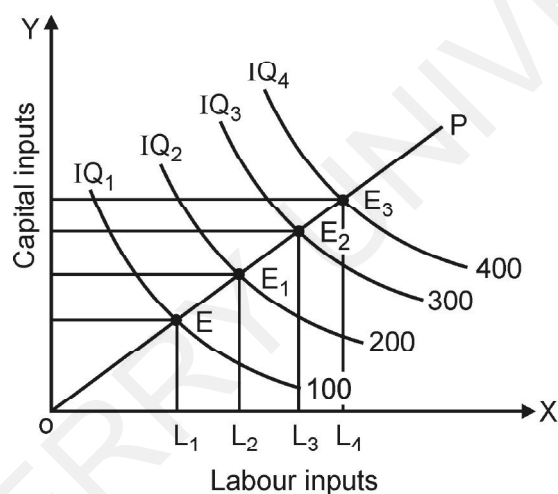
Fig. 2.19: Increasing Returns to Scale

The iso-quants IQ_1, IQ_2, IQ_3, and IQ_4 in fig. 2.19, respectively, stand in for the output of 100, 200, 300, and 400 units. The OP scale line shows how various output quantities can be generated with the help of two factor inputs, labour and capital, at the lowest possible cost. The steady reduction in the space between the iso-quants along the expansion path or the scale line is a sign of rising returns to scale. As an illustration, $EE_1 > E1E_2 > E_2E_3$.

The following elements are responsible for the rising returns to scale:

1. Machines, management, labour, finances, and other things could have indivisibilities that can't be broken down into smaller parts. The returns to scale rise as a business grows because the indivisible elements are used to their full potential.

2. Diversification of labour and specialisation also lead to rising returns to scale. Opportunities for specialisation and labour division exist as an enterprise's scale grows. Workers concentrate on their narrow range of operations as work is broken down into smaller jobs. For this, cutting-edge machines are deployed, enhancing efficiency and returns on investment.

3. The company benefits from internal economies of production as it grows. It might be able to put in cutting-edge machinery, market its goods simply, borrow money at a lower interest rate, and attract competent managers and staff. Therefore, the returns to scale are increased.

4. An industry expands to meet the rising long-term demand for its product, and as a result, external economies emerge that are shared by all the industry's firms, allowing a firm to benefit from growing returns to scale.

Decreasing /Diminishing Returns to Scale

According to the theory of diminishing returns to scale, a given increase in output necessitates a bigger increase in the quantity of the production's inputs. In other words, as illustrated in fig. 2.20, the proportionate increase in factor inputs will be greater than the proportionate increase in output.
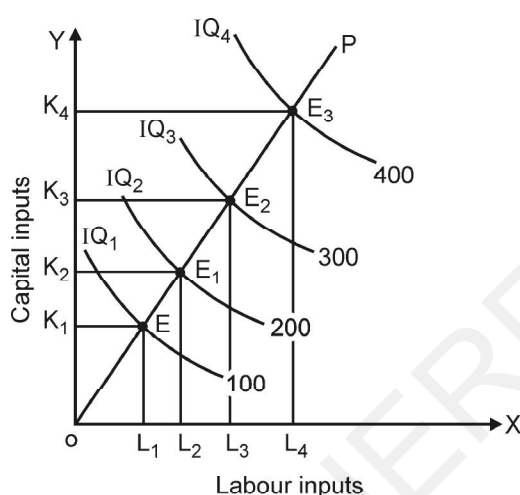
Fig. 2.20: Decreasing Returns to Scale

IQ_1, IQ_2, IQ_3, and IQ_4 are the iso-quants in Fig. 2.20 that, respectively, represent output of 100, 200, 300, and 400 units. OP is the scale line that depicts the proportional increase in output brought on by an increase in the labour and capital input amounts. The scale line's line segments EE_1, E_1E_2, and E_2E_3 demonstrate that the firm must gradually increase its expenditure to achieve the equivalent gain in output.

As seen in fig. 2.20, the firm must increase labour and capital inputs from L_1K_1 to L_2K_2 in order to increase output from 100 to 200 units. However, in order to increase output by another 100 units—from 200 to 300 units—the firm must increase labour and capital inputs in a much greater proportion, i.e., from L_2K_2 to L_3K_3, as is evident from the growing distance between the segments EE_1, EE_2, etc. along the scale line. Thus,

$EE_1 < E_1E_2 < E_2E_3$

So, diminishing returns to scale operates when progressively increasing factor inputs are required to yield the same additional increase in output.

Returns to scale may start diminishing due to the following factors:

1. Indivisible factors may become inefficient and less productive.

2. Internal inefficiencies occur at the company as a result of possible business chaos and the resulting lack of coordination and supervision. An excessive amount of management leads to rigidities and control issues.

3. External scale diseconomies, such as rising factor prices, declining factor productivities, etc., are added to the aforementioned internal diseconomies.

Constant Returns to Scale

Constant returns to scale take place when the growth of the overall output is proportional to the growth of the input quantities. Figure 2.20 depicts this scenario.
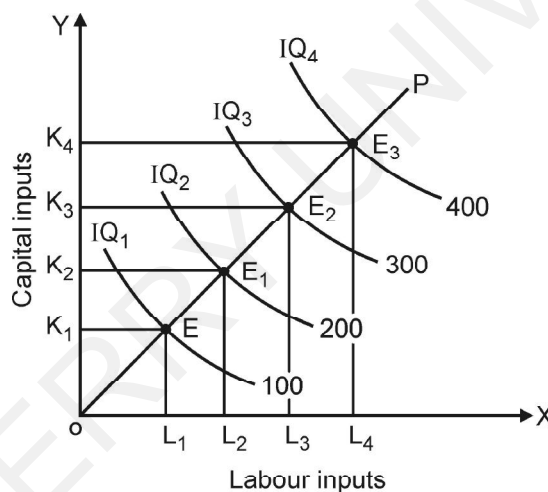
Fig. 2.21: Constant Returns to Scale

In figure 2.21, the iso-quants IQ_1, IQ_2, IQ_3, and IQ_4 stand in for the total output of 100, 200, 300, and 400 units, respectively. The scale line or expansion path known as OP is used to depict the various output levels represented by distinct iso-quants. The scale line OP is divided into segments by the iso-quants: EE_1, E_1E_2, and E_2E_3. Each of these sections demonstrates a certain ratio of the two elements. The equal separations between the iso-quants point to constant returns. The factor proportion has also been boosted in order to enhance output from 100 to 200 units. So,

$EE_1 = E_1E_2 = E_2E_3$

As a result, in order to summarise, we can state that the constant returns to scale principle is in operation when the output rises precisely proportionately to an increase in the quantity of factor inputs.

The following criteria ensure that returns to scale remain constant:

1. When a firm's internal economies are offset by internal diseconomies, the returns to scale remain constant and output grows in the same proportion.

2. The balance of external economies and external diseconomies is another factor.

3. When factors of production are fully divisible, interchangeable, homogeneous, and their supplies are absolutely elastic at any given price, constant returns to scale results.

Therefore, the production function is homogenous of degree one in the situation of constant returns to scale.

Iso-quants and Returns to a Variable Factor

Iso-quants can also be used to measure the returns to a variable factor i.e., when more of a variable factor is used to produce a higher output while more of one factor is seen as fixed. This is shown in fig. 2.21.
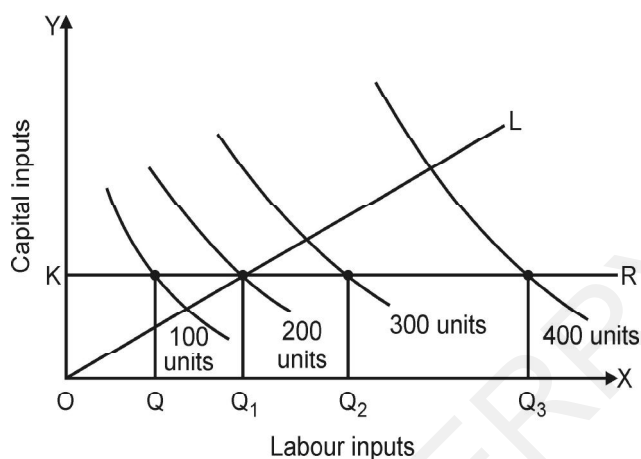
Fig. 2.22: Iso-quants and Returns to a Variable Factor

We have depicted four iso-quants in Fig. 2.22, each one representing one of the four output levels. The expansion route OL calculates the varying amounts of labour and capital needed to create the rising output levels. We have also drawn a horizontal straight line KR on the assumption that the quantity of capital, a fixed factor, remains unchanged at OK for different levels of output. Increased quantity can be produced by making use of larger labour force. Therefore, OK units of capital and OQ units of labour are needed to produce 100 units of output. OK units of capital and OQ_1 units of labour are needed to generate 200 units of output. Therefore, an additional OQ_1 unit of labour can be used to produce the extra 100 units of output. Again, for increasing the level of output from 200 units to 300 units and from 300 units to 400 units, Q_1Q_2 and Q_2Q_3 units of additional labour is required. Thus, iso-quants are also useful in illustrating the returns to a variable factor.

Check Your Progress

17. What do you understand by Iso-quant approach?

18. Define Isoquent map?

2.11 FACTOR SUBSTITUTION

The producer will react to a change in factor prices if either the cost of labour (w) or the cost of capital (r) changes, as this will disturb their cost-minimization condition. Assume that at the initial equilibrium position, if the wage rate grows from w_0 to w_1, then

$$MP_L/w_1 < MP_K/r_0 \text{ or } MP_K/r_0 > MP_L/w_1$$

This will persuade a sensible manufacturer to replace comparably more expensive labour with capital. Therefore, he will endeavour to use more capital and less labour while continuing to replace labour with capital until $MRTS_{LK} = w_1/r$ or $MP_L/w_1 = MP_{K/r}$.

The use of iso-quants in fig. provides a pictorial representation of the replacement of one element with another. 2.11 shows that the iso-cost line, AB, which is tangent to the iso-quant Q_0 at point E, has factor prices for labour and capital, w_0 and r_0, respectively. He is employing OL_0 of labour and OK_0 of capital in this equilibrium position. Now imagine that the cost of labour, or the wage rate, increases, causing the iso-cost line to rotate to the new position AC while the cost of capital (r) and outlay stay unchanged. Figure 2.11 illustrates that none of the factor combinations located on the is-cost line AC will be able to achieve the output level Q_0 since the iso-cost line AC is located below the iso-quant Q_0. In other words, with a higher wage rate w_1, the provided amount of expenditure is insufficient to purchase the necessary quantities of the two inputs to create the output level Q_0. Therefore, the producer will need to increase its outlay in order to create output Q_0 at the same level. A higher iso-cost line that runs parallel to the new iso-cost line AC is implied by the increase in expenditure on factors. As a result of the updated labour and capital costs, the iso-cost line GH is now drawn parallel to AC and tangent to the iso-quant Q_0.
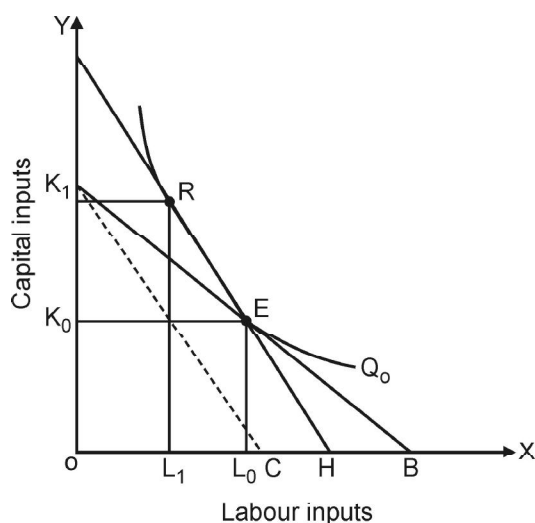
Fig. 2.23: Rise in Wage Rate (Price) of Labour Causes Substitution of Capital for Labour

Since the new iso-cost line GH's slope reflects new relative factor prices that are different from those of the initial iso-cost line AB, it can be seen from Figure 2.23 that it will not be tangent at the initial equilibrium point E. Because of the changing relative factor pricing, the beginning point E no longer minimises cost.

To achieve the original level of output given the higher wage rate, or substantially more expensive labour, a producer will substitute capital for labour by increasing up the iso-quant Q_0. Figure 2.11 demonstrates the new iso-cost line GH, which runs parallel to AC. Since it is tangent to the iso-quant Q_0 at point R, it demonstrates that to minimise cost at the new relative factor prices, the pay rate should be higher than that shown by the iso-cost line AB. To arrive at the new cost-minimizing factor combination R, where he employs less OL_1 labour and more OK_1 capital, the producer has swapped out K_0K_1 amount of capital for L_0L_1 amount of labour.

It should be mentioned once more that switching from capital to labour and altering the factor proportion used to arrive at equilibrium point R for producing a specific level of output Q_0 results in an increase in production costs due to the rising cost of labour (iso-cost line GH lies further away from the iso-cost line AC when viewed from the origin). However, if the producer had chosen to use the factor combination E in conjunction with the new, higher rate of labour, he would have had to invest an even greater cost or expense to generate the output level Q_0. If an iso-cost line is drawn parallel to AC reflecting new relative factor prices and passes through the original point of the factor combination E, it will lie further away from GH, indicating that using the same labor-capital combination E at the new relative labour and capital prices will result in higher costs. The firm has thus been successful in lowering its costs compared to what it would have incurred if it had continued to use the same factor combination E even after the change in the factor-price situation by switching the factor combination from E to R in response to the increase in the price of labour by substituting capital for new relatively more expensive labour.

We conclude from the foregoing analysis that a change in relative factor pricing results in the substitution of a factor that has become relatively more expensive. There are several instances of factor substitution occurring in the real world in response to changes in relative factor costs. When the price of oil rose, several nations tried to replace it with other energy sources by employing inputs like coal, electricity, etc. to lower production costs. Again, because labour is more expensive in the United States than in some developing nations where wages are comparably cheap, businesses there utilise fewer people and more machinery, or capital. Additionally, since computer prices have dropped recently, capital (i.e. computers) have replaced manual labour in tasks like bookkeeping, creating architectural maps, and writing books and journals.

Check Your Progress

19. What do you understand by Factor substitution?

2.12 ELASTICITY OF FACTOR SUBSTITUTION

To maximise profit, a production process employs a variety of production characteristics. In order to boost profitability by increasing/decreasing outlay in one resource or the other, resources are shifted from one use to another if the composition of these elements of production is not viable.

Change in the price of one factor, provided all other prices remain constant, then readjustment of factor proportion takes place: Because, change in the price of one factor destroys the equilibrium condition of the equality of price ratios between the two factors and also the Marginal Rate of Technical Substitution (MRTS).

The Theory of Wages, written by J.R. Hicks in 1932, introduced the idea of factor elasticity for determining how sensitive the capital-labor ratio would be to changes in the marginal rate of technical substitution of capital for labour.

When their relative prices vary, it quantifies the degree to which one factor will be replaced by another.

The entrepreneur will, however, use more labour than capital if wages or the cost of labour falls. The two components' marginal rates of technological substitution and changes in their respective prices will determine how and how quickly they will be substituted for one another.

The proportionate change in the factor proportions to the proportionate change in the marginal rate of technological replacement, so that the output remains unchanged, may be described as elasticity of factor substitution. It gauges how powerful the substitution effect is.

Check Your Progress

20. Explain the concept of elasticity of factor substitution.

2.13 ANSWERS TO 'CHECK YOUR PROGRESS'

1. The term "supply curve" refers to a graphic that depicts consumers' propensity to buy more goods in response to a rise in the selling price.

2. The amount of a commodity that manufacturers are willing and able to sell at a specific price while maintaining all other variables at a given moment is known as the supply in economics.

3. The degree to which the supply is responsive to price changes is referred to as elasticity of supply.

4. When a change in price has no effect at all on the quantity delivered.

5. The ultimate objective of the firm is to find an input-mix, which can maximise its output and minimise the cost.

6. A company makes decisions that have both short- and long-term implications. Some inputs are fixed while others are changing in the short-term. Consequently, a firm has limited choice in the short-run with

respect to allocation of resources. In the long-run, nevertheless, all inputs are flexible, giving the company a wide range of options for resource allocation.

7. The four main categories of production factors are land, labour, capital, and organisation or entrepreneurship.

8. Land alludes to the elements and powers that nature freely bestows on man in the forms of air, land, water, light, and heat. Land is a metaphor for all naturally occurring resources that can be sold or that have economic value.

9. Transformation of inputs into output occurs throughout production.

10. Laws of production are only technical strategies to raise output levels. There are two ways to improve output: either in the long-term or in the short-run.

11. According to the law of variable proportions, the marginal product of a given factor will decrease if its quantity is raised while the other elements remain fixed.

12. The slopes, forms, and interactions of the total, marginal, and average product curves describe three stages of manufacturing. The first stage is marked by the average product curve's positive slope, which ends at the point where the average product and marginal product curves converge. The second stage continues up to the peak of the total product curve, where the marginal product curve turns negative. The third stage is defined by the range in which the total product curve is negatively sloped.

13. Returns to scale make clear how output behaves when units or quantities of all production factors are increased collectively in a specific percentage.

14. There are two different kinds of economies of scale: internal economies and external economies.

15. Economies of scale, in general, refer to gains from increasing the size of a business or decreases in the cost of production per unit.

16. The domestic and foreign economies are interconnected and rely on one another. As previously stated, internal economies are those that are unique to a single firm, whereas external economies are benefits that are enjoyed by all of the companies in an industry collectively. The two sorts of economies rarely differ from one another, though. What might be an internal economy for company Y might end up becoming an exterior economy for firm X. Therefore, they appear to be predominantly internal economies when we consider those economies in the context of the entire economy as a whole.

17. Iso is a Greek word that means "equal" or "same," and quant is the abbreviation for amount. In other terms, the producer's indifference curve may be referred to as the equal product curve. An indiffererence curve

measures happiness in physical units, whereas an equal product curve measures production in physical units. On the same equal product curve are all combinations that produce the same level of output.

18. An iso-quant map is a family or a collection of iso-quants that each indicate a different quantity of output.

19. The substitution of one factor for another.

20. J.R. Hicks created the idea of factor elasticity in 1932 and used it in his book "The Theory of Wages" to calculate how responsive the capital-to-labor ratio is to changes in the marginal rate of technical substitution of capital for labour. When their relative prices vary, it determines the amount to which one item will be replaced by the other.

2.14 SUMMARY

1. The phrase "supply curves" refers to a graphical representation of the willingness to respond with more goods to an increase in selling price.

2. The amount of a commodity that manufacturers are willing and able to sell at a specific price while maintaining all other variables at a given moment is known as the supply in economics.

3. According to the rule of supply, which is a cornerstone of economic theory, an increase in price would, on average, lead to an increase in the quantity supplied.

4. The rising slope of the supply curve is caused by supply, which is a positive relationship between quantity supplied and price.

5. The degree to which the supply is responsive to price changes is referred to as elasticity of supply.

6. Price elasticity of demand shows Consumers' desirability to substitute one commodity to another. But elasticity of supply shows seller's willingness to supply more of that commodity at nearly same cost.

7. Long-term supply is more elastic than short-term supply, as it is easier to increase quantity produced while the firm has more time to do so.

8. The ultimate objective of the firm is to find an input-mix which can maximise its output and minimise the cost.

9. Land alludes to the components and forces that nature freely provides for man's benefit, including air, land, and water, as well as light and heat.

10. Natural resources are often divided into two categories:

   (a) The exhaustible resources or non-renewable resources,

   (b) The renewable resources.

11. Different meanings of the word "capital" are used in economics. The term "capital" is frequently used in economics and everyday speech to refer to

money. However, capital as a factor of production consists of equipment, tools, factories, tractors, etc. that directly support output.

12. Human capital refers to the pool of individuals who are healthy, educated, and skilled.

13. Capital goods are manufactured manufacturing tools that boost the economy's capacity for output.

14. The gross domestic product (GDP) of a nation is dependent on productivity, which is dependent on education, in addition to the number of labour hours employed to produce goods and services.

15. The labour force's contribution to the national product and income is influenced not just by its quantity but also by its quality, or productivity.

16. Transformation of inputs into output occurs throughout production.

17. Laws of production are only technical strategies to raise output levels. There are two ways to improve output: either in the long-term or in the short-run.

18. By drawing a straight line from the origin to any point on the total product curve, and then measuring the slope of that line, the average product at that location can be determined.

19. Returns to scale make clear how output behaves when units or quantities of all production factors are increased collectively in a specific percentage.

20. Economies of scale, in general, refer to gains from increasing the size of a business or decreases in the cost of production per unit.

21. The term "iso-quant map" refers to a family or a collection of iso-quants that reflect various output amounts.

22. Alternative factor combinations that can be obtained for a specific outlay are displayed on an iso-cost line.

23. The location of tangency points between iso-cost lines and iso-quants is referred to as the expansion path. It displays the least expensive labour and capital combinations required to create certain production levels.

24. According to the theory of diminishing returns to scale, a given increase in output necessitates a bigger increase in the quantity of the production's inputs.

25. When the amount of one element is thought of as fixed and the quantity of a variable factor is increased to have a higher output, iso-quants can also be used to assess the returns to a variable factor.

26. J.R. Hicks created the idea of factor elasticity in 1932 and used it in his book "The Theory of Wages" to calculate how responsive the capital-to-labor ratio is to changes in the marginal rate of technical substitution of capital for labour. When their relative prices vary, it quantifies the degree to which one factor will be replaced by another.

2.15 KEY TERMS

- **Supply Curves:** Supply curves shows willingness of sellers to provide commodities for sale in the market.

- **Supply:** The quantity of a product that a producer is willing and able to sell at a specific price while maintaining all other variables at a given point in time is known as the supply.

- **Laws of Supply:** According to the rule of supply, which is a cornerstone of economic theory, an increase in price would, on average, lead to an increase in the quantity supplied.

- **Elasticity of supply:** Elasticity of supply is similar to elasticity of demand. The degree to which the supply is responsive to price changes is referred to as elasticity of supply.

- **Price elasticity of demand:** Price elasticity of demand reveals consumers' willingness to switch from one good to another.

- **Elasticity of supply:** Elasticity of supply shows seller's willingness to supply more of that commodity at nearly the same cost.

- **Land:** Land alludes to the components and forces that nature freely provides to support man, including air, water, light, and heat.

- **Capital:** Different meanings of the word "capital" are used in economics. The term "capital" is frequently used in economics and everyday speech to refer to money. However, capital as a factor of production consists of equipment, tools, factories, tractors, etc. that directly support output.

- **Labour:** The labour force's contribution to the national product and income is influenced not just by its quantity but also by its quality, or productivity. The division of labour is a significant aspect in influencing the effectiveness of a workforce.

- **Production:** Transformation of inputs into output occurs throughout production.

- **Laws of Production:** Laws of production are only technical strategies to raise output levels. There are two ways to improve output: either in the long-term or in the short-run.

- **Marginal return or Marginal output:** It refers to output due to an additional unit of input being applied.

- **Returns to scale:** Returns to scale make clear how output behaves when units or quantities of all production factors are increased collectively in a specific percentage.

- **Economies of scale:** Economies of scale, in general, refer to gains from increasing the size of a business or decreases in the cost of production per unit.

- **Iso-quants/Equal product curves:** Iso-quant technique has been developed to help a firm to make national choice of input proportions and its replacement in response to variations in the relative costs of inputs. All

potential combinations of the two components that will result in the same final product are represented by the iso-product curve.

- **Iso-quant map:** The term "iso-quant map" refers to a family or a collection of iso-quants that reflect various output amounts.
- **Iso-cost lines/Budget line/Outlay line:** Alternative factor combinations that can be obtained for a specific outlay are displayed on an iso-cost line.
- **Expansion path:** The location of tangency points between iso-cost lines and iso-quants is referred to as the expansion path. It displays the least expensive labour and capital combinations required to create certain production levels.
- **Constant Returns to Scale:** When the overall output grows proportionally to the growth in input quantities, there are constant returns to scale.
- **Elasticity of factor substitution:** When their relative prices vary, it determines the amount to which one factor will be substituted by another.

2.16 SELF-ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Define supply.
2. Define Law of Supply.
3. Define elasticity of supply.
4. Define production function.
5. Define Returns to scale.
6. Define Economies of scale.
7. Define iso-quant.

Long Answer Questions

1. Illustrate Market supply curve.
2. Explain the characteristics of supply?
3. Explain Degrees of Elasticity of Supply.
4. Explain Classification of Factors of Production.
5. Write short notes on Land, Capital.
6. Explain the Advantages of Division of Labour. Define Returns to scale. Explain its types.
7. Explain Factors affecting Production Function.
8. Illustrate The Laws of Production.
9. What are the Causes for Diminishing returns? Explain.
10. Explain Modern Approach to the law of returns (The law of variable proportions).

11. Explain Returns to scale and what are its types?

12. Explain the concept of Economies of scale.

13. Explain the properties of iso-quant.

2.17 REFERENCES

1. S.K. Misra & V.K. Puri. 2011. Principles of Microeconomics. Himalaya Publishing House, Mumbai.

Unit III   Theories of Cost and Revenue

Learning Objectives:

By the end of this unit the learners would be able to understand:
- What are Costs?
- Production and Costs
- Cost Curves and their Shapes
- Relationship between Short-run and Long-run Average Total Cost
- Elasticity of Cost
- Average and Marginal Revenue
- Relation between AR and MR Curves
- Interactions of Cost and Revenues
- Conditions of Equilibrium of a Firm

Structure:

3.1   INTRODUCTION

In this unit, we shall study Theories of cost and revenue. In the beginning we shall study costs and its various aspects such as cost curves, shapes, Relationship between Short-run and Long-run Average Total Cost, Elasticity of Cost. Gradually as the unit advances, concept of revenue and its interaction with cost have been illustrated.

3.2   WHAT ARE COSTS?

Cost Concepts, Nature of Short-run Costs and Cost Curves

Cost Concepts

As is common knowledge, a product refers to the entire amount of items created over a specific time period. During the production process, the producer is required to pay these production elements for their labour. The costs incurred on these production elements are referred to as the cost of production, or simply the cost. Although the term "cost of production" typically refers to the financial outlays made in the process of producing a good or service, this is actually only a portion of the total cost. In fact, after considering the notions below that relate to the cost of manufacturing, the true nature of cost might be truly comprehended.

Money Costs

Money costs refer to the total amount spent by a company on the various inputs used in the production of a good or service. Wages to workers, salaries to managerial staff, money spent on machinery expenses on raw materials purchased, expenses on insurance, transport, etc., all such expenses comprises money costs of production which depends upon variables like:

- Price given to owners of different production factors.
- Level of output of firm.
- Production time, or if a corporation has a short or long period of time to make the necessary changes to its organisational structure.

Alternatively, element of time makes a serious impact on money cost. Above all, above three variables combined together, measure money cost of production of any product.

Real Cost

Money cost related concept is that of real cost. It indicates sacrifices made by every factor in manufacturing a commodity. Foregoing of leisure in real cost of labour, abstinence is sacrifice done by savers to accumulate capital. These real costs are compensated by money costs. Marshall recognised the significance of the

real cost, which, in his view, includes the efforts of many forms of labour that are either directly or indirectly involved in its production, as well as the abstinence or, more precisely, the waiting necessary to save the capital utilised in its production. Real expenses of production for that specific product are collectively referred to as all of these sacrifices and efforts. However, this idea has a flaw because sacrifices and efforts are solely psychological and subjective, making it impossible to evaluate them precisely.

Alternative or Opportunity Cost

Opportunity cost is otherwise known as alternative cost. It refers to next best alternative sacrificed or foregone. In modern sense cost is not strained nor money cost involved in producing a product, but cost of alternative commodity that have been produced. Firm has to hire factors of production and also to be engaged in that line of production. Price or value for these sevices measured is determined in terms of sacrifice or alternative commodity that have been produced. Opportunity cost, according to Richard G. Lipsey, is the price of utilising something in a particular production process, as opposed to the value or opportunity lost by employing it in its best alternative usage. In other words, the opportunity cost of any good or service is inferior than the value of substitute goods or services given up.

Explicit or Expenditure Costs

Explicit costs are often payments made under a contract by the employer to the proprietors of the components of production whose services the firm has procured for output. Employers' contractual payments to these parties include payments for raw commodities, rent on rented land, and interest on capital borrowed. Such type of payments are known as expenditure or explicit cost.

Implicit or Non-expenditure or Imputed Costs

Implicit costs are those that develop when an employer supplies factors that he or she has access to. Assume, employer may set up factory on his own land or invest his own capital rather than borrowed capital might even serve as manager of the relevant company. He is entitled to rent, interest, and a salary in this location. All of these must be paid to the employer directly and must be included in the imputed cost. But, employer compute, these costs on the basis of their opportunity costs, like, capital invested will provide a return for example 10 per cent if it were invested in any long-term securities rather than in business. Thus, 10 per cent is his opportunity cost. Likewise, he can compute interest payable to him on capital invested by him in his own business at that rate of interest.

Fixed or Supplementary Costs and Variables of Prime Costs

A company can categorise the inputs it uses into two groups. Some inputs are fixed and can only be used for a certain amount of time. For instance, fixed inputs are machinery, equipment, land, buildings, permanent staff. Costs incurred on all such factors of production are called fixed costs, as these are indivisible and have to be engaged for technical reasons in certain sizes. While these factors are once engaged, they can be utilised over a period of time. On the contrary, variable costs are those costs which differs alongwith changes in output level. Variable cost

occurs due to exhaustible nature of input by single use, e.g., fuel, raw materials, etc. If output level has to be enhanced firm should spend more on such items. Therefore, variable cost rises while output increase and hence, if output is zero variable cost will also be zero.

Past Cost and Future Costs

Actual costs are unadjusted records of past cost. These are historical costs. Future costs are based upon forecasts. Costs those are in the nature of forward looking like managerial decision making are instances of future costs.

Short-run Costs and Long-run Costs

In the short-run, production can be increased or decreased by altering merely movable variables of production. The traditional idea of costs makes a distinction between short-term and long-term expenses. Some factors, such as capital, machinery, etc., are fixed in the near term. In the short-term, increasing variable input is the only way to increase output. On the other hand, all production factors are erratic over the long-term. Therefore, in long-run new machines, equipment, building, etc., can be installed and production capacity can be increased. Fixed costs of a firm are called supplementary cost or overhead costs. Variable expenses, on the other hand, are referred to as prime costs or direct costs. Total cost is the sum of fixed and variable costs at a particular output level. Symbolically,

TC = TFC + TVC

Total cost = Total fixed cost + Total variable cost.

Traditional Theory of Cost

Traditional theory of cost differentiates costs into two categories, i.e., short-run and long-run. In short-run, certain factors like entrepreneurship, equipment, etc., are remain fixed. But in case of long-run all factors of production are variables:

 (i) **Out of Pocket Costs and Books Costs:** Out of pocket costs are those expenses that require both ongoing and one-time financial payments or transfers.

   Certain business expenses are not paid in cash, but a provision is made for them in the books of accounts, and they are taken into consideration when the profit and loss statements are finalised. These fees are referred to as book costs.

 (ii) **Incremental Costs and Sunk Costs:** Even if they have a somewhat larger meaning, incremental costs are closely related to the idea of marginal cost. The terms incremental cost and marginal cost both refer to the overall additional costs incurred as a result of decisions to increase output, add new product varieties, or both. Marginal cost denotes the cost of the marginal unit, or one unit of output. In a nutshell, we can also say that incremental costs result from changes in product lines, the addition or introduction of a new product, the replacement of outdated equipment and plant, the adoption of new production techniques, and other factors.

(iii) **Sunk Costs:** Sunk costs are expenses that are incurred once and cannot be changed, increased, decreased, or recovered through changing output rates. Suppose, while decision is made in our incremental investment expenditure and funds are allocated and spent, all preceding costs are treated as sunk costs, because, These expenses are based on prior commitments and cannot be changed, reversed, or reimbursed in the event that market conditions or business decisions change.

Historical Costs and Replacement Costs

Historical cost refers to the price paid for productive assets like land, buildings, machinery, etc. in the past.

Costs incurred to replace an outdated asset are referred to as replacement costs:

Private and Social Costs: Private expenses are those that are actually incurred by a person or a business when they buy products and services from the market. These expenses are therefore internalised expenses that are included in the total cost of production for the company.

Social costs refer to all expenses that society incurs as a result of producing a good or service. Both internal and external costs are included. The social cost-benefit analysis of the total impact of any firm's operations on society as a whole and the calculation of the social cost of private gains are where social cost becomes relevant.

Cost Function

The relationship between cost and its determinants is expressed by the cost function. Cost is influenced by many things. While their relation to price is described in the following way in functional or mathematical form:

$$C = f(S, O, P, T, ...)$$

Where,   C = Cost

S = Size of plant

O = Level of output

P = Price of input

T = Technology

Check Your Progress

1. Define the term Product.
2. Define the term Money costs.

3.3 PRODUCTION AND COSTS

'Please refer unit 2, point 2.6 for Production function, Laws of production, Classical version, Law of Diminishing Returns, The law of variable proportions. As these points have been discussed in unit 2 and thus not repeated here.

Diagrammatic Presentation of the Law of Variable Proportions

Average product at any point on total product curve in obtained by drawing straight line from point of origin to that point and thereafter measuring slope of that line. It is clear that slope is obtained by dividing total product Q by units of labour employed which gives average product Q. With reference to Q', AP is obtained by dividing $Q'L_1$ of total product by OL_1 of labour which provides slope of line OQ'. Marginal product at any point on TP curve is obtained by drawing tangent to TP curve at that point. Slope of the tangent provides value of marginal product.
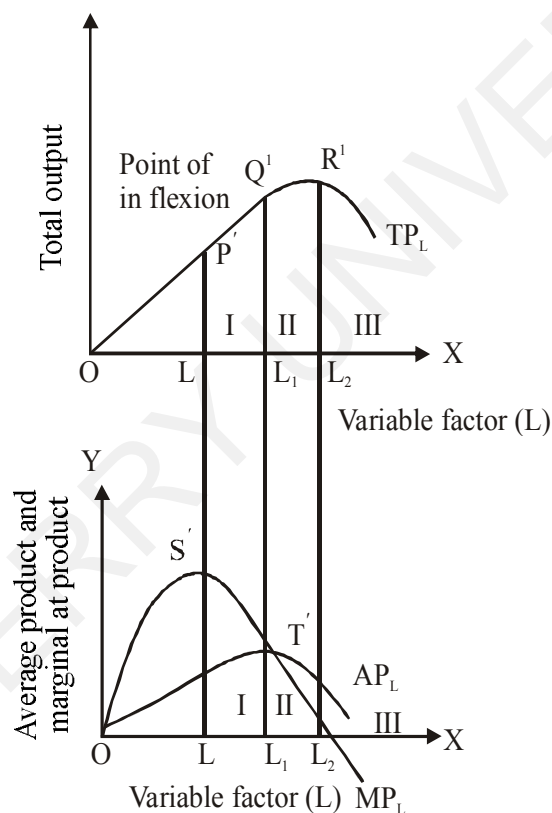
Fig. 3.1: Three Stage of Law Variable Proportions
(Total, Marginal and Average Product of Labour)

In Fig. 3.1 line drawn from point of origin to point Q' is also tangential to total product curve at that point. Alternatively, slope of the line OQ' and slope of tangent to total product curve at point Q' are equal. Therefore, average product is equivalent to marginal product at point Q'. Again, no other line from point of origin to any point other than Q' can provide a greater slope than OQ'. Hence value of average product is maximum at Q'.

Upto point P', TP curve is concave upwards and thereafter it concaves downward and thus total product curve changes its slope here. Point P' is thus known as point of inflexion where total product rises at an increasing rate, thereafter total product increases at a diminishing rate. At point P' law of diminishing returns set in. At point P' marginal product is at its maximum, i.e., point S' on Marginal Product (MP) curve.

At point Q' on TP curve average product is equal to marginal product. Thus, in lower panel at point T' corresponding to point Q' on total product curve, marginal product curve cuts the average product curve from above.

At point R', total product reaches its maximum level and thereafter decreases and hence marginal product is equal to zero while total product is at its maximum level. Thereafter, marginal product becomes negative.

Stages of Production

Let us study three stages of production and rational stage where firm should operate can be identified with reference to the points relates to maximum average product and maximum total product.

Stage I is characterised by increasing average product. It ends at point Q' where average product is at maximum level. Till maximum average product is utilised, every additional or extra unit of labour employed leads to an increase in average productivity. It is for the benefit of the firm to continue to employ more units of labour. Hence it will not be proper to stop before maximum average product is obtained.

Stage II is bounded on left by the point of maximum average product and on right by the point of maximum total product. It is seen that during this stage both average and marginal product are declining, but positive.

In stage III, it starts from point of maximum product. Beyond that limit, marginal product turns negative and total product drops. Negative marginal returns will result from further labour hiring. Therefore, only the second step, or the rational stage, can be used for production. As such stage I and stage II are characterised as irrational stage.

Cost Function

The relationship between cost and its determinants is expressed by the cost function. Cost is influenced by many things. While their relation to price is described in the following way in functional or mathematical form:

$$C = f(S, O, P, T, ...)$$

Where, C = Cost

S = Size of plant

O = Level of output

P = Price of input

T = Technology

Short-run costs of the Traditional Theory (Total Cost, Average Cost, Marginal Cost)

Total cost, average cost, and marginal cost are the fundamental analytical cost concepts utilised in the investigation of cost behaviour. These there concepts on supply side are related to total, average and marginal revenue curve on demand side.

Concept of total cost means total money cost of producing a commodity. The total cost will increase as output does.

Mathematically,

Total output determines total cost.

| Symbolically, | TC | = | f (Q) | ...(3.1) |

| Where, | TC | = | TFC + TVC |

| Since, | TFC | = | constant say symbolised as 'K' |

| So, | TC | = | $\overline{K}$ + TVC | ...(3.2) |

| Now, suppose, | L | = | variable factor at given price w |

| | TVC | = | L.w. |

By substituting value of TVC in equation (3.2), we get

| | TC | = | K + L.w. | …(3.3) |

From equation 3.3, it is evident that alongwith the increase in L.w. output rises and TC also increases. As a result, TC directly varies with total output (Q), which is a function of it.

Check Your Progress

3. Define the term Law of Variable Proportion.
4. Why the Law of Variable Proportion is called the law of universal application.

3.4 COST CURVES AND THEIR SHAPES

3.4.1 Graphical Presentation

Total fixed cost is shown graphically by a straight line parallel to x axis (output) as in fig. 3.2 (a)

An inverse "S" shape that represents **total variable cost (TVC)** graphically illustrates the law of variable proportions. In Fig. 3.2, it is depicted (b). At the beginning of the production process with an existing plant, productivity rises and average variable cost (AVC) decreases in accordance with the law of variable proportions as more variable elements are utilised. This method is used repeatedly until the ideal fixed and variable factor combination is found.

Total cost curve of firm is shown in fig. 3.2 (c). In this case, while increased quantities of variable factors are combined with fixed factors productivity of variable factors declines and average variable cost (AVC) increases. Therefore by summation of TFC and TVC we get total cost (TC) curve of a firm.

Y

Cost

TFC

O

Output

X

(a)

Total fixed cost curve Total

Y

Cost

TVC

O

Output

X

(b)

Variable cost curve

Y

Cost

TC

TVC

TFC

O

Output

X

(c)
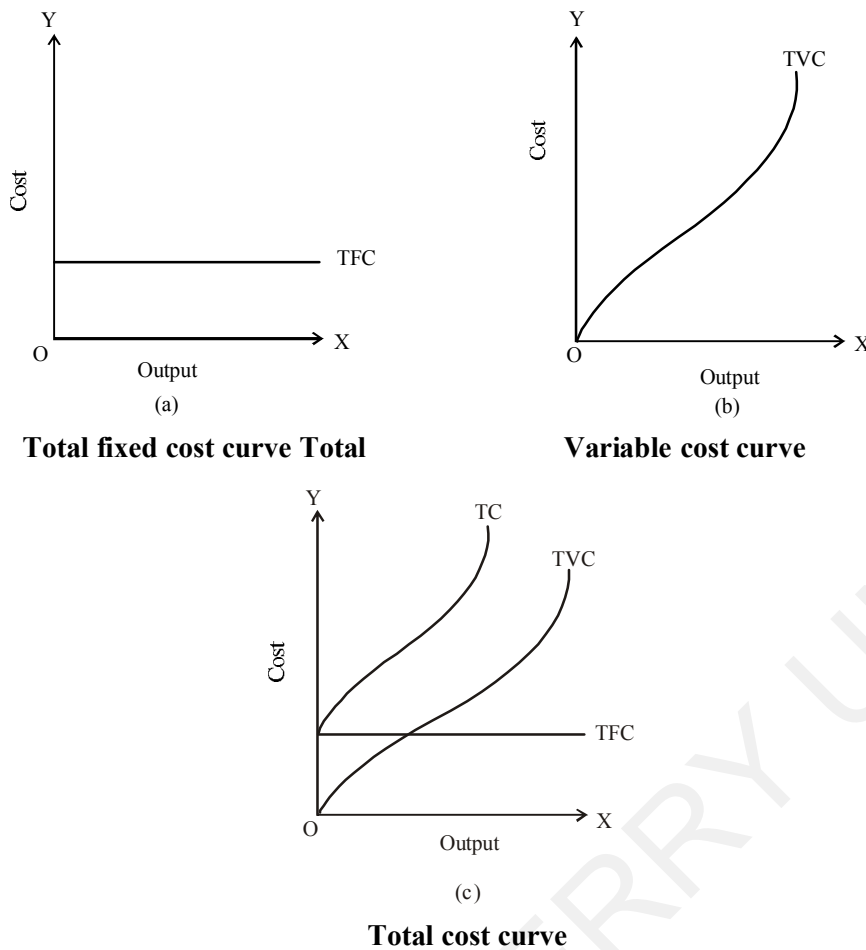
Total cost curve

Fig. 3.2: TFC, TVC, TC Curve

3.4.2 Average Cost

Concept of cost is more significant in terms of per unit cost of production instead of total cost. Per unit costs are:

  (i) Average fixed cost (AFC)

 (ii) Average variable cost (AVC)

(iii) Average total cost (ATC)

(i) Average Fixed Cost: Average fixed cost is total fixed costs divided by number of units of output produced or level of output. Symbolically,

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

Where,   X = Number of units of output produced.

         AFC = Average fixed cost per unit of output.

Therefore, the average fixed cost will be lower the more a company produces. Since overall fixed costs are constant regardless of production level, fixed costs are spread out over a larger number of units when more are produced, and as a result, each unit of output carries a reduced share of fixed costs. AFC decreases alongwith increase of output.

3.4.3 Graphical Presentation of AFC

Graphically AFC is a downward sloping curve as in fig. 3.3, and a rectangular hyperbola. A hyperbola is a set of points in any plane where there is a continuous difference in distance between two fixed points in that plane. It shows that AFC and quantity manufactured are constant. Alternatively, AFC curve reflects that every points upon it are of identical magnitude.

(ii) Average Variable Cost (AVC): Variable cost per unit of production is referred to as the average variable cost. It is calculated by dividing TVC by the amount of output manufactured or produced. AVC can also be calculated by dividing TVC by the appropriate output level. Symbolically,

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

Where, X = Output

The typical shape of the average variable cost curve is a U. Due to the use of the law of rising returns, AVC will decrease as output is increased from zero to typical capacity output. However, it is also true that, due to the application of the law of diminishing returns, production AVC will rise sharply above normal capacity.
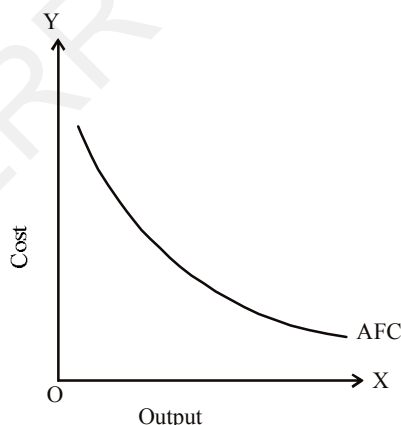
Fig. 3.3: Average Fixed Cost Curve

3.4.4 Graphical Presentation of AVC

Graphically, AVC at every level of output is derived from slope of a line drawn from origin to the point on TVC curve corresponding to particular output level. Fig. 3.4 (a) makes it abundantly evident that AVC at point x_0 is the slope of line OP, AVC at point x_1 is the slope of line oq, etc. In addition, it is clear from Fig. 3.4 (a) that the slope of the line across the origin gradually decreases until it tangents the TVC at point r. The AVC curve initially declines as variable factor productivity rises and reaches a minimum level while the plant is operated optimally with the optimal combination of fixed and variable factors, rising beyond that point as shown in fig. 3.4. The slope of the line through the origin continues to increase towards the right side of point r. (b).
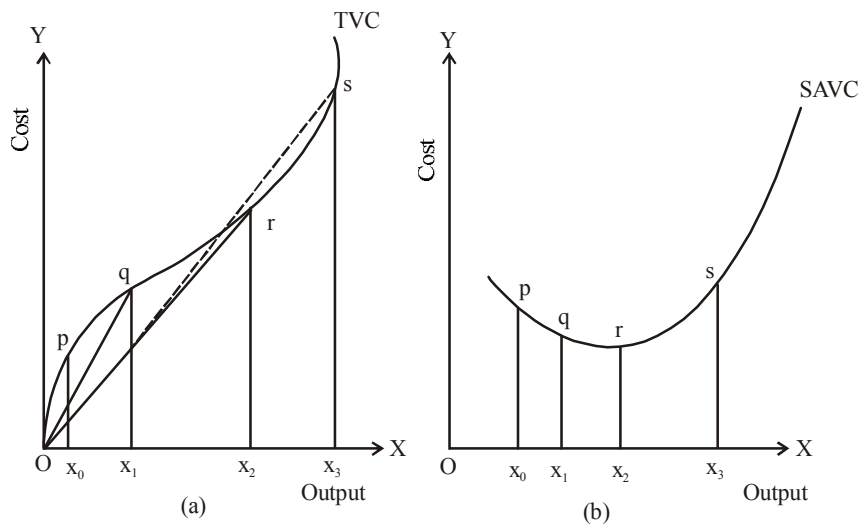
Fig. 3.4: Average Variable Cost Curve

(iii) Average Total Cost (ATC): AVC and AFC together make up the average total cost curve. The vertical distance between ATC and AVC continues to decrease as output level increases, and AVC gets smaller and smaller. While AFC approaches towards X axis AVC curves approaches ATC curve. In simple term, ATC is called Average Cost (AC) and it is obtained by dividing total cost by output produced. Symbolically,

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

Where,   X = Output

As, we know that

$$TC = TFC + TVC$$

$$ATC = AVC + AFC$$

Hence, we can write

$$ATC = \frac{TC}{X} = \frac{TVC + TFC}{X} = AFC + AVC$$

Graphical Presentation of ATC

Graphically, ATC curve is obtained in similar manner as in case of SAVC. At whatever output level A straight line's slope from the origin to any point on the TC curve that corresponds to a certain level of output is known as ATC as shown in fig. 3.5 (a).
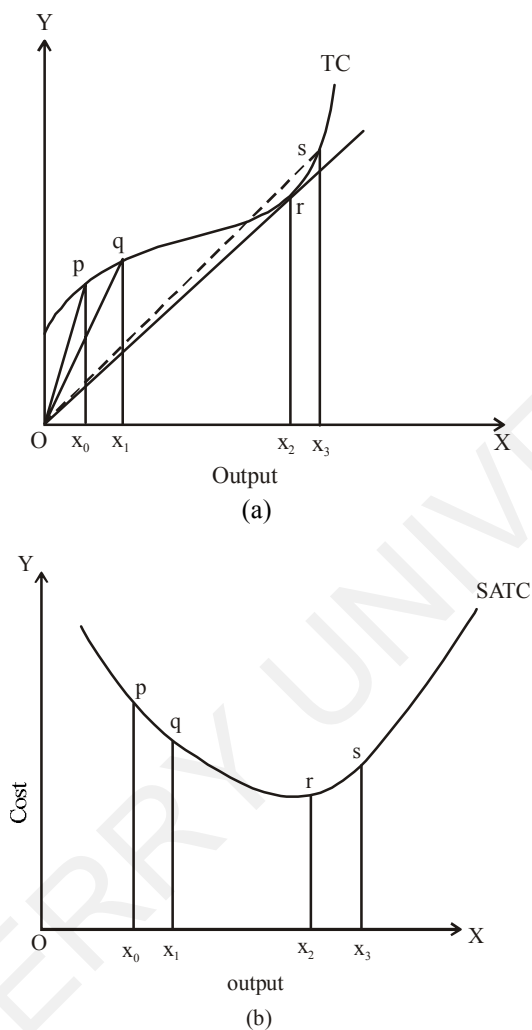
Fig. 3.5: Average Total Cost Curve

From fig. 3.5 (b), it is clear that, shape of ATC is U-shaped like AVC. Though, ATC at initial stages falls, and reaches at minimum level i.e., x_2 and thereafter rises again. It is shown in fig. 3.5 (b).

3.4.5 Why ATC Curve is a 'U-shaped' Curve?

The U-shape of ATC curve can be explained because of following:

1. ATC curve is sum of AFC and AVC curves.

2. By dividing total fixed costs by total production, the average fixed cost is determined. Total fixed costs are constant across all output levels, hence it follows that average fixed costs decrease as output level rises.

3. The law of variable proportions affects average variable cost. The curvature of the average variable cost, which resembles a disc, suggests that it has begun to rise over its level of normal capacity.

4. Average overall cost also decreases as average variable cost does. After that, for a while, even if average variable costs may be increasing, declining average fixed costs outweigh them, resulting in a decrease in

average total costs. Finally, however, the average overall cost is up again. We get an average total cost curve in the shape of a U.

Check Your Progress

5. What is the shape of TVC?

6. What is Average Variable Cost (AVC)?

3.5 THE RELATIONSHIP BETWEEN SHORT-RUN AND LONG-RUN AVERAGE TOTAL COST

Both SRAC and LRAC are drawn subject to following assumptions:

1. Factor prices do not change.

2. Technology does not change.

Fig. 3.6, represent between SAC and LAC curves. Three short-run average cost curves shows different scale of plant. LAC curves envelopes them all. SAC_2 shows optimum scale of plant. Towards left of point M', LAC curve is declining with every larger plant size, economies of scale continue to be generated. Towards right of point M', LAC curve turns towards upwards as diseconomies of scale arise.
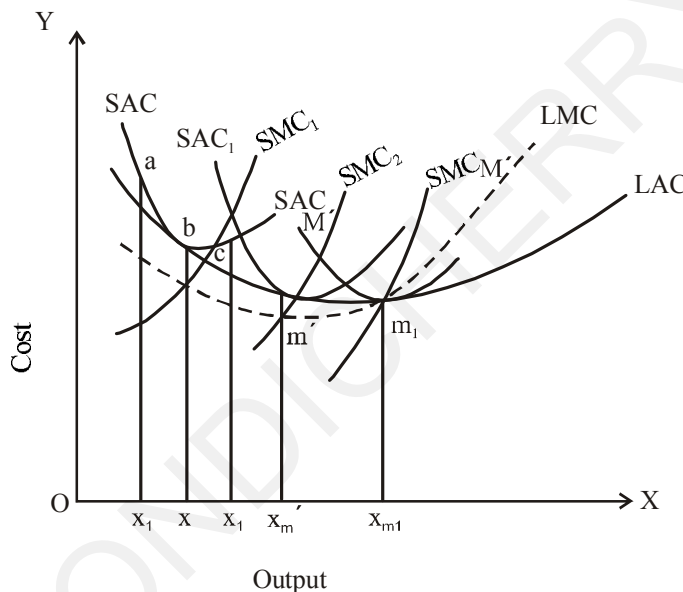
Fig. 3.6: Relationship between SAC and LAC Curves

Towards left of point M' LAC curve is tangential to SAC curve at a point on declining part of SAC curve. It implies that it is possible to build a larger plant in long-run for producing larger output at as cost lesser than minimum cost producing by smaller plant. Therefore, towards left of point M' each plant is underutilized.

Towards right of point M', each plant is overutilized, as larger plant means higher average cost and as a result diseconomics of scale are rising.

Additionally, it should be noted that the LAC curve does not join the lowest cost SAC curve points, except those that pertain to the ideal scale plant, or point M'. The LAC curve is a point of tangency between the LAC and various SAC curves.

At point M'

$SAC_{M'} = SMC_{M'} = LAC = LMC$

Check Your Progress

7. Why LRAC is called Envelop curve?

3.6 ELASTICITY OF COST

Cost elasticity, commonly referred to as cost-output elasticity, gauges how responsively total cost is to output changes. By dividing the percentage change in output by the percentage change in cost, it is calculated. Economies of scale are indicated by a cost elasticity value less than 1.

When there is a rise in output and a decrease in unit cost while maintaining constant input costs, economies of scale occur. When employees specialise, productivity increases and the average cost decreases. As a result, the company may be able to negotiate volume discounts with suppliers more successfully.

Calculation

Calculating cost elasticity involves dividing the percentage change in production by the percentage change in total costs:

Cost Elasticity

$$\frac{\%/\text{Change in Total Costs}}{\%/\text{Change in Output}}$$

Where ΔC is the change in total costs, percentage change in total costs equals $\Delta C/C$. Similarly, percentage change in output is $\Delta Q/Q$. It follows that:

Cost Elasticity

$$\frac{\Delta C/C}{\Delta Q/Q}$$

Cost Elasticity

$$\frac{\Delta C}{\Delta Q} \times \frac{Q}{C}$$

Check Your Progress

8. Define the term cost-output elasticity.
9. How cost-output elasticity is computed?

3.7 AVERAGE AND MARGINAL REVENUE

Revenue Concepts

A company's income from regular business operations, typically from the selling of goods and services to consumers, is referred to in business as revenue or turnover. In common parlance, revenue refers to the money that an organisation

receives in the form of cash or currency equivalents. This means that the gap between sales and expense determines a company's earnings. A business makes money if total revenue exceeds total costs, and *vice versa*.

Total revenue: Whole revenue, often known as gross revenue, is the total amount of money that a business makes from the sale of its goods. Symbolically, it can be expressed as

TR = f (Q)

where, q = The total amount of merchandise sold over the specified time.

The quantity sold times the commodity's selling price equals the total revenue. Symbolically,

TR = Q. P

Where, P = Price per unit.

Average Revenue: The average revenue is the earnings per sold unit. Average revenue is calculated by dividing total revenue by the number of units sold to obtain revenue per unit sold. Symbolically,

AR = TR/Q

Marginal Revenue: A unit change in production sold results in a change in marginal revenue, which affects overall revenue. In other words, the sale of one additional unit of a commodity results in a net increase in overall revenue. According to algebra, marginal revenue is the extra money the company makes by selling n units of a good rather than n-1. As a result, it can be said:

	MR	=	TRn – TRn-1
Where,	MR	=	Marginal revenue
	TRn	=	Sale of n units of output.
	TRn–1	=	Total revenue from sale of n-1 units of output.

Alternatively, Marginal revenue can also estimated by using following formula:

	MR	=	ΔTR/ΔDQ or δTR/δQ
Where,	ΔTR or δTR	=	Change in total revenue.
And	ΔQ or δQ	=	Change in quantity sold.

Check Your Progress

10. Define the term Revenue.
11. What is profit?

3.8 RELATION BETWEEN AR AND MR CURVES
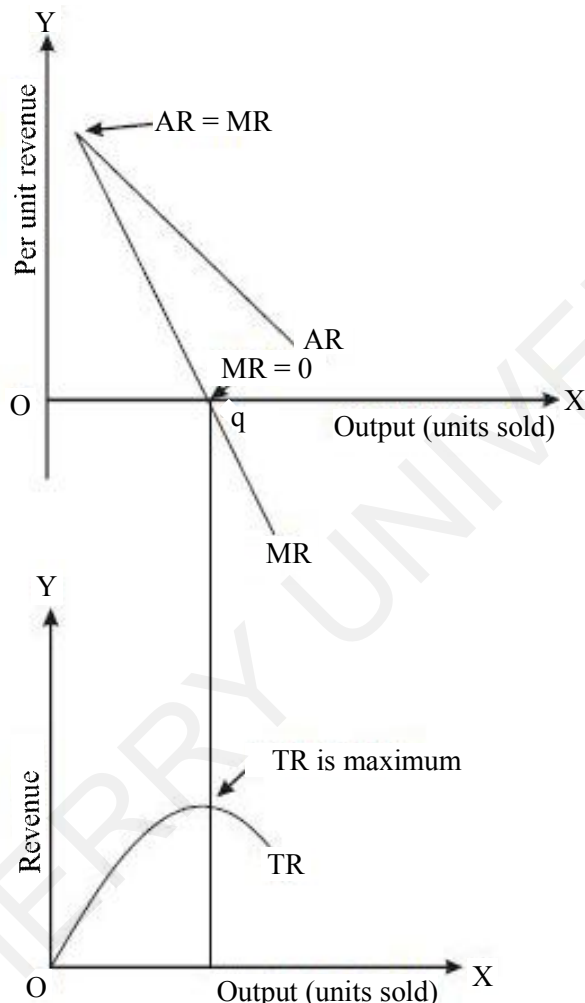
Fig. 3.7: Relationship between AR, MR and TR

Relationship between Marginal, Average and Total Revenues: Instead of using schedules, let's consider the link between average, marginal, and total revenues at each production level. As shown in Fig. 3.7:

1. Total revenue increases and keeps on increasing till marginal revenue is positive, *i.e.,* at Oq total revenue is maximum.

2. Total revenue is at its highest when marginal revenue is zero, or at point "q."

3. When marginal revenue becomes negative total revenue starts declining, *i.e.,* beyond point 'q'.

4. Despite the fact that both average and marginal revenues are falling, marginal revenue is falling more quickly than average revenue, hence marginal revenue will eventually fall below average revenue.

3.9 INTERACTIONS OF COST AND REVENUES

Cost and revenue are crucial ideas in economics. Revenue is the money made by the producer from selling the good or service, whereas cost is the money used to produce it during the production process. Cost thus represents a producer's sacrifice, whereas revenue represents a producer's advantages. The producer can recoup his initial costs by receiving the necessary money from the sale of the commodity. In that situation, we say that the producer received his just share, or profit. Profit can be defined as the difference between revenue and total production costs.

Profit = Total Revenue – Total Cost.

Check Your Progress

14. What is cost?

3.10 CONDITIONS OF EQUILIBRIUM OF A FIRM

The word "equilibrium" is a scientific term. In a constant condition, opposing forces are balanced out. When a customer is receiving the most amount of happiness from his income, he is in balance.

Similar to this, when an industry is in equilibrium, there is no trend for new enterprises to enter or leave. Now, the question arises, under what conditions such equilibrium situations will be achieved.

3.10.1 Equilibrium of Firm

"A firm is a unit engaged in the production for sale at a profit and with the objective of maximizing profit." –Watson

When a company is content with the output it is currently producing, it is in equilibrium. In this case, the company will produce at the output level that results in the greatest profit or the smallest loss. The firm is said to be in equilibrium when this happens.

3.10.2 Conditions of the Equilibrium of Firm

The Equilibrium of the Firm and Industry

In price theory, the idea of firm's equilibrium plays a significant role. When a company is in equilibrium, it has no need to increase or decrease its output. When total profits are at their highest, a company would prefer not to alter its output level. As a result, when a corporation is in equilibrium, it means it is making the most possible money profit. A firm's equilibrium can be depicted in two stages, namely the short-run and the long-run.

Short-run Equilibrium

The short-run is the time span during which a company can alter its output but not its plant size. The number of businesses in a sector is set since neither new businesses nor current businesses have time to quit.

Here, we shall describe the short-term equilibrium of the firm and the industry in two separate scenarios with perfect market competition:

(i) Identical cost condition

(ii) Differential condition

I. Short-run equilibrium of firm (Identical cost conditions)

Firm will be in equilibrium while it maximises its profits, which is determined by difference between total cost and total revenue.

Symbolically,

$$\pi = TR - TC$$

where π = Profit

Graphically, equilibrium of firm may be shown in two ways:

(i) TR and TC curves

(ii) MR and MC curves

(i) TR and TC curves of a firm in a perfectly competitive market: A straight line crossing through the origin in Fig. 3.8's total revenue curve (TR) indicates that prices are consistent at all output levels. Since the company accepts any price, it may sell any quantity of goods, and as a result, TR rises according to sales. Slope of TR is MR and constant and equivalent to existing market price.

So, MR = AR = P.

Because of the rules of variable proportions, the shape of the TC curve resembles the average cost curve in a U-shape. Due to the widest distance between TR and TC in Q_1, the company's profit will be at its highest.
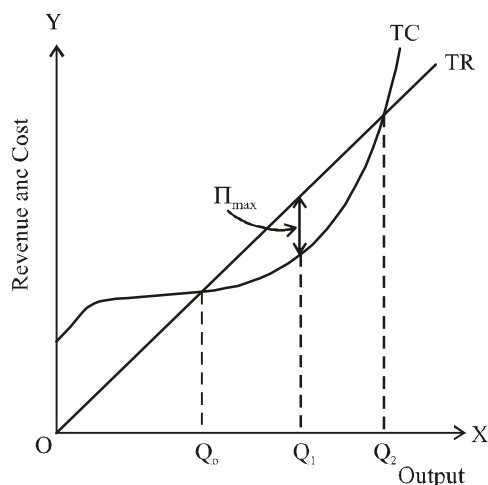
Fig. 3.8: TR and TC Curves in a Perfectly Competitive Market

(ii) MR and MC curves of a firm in a perfectly competitive market (Identical cost condition): The TR and TC curve technique is not appropriate when studying industries with integrated enterprises. Here, MR and MC curve approach will be suitable which clearly represents behavioural rule which results profit maximisation.

An individual company is a price taker in a market with perfect competition. In an industry with perfect competition, market forces determine price. Thus, enterprises receive the price set by the industry. So, no individual firm in a competitive industry cannot influence price by its own individual action. Figure 3.9 displays the firm's average and marginal cost curves along with the demand curve. Therefore, in a market with perfect competition, the demand or average revenue or marginal revenue curve is perfectly elastic at the current price. i.e., MR = P. Under perfect competition an individual firm will have to all additional output at similar price level and thus MR coincides with AR curve. But, so far as quantity of unit of output is concerned which a competitive firm produces in short-run period is absolutely depends upon its MC as well as price. Firm will be in equilibrium and earns maximum profit at Q_E in fig. 3.9 where
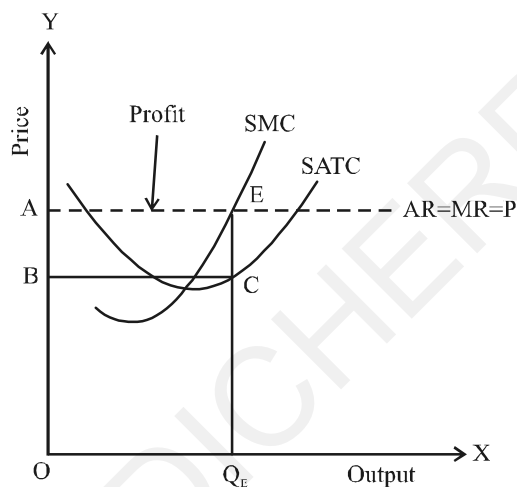
Fig. 3.9: MC and MR Curve in a Perfectly Competitive Market where MC = MR

(i) MC = MR

(ii) MC curve cuts MR curve from below.

In fig. 3.9, to the left of Q_E

MC < MR, because revenue is greater than marginal cost.

to the right of Q_E

MC > MR, because cost is greater than revenue.

But ironically, fulfilment of exclusive condition MC = MR is not sufficient to justify a firm's equilibrium condition.

From fig. 3.10, it is clearly seen that, MC = MR condition is met at point E'. But it does not mean that it is equilibrium condition. For the goal of achieving balance, the MC curve must be steeper than the slope of the MR curve in order to

cut the MR curve from below. At point E, the slope of the MC is positive whereas the slope of the MR is 0 for each output level. So $Q_E > Q_{E'}$
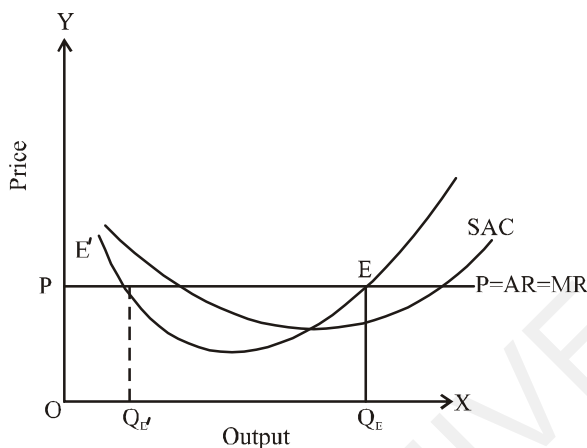
Fig. 3.10: MC and MR Curve in a Perfectly Competitive Market where: (i) MC = MR, (ii) MC cuts MR from below

i.e., point E satisfies both conditions for equilibrium i.e.,

(i) MC = MR = Price.

(ii) MC curve cuts MR curve from below.

It is also to be remember that more fulfilment of above two condition does not guarantee that firm will make positive profits. It is, therefore, indispensable to analyse relationship between average cost and average revenue or price as shown in fig. 3.11.
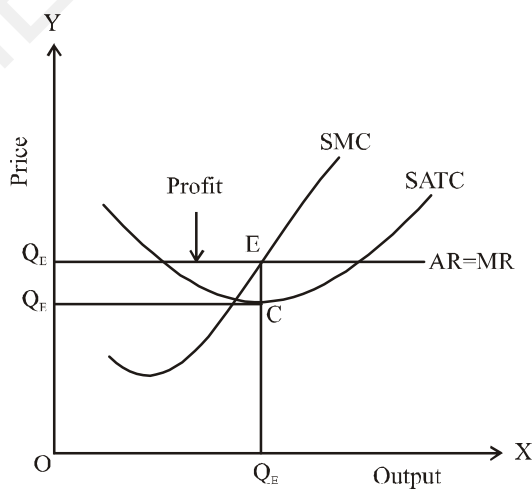
Fig. 3.11: SATC and SMC Curves with Identical Cost Curves (Short-run) where Existing Firms Earns Supernormal Profits

In fig. 3.11, SATC and SMC are short-run average total cost and marginal cost curve respectively.

OA = Market price

OX_E = Equilibrium output

E   =   Point of equilibrium

EQ_E =   Average revenue

CQ_E =   Average cost

EC   =   Profit per unit of output

Here,

Profit per unit = EC

Total output = BC or OQ_E

Thus, Total profit = ABCE

In this situation, all firms in the industry having identical cost condition and thus each firm is earning supernormal profits. Since period is short and all firms are in equilibrium, there will be a tendency to enter the industry by new entrants to compete away supernormal profits. But due to short period no new firm can enter the industry to compute away supernormal profits earned by existing firms and equilibrium will persist at price level OA and with the identical cost curves.
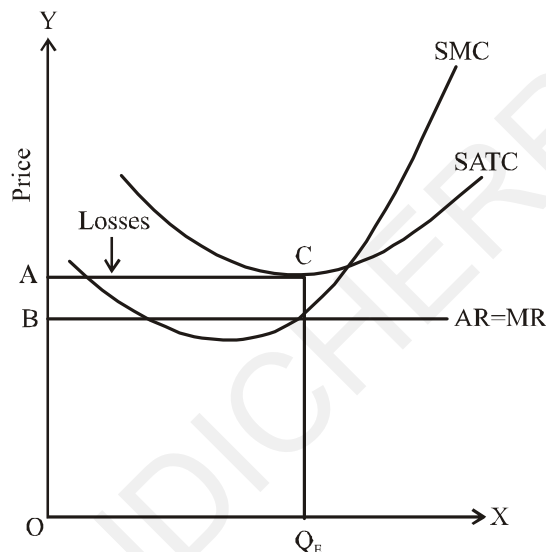
Fig. 3.12: Equilibrium of Firm while it Minimises its Losses

Now, let it be remembered that equilibrium of firm takes place not only while its profit will be maximum, but also while it minimises its losses. In fig. 3.12.

OB   =   Reduced price

E   =   Equilibrium point (MC = MR)

Here, at E, MC   =   MR

OQ_E =   Equilibrium output where loss will be minimum

EQ_E =   Average revenue

CQ_E =   Average cost

CE   =   Loss per unit of output

Here,

$$CE = \text{Loss per unit of output}$$

BE or OQ_E = Total output

Thus, Total loss = ABEC

In this situation, at price OB, undoubtedly firm will be in equilibrium but not industry as a whole as all firm are suffering or incurred losses. Consequently, firm will leave industry for searching of earning at least normal profits somewhere else in the industry. But it is to be remembered that firm can do so in long-run, and it is not possible in short-run.

Up until this point, it has been clear that a company will lose money if the price is below the short-term average cost at every output level. The question now is: Will the company keep operating at a loss? Choices open to firm are:

1. Whether to produce at a loss.

2. Whether to discontinue production.

During short-run firm may be able to stay in business. In this case firm cannot change its fixed capital, as time is so short. If during short-run, firm closes down altogether, it has to bear fixed cost irrespective of the fact that it produces or not. It can avoid only variable cost. So, the firm will stay in business till it can cover its variable cost – as firm knows that fixed cost will have to bear at any level of output during short-period. In summary, the company should keep producing in the near term until the market price exceeds the average variable cost as shown in fig. 3.13.

Figure 3.13 shows the short-run average total cost and marginal cost curves, respectively. AVC is Average Variable Cost Curve.

Now, if the price is OP_2, the firm is in equilibrium at point B and experiences losses, which correspond to the P_2BEG area.

But firm covers TVC and part of FC, because (Price) OP_2 or $BQ_2 >$ (AVC) CQ_2 and OQ_2 = Equilibrium output.

But if price declines to OP_3, firm will be in equilibrium at point A – which covers only its variable cost but not at all its fixed cost.

In this situation, (Market price) $OP_3 =$ (AVC) AQ_3 at OQ_3 level of equilibrium output.

Point A is, therefore, closing down point or shut down point.

At price level OP_4 firm will not be able to cover its variable cost, because, (Price) $OP_4 <$ AVC at every level of output: Here, loss of firm will be equal to fixed cost plus a part of variable cost not covered by total revenues.

Hence, firm will stop production any output at price OP_4 and will wait and observe for some good opportunity to start operation.

On the other hand, if market price is OP_1 instead of OP_2 then, OM = Equilibrium level of output and at point B:

1. Firms are earning normal profit

2. MC = MR

3. MC cuts MR from below

4. P or AR = AC

As all firms in the industry earns normal profit, no firm will enter the industry or leave the industry. Point B is the position of full equilibrium in the industry even in short-run period. Because of the presence of large number of firms no individual firm will earn super normal profits.
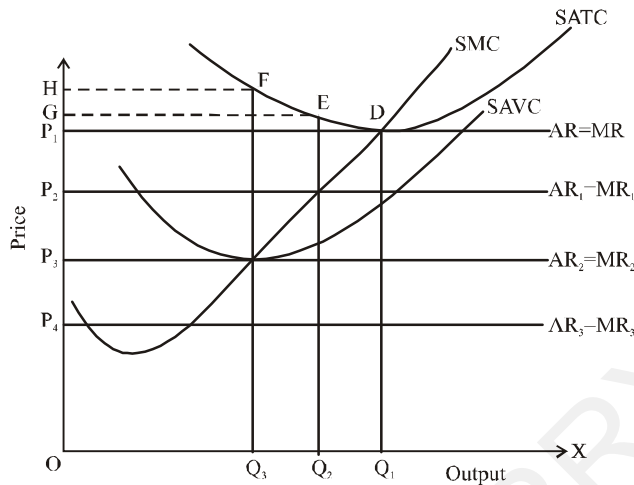
Fig. 3.13: Option of Firm of Production Regarding: (a) Whether to Produce at a Loss, (b) Whether to Shut down or Discontinue Production

I. Short-run Equilibrium of Firm (Differential Cost Conditions)

Let us now shift on a different concept and assume a circumstance while entrepreneurs are not identical is efficiency. Consequently, costs of the firm will differ. Though factors of production are homogeneous and procured at uniform price. Efficient entrepreneurs will produce products at a lower cost than comparatively inefficient entrepreneurs. It is true that selling price is uniform in the industry and each firm seeks maximum profit – which of course differs because of individual cost of production. This situation persist during short-run as shown in fig. 3.14.

In fig. 3.14 firm A is most efficient entrepreneur.

Here, Point E = Equilibrium point, as

(i)   MR = MC

(ii) MC cuts MR from below

OQ_E = Equilibrium output

ABCE = Super normal profits earned by firm A.
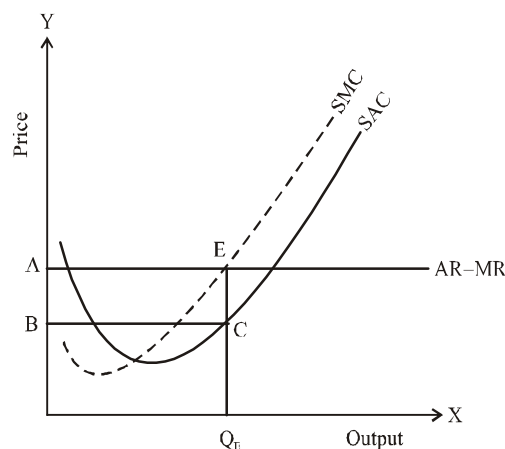
(a) Efficient entrepreneur earns super normal profit
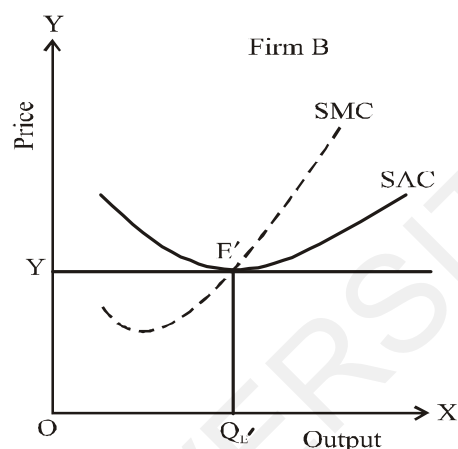
(b) Less efficient entrepreneur earns normal profit
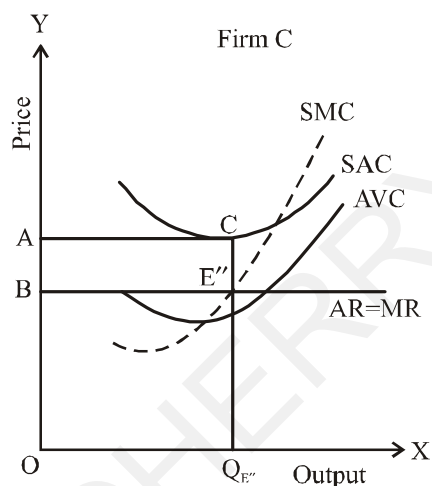
(c) Comparatively less efficient entrepreneur incur losses (covers average variable cost and a part of fixed cost)
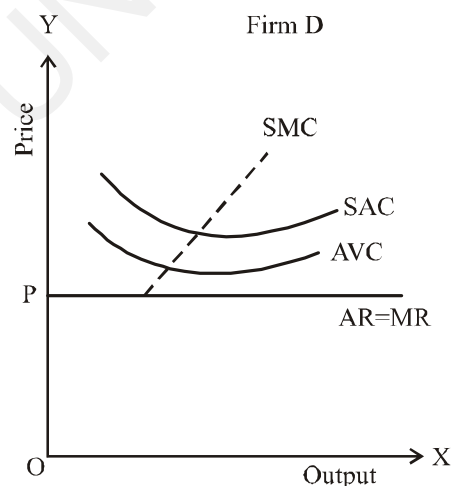
(d) Least efficient entrepreneur fails to cover events average variable cost and to reach equilibrium position at any level of output

Fig. 3.14

Now, as shown in fig. 3.14 (b) in case of firm B, less efficient entrepreneur.

Here, OQ'_E = Equilibrium output and earns normal profits.

Again, according to fig. 3.14 (c) in case of firm C, comparatively less efficient entrepreneur and incur losses.

Here, ABE"C = Total losses incurred by firm C though it covers its variable cost.

OQ_E" = Equilibrium output.

OB = Average variable cost and also a part of fixed cost covers by firm C consequently firm C decides to stay in the industry.

Lastly, according to fig. 3.14 (d) firm D is least efficient entrepreneur.

Here, OP = Price

In this case of firm d, price OP fails to cover even its average variable cost and deter to reach any equilibrium level of output. In this situation, MC curve does not cut its MR curve and thus consequently discontinue production even in short-run period. Hence from above, it is evident that entrepreneurs are heterogeneous though all other factors are homogeneous. Yet the industry as a whole will not be in equilibrium condition for following two reasons:

1. All firms are not in a position to reach equilibrium position.
2. All firms are not earning normal profits. Few firms earns super normal profits while some incurs losses.

II. Supply Curve of the Firm and Industry in Short-run

A. Supply curve of firm (Short-run): The intersection of a firm's supply and demand curves allows for the derivation of its marginal cost curve. In the near run, a single firm will create an output where its marginal cost is equal to the selling price. Price must be higher than the average variable cost for a firm to supply its goods. In other words, the portion of a firm's marginal cost curve that is above its average variable cost curve is the firm's short-term supply curve. Fig. 3.15 (a) represents five different price and relevant equilibrium amounts for every price level. ISMC depicts the short-run supply curve of a specific firm in figure 3.15 (a). Consider a price increase that causes a firm's demand curve to shift upward. Due to having positive slope each higher demand curve intersects MC curve at a point right of earlier intersection, which indicates firm will produce and supply increasingly larger quantities at higher and higher price levels. But at any case, firm will not supply anything for any price below price OP_2 i.e., it won't be able to pay its variable costs, so it will shut down. Figure 3.15 depicts this scenario (a). It is evident that each firm's supply curve is identical to its marginal cost curve toward the right of the shut-down point if we graphically represent the pertinent points of intersection of the marginal cost curve and demand curve as shown in fig. 3.15 (b) i.e., point S. Below price OP_2 firm will not supply any product in market.

B. Industry supply curve (short-run): Let us now divert the direction of our discussion towards industry supply curve during short-run. For this again concentrate on fig. 3.15 (b). Now for the time being for the purpose of our analysis let us consider that there are 100 firm in an industry. At price OP_2 firm supplies OM level of output. Here, MC = MR and thus firm is in equilibrium at OM level of output as it covers merely its variable cost here. According to our assumption since there are 100 different individual firms in whole industry amount of total quantity supplied will be equal to 100X OM level of output which is plotted against price OP_2. Likewise similar quantity will be plotted at different price level like OP_3, OP_4, Op_5 etc. As the price will increase more quantities will be supplied by every individual firm. But simultaneously, it is also to be observed from fig. 3.15 (a), no firm will supply any of its product at price below OP_2, because, it is minimum price requirement for firm which just equal to its average variable cost.

(a) Short-run supply curves of an individual firm

(b) Supply curve of individual firm OR quantity supplied by individual firm
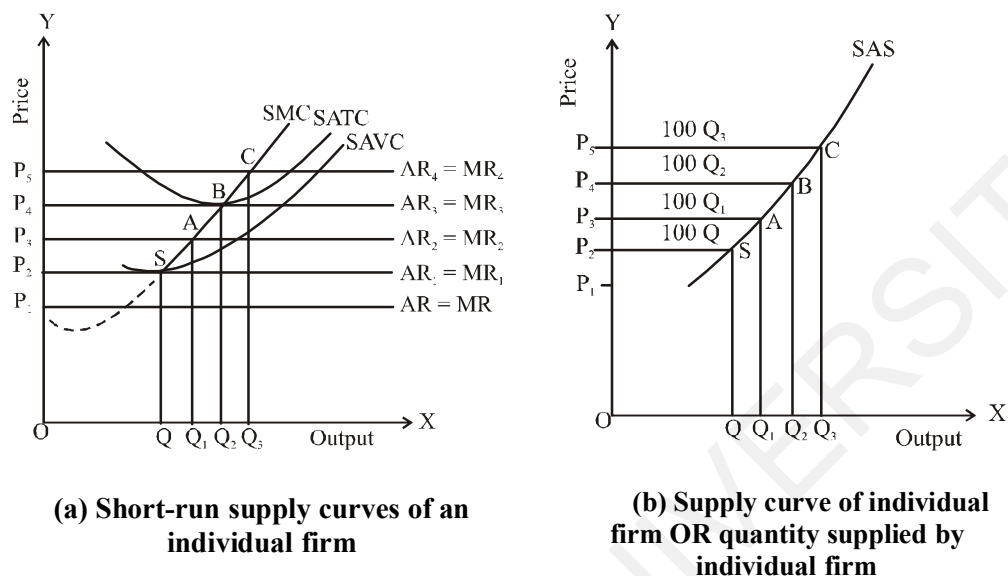
Fig. 3.15: Short-run Supply Curve of Firm and Industry

The short-run supply curve for the whole industry is created by lateral summing the portion of each firm's marginal cost curve that is above the minimum points on their AVC curves. Because short-run marginal cost-curves of businesses always slope upward above the minimum point of average variable cost curves, the short-run supply curve of industry will always slope upward.

In fig. 3.16 (a), industry supply curve is shown by a straight line having a positive slope. In this instance, it is presumed that both price and technology are present. However, the actual form of the market supply curve depends on the technology available, the cost of the factors, and the distribution of company sizes over the entire sector, which in turn depends on the effectiveness of the individual entrepreneur.

Short-run Equilibrium of Industry

To make matters simple at this point it is necessary understand how individual firm's supply curves aggregate in short-run to produce an industry supply curve. In this regard, equilibrium will be reached at a price where quantity demanded will be equal to amount supplied if market demand and market supply of an industry are understood.

Figure 3.16 (a) depicts an industry in equilibrium at price level P*, with quantity required as well as supply being represented by Q*. Short-term equilibrium will be reached. r. In fig. 3.16 (b) and 3.16 (c) it is demonstrated that businesses are making excess profits and losses, respectively, at the current prices.

II. Long-run Equilibrium

During long-run, as all inputs are variable, an entrepreneur adjust his plant size and output to attain maximum profit. In this situation business can be liquidated entirely by transferring its resources into an alternative more profitable investment. In this process of entry and exit of firms in industry counterbalance

each other provided profit prospects are brighter there than elsewhere as it is key element for establishing long-run equilibrium.

In this section we shall design our analysis into three parts. Initially, we shall study long-run equilibrium of individual firm, thereafter analysis will consider industry equilibrium in long-run and ultimately it shall examine optimality in allocation of resources in long-run equilibrium:

A. Long-run equilibrium of firm: Long-term enterprises will be in equilibrium if they produce at the long-term average cost curve's minimum point, which is tangent to the demand curve shown by the current market price, and make a normal profit. If they make excessive profits, new competitors will be drawn to the market, which will cause prices to drop and cost curves to shift upward due to an increase in factor prices brought on by the industry's expansion. This changes will persist till LAC in tangent to demand curve. On the other hand, in case firm incurs losses they will leave the industry. Consequently there will be hike in prices followed by decline in cost as contraction of industry takes place. It will continue till remaining firm cover their total cost and start earning normal profit.

Let us analyse above stated fact graphically. If we see fig. 3.17 (b) we will be able to understand how firm adjust in long-run equilibrium position. At price level P_1 firms earns excess profit at a cost shown by SAC_1, which motivate to make new capacity and will move along its LAC.
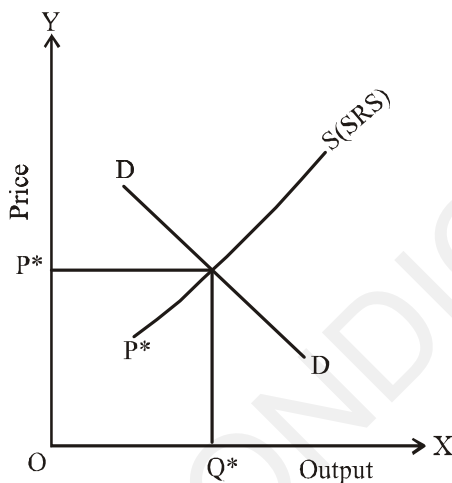
(a) Short-run industry equilibrium
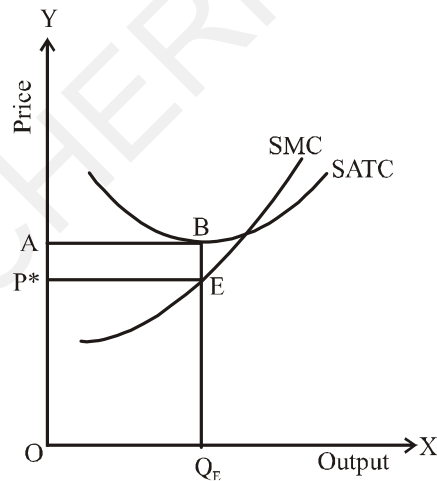
(b) Short-run equilibrium of a firm (excess profit)
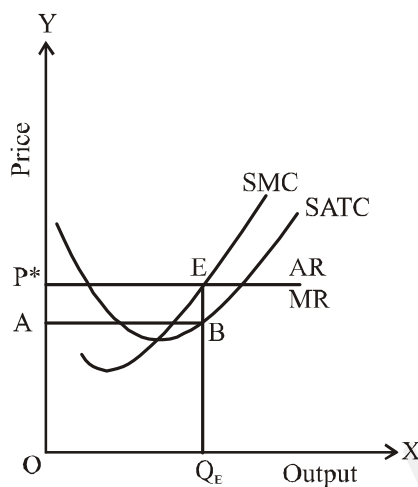
**(c) Short-run equilibrium of a
firm (losses)**

Fig. 3.16: Short-run Equilibrium of Industry
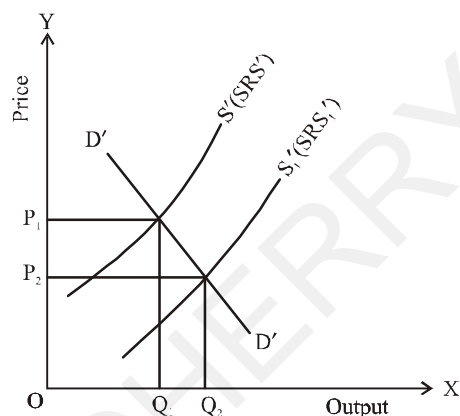
**(a) Shift of supply curve of firm
in long-run**
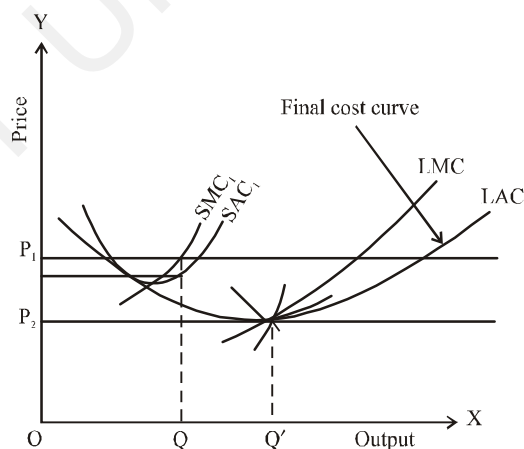
**(b) Adjustment of firms in long-run
equilibrium**

Fig. 3.17: Equilibrium of Firm in Long-run

Additionally, excessive earnings will entice new businesses to the sector. As a result of the increase in supply, the supply curve will shift to the right, and the price will decline until it hits price P_2 as shown in fig. 3.17 (a).

In long-run equilibrium of firm,

LMC = LAC = P ...(1)

During equilibrium

$\quad$ SMC $\ =\ $ LMC

and $\quad$ SAC $\ =\ $ LAC

So, from above mentioned condition (1) we can write it as

SMC = LMC = LAC = LMC = P = MR

From the aforementioned, it is clear that the LAC plant operates at its peak efficiency at the minimum point, when LAC and SAC also meet.

B. Long-run equilibrium of industry: In long-term, the economy will be in equilibrium while all firms are in equilibrium at certain price level i.e., production is being carried out at minimum point of LAC curve and earns normal profits. Here, at this condition of existing technology and prevailing factor price no further entry or exit of firms takes place. As shown in fig. 3.18 (b) at price level P firms manufacturer at their least cost to make normal profit. At output QE firm obtains equilibrium earns maximum profit as here,

$$LMC = SMC = P = MR$$

and also $LAC = SAC = P$ at minimum point of LAC.

Therefore, according to this condition, as shown in fig. 3.18 (a) DD is market demand curve and P is long-run equilibrium price.

(a) Industry

(b) Firm
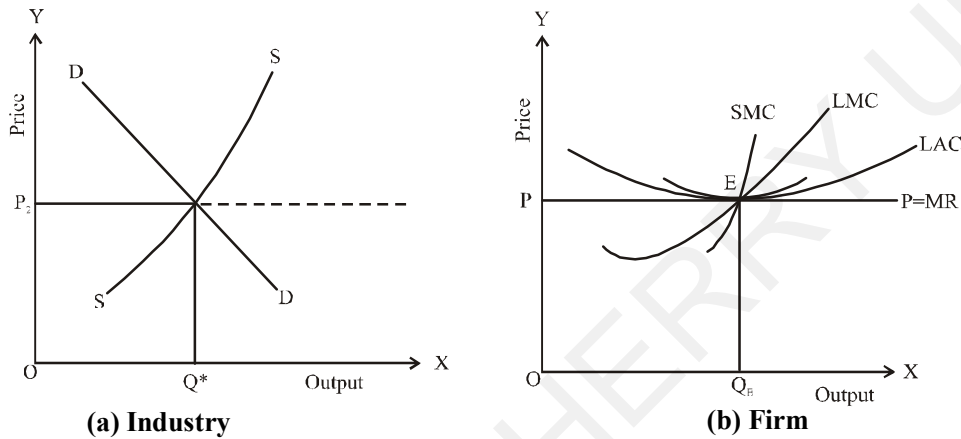
Fig. 3.18: Industry Equilibrium in Long-run

(a) Market equilibrium condition

(b) Equilibrium of a comparatively efficient firm
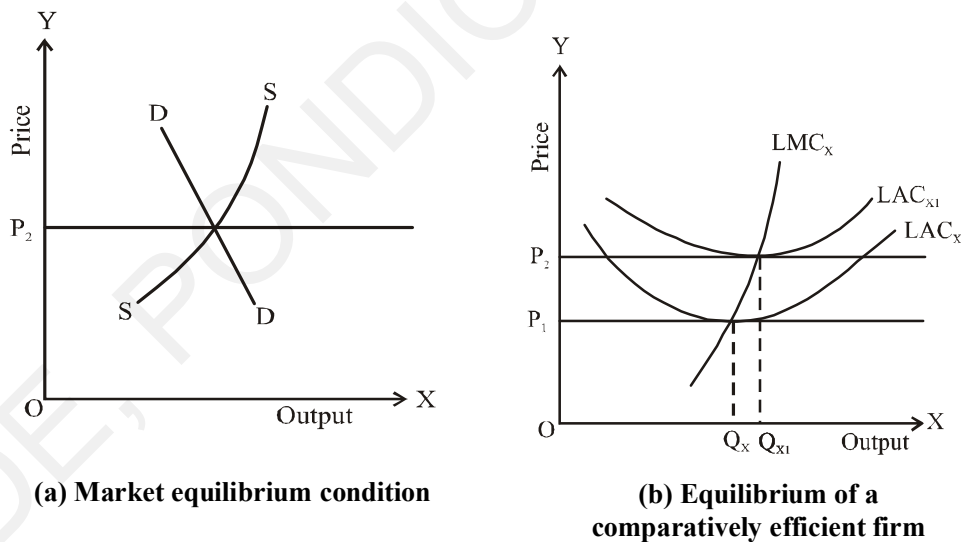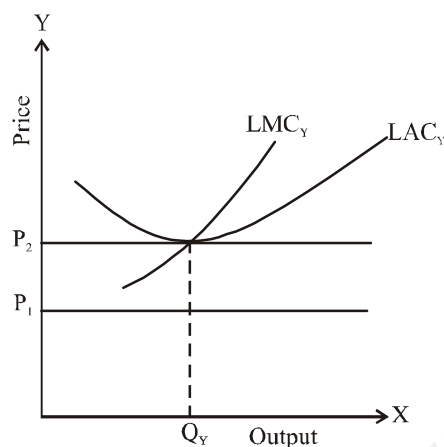
(c) Equilibrium of a new firm

Fig. 3.19: Firms having Same unit Cost in Long-run Equilibrium

One thing is to be noted here that as price in market is uniform, it does not mean that all firm have same minimum LAC. The reason is all firms are not equally efficient. As such efficient firms employs more productive factor or expert managers by paying higher remuneration because they are more productive. Otherwise, new firms will bid them off. Instead, effective businesses generate a rent that they pay to better resources when prices rise. As a result, it turns into cost and LAC, which shift higher together with an increase in market-level pricing. Old efficient firms' LAC was redrewn in this instance to be tangent at a higher price level. But until the factor price for the industry as a whole increases, LMC of old enterprises won't be impacted. As a result, the old efficient firms will be in equilibrium, and in the long term, all enterprises will have the same unit cost, as shown in fig. 3.19. From fig. 3.19 it is clearly visible that at price P_1 i.e., No new company entered the market at the first price point since it could not make a profit. However, at P_2 price level, firm Y joins and generates regular profit. But as a result of earning rents (imputed costs), efficient company x's LAC shifts upward and it eventually reaches a new long-run equilibrium at the level of production Q_{x1}.

Check Your Progress

15. Define the term firm's equilibrium.

3.11 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Product is the entire amount of items created over a specific period of time, and during this production process, the producer is required to pay these production elements for their labour.

2. Money costs refer to the total amount spent by a company on the various inputs used in the production of a good or service.

3. The Law of Variable Proportion is a crucial economics concept. The law, as it is known, stipulates that as the amount of one factor of production

increases, and all other factors remain unchanged, it leads to decline of the marginal product of that factor.

4. The law of variable proportions is universal in that it can be used in any sector of the production process. Any sphere of production where some factors are fixed while others are variable is subject to this law. It is known as the law of universal application for this reason.

5. The law of variable proportions can be seen in the inverse "S" form of total variable cost.

6. Variable cost per unit of production is referred to as the average variable cost. To get it, divide TVC by the amount of output produced or manufactured.

7. LRAC curves envelopes all SRAC. Thus it is also called as Envelop curve.

8. Cost elasticity, commonly referred to as cost-output elasticity, gauges how responsively total cost is to output changes.

9. By dividing the percentage change in output by the percentage change in cost, it is calculated. Economies of scale are indicated by a cost elasticity value less than 1.

10. A company's income from regular business operations, typically from the selling of goods and services to consumers, is referred to in business as revenue or turnover. In common parlance, revenue refers to the money that an organisation receives in the form of cash or currency equivalents.

11. A company's profits are based on the difference between its income and costs. A business makes money if total revenue exceeds total costs, and *vice versa*.

12. The additional revenue generated by the sale of one more unit of output is known as marginal revenue (MR).

13. The term "average revenue" describes the sum of money made from each individual unit or user. The average revenue is calculated by dividing the total revenue by the quantity.

14. Cost is the amount spent during the production process to create a good or service.

15. When a company is in equilibrium, it has no need to increase or decrease its output.

3.12 SUMMARY

1. Product is the entire amount of items created over a specific period of time, and during this production process, the producer is required to pay these production elements for their labour.

2. Money costs refer to the total amount spent by a company on the various inputs used in the production of a good or service.

3. When a company is in equilibrium, it has no need to increase or decrease its output.

4. Money cost related concept is that of real cost. It indicates sacrifices made by every factor in manufacturing a commodity.

5. Opportunity cost is otherwise known as alternative cost. It refers to next best alternative sacrificed or foregone.

6. Explicit costs are often payments made under a contract by the employer to the proprietors of the components of production whose services the firm has procured for output.

7. Implicit costs are those that develop when an employer supplies factors that he or she has access to.

8. A company can categorise the inputs it uses into two groups. Some inputs are fixed and can only be used for a certain amount of time. For instance, fixed inputs are machinery, equipment, land, buildings, permanent staff. Costs incurred on all such factors of production are called fixed costs, as these are indivisible and have to be engaged for technical reasons in certain sizes. While these factors are once engaged, they can be utilised over a period of time.

9. Due to the finite nature of inputs that are used just once, such as gasoline, raw materials, etc., variable cost occurs. If output level needs to be raised, company should invest more in such things. In light of the fact that variable costs grow as output increases, they will also be zero if output is zero.

10. Incremental costs are closely related to the concept of marginal cost but with a somewhat larger connotation. The terms incremental cost and marginal cost both refer to the overall additional costs incurred as a result of decisions to increase output, add new product varieties, or both. Marginal cost denotes the cost of the marginal unit, or one unit of output. In a nutshell, we can also say that incremental costs result from changes in product lines, the addition or introduction of a new product, the replacement of outdated equipment and plant, the adoption of new production techniques, and other factors.

11. Sunk costs are expenses that are incurred once and cannot be changed, increased, decreased, or recovered through changing output rates.

12. Private expenses are those that are actually incurred by a person or a business when they buy products and services from the market. These expenses are therefore internalised expenses that are included in the total cost of production for the company.

3.13 KEY TERMS

- **Money Costs:** Money costs refer to the total amount spent by a company on the various inputs used in the production of a good or service.

- **Real Cost:** Money cost related concept is that of real cost. It indicates sacrifices made by every factor in manufacturing a commodity.

- **Firm's equilibrium:** in equilibrium, where there is no incentive for it to increase or decrease production.

- **Alternative or Opportunity Cost:** Alternative cost is another name for opportunity cost. It refers to next best alternative sacrificed or foregone.

- **Explicit or Expenditure Costs:** Explicit costs are often payments made under a contract by the employer to the proprietors of the components of production whose services the firm has procured for output.

- **Implicit or Non-expenditure or Imputed Costs:** Implicit costs are those that develop when an employer supplies factors that he or she has access to.

- **Fixed or Supplementary Costs:** A company can categorise the inputs it uses into two groups. Some inputs are fixed and can only be used for a certain amount of time. For instance, fixed inputs are machinery, equipment, land, buildings, permanent staff. Costs incurred on all such factors of production are called fixed costs, as these are indivisible and have to be engaged for technical reasons in certain sizes. While these factors are once engaged, they can be utilised over a period of time.

- **Variables of Prime Costs:** Variable cost occurs due to exhaustible nature of input by single use, e.g., fuel, raw materials, etc. If output level has to be enhanced firm should spend more on such items. Therefore, variable cost rises while output increase and hence, Variable cost will also be zero if output is zero.

- **Incremental Costs and Sunk Costs:** Even if they have a somewhat larger meaning, incremental costs are closely related to the idea of marginal cost. The terms incremental cost and marginal cost both refer to the overall additional costs incurred as a result of decisions to increase output, add new product varieties, or both. Marginal cost denotes the cost of the marginal unit, or one unit of output. In a nutshell, we can also say that incremental costs result from changes in product lines, the addition or introduction of a new product, the replacement of outdated equipment and plant, the adoption of new production techniques, and other factors.

- **Sunk Costs:** Sunk costs are expenses that are incurred once and cannot be changed, increased, decreased, or recovered through changing output rates.

- **Private Cost:** Private expenses are those that are actually incurred by a person or a business when they buy products and services from the market. These expenses are therefore internalised expenses that are included in the total cost of production for the company.

- **Social Costs:** Social costs refer to all expenses that society incurs as a result of producing a good or service. Both internal and external costs are included.

- **Cost Function:** Cost function expresses relationship between cost as well as its determinants.

3.14 SELF-ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Define the term cost/cost of production.
2. Write short notes on money cost.
3. What do you understand by the Real cost?
4. Write short notes on Expenditure cost.
5. What do you understand by Imputed cost?
6. Explain the term Fixed and Variable cost.
7. Explain Past Cost and Future Costs.

Long Answer Questions

1. Explain Traditional Theory of Cost.
2. Explain Cost Function.
3. Illustrate The Law of Variable Proportion.
4. Explain Short-run costs of the Traditional Theory (Total Cost, Average Cost, Marginal Cost).
5. Explain cost curves and their shaoes.
6. Illustrate relaytionship between SRAC and LRAC.
7. What is cost elasticity and how it is computed?

3.15 REFERENCES

1. S.K. Misra & V.K. Puri. 2011. Principles of Microeconomics. Himalaya Publishing House, Mumbai.

Unit IV   Market Structure and Equilibrium

Learning Objectives:

By end of this unit the learners would be able to understand:

- Market concept
- Market types
- Importance of Time Element in Price Theory
- Firm and Industry
- Monopolistic Competition
- Duopoly and Oligopoly
- Price Discrimination
- Control and Regulation of Monopoly
- Collusive Price Leadership
- Kinked Demand Curve
- Comparison of Various Markets

Structure:

4.1   INTRODUCTION

In this unit, we shall study fundamental aspects of market like its concept, type, and importance of price theory. Gradually as this unit advances we shall focus our attention to its complex issues particularly: Monopolistic Competition, Oligopoly, Price exclusion, monopoly power, collusive price setting, and a kinked demand curve. Multiple market comparisons have been included.

4.2   MARKET CONCEPT

The word "market" typically refers to a location where items are bought and sold. However, in an economic sense, a market is a system by which buyers and sellers negotiate a product's price, agree on a price, and conduct business. In contrast, it alludes to a region where buyers and sellers are free to compete with one another. As a result, the notion of a specific locality or geographic location is not necessary to the concept of market. Therefore, buyers and sellers do not need to interact personally. Rather, all that is required for the market to function is communication between buyers and sellers so that a transaction can happen between them at a predetermined price. In certain cases such as forward sale and purchase, even transfer of ownership of commodities is not required. So, in economics, the term market is a wider concept. It may be local, regional, national or international. According to Prof. Cournot, Economists use the term "market" to refer to a region rather than a specific location where products are purchased and sold because this allows for close and free communication between buyers and sellers and the easy and quick convergence of commodity prices to equality.

Characteristics

Following are major features or characteristics of market:

(a) **Area:** The term "market" does not refer to a particular location where buyers and sellers congregate to buy and sell items. Rather, it implies entier region where buyers and sellers are spread over. Hence, market does not refer any geographical territory.

(b) Buyers and Sellers: The market requires both buyers and sellers to be present. Although their physical presence is not mandatory. Instead, they enjoy liberty to contact through telephone, fax, e-mail or middlemen.

(c) Commodity: There must be some commodity, which is dealt with.

(d) Competition: Free competition between buyers and sellers is necessary for a single price to rule the market for the same good.

Check Your Progress

1. Define the term 'Market'.
2. What are the major features of market?

4.3 TYPES

4.3.1 Classification of Forms of Market or Market Structure and Degree of Competition

Economists have given various definition for classification of market structure. However, the classification of market structures is based on three key elements: the number of firms producing a product, the type of product provided by firms (homogenous or differentiated), and the entrance requirements. In this course, we're interested in how commodity prices are established in various market segments. How are pricing and output determined in the actual world, and how much of this is influenced by market structure? Actual and future consumers and sellers of a particular product make up the market. The quantity of product sellers in a market affects the type and intensity of competition there. Therefore, market structure refers to the type and level of competition that exists between buyers and sellers of a product. In fact, the degree of pricing freedom and control that a firm has over the price of its own product decreases as the level of competition increases, and *vice versa*. Typically, four different market kinds are recognised. These are listed below:

1. Perfect competition
2. Monopoly
3. Monopolistic competition
4. Oligopoly

1. Perfect Competition: Under perfect competition, a firm takes prices rather than sets them. The industry determines price (market). An industry is the culmination of all businesses manufacturing the same product.

2. Monopoly: The word monopoly is composed of two words i.e.:

(a) 'Mono' implies single and

(b) Poly implies a seller.

As a result, the term "monopoly" describes a market condition in which a single company sells a good for which there are no direct competitors. It is not only difficult, but also impossible, to break into the sector.

3. **Monopolistic Competition:** It is distinguished by a high concentration of businesses and product variety. According to Left Witch, monopolistic competition refers to a market condition in which there are numerous sellers of a particular commodity, but each seller's product is in some way distinct from the products of each other seller in the eyes of consumers. In the current market environment, entering or leaving the sector over the long-term is simple.

4. **Oligopoly:** A market condition known as an oligopoly occurs when there are only a few companies in the sector offering either uniform items or products with little room for differentiation. It is feasible to enter the industry, but it is not simple. Duopoly exists when there are just two sellers in the market.

However, imperfect competition is distinguished from perfect competition by the terms oligopoly, monopolistic competition, and oligopolistic competition. In this unit, we shall study only perfect competition and monopoly, as remaining portion is outside the scope of this book.

Check Your Progress

3. Define the term Perfect Competition.
4. Define the term Monopolistic Competition.

4.4 PERFECT AND IMPERFECT FORMS

4.4.1 Perfect Competition

The term competition is used ambiguously both in economic literature and in ordinary usage. Generally it means rivalry. But the term competition in economics does not mean rivalry. Prof. F.W. Knight defined perfect competition as a market environment in which the number of enterprises and their sizes can freely increase or decrease due to the fluidity and mobility of the inputs of production. It leads to rational behaviour on the part of buyers and sellers, total information, a lack of friction, perfect mobility and divisibility of production elements, and a condition that is completely static.

Assumptions:

The model perfect competition makes the following presumptions:

1. **Large Number of Buyers and Sellers:** A large number of buyers and sellers in the market is a crucial component of ideal competition. Each individual seller sells so little and each individual buyer buys so little that no one of them can affect the market price. As a result, completely competitive firms are frequently referred to as quantity adjusters or price-takers rather than price makers.

2. **Homogeneous Product or Product Homogeneity:** A totally competitive market also has products that are homogeneous or same across sellers,

making it impossible for consumers to distinguish between the offerings of various businesses.

Due to the homogeneity of the many items on the market, any one seller's product may be perfectly substituted for another seller's product, a single price will remain in the market, and the demand elasticity for a single seller's product will be infinitely elastic.

3. **Free Entry and Exit of Firms:** The ability of resources to enter and exit the relevant industry in response to financial signals is the third requirement for perfect competition. There shouldn't be any obstacles to entering or leaving a sector. Entry or leave may take some time, but freedom of movement for businesses within an industry is one of the key characteristics of a competitive market. Assumptions of free entry ensure a very high number of businesses in the market. Instead, if restrictions are in place, there will be fewer businesses in the sector, and each one of them may gain the ability to influence market prices.

4. **Profit Maximisation:** The sole objective of every company is to maximise profits.

5. **Perfect Knowledge:** If a market is to be totally competitive, consumers and producers must have precise knowledge of prices. This information includes information about both the present and the future. Such circumstances fully eliminate uncertainty regarding future market developments.

6. **Factors of Production are Perfectly Mobile:** In a perfectly competitive market, factor of production are perfectly mobile throughout the economy. New firms must be free to enter any preferred industry and resources should also be free to shift among various alternative uses to those where they like to accept employment. Similarly sellers are also permitted to sell commodities or products as well as services where they get highest price. Furthermore, resources must also secure employment at highest paid services. Finally, there should be no monopolisation of labour, raw resources, or other elements.

7. **No Government Regulation:** There should not be any government restrictions in market and not imposing taxes and duties.

8. **Absence of Transport Cost:** Transport costs are thought to be nonexistent in a perfect competitive environment. This assumptions is essential for uniform price throughout the market. As a result, we make the assumption that businesses operate so closely together that there are no transportation expenses.

4.4.2 Imperfect Competition

When the product is not homogeneous, the market, even one with a huge number of customers and sellers, is rendered flawed. There are differences in the product. What one company produces differs slightly

from what any other company does. There are many distinctions among varieties of a certain family of related commodities. Quality, style, packaging, container, type of service, retail location, credit terms, etc. could all vary.

The most appropriate example of this kind of market is lipstick. There are many producers, but each of them has a distinct set of clients. Commodities that are sold in markets with insufficient competition include textile goods, apparel, tea, shoes, pens, inks, sewing machines, and nearly everything else found in stores like Super Bazar.

Every producer in this kind of market has a unique, autonomous price policy. Since there are presumably many producers, it stands to reason that the pricing strategy of any one seller does not necessitate an instantaneous and equal response from other producers who have their own sphere of influence among the consumers. Every producer makes an effort to draw more and more consumers to their own brand of goods. Every producer does their own advertising and sales promotion in order to achieve this. At the point where all enterprises are just making regular profits, equilibrium under imperfect competition is established, just as it is under perfect competition.

Check Your Progress

5. Explain the term imperfect competition.
6. Define the term Product Homogeneity.

4.5 IMPORTANCE OF TIME ELEMENT IN PRICE THEORY

Role of Time Element

Marshall, who put out the idea that supply and demand work together to establish pricing, also placed a high value on the timing component. Since one of the two factors that determines price, namely supply, depends on the amount of time given for it to adjust, time elements are very important in the theory of value. It is important to note that Marshall separated time into distinct periods based on supply rather than demand.

Time is either short or long depending on how much the supply can change on its own. Because it always takes time for the supply to fully adapt to the altered conditions of demand, Marshall believed it was important to split time into distinct phases based on the response of the supply.

The nature of technical production conditions prevents immediate adjustment of supply to altered demand conditions, which is why it takes time for supply to adjust itself to a change in the demand conditions. Changes in the size, scope, and organisation of businesses as well as the industry must be implemented throughout time.

It's important to note another point. Marshall did not use clock or calendar time as his criterion when he distinguished between short and long periods; rather, he used "operational" time in terms of the forces of economics at play. As was previously said, supply forces received the majority of attention in this regard, and the length of time depended on how much the supply forces had to be adjusted. The length of time increases with the supply forces' ability to adjust, regardless of how long it takes in clock time.

Marshall split time into the three following phases based on how the supply responded to a specific and ongoing change in the demand:

1. Market Period

The market period is a very little time frame during which the supply is fixed, meaning that supply circumstances cannot be altered. In other words, the quantity of the commodity in stock at any given time limits the supply during the market period. The amount of stock of the good that has already been manufactured is the utmost that can be provided during the market time.

It is currently impossible to generate more goods in response to rising demand. Depending on the type of the items, this market time could be a day, a few days, or even a few weeks. For instance, the market period may be one day for perishable items like fish and many weeks for cotton clothing.

2. Short-run

The short-run is the time frame during which supply changes can be made only slightly. With the equipment they have, businesses can increase output temporarily by varying the proportions of variable components they use. Short time frames are insufficient for the company to alter its plant or acquire new capital equipment. In the short-term, the capital equipment or plant is fixed or unmodified. By maximising the use of the existing capital equipment or plant, output can be increased by adjusting the proportions of variable elements.

3. Long-run

The long-term is a time frame that will allow businesses to establish new plants or shut down existing ones. Furthermore, in the long-run, both new and old businesses may enter the industry. None of the factors are constant over time because they are all prone to change. A given change in demand is completely accommodated for over a lengthy period of time by the forces of supply, and both individual businesses and the industry as a whole grow or shrink in response to those demands.

As seen above, it is evident that studying the pricing process in the following areas is vital and valuable due to the variable reaction of supply over time to a sudden and permanent increase in demand Marshall found:

(a) The market period,

(b) The short-run and

(c) In the long-run, depending on whether the supply conditions have sufficient time to change,:

   (i) No adjustment,

   (ii) Some labour adjustment, other variable factors, and

   (iii) Complete cost and factor adjustments. Marshall therefore clarified how the market price, short-run price, and long-run price were established in three time periods and decided by the equilibrium between supply and demand.

Thus, it is clear that the price that would prevail will depend on the time frame in question. Since supply cannot increase throughout the market period, the market price will experience a significant increase if there is an abrupt and permanent increase in demand.

Businesses can only sell the stuff that has already been created during this market period. However, in the short-term, a small amount of supply adjustment will occur as a result of firms extending their output in order to move along their short-run marginal cost curves as a result of the rise in the number of variable factors. As a result, from the market price's new high, the short-term price will decline.

However, this short-term price will be higher than the level of the initial market price that was in place prior to the occurrence of the demand increase. In the long-run, businesses would grow by adding new plants, or by enlarging existing capital equipment.

To put it another way, businesses would grow in line with long-term marginal cost curves. In addition, new businesses will eventually enter the market and increase the supply of output. These long-term changes in supply will cause the price to decrease.

As a result, the long-term price will be less expensive than the current one. However, if the sector is an increasing-cost industry, the long-term price will be higher than the initial price that prevailed before the increase in demand occurred.

Figure 4.1 depicts the long-run supply curve LRS of an industry with growing costs combined with the market-period supply curve MPS and the short-run supply curve SRS. This shows how supply varies over time and how price changes as a result. At point E, where the market-period supply curve MPS and demand curve DO initially connect, the price OP is established. Assume that demand has permanently increased from DD to D′D′.

In the market period, supply is limited and stays the same at OM. At point Q, the new demand curve D′D′ and the market-period supply curve MPS intersect. As a result, the market price rapidly increases to OP. The new demand curve D'D' and the short-run supply curve SRS cross at point R.

As a result, the short-term price will be OP″, which is less than the new market price OP′. The price will decrease to OP″ as a result of the long-run

adjustment, which occurs where the long-run supply curve LRS contacts the demand curve D′D′.

The original price OP, which was in effect prior to the rise in demand, will be greater than the new long-run price OP′, which is lower than the new market price OP′ and the short-run price OP′. This is true since we are assuming an industry with rising costs. The long-term pricing will be the same as the initial price if the industry is subject to constant costs. Additionally, if the industry experiences declining costs, the final price will be less than the starting price.
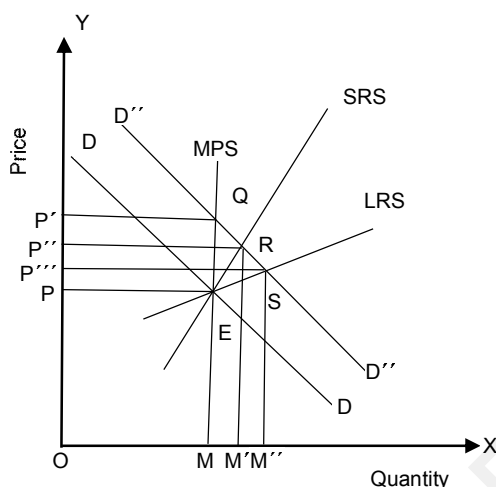
**Fig. 4.1: The Role of Time Element
(In the Determination of Price)**

The price that is on the market depends on the time period under consideration, as can be seen from the example above. Thus, it is evident that time has a significant impact on how much something costs. Another important aspect of the time-period study of pricing is that it allowed Marshall to settle the ongoing debate among economists over whether supply or demand drives price.

Marshall advanced the idea that supply and demand both contributed to the setting of prices. But "generally speaking," according to Marshall, "the longer the period, the more significant will be the influence of cost of production on value, and the shorter the period, the higher must be the share of our attention, which is given to the influence of demand on value."

Actual worth, or market value as it is frequently referred to, is frequently influenced by transient events and causes whose action is sporadic and fleeting rather than by those that work consistently. However, with time, these sporadic and erratic causes increasingly reduce the effect of one another, leading to persistent causes entirely dominating value.

Marshall's quote above indicates that while supply ultimately has a greater impact on pricing than demand does during the market period, supply nonetheless exerts a dominant influence during that time. In general, we may say that during the market time, the force of demand influences price, while during the long period, the force of supply does.

Thus, both economists who argued that price is determined by supply and demand were partially correct, as were those who believed that value is determined by demand. The difference between the two points of view was caused by the emphasis placed by one group of economists on the establishment of the market price, over which demand exerts decisive influence and over which cost of production does not exercise much influence, as opposed to the emphasis placed by the other group on the establishment of the long-term price, over which cost of production exerts decisive influence. Thus, it is evident that Marshall, by advancing the idea that supply and demand interact to determine price, brought about a synthesis between the ideas of earlier economists.

Although each of the earlier economists' opposing viewpoints was biassed, they were both in some ways correct. Each perspective gave us a force that controlled price. The two conflicting forces of supply and demand that they presented were sufficient deciding factors.

Marshall therefore saw supply and demand as equally important factors in determining price, despite the fact that their relative importance changed over time. To highlight the varied effects of each of the two influences on the price of the product in different time periods, Marshall incorporated time period analysis into the pricing process.

It follows from the foregoing that Marshall and contemporary economists who followed him research the impact of the diverse supply responses over time to a sudden and permanent shift in demand conditions on pricing.

Contrarily, economists don't research how changing supply conditions cause demand to fluctuate over time, which has an impact on pricing. The worlds of Professors Stonier and Hague better demonstrate why we do not investigate the adjustment in demand to a change in supply and the ensuing influence on price. There is no reason why demand circumstances should vary differently in the short-term and the long-term if supply conditions change, or why they should change at all if they do.

While supply conditions are influenced by technology, changes in consumer preferences are not. It's true that consumer preferences could—and certainly will—change over time. However, this will be a change in the data rather than a change brought on by altered supply conditions.

There isn't a reason why the long-term demand curve should be different from the short-term demand curve, but given how supply has historically behaved, we might anticipate that changes will occur more frequently the longer it takes for demand and supply to reach equilibrium. If we were to examine how demand and supply would vary in response to any change in data across a series of extremely brief time periods, we would discover that we have added needless and unacceptable information to the analysis.

The market-period equilibrium, short-run equilibrium, and long-run equilibrium between supply and demand will be thoroughly explained below. This

will lead to the determination of the market price, short-run price, and long-run price under conditions of perfect competition.

4.6 FIRM AND INDUSTRY

1. **Firm:** Any business that meets the following criteria is considered a "firm" in the subject of economics which seeks to earn profit by way of manufacturing/goods or services – or both – for buyers. For instance, 'law firms,' that sell services in relation to the law.

2. **Industry:** The term Industry may be defined as a group of productive organizations which produces/supply commodities/products, services, or sources of income. Industries in economics are typically divided into primary, secondary, tertiary, and quaternary categories. Secondary industries can also be divided into heavy and light categories.

3. **Primary:** This sector includes agriculture, mining, fishing, quarrying, mineral extraction, forestry. It can also be broken down into two different categories: genetic industry, which produces raw materials that are enhanced by human involvement in the manufacturing process, and extractive industry, which produces exhaustible raw resources that cannot be improved by cultivation.

   Agricultural, forestry, fisheries, and livestock management are all part of the genetic industries: These are impacted by the growth of renewable resources in science and technology. The mining of mineral ores, the extraction of mineral fuels, and stone quarrying are all considered extractive industries.

4. **Secondary:** Manufacturing is a part of this sector; it turns the raw materials given by primary industries into finished commodities. Additionally, it processes raw materials that other secondary industries have turned into finished items and produces capital goods needed to make both consumer and non-consumer goods. Energy-producing sectors like hydroelectricity and building are also included in secondary industry.

   Heavy, large-scale, and light, or small-scale, secondary industries are also divided. Large-scale industries typically require significant capital expenditures for buildings and equipment, serve a sizable and diverse market of other manufacturing industries, have a complex industrial structure, employ a skilled specialised workforce, and produce a lot of goods, such as the refining of crude oil, the production of steel and iron, the manufacture of heavy machinery, the production of cement, the

refining of nonferrous metals, the production of hydroelectric power, the production of meat, and so forth.

Light, or small-scale, industries are those that produce nonstandard products, such as specialized/craft work, and require less capital investment in plants, equipment, and machinery. Low-skilled labour is used in the production of textiles and apparel, food processing, and plastics, while highly-skilled labour is used in the production of precision instruments, electronics and computer systems, gemstone cutting/craft work, etc.

5. **Tertiary:** This sector, which consists of both private and public businesses, is also known as the service industry and includes businesses that provide only intangible wealth-creating services or non-tangible items. Wholesale, retail, and resale commerce, transportation, consultancy, legal, tourist, hotels, restaurants, and maintenance services are all included. In addition, there are also services related to health, social welfare, administration, police, security, and defence.

6. **Quaternary:** Quaternary industry, a branch of tertiary industry that is classified as its own sector, is focused on information-based or knowledge-oriented goods and services. It consists of a combination of commercial and public businesses. Information systems and information technology (IT) are included, as are scientific research, technological development, financial and strategic analysis, consultancy, media, and education.

4.6.1 Equilibrium of a Firm under Perfect Competition

In a perfectly competitive market, a firm cannot change the price of a product by modifying the quantity of its output. Further, the input and cost conditions are given.

Therefore, the firm can alter the quantity of its output without changing the price of the product. We know that a firm is in equilibrium when its profits are maximum, which relies on the cost and revenue conditions of the firm.

These conditions can vary in the long and short-term. Before we take a look at the equilibrium states, let's look at the demand curve of a product under perfect competition.

Demand Curve of a Product in a Perfectly Competitive Market

Let's derive the firm's demand curve with the help of the market's demand and supply curve. In perfect competition, the equilibrium of the market's demand and supply determines the price.

In the Fig. 4.2 below, Price is on the Y-axis and Quantity on the X-axis. The left side of the figure represents the industry and the right side the case of a firm. The market demand curve is DD and the market supply curve is SS.
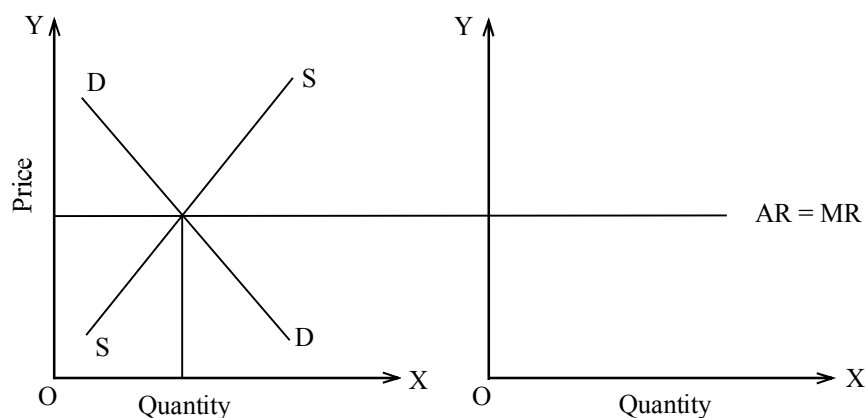
Fig. 4.2: Determination of Market Price under Perfect Competition

Further, the point at which the market's demand and supply curves intersect each other is the equilibrium point. The price at this level is the equilibrium price and the quantity is the equilibrium quantity.

All firms receive this price in a perfectly competitive market. Also, firms are the price-takers and the industry is the price maker. The Average Revenue (AR) Curve is the demand curve of the firm as it can sell any quantity it wants at the market price.

Short-run Equilibrium of a Competitive Firm

In the short-run, there the following assumptions:

- The price of the product is given and the firm can sell any quantity at that price.
- The size of the plant of the firm is constant.
- The firm faces given short-run cost curves.

We know that the necessary and sufficient conditions for the equilibrium of a firm are:

1. MC = MR
2. MC curve cuts the MR curve from below

In other words, the MC curve must intersect the MR curve from below and after the intersection lie above the MR curve. In simpler terms, the firm must keep adding to its output as long as MR > MC.

This is because additional output adds more revenue than costs and increases its profits. Further, if MC = MR, but the firm finds that by adding to its output, MC becomes smaller than MR, then it must keep increasing its output.

Since it is a perfectly competitive market, the demand for the product of the firm is perfectly elastic. Further, it can sell all its output at the market price. Therefore, its demand curve runs parallel to the X-axis throughout its length and its MR curve coincides with the AR curve.
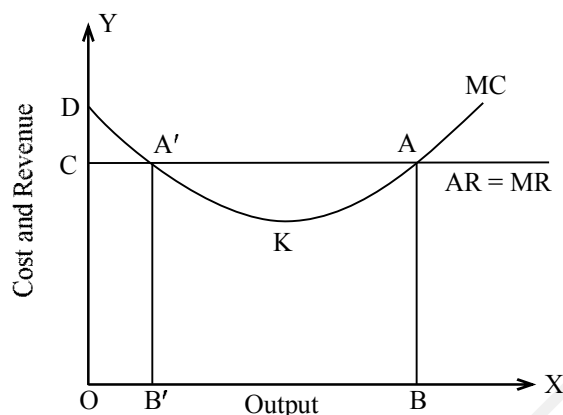
Fig. 4.3: Equilibrium of a Firm using MC and MR Curves

On the supply side, recall the four cost curves – AFC, AVC, MC, and ATC? Of these, the supply curve is that portion of the MC curve which lies above the AVC curve and is upward sloping.

In the short-run, the firm cannot avoid fixed costs. Even if the production is zero, the firm must incur these costs. Therefore, the firm cannot avoid losses by not producing and continues producing as long as its losses do not exceed its fixed costs. In other words, a firm produces as long as its average price equals or exceeds its AVC.

Three Possibilities in Short-run

In a perfectly competitive market, a firm can earn a normal profit, super-normal profit, or it can bear a loss. At the equilibrium quantity, if the average cost is equal to the average revenue, then the firm is earning a normal profit.

On the other hand, if the average cost is greater than the average revenue, then the firm is bearing a loss. However, if the average cost is less than average revenue, then the firm is earning super-normal profits.

Normal Profit
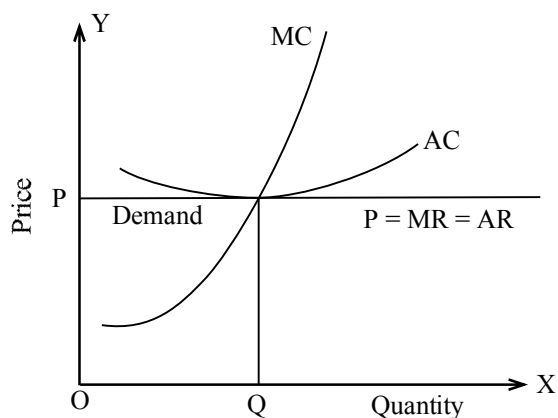
Fig. 4.4: Normal Profits

In the above Fig. 4.4, you can see that the costs and revenue are on the Y-axis and the Quantity is on the X-axis. Further, marginal costs cut the marginal revenue

curve from below at point A. At point 'A', P is the equilibrium price and 'Q' is the equilibrium quantity.

Note that corresponding to the equilibrium quantity, the average cost is equal to the average revenue. It also means that the firm is earning a normal profit.

Loss
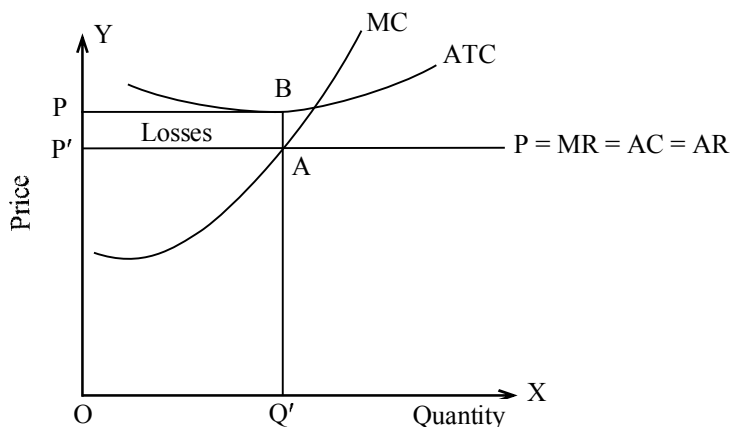
Fig. 4.5: Loss

In the Fig. 4.5 above, the cost and revenue curves are on the Y-axis and the quantity demanded is on the X-axis. Further, the marginal cost curve cuts the marginal revenue curve from below at point 'A', the equilibrium point.

Corresponding to point 'A', P′ and Q′ are the equilibrium price and quantity respectively. Also, corresponding to Q′, the average cost is more than the average revenue.

In this case, the per unit cost of OQ′ (average cost) is more than the per unit revenue of OQ′ (average revenue). As per the figure, the per unit revenue is OP and the per unit cost is OP′. This means that the per unit loss is PP′. Also, the total loss on quantity OQ′ is PP′BA.

Super-normal Profit
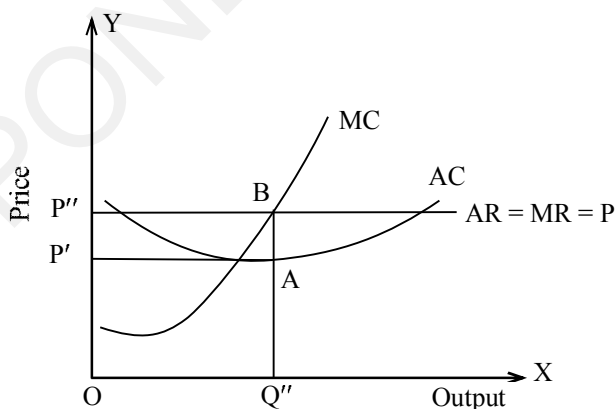
Fig. 4.6: Super-normal Profits

In the Fig. 4.6 above, the per unit revenue or average revenue is OP″ while the per unit cost or average cost is OP′. Therefore, the per unit receipts are high in comparison with the per unit cost.

That's why the average revenue curve lies above the average cost curve corresponding to Q″. The firm is earning super-normal profits. The per unit profit is P′P″ and the total profit is for quantity OQ″ is P′P″BA.

Summary of the Equilibrium of a Competitive Firm in the Short-run
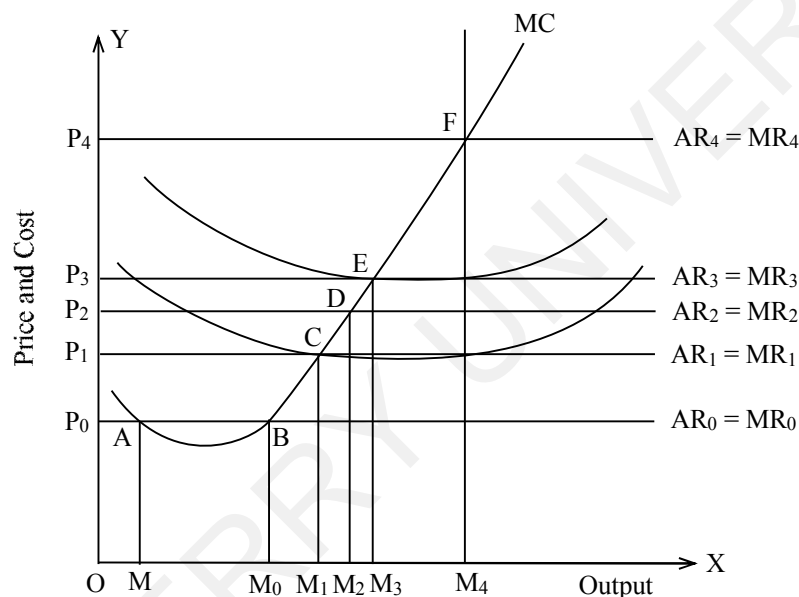
Fig. 4.7: Equilibrium of a Competitive Firm in the Short-run

In the Fig. 4.7 above, we have taken five different prices to illustrate the supply behaviour and equilibrium of the firm. Further, each price has an average revenue curve which runs parallel to the X-axis and coincides with the MR curve.

MR_0

When the price is OP_0, the corresponding MR_0 curve cuts the MC curve at two points – A and B. At point 'A', none of the conditions of equilibrium are satisfied.

At point 'B', the MC curve cuts the MR_0 curve from below but AR is less than AVC. Therefore, the firm incurs a loss which is greater than its fixed cost if it decides to produce when the price is OP_0. Hence, the firm closes down.

MR_1

If the price is equal to OP_1 (*equal to the least possible average variable cost*), then the firm decides to produce. In this case, the MC curve cuts the MR_1 curve from below at point C and AR_1 is equal to AVC. Therefore, the firm either does not produce at all or produces equal to OM_1.

MR_2

If the price is equal to OP_2, it exceeds AVC but is less than ATC. The MR_2 and MC curves intersect each other at point D. The firm produces an output – OM_2. The firm still incurs a loss but it is less than its fixed costs.

MR₃

If the price rises to OP₃, the firm can recover all its costs including the fixed costs. The MC curve cuts the MR₃ curve from below at point E and AR₃ is equal to ATC. Therefore, all the conditions of the equilibrium are satisfied and the firm produces an output – OM₃.

MR₄

If the price rises even higher, the point of intersection of MR₄ and MC curves moves to point F. In this case, the firm earns super-normal profits and produces OM₄.

Therefore, in the short-run, even if a firm incurs losses, it continues production until it loses start exceeding its fixed costs. On the other hand, if the firm earns super-normal profits, then new firms entering the market wipe it out.

Check Your Progress

9. Define the term Firm.
10. Define the term Industry.

4.7 MONOPOLISTIC COMPETITION

The term monopolistic competition has been introduced by E.H. Chamberlin. Imperfect competition is another name for monopolistic competition. Monopolistic competition describes a market environment when there are numerous sellers offering unique products.

Features

The main characteristics of monopolistic competition are as follows:

1. **Existence of large number of firms:** There are numerous businesses, each with a small market share. There are numerous purchasers.

2. **Product differentiation:** Product differentiation is one of the monopolistic competition's key characteristics. No two businesses generate the same product due to product differentiation. For instance, while soaps made by several companies are similar, they are not the same:

   (a) It could be based on specific product-specific characteristics. brand name, colour, packaging design, etc. Instead of being a horizontal straight line, the Average Revenue (AR) curve is a downward sloping curve to the right.

   (b) It may be accomplished through marketing or sales promotion.

3. **Free entry and exit:** There is no difficulty for new firm to enter into or existing firm to leave the industry. Each firm acts more or less independently.

4. The demand curve or Average Revenue (AR) curve is a downward sloping curve to the right and not a horizontal straight line.

Short-run equilibrium under monopolistic Competition

Different businesses generate various products under monopolistic competition. Each business will set the cost and quantity of its own products. The firm engaged in monopolistic competition makes the same profit-maximizing efforts that it does in other market forms. The equivalence of marginal revenue and marginal cost indicates the presence of equilibrium. When MR = MC, the firm will be in short-term equilibrium.

The determination of prices can be represented graphically using revenue and cost curves. In the diagram, MR stands for marginal revenue and AR for average revenue. The Short-run Average Cost Curve is known as SAC. The Short-run Marginal Cost Curve is known as SMC. If MR = MC, the company is in equilibrium. The profit-maximizing price is OA, while OM is the equilibrium output. The shaded area ABCD indicates that the business is making profits that are above average.
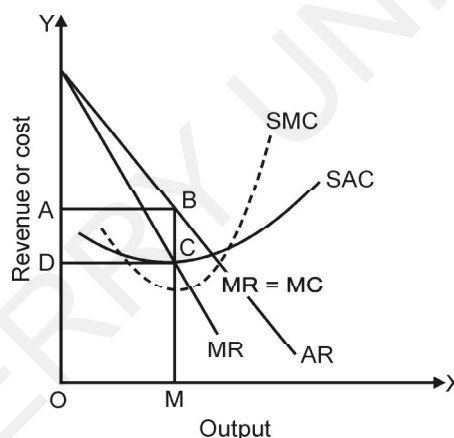
Fig. 4.8: Short-run Equilibrium under Monopolistic Competition

Long-run Equilibrium or Group Equilibrium

Under monopolistic competition, every company will eventually make a regular profit.

There will be free entry and departure for businesses, and extremely regular profit or loss will be competed away. It is said to be in equilibrium when MR = MC and AR = AC. Figure 4.9 serves as an illustration of this.
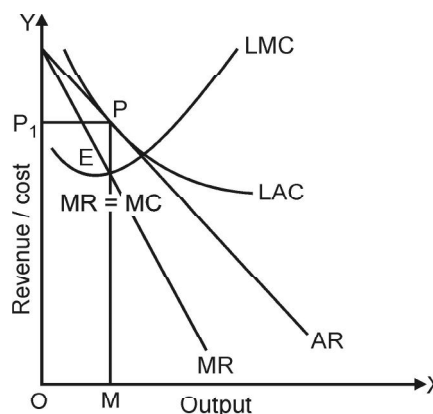
**Fig. 4.9: Long-run Equilibrium (Group Equilibrium)
under Monopolistic Competition**

LMC is for long period Marginal Curve in Figure 4.9, and LAC stands for long period Average Curve. Figure 4.9 shows that at point P, AR is tangent to the AC curve. On a long-term basis, only normal profits will exist given the equilibrium output OM and price OP_1. All things considered, it is obvious that each business within the group is in equilibrium, which is known as group equilibrium.

4.7.1 Excess Capacity

If we look very closely fig. 4.10 above, it is evident that in long-run firm under equilibrium does not produce capacity output i.e., level of production is not optimum at equilibrium point. Every firm produces less than its optimum capacity. According to Chamberlin and Joan Robinson, in the long-run it produces less than its optimal output at equilibrium point. Therefore, when actual quantity of long-run output falls short of the ideal output it is termed as excess capacity, which is regarded as wastage in monopolistic competition. So, it is true that, misallocation of resources takes place under monopolistic competition. Consumers, on the other hand, prefer a wide selection of goods. Differentiation in products reveals consumer want. Even consumers are willing to pay more for a wider selection of overstocked goods.

In fig. 4.10, x is actual level of production. Here, optimum level of production will be at x_1 i.e., at minimum level and thus, $x\ x_1$ is excess capacity. Lower price would be established at minimum cost point and higher price at which producer sell at the social cost, offers to the consumer's variety.

Distinctions between Production cost and Selling cost:

1. **Selling cost:** Firm under monopolistic competition incur certain expenditure on selling activity and thus referred as selling cost. These include advertising costs, salesperson salaries and benefits, display costs, and so on.

2. **Production cost:** Costs incurred by a company during the creation of a specific sort of product can be referred to as production costs and includes cost of raw materials, electricity charges, wages to workers, expenditure on packing, transportation of product to market etc.
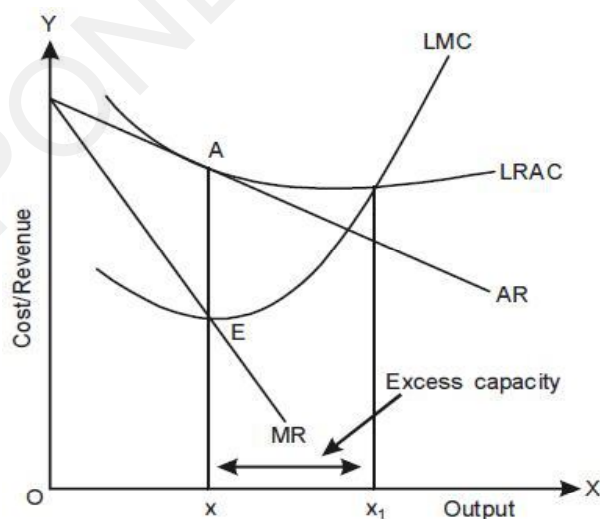
Fig. 4.10: Excess Capacity

Price-output Equilibrium under Selling Costs

A producer can sell a larger output by spending money on advertisement and salesmanship. Producer has to determine the output which yields him the maximum profit. Net profit can be found as Net Returns = (Price and Output) – (Production cost and selling costs).

In fig. 4.11, D_1, D_2, D_3 represent three demand curves. Three alternative selling costs are incurred ATC_1, ATC_2, ATC_3 are the Average Total Cost Curves. It includes both production cost and selling cost. For the sake of simplicity MR and MC have been omitted. Total profit has been calculated by taking the difference between demand and average cost curves.

Total profit = Demand – Average cost curves
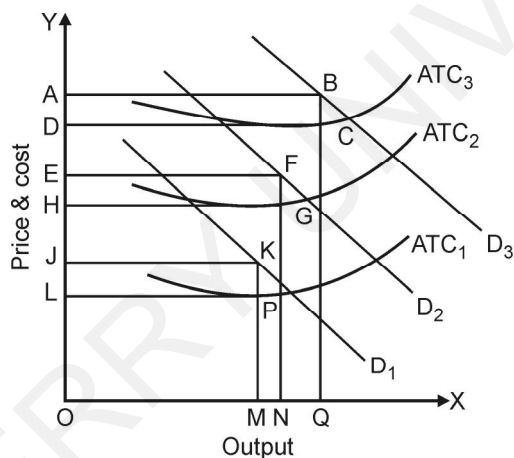
Fig. 4.11: Price Output Equilibrium under Selling Cost

In Monopolistic competition selling cost is an essential factor to increase the market share of the essential factor to increase the market share of the producer and to create goodwill. Selling costs are incurred to impress the consumers with the availability of new products or about the existence of old products.

Peculiarities of Selling Cost

1. Selling costs is an effort to appeal to the mind of the buyer. The success of advertising or selling schemes consists in the appeal of uniqueness or novelty.

2. Selling costs may also be harmful because it creates an irrational preference for a good. It leads to wastage of resources.

3. The effect of selling cost depends on the degree of willingness of the consumers to change their purchase.

4. Selling cost is a greater disproportionality between the costs of advertising and volume of sales. We cannot determine accurately about the volume of sales.

Check Your Progress

11. What are the features of Monopolistic competition?

12. Define the term 'Excess capacity'.

4.8 DUOPOLY AND OLIGOPOLY

4.8.1 Duopoly

A situation known as a duopoly occurs when two rival businesses share a market. In such cases, two brands may conspire to set pricing and/or quantities in order to raise the price for consumers. Due to the fact that there are only two players in a duopoly market, each player's activities will have an impact on the other's reaction and activity. Businesses in a duopoly concentrate on improving the present products and services rather than trying to enter the market with new ones. Given that there are only two companies competing in the market, and that they are the only ones with the power to set pricing and bar competitors from joining the market.

Features of Duopolies

A market structure related to oligopoly is duopoly. It still has certain distinguishing qualities, though. This market structure's primary characteristic is that:

1. The market is exclusively shared by two businesses.

2. Customers are drawn to and depending upon both enterprises that make up a duopoly. They rely on tactical choices like price cuts and fostering brand loyalty. Thus, it is challenging for new businesses to enter. Because there is only one rival and there are significant obstacles to entrance, this results in an increase in sales volume and revenues.

Advantages and Disadvantages of Duopolies

Advantages

1. Duopoly is a market condition that has both beneficial and bad effects on enterprises and customers.

2. The two businesses are given every chance to work together and make the most money.

Disadvantages

1. Duopoly restricts trade. The market is greatly impacted by the presence of just two competitors.

2. It restricts the range of products available to clients.

3. Due to the obstacles created by the competition, it is challenging for new businesses to enter the market and get any market share.

4. Prices are fixed and collusion occurs in a duopoly. As a result, buyers have few options and pay a high price.

Duopoly vs. Oligopoly

Duopolies and oligopolies both impose entrance barriers that make it difficult for new businesses to gain market share. In terms of authority, they resemble one another. Than increase their revenues, businesses in these market frameworks

prefer collaboration to competition. The fact that there are so few businesses means that clients have little options.

The number of firms in a duopoly and an oligopoly's marketplaces, however, varies. In contrast to a duopoly, where there are only ever two firms and the market is split in half, an oligopoly has more than two companies, each of which has monopoly power and is interdependent with the others.

Types of a Duopoly

Duopolies fall into one of two categories:

- **Cournot duopoly:** This duopoly postulates that the production of manufactured goods and services influences player competition. To maximise profits, corporate organisations in this market system produce a set number of goods and bargain to split the market. It eliminates the possibility of collaboration.

- **Bertrand duopoly:** This duopoly contends that prices influence the type of competition that exists between businesses. A pricing war and intense competition amongst players may result from customers choosing the companies with the lowest prices. As a result, businesses adopt low-price methods and see a decline in profit, but customers like getting deals on goods and services.

Oligopolistic Theories

Oligopoly: The term "oligopoly" describes a market with few sellers. The word "oligopoly" comes from the Greek words "ologas," which means "a few," and "pollian," which means "to sell." Oligopoly, according to Prof. Stigler, is a situation in which a firm bases some of its market strategy on the anticipated behaviour of a small number of close competitors. Prof. Liftwitch defines an oligopoly industry as one where there are few enough sellers for him to be impacted by the actions of other businesses. Competition among the few is how oligopoly is described. The markets for cigarettes, oil, and other products are the best examples of oligopoly.

Features of Oligopoly Market

1. **The number of firms is limited:** Either a homogeneous or a differentiated product is produced by each company.

2. **Conflicting attitude of firms:** Oligopoly firms may show igopoly Firms may show conflicting attitudes to one another. Two conflicting trends i.e., Co-operation and conflict are at work under oligopoly.

3. **Advertising Campaign:** Oligopoly firms resort to various aggressive or defensive marketing methods. They turn to intensive marketing and sales efforts. There is competitive advertisement and sales promotion between them.

4. **Elements of monopoly:** A corporation operating in an oligopoly has some monopoly control over the goods it produces.

5. **Price leadership:** In oligopoly, one seller is acknowledged as a leader and other sellers follows the leader. The leader fixes the price and the others accept it unchanged for months, even for years.

Stackleberg Model of Oligopoly

Stackleberg introduced a price reaction model. It is different from Counot Model. It is a leader and follower model. Price leadership means that in an industry one firm leads the other firms with respect to price fixation. The firm takes the initiative in annpuncing its price change which is called the price leader. All other firms in the industry are termed as price followers. This model is a crucial example of price fixation in an oligopolistic environment. Price leadership is of two types:

1. **Domonant Price Leader:** The dominant price leadership exists when one firm dominates the industry. It produces a significant portion of industry's output. The dominant firm has the lowest cost and assumes the position of a monopolist. It fixes the price and other firms accept it.

2. **Parametric Price Leader:** It happens when a knowledgeable company carefully considers the demand, cost, competition, etc. and sets a price that is acceptable to all the companies in the industry. The competitive market's role is played in this instance by the price leader.

Conditions for Oligopoly

1. The firms must be few in number. They should have strong feelings of interdependence.
2. Entry to the industry must be restricted.
3. The products of the firm must be homogeneous or have some close substitutes.
4. The firms must have similar cost curves.
5. The industry's product must have a just-elastic demand.

If a firm chooses to be the leader then the rival firms would be a follower and there will be a stable equilibrium. For the firms choosen to be the followers, there will be competitive price changes and a stable equilibrium will be reached at. If the duopolists wish to be the leaders,then there will be no stable equilibrium.
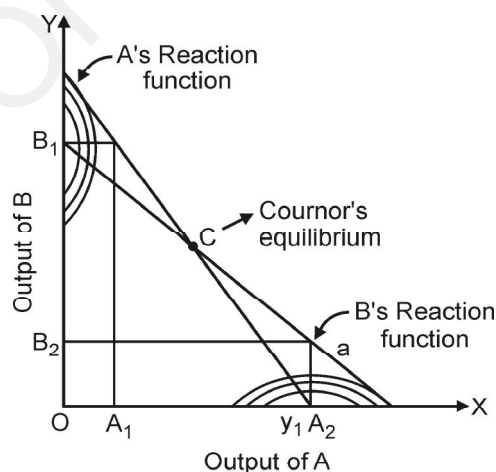
Fig. 4.12: Oligopoly

In fig. 4.12, A's reaction curve is YY_1 and B's reaction curve is XX_1. A is the leader and B is the follower. A chooses to produce A_2 which is on the maximum isoprofit point at 'a'. B the follower produces only B_2 and B is on a higher profit curve. A the follower produces only OA_1. If both the firms wish to be leaders, there is an unstable equilibrium. There will be a price war or there will be a collusion.

Equilibrium of an Oligopoly Firm

When there is differentiated oligopoly, the equilibrium resembles monopolistic competition. Although the company is making a reasonable profit, its output is below average. This is shown in fig. 4.13.
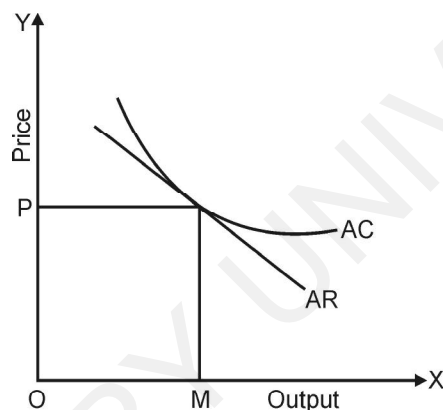
Fig. 4.13: Equilibrium of an Oligopoly firm

When there is differentiated oligopoly, monopolistic competition is similar to the equilibrium. The company's output is below average, despite the fact that it is producing a respectable profit. The position is similar to that of monopolistic competition.

Prices under an oligopoly will be in the middle of monopolistic and competitive ranges. According to Stonier and Hague, the actual price will depend on the conditions prevailing and will differ from case to case. Hence oligopoly price and output are said to intermediate.

Edgeworth Model of Oligopoly

Edgeworth shows a price war between the two competitors. The two producers cannot produce the competitive output. Edgeworth assumes a perfectly homogeneous product and the goods are close substitutes.

In Edgeworth model of oligopoly the producer 'A' starts with a price and sells a quantity in the market. 'B' lowers the price and captures a post of the A in market. Thus the price war goes and reached an equilibrium.
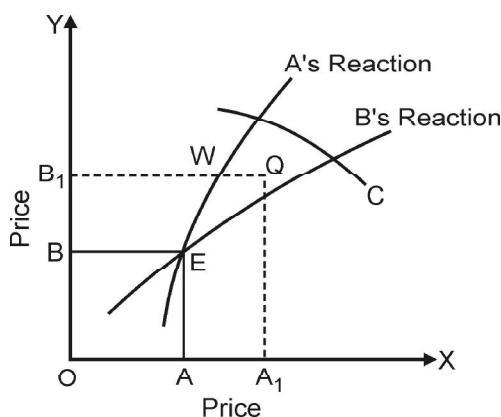
Fig. 4.14: Edgeworth Model of Oligopoly

Check Your Progress

13. Define the term Duopoly.

14. Comment on Advantages and disadvantages of duopolies.

4.9 PRICE DISCRIMINATION

4.9.1 Discriminating Monopoly

Price discrimination is one of monopoly's unique characteristics. The practise of charging different prices to different buyers is known as price discrimination or differential pricing. Monopolist can boost total profits through this way.

Price discrimination does not occur frequently. Setting a different price for the same goods from various buyers is highly challenging. In order to practise effective price discrimination, products are typically slightly different. In other words, price discrimination refers to the practise of selling similar goods in a variety of forms at prices that are not in line with their marginal costs. In words of Prof. Stigler, prices those are not proportional to marginal cost. Again, in the words of Mrs. Joan Robinson, price discrimination is the act of charging different customers for the same commodity that was produced under one common control. According on the income of their clients, professionals like doctors, lawyers, and business consultants charge different rates for their services. Tea producers provide their goods for less money abroad than they do at home. Electricity providers charge less for industrial use than for residential use. The ton-kilometer charges charged by Indian railways vary depending on the type of cargo.These are all examples of price discrimination, which occurs when a producer sells the same product to several buyers at two or more different prices without regard to cost variances.

Price discrimination is of three types i.e.: (i) personal, (ii) local (iii) according to use or trade. Price discrimination is personal while a producers charges different prices from different buyers for the same product. Localized price discrimination occurs when a merchant sets different prices for customers in various locations. For instance, a producer may dump goods by charging a much lower price on the international market and a relatively higher one on the domestic market. Price discrimination is a pricing strategy of charging different prices for same goods and

prices. For instance, electricity company sells electricity at a cheaper rate for industrial use than for domestic use and it is known as use or trade discrimination.

Logic behind price discrimination is that different buyers are ready to pay different amounts for same products or services and it is then beneficial for seller to take best possible opportunities of this condition. Basic model of price discrimination is represented in fig. 4.15.
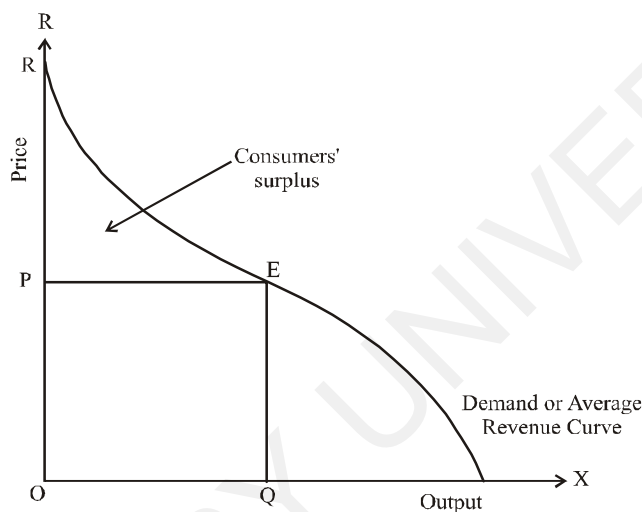
Fig. 4.15: Price Discrimination

As shown in fig. 4.15, at price level OP marginal buyer or consumer desires to buy OQ units of output. But shape of demand curve indicates that there are other purchasers desiring to pay high price. to purchase the product. So, if the product is sold at uniform price OP to all consumers, monopolist have to forgo opportunity to obtain revenue shown by area PRE, which is marked as consumer's surplus.

When is Price Discrimination Possible?

Two basic conditions need to be fulfilled for discrimination to takes place:

1. Monopolist can practice price discrimination only while he is selling in separate market which is segregated in a manner that products sold are cheaper. A watertight chamber should separate the two types of markets, making it impossible to transfer any units of goods from one market to the other. Price discrimination by original seller will succeed, if and only if there is no opportunity or prospect of commodity being transferred from cheaper to dearer market. Alternatively, a strategy of price discrimination can only be successful if it is impossible for customers who are charged a lower price by the monopolist to get or resale goods to customers who are charged a higher price.

2. Second condition for price discrimination is enabling monopolist to charge discriminating prices in such a way so that demand must not be transferred from dearer market to cheaper market. As an alternative, customers in high-priced markets are unable to migrate themselves into low-priced markets in order to buy goods or services there for a lower

price. For instance, if a medical practitioner charges lower price from poor client than that of rich client, monopolist's goal of charging discriminating prices will not succeed if rich client present himself as poor client and makes payment of poor client's fees to the practitioner.

Price Discrimination is Possible in following cases

1. Price discrimination takes place while differences in prices are so minor that buyer ignores that.

2. Nature of commodity or service are such that chances of transferability from one market to other market is not possible. For instance, sale of direct personal services of lawyer or surgeon. Surgeons charges different fees from rich and poor patients for similar operation.

3. Price discrimination may also become possible because laziness and ignorance of consumer. Monopolist can easily resort to price discrimination while buyer in one market are quite ignorant about lower prices are being charged in other parts of market. Apart from that if due to laziness buyers of dearer market may not go for shopping in cheaper market then price discrimination will also persists.

4. In certain cases price discrimination exists because of legal sanction. In this case, monopolist charges discriminating prices depending upon uses to which a commodity is put into use. Electricity providers may impose reduced rates for residential usage and higher rates for business or industrial usage.

5. Price discrimination occurs because of preference or prejudice of buyers. Therefore, price discrimination happens when a customer experiences an illogical feeling despite paying a greater price for a superior kind of good. Consider a situation where the deluxe edition and regular edition of a book differ in the type of paper used and the quality of binding, but the price difference between the two books is greater than the additional expenses paid for the deluxe version. It is a good example of price discrimination on account of prejudices or preferences of different buyers of the product or goods.

6. Monopolist may resort to price discrimination where consumers are separated by long distance or tariff barriers. A monopolist producer in Gujrat may sell his goods in one town say Kochi at ₹ 30 and in other city say Rajasthan at ₹ 15. Therefore, if transportation cost between Kochi and Rajasthan is more than ₹ 6 per unit in that case, it will not be economical for consumers or purchaser to transfer product to Rajasthan by their own means.

   Additionally, a monopolist may engage in "dumping," or selling the identical items at a lower price on the domestic market and at the legal price on the international market.

7. Price discrimination may also occur while several groups of buyers necessiatates same services for differentiated products. For instance,

railways charge different fare rates for transport of coal and cotton. Here, bales of cotton cannot be transformed into loads of coal for talking advantage of cheaper rate of transport of coal and cotton.

Under What Market Structure Price Discrimination is Possible?

It is evident from above clarifications under what conditions price discrimination is possible. Now the question is under what market structure a seller can practise price discrimination. It is definite that seller cannot resort to price discrimination under perfect competition. It is considered that there are numerous customers and sellers, a uniform product, etc., in this scenario, but that there is only one uniform price that rules the market. There is therefore no room for pricing discrimination. It is important to keep in mind that price discrimination is only conceivable if one producer has a monopoly on a given product or if there is an agreement between several producers or manufacturers that sell the same good or service.

When is Price Discrimination Profitable?

We have examined the circumstances under which price discrimination is feasible thus far. But at the same time, monopolist will resort to price discrimination if it is found to be profitable to him. Below, we'll analyse this profitability price discrimination condition:

1. If demand elasticity in different markets is different, price discrimination will be lucrative; otherwise, there won't be any incentive. Every market will have the same MR if the elasticity at a single monopoly is the same.

Formula

$$MR = AR \times \frac{e-1}{e}$$

Where, e = Point elasticity of demand.

If AR or single monopoly price is identical at every market and at the some time elasticity of demand is also similar then MR at every market will be the same. It implies that if certain amount of product is transferred from dearer market to cheaper market then ultimately there won't be an increase in the monopolist's overall revenue. What is gained in a lower market will therefore be lost in a more expensive market.

2. Second, price discrimination is only feasible and profitable when demand elasticity varies across markets at a single monopolistic price. Under those conditions, a monopolist can boost profits by selling more of his product in markets where demand is determined to be relatively elastic and less of it in markets where demand is found to be relatively inelastic. For simplicity in our analysis, let us consider that total market has been regraded into two sub-markets, say, A and B and elasticity of demand in market A is relatively inelastic and market B is relatively elastic. Therefore according to above mentioned formula, if elasticity of demand is different in these two markets, their MR will also be different and so it is beneficial for monopolist to transfer product from dearer market of cheaper market.

Thus price discrimination will be profitable in this condition. Monopolist will increase price above single monopoly price in market A where relatively inelastic demand prevails. Here, price rise will not result in any appreciable decline in demand. Reserve will happen in market B as elasticity of demand is high here. Reduction in price will lead to increase in demand at market B. In short, price will be higher at market A and lower at market B. Now, how will it be beneficial for monopolist to charge different prices in different markets while elasticity of demand at single monopoly price is different may be found by using the following formula:

$$MR = AR \times \frac{e-1}{e}$$

But, here a question arises – how long monopolist shall continue to transfer product from market A to market B? It is important to keep in mind that a monopolist will find it beneficial to move output from market A to market B till MR in every market is equal. Thereafter, he will discontinue the process of switching over sales from one market to another immediately.

Forms or Degrees of Price Discrimination

According to Prof. A.C. Pigou, price discrimination may takes place in different ways. For the purpose of simplicity or convenience in analysis, price discrimination is divided into three categories i.e.:

1. First degree discrimination or perfect price discrimination.
2. Second degree discrimination.
3. Third degree discrimination.

1. **First degree discrimination or perfect price discrimination:** First-degree price discrimination occurs when a seller charges the same customer a different price for each item purchased, as with quantity discounts. Different prices may be charged according to transaction, whether whole sale or retail.

2. **Second degree discrimination:** Price discrimination of second degree occurs while seller charges different price to different buyers and different price for different units of same products e.g., different rate charged by an electricity undertaking for domestic and for industrial use.

3. **Third degree discrimination:** Third-degree price discrimination is believed to occur when a monopoly corporation collects prices from several market segments. Producers segregates consumers based upon their income level, individual preferences types of uses for product and charges different price levels to every group or market. Discrimination of third degree is most common type in practice.

Special Feature of Price Discrimination

Following are certain characteristics or special features those are to be satisfied for effective implementation of price discriminations:

1. **Multiple Demand Elasticities :** These must to be two or more markets or groups of consumers for monopoly product or service. There should also be difference in demand elasticities among different buyers. Consumers with inelastic demand for any product or service will be in a position to pay higher price in comparison to those with elastic demand.

2. **Market Segmentation :** Secondly, seller or producer (monopolist) must be capable to divide markets into sub-markets and also to keep them separate. Separation of sub-market is mandatory so that he can sell at different prices in every market and prevent resale of products. In this case to make discrimination possible monopolist producer uses device of different packaging and brand name.

3. **Market Sealing :** The seller must be able to stop the resale of products in submarkets with lower to higher prices. It resales are not prevented price discrimination cannot succeed. Price discriminating firm must be a monopolist.

Assumptions: When a vendor sets different prices for different quantities of the same goods for reasons unrelated to variations in cost, this is known as price discrimination. A monopolist can discriminate on prices with ease since he has complete control over the flow of a certain good. Other businesses who offer various prices to customers based on the quantity of goods they purchase, how long they do business with the producer, where they are located, and other relevant characteristics, adhere to this pricing philosophy.

Necessary Conditions of Price Discrimination

The following requirements must be met for price discrimination to be put into practise effectively:

1. **Existence of two or more than two markets:** In order for a monopolist to categorise his clients and set different prices for the same commodity, there must be at least two marketplaces.

2. **Existence of different elasticities of demand in different markets:** In different markets, electricity of demand for a monopoly commodity should be different. Monopolists will be successful in charging high prices in inelastic markets and low prices in elastic markets due to differing elasticity of demand.

3. **No possibility of resales:** Sub-markets must be effectively divided to prevent resale from a cheaper market to a more expensive market.

4. **Full control over supply:** A monopolistic factor must exist for discrimination to exist. If vendors continue to engage in fierce rivalry, the market as a whole will experience consistent pricing.

5. **No contact among buyers:** It must be impossible for purchasers in different segments of the monopolist's market to communicate. Alternately, no seepage is allowed between the several markets of a discriminating monopolist.

Equilibrium under Price Discrimination or Price-output, Determination under Discriminatory Monopoly

Up to this point, we've shown various scenarios or circumstances in which price discrimination is both feasible and lucrative. We will now examine how price-output determination works when there is a discriminating monopoly. How can a monopolist increase his profit? A single price is charged for the total output in a basic monopoly. But, in discriminating monopoly, monopolist charges different price in different segregated market. In case of discriminating monopoly, first of all monopolist will segregates entire market into several sub-markets based upon differences in demand elasticity, but for simplicity in analysis. let us assure that monopolist sells his product at two different price and in two sub-markets.

Now, question arises – How will discriminating monopolist fix price and output in two sub-markets so that he will earn maximum profits? Point to be noted here is that, to attain equilibrium, discriminating monopolist has to satisfy following two conditions:

 (i) MR in two sub-markets must be the same.

 (ii) MR in two sub-markets must be equal to MC of entire output of monopolist.

Additionally, a price-discriminating monopolist must make choices regarding:

 (i) Total output required from him.

 (ii) How much and at what price to sell in each market to maximise his profits.

Fig. 4.16 (a) (b) (c) represents equilibrium under discriminating monopoly. Now, from fig. 4.16, According to the elasticity of demand for his product in these two sub-markets, it is clear that the monopolist has divided his whole market into two sub-markets, A and B.

Figure 4.16 (a) shows the demand curve in market A, which is steep and suggests that the elasticity of product demand is inelastic. Here,

D_1 = Demand curve in market A.

MR_1 = Marginal revenue curve in market A.

The flatness of the demand curve in Figure 4.16 (b) shows that the demand for his goods is elastic. Here,

D_2 = Demand curve in market B.

MR_2 = Marginal revenue curve in market B.

Fig. 4.16 illustrates the aggregate marginal revenue curve (AMR). By lateral summation of MR_1 and MR_2, 4.16(c) is obtained. The MC curve for total output here represents the marginal cost curve of the monopolist.

From fig. 4.16 (c), it is quite clear that, OQ is profit maximising output which is obtained by intersection of marginal cost curve (MC) for total output of monopolist with aggregate marginal revenue curve (AMR) of two market. Here,

OQ = Equilibrium output

EQ = Aggregate marginal revenue as well as marginal cost.

After determining the total output to be produced, the next step is to divide it across the two submarkets A and B, ensuring that the marginal revenue in each segmented market is equal. Thus,

OQ_1 = Output in market A.

OQ_2 = Output in market B.

Here, marginal revenue $EQ = E_1Q_1 + E_2Q_2$.

Although MR is the same in both of these marketplaces, the elasticity of demand varies. Two submarkets' prices ought to differ from one another.

(a) Sub-market A   (b) Sub-market B   (c) Total Market
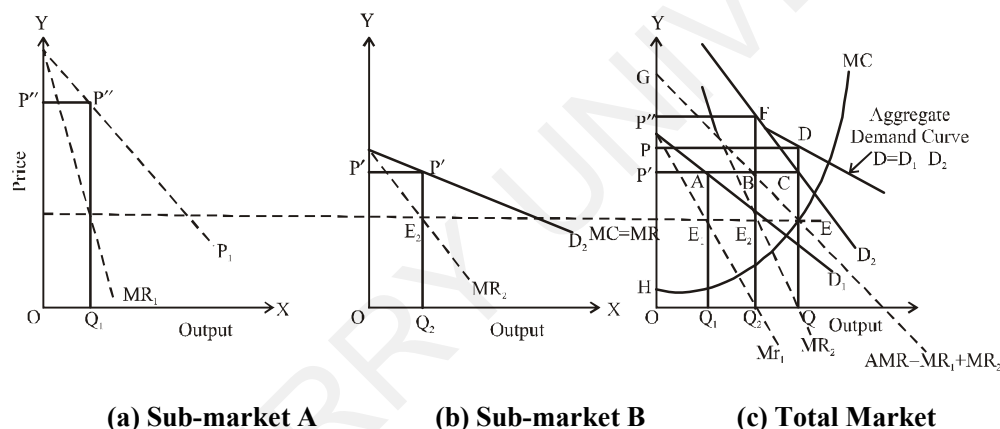
Fig. 4.16: Equilibrium under Discriminating Monopoly

From fig. 4.16 (a), it is clear that OQ_1 output is sold at price E_1Q_1 in sub-market A.

Likewise, in fig. 4.16 (b), OQ_2 output will be at price E_2Q_2 in sub-market B.

Because demand in sub-market A is less elastic than it is in sub-market B, price is higher in sub-market A, as shown in fig. 4.16. Thus, price

$E_1Q_1 > E_2Q_2$

Total profit of the discriminating monopolist in this case is represented by the region GEH.

Therefore, if a discriminating monopolist meets the following two criteria, he will be in equilibrium i.e.:

(i) AMR = MC

(ii) MC of total output = $MR_1 = MR_L$

If MR dominates a certain market, its discriminating monopolist will sell more goods there while selling fewer goods elsewhere until the aforementioned situation is achieved.

Graphical Presentation

In fig. 4.16 (c), if a line is drawn perpendicular to price axis it cuts MR_1 and MR_2 at point E_1 and E_2 where we get required equality i.e.,

MC of total output = MR_1 = MR_2

Now, from point E_1 and E_2 let us drop vertical lines to quantity axis and extend them upward till they meet demand curve D_1 and D_2 which indicate price and output in every individual market. According to fig. 4.17 (c), discriminating monopolist will sell OQ_1 at a price P′ in first market and OQ_2 at a price P′ in second market.

Thus, $OQ = OQ_1 + OQ_2$

Here, the overall revenue from price discrimination exceeds the entire revenue from a uniform price P i.e., OQDP. By price discrimination, total revenue is P′ (OQ_1) + P″ (OQ_2) = OP′AQ_1 + OP″FQ_2
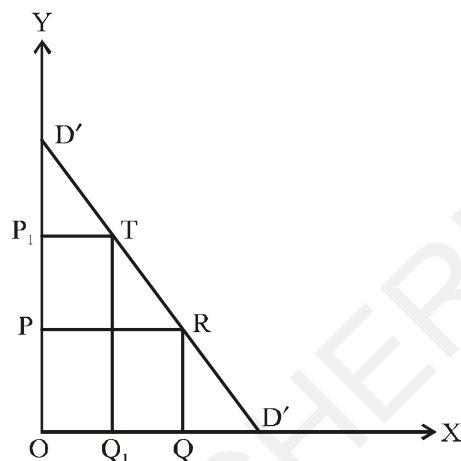
Fig. 4.17: Third-degree Price Discrimination

Now if we compare revenue from price discrimination with revenue from uniform price, we get,

Revenue from P (R_1) = OQDP = OQ$_2$EP + Q$_2$QCB + BCDE   ...(1)

Revenue from P′ and P″ (R_2) = OQAP′ + OQ$_2$FP″

But OQAP' = Q$_2$QCB and OQ$_2$FP″ = OQ$_2$EP + PEFP″

So, R_2 = QCB + OQ$_2$EP + PEFP″   ...(2)

Now, if we subtract equation (1) from equation (2), we get

$R_2 - R_1$ = PEFP″ − BCDE

It implies that

BCDE < PEFP″

thus $R_2 > R_1$

Here, PEFP″ = Additional revenue from selling OQ_2 at price P″, which is higher than price P.

BCDE = Loss in revenue from selling OQ_1 at Price P′, which is lower than price P.

As a result, increased revenue more than makes up for the loss, resulting in higher overall revenue from price discrimination. Profits from price discrimination will be higher than those from selling the total output at the same price because the cost of production remains constant regardless of price. According to fig. 4.17, this is an instance of third-degree pricing discrimination. Here it is clearly to be observed that if output OQ is sold at price P revenue will be earned, OQRP and PRD′ will be consumer's surplus. Again if instead of OQ output only OQ_1 is sold at a price P_1 in that case remaining output Q_1Q is sold at price P. In that case total revenue:

$$OQ_1TP_1 + Q_1QRS = OQRP + PSTP_1$$

It is thus evident from above that discriminating monopolist has managed P part $PSTP_1$ from consumer's surplus (PRD′).

Again, as shown in fig. 4.18, if discriminating monopolist sells at more than two prices which is higher than P, he will earn still larger part of consumer surplus. It is known as second-degree price discrimination.
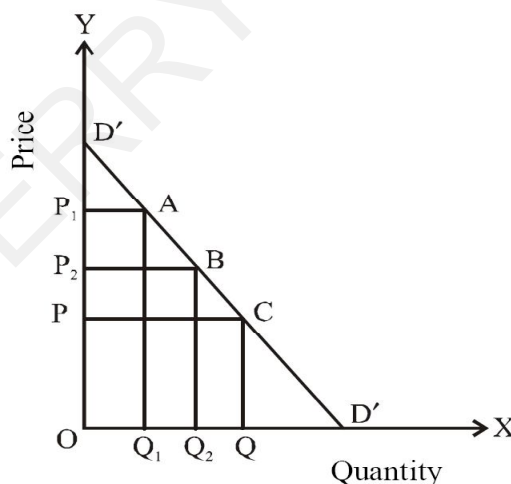
Fig. 4.18: Second Degree Price Discrimination
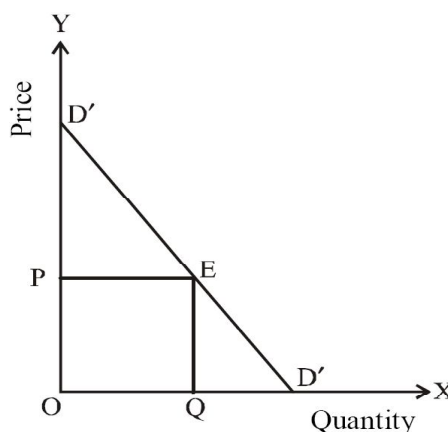
Fig. 4.19: First Degree Price Discrimination

Finally, as shown in fig. 4.19, if in specific cases, where discriminating monopolist negotiates individual purchase and sells every unit at corresponding price level, he will get whole consumer surplus. First-degree price discrimination, often known as take-it-or-leave-it price discrimination, is a legal term. Demand curve becomes MR curve of monopolist in this situation.

Check Your Progress

15. Explain the term 'Discriminating Monopoly'.
16. What are Degrees of Price Discrimination?

4.10 CONTROL AND REGULATION OF MONOPOLY

Monopoly is always in a position to fix a commodity's price in a way that it likes to exploit society. The society must be protected from exploitation at all costs. Only when the state intervenes is this possible, and the state always takes some sort of action in this regard.

It is clear from the discussion above that a monopolist is essentially a strong man. He may make any good in any quantity and set a high price because he is a sole producer and only seller, ensuring maximum profits. The actions of a monopolist cannot be effectively controlled. Should his authority, however, be ignored? Should he have total monopoly authority? His authority shouldn't be constrained in any way. All of these inquiries are crucial and demand satisfying responses. They are especially important in the context of today's rapidly evolving society, which is characterised by universality, uniformity, and concern for the wellbeing of the social groups who are often overlooked.

There is a limit to monopoly power. Even though a monopoly corporation may have complete control over a commodity's supply, demand is not always under his control. He may not always be able to fix a high price and want to take advantage of the purchasers. Only when the state intervenes is this possible, and the state always takes some sort of action in this regard.

Among the crucial actions are:

1. **Anti Trust Legislation:** One action that monopolies typically take is to form trusts. While this is a voluntary action, all the negative aspects of monopolies essentially crawl into it, forcing the state to pass antitrust legislation. However, monopolists can also be highly active and attempt to undermine the efforts of the state by either joining forces in a different way or coming to an informal accord.

2. **Control over Prices:** Monopoly would always seek to set the highest price from customers in order to make the smallest profit. The profits and prices can be set by the government in order to prevent the industry from making excessive profits. However, it cannot be used in real life.

3. **Organised Consumer's Associations:** Customers can organise their own associations and boycott the monopolist's products if it fails to provide

high-quality items in sufficient quantities and at a reasonable price. The buyer's association has the option to start producing on a no-profit, no-loss basis.

4. **Effective Publicity:** Monopoly operates with abnormalities that the players are unaware of. Therefore, all of these flaws should be made public, and specific legislation, such as public oversight of monopolistic houses, must be passed.

5. **Creating Fair Competitions:** Only when there is no true competition can monopoly last. The problem, however, is that the monopoly will never permit any competition because that would result in market sharing. Pure monopoly does not, however, exist in the real world. If there aren't any near equivalents for a commodity, one can at least locate close ones. A monopolist would be foolish to demand a high price for products that have alternatives.

6. **Nationalisation/Government interference:** By passing anti-monopolistic laws and making the creation of monopoly associations unlawful, the government may impose different limits on the monopolist's business practises as long as it is guided by the benefit of the public. Additionally, you have the option to implement a severe licencing policy, credit restrictions, high taxes, tight output limits, and price controls. As a last option, the government should nationalise the monopoly-affiliated businesses that the public will not allow. But once more, this system is problematic because the government can nationalise only a small number of companies due to its limited economic resources.

To sum up, it is exceedingly challenging to check or manage the monopoly. The only way that works is to organise fair tournaments. Although it is a challenging task, monopoly may be checked most successfully once it has been established.

Check Your Progress

17. Write short notes on Anti Trust Legislation.
18. What are the measures to control over monopoly?

4.11 COLLUSIVE PRICE LEADERSHIP

Collusive Oligopoly Model

The market condition where the companies band together to fix the price and outputs of the industry is referred to as a collusive oligopoly. A tacit understanding exists in collusive oligopoly. Open collusive action is illegal. Many collusive organisation like cartels, trusts and trade associations perform many activities through indirect ways.

Non-collusive Oligopoly Model

In a non-collusive oligopoly, there is no understanding or agreement between the firms. According to the firms' understanding or agreement, this classification is made.

4.12 KINKED DEMAND CURVE

Price rigidity is a feature of oligopoly market. Paul M. Sweezy uses a peculiar demand curve to illustrate price rigidity. It is popularly known as Kinked Demand Curve.

The Kinked Demand Curve assumes that the producers have no incentive either to raise or to lower the price. It is a sticky price because they know any change in price will be reacted by rival firms. The average cost principle was used to determine the price.
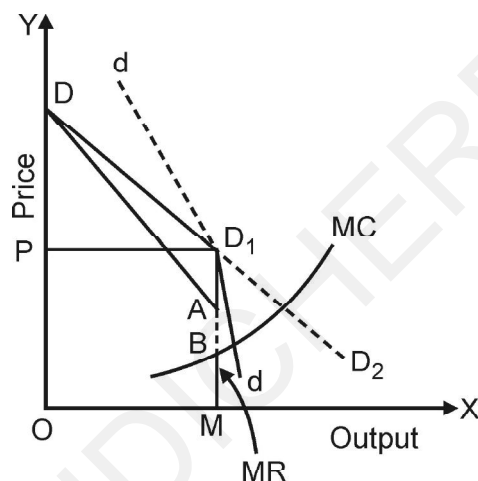
Fig. 4.20: Kinked Demand Curve

In fig. 4.20, DD_1d is a Kinked Demand Curve. Price is OP and output is OM. MR curve is equal to MC firms maximise the profit. DD_1 and D_1d portion is relatively flatly sloped. In the DD_1 portion demand is generally elastic. The seller will not tend to rise the price above OP. If the seller lowers the price below this level he may not gain much because it is inelastic. So OP price will tend to exist. The tendency to be inflexible under oligopoly is explained by the kinked demand curve model.

4.13 COMPARISON OF VARIOUS MARKETS

Basis	Perfect Competition	Monopoly	Monopolistic Competition	Oligopoly
1. Number of Sellers	Very large number of sellers	Single seller	Large number of sellers	Few Big sellers
2. Nature of Product	Homogeneous Products	No Close Substitutes	Closely related but differentiated Products	Products are homogeneous under Pure Oligopoly and differentiated under Differentiated Oligopoly
3. Entry and Exit of Firms	Freedom of entry and exit	Entry of new firms and exit of old firms is restricted	Freedom of entry and exit	Restrictions on entry of new firms
4. Demand Curve	Perfectly elastic demand curve	Downward sloping demand curve (less elastic)	Downward sloping demand curve (but more elastic)	Indeterminate demand curve
5. Price	Uniform price as each firm is a price-taker	Firm is a price-maker. So, price discrimination is possible.	Firm has partial control over price due to product differentiation.	Price rigidity due to fear of price war
6. Selling Costs	No selling costs are incurred	Only informative selling costs are incurred	High selling costs are spent	Huge selling costs are incurred
7. Level of Knowledge	Perfect Knowledge	Imperfect Knowledge	Imperfect Knowledge	Imperfect Knowledge

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Check Your Progress

22. Make a comparative study of various market on the basis of demand curve?

4.14 ANSWERS TO 'CHECK YOUR PROGRESS'

1. The word "market" typically refers to a location where items are bought and sold. However, in an economic sense, a market is a system by which buyers and sellers negotiate a product's price, agree on a price, and conduct business. In contrast, it alludes to a region where buyers and sellers are free to compete with one another. As a result, the notion of a specific locality or geographic location is not necessary to the concept of market. Therefore, buyers and sellers do not need to interact personally. Rather, all that is required for the market to function is contact between buyers and sellers so that a transaction can happen between them at a predetermined price.

2. Following are major features or characteristics of market:

   (a) Area: The market is not limited to one location where buyers and sellers get together to buy and sell things. Rather, it implies entire region where buyers and sellers are spread over. Hence, market does not refer to any geographical territory.

   (b) Buyers and Sellers: The market requires both buyers and sellers to be present. Although their physical presence is not mandatory. Instead, they enjoy liberty to contact through telephone, fax, e-mail or middlemen.

   (c) Commodity: There must be some commodity, which is dealt with.

   (d) Competition: Free competition between buyers and sellers is necessary for a single price to rule the market for the same good.

3. In a market with perfect competition, the number of enterprises and their sizes can fluctuate freely due to the fluidity and mobility of the production variables. It leads to rational behaviour on the part of buyers and sellers, total information, a lack of friction, perfect mobility and divisibility of production elements, and a condition that is completely static.

4. It is distinguished by a high concentration of businesses and product variety. According to Left Witch, monopolistic competition refers to a market condition in which there are numerous sellers of a particular commodity, but each seller's product is in some way distinct from the products of each other seller in the eyes of consumers. In the current market environment, entering or leaving the sector over the long-term is simple.

5. When the product is not homogeneous, the market, even one with a huge number of customers and sellers, is rendered flawed. The product is unique; what one company creates is not exactly similar to what any other company does. There are many distinctions among varieties of a certain family of related commodities. Quality, style, packaging, container, type of service, retail location, credit terms, etc. could all vary.

6. There is no method for a buyer to distinguish between products from several companies when the goods being sold by multiple sellers are homogeneous or identical.

7. **Categories are:** Market period, Short-run, Long-run.

8. The supply is fixed during the market period, meaning that there can be no alteration to the supply conditions during this brief time period.

9. The term 'firm' in the field of economics may be defined as any company which seeks to earn profit by way of manufacturing/goods or services – or both – for buyers. For instance, 'law firms,' that sell services in relation to the law.

10. A set of productive businesses that generate or offer goods, services, or sources of money can be referred to as an industry. Industries in economics are typically divided into primary, secondary, tertiary, and quaternary categories. Secondary industries can also be divided into heavy and light categories.

11. The main characteristics of monopolistic competition are as follows:

   (a) Existence of large number of firms: There are numerous businesses, each with a small market share. There are numerous purchasers.

   (b) Product differentiation: Product differentiation is one of the monopolistic competition's key characteristics. No two businesses generate the same product due to product differentiation. For instance, while soaps made by several companies are similar, they are not the same:

   ● It could be based on specific product characteristics. brand name, colour, packaging design, etc. Instead of being a horizontal straight line, the Average Revenue (AR) curve is a downward sloping curve to the right.

   ● It may be accomplished through marketing or sales promotion.

   (c) Free entry and exit: It is not difficult for a new company to enter the market or for an existing company to depart it. Each company operates largely independently.

   (d) The demand curve or Average Revenue (AR): Instead of being a horizontal straight line, curve is a downward sloping curve to the right.

12. It is evident that in long-run firm under equilibrium does not produce capacity output i.e., level of production is not optimum at equilibrium at equilibrium point. Every firm produce less than its optimum capacity. According to Chamberlain and Joan Robinson, production in the long-run is less than its optimal output at equilibrium point. Therefore, when quantity of long-run output fall short of the optimal output, it is termed as excess capacity and this is regarded as wastage in monopolistic competition. So, it is true that, misallocation of resources takes place under monopolistic competition. Consumers, on the other hand, prefer a wide selection of goods. Differentiation in products reveals consumer want. Even customers desire to spend more to obtain variety of products that brings excess capacity.

13. In a duopoly, two businesses that are in direct competition with one another control the same market. In such cases, two brands may conspire to set pricing and/or quantities in order to raise consumer prices. Due to the fact that there are only two players in a duopoly market, each player's activities will have an impact on the other's reaction and activity. Companies in a duopoly concentrate on improving their existing products

and services rather than trying to enter the market with new ones. Given that there are only two companies competing in the market, and that they are the only ones with the power to set pricing and bar competitors from joining the market.

14. **Advantages:**

   (a) Market duopoly has both beneficial and negative effects for consumers and enterprises.

   (b) It offers every chance for two businesses to work together for the greatest financial gain.

   Disadvantages:

   (a) Due to the fact that there are only two businesses in the market, duopoly greatly restricts free commerce.

   (b) It restricts the range of products available to clients.

   (c) Due to the obstacles created by the competition, it is challenging for new businesses to enter the market and get any market share.

   (d) Prices are fixed and collusion occurs in a duopoly. As a result, buyers have few options and must pay a premium price.

15. A special feature of monopoly is price discrimination. Price discrimination or differential pricing may be defined as practice of charging different price from different buyers. Monopolist can increase total profits by this method.

16. According to Prof. A.C. Pigou, price discrimination may takes place in different ways. For the purpose of simplicity or convenience in analysis price discrimination is divided into three categories i.e.:

   (a) First degree discrimination or perfect price discrimination.

   (b) Second degree discrimination.

   (c) Third degree discrimination.

17. One measure which is usually adopted by the monopoly is to form trust, which is voluntary, but all the evils of monopoly more or less creep into it and thus the State is forced to take legislative measures by enacting Anti Trust Legislation. But sometimes monopolists are very active and try to undo the work of the state by either combining in another form or by reaching some informal understanding.

18. Some of important measures are: Anti Trust Legislation, Control over Prices, Organised Consumer's Associations, Effective Publicity, Creating Fair Competitions, Nationalisation/Government interference.

19. The market condition where the companies band together to fix the price and outputs of the industry is referred to as a collusive oligopoly. Collusive oligopoly is a tacit agreement. Open collusive action is illegal. Many collusive organisation like cartels, trusts and trade associations perform many activities through indirect ways.

20. In a non-collusive oligopoly, there is no understanding or agreement between the firms. According to the firms' understanding or agreement, this classification is made.

21. Paul M. Sweezy uses a peculiar demand curve to illustrate price rigidity. It is popularly known as Kinked Demand Curve.

22. Perfect Competition: Perfectly elastic demand curve:

   (a) Monopoly: Downward sloping demand curve (less elastic).

   (b) Monopolistic Competition: Downward sloping demand (but more elastic).

   (c) Oligopoly: Indeterminate demand curve.

4.15 SUMMARY

1. The word "market" typically refers to a location where items are bought and sold. However, in an economic sense, a market is a system by which buyers and sellers negotiate a product's price, agree on a price, and conduct business. In contrast, it alludes to a region where buyers and sellers are free to compete with one another. As a result, the notion of a specific locality or geographic location is not necessary to the concept of market. Therefore, buyers and sellers do not need to interact personally. Rather, all that is required for the market to function is communication between buyers and sellers so that a transaction can happen between them at a predetermined price.

2. In a market with perfect competition, the number of enterprises and their sizes can fluctuate freely due to the fluidity and mobility of the production variables. Buyers and sellers behave rationally, there is total knowledge, there is no friction, the factors of production are perfectly mobile and divisible, and there is complete static condition.

3. Major features of Market are:

   (a) Area: Market does not confine to a specific place where buyers and sellers gather to purchase and sale goods. Rather, it implies entire region where buyers and sellers are spread over. Hence, market does not refer to any geographical territory.

   (b) Buyers and Sellers: Existence of buyers and sellers is an essential condition for market, although their physical presence is not mandatory. Instead, they enjoy liberty to contact through telephone, fax, e-mail or middlemen.

   (c) Commodity: There must be some commodity, which is dealt with.

   (d) Competition: Free competition should exist between buyers and sellers, so that only one price should prevail for same commodity in the entire market.

4. A large number of businesses and product differences define monopolistic competition. According to Left Witch, monopolistic competition refers to a market situation where there are numerous sellers of a single commodity, but each seller's product differs in some way from the products of each other seller in the eyes of consumers. In the current market environment, entering or leaving the sector over the long-term is simple.

5. When the product is not homogeneous, imperfect competition results, making the market even with a high number of customers and sellers imperfect. When a company creates something that is somewhat unique from what any other company produces, the product is differentiated. There are many distinctions among varieties of a certain family of related commodities. Quality, style, packaging, container, type of service, retail location, credit terms, etc. could all vary.

6. Product When multiple sellers' items are homogeneous or identical, a consumer cannot distinguish between the offerings of several businesses, which is what homogeneity indicates.

7. According to the Marshall Market Period, the categories on which the supply reaction to a specific and ongoing change in demand takes place are short-run and long-run.

8. The market period is a relatively little time frame during which the supply is fixed, meaning that there can be no modification to the supply situation.

9. The term 'firm' in the field of economics may seek to earn profit by way of manufacturing/goods or services – or both – for buyers. For instance, 'law firms,' that sell services in relation to the law.

10. A set of productive businesses that generate or offer goods, services, or sources of money can be referred to as an industry. Industries in economics are typically divided into primary, secondary, tertiary, and quaternary categories. Heavy and light secondary industries are further divided.

11. **Primary sector:** Agriculture, mining, fishing, quarrying, mineral extraction, and forestry are all part of this industry.

12. **Secondary sector:** This sector includes the manufacturing industry, which turns primary industries' raw materials into consumer goods, refines those items after other secondary industries have turned them into finished goods, and produces capital goods that are used to make both consumer and non-consumer goods.

13. **Tertiary sector:** Included in this sector is the manufacturing industry, which transforms raw materials from primary industries into consumer goods, refines those goods after they have been transformed into finished goods by other secondary industries, and creates capital goods that are used to manufacture both consumer and non-consumer goods.

14. **Quaternary sector:** Quaternary industry, a branch of tertiary industry that is classified as its own sector, is focused on information-based or knowledge-oriented goods and services. It consists of a combination of commercial and public businesses. Information systems and information technology (IT) are included, as are scientific research, technological development, financial and strategic analysis, consultancy, media, and education.

15. Agriculture, cattle management, fishing, and forestry are all parts of the genetic industries and are influenced by advances in science and technology related to renewable resources.

16. Light, or small-scale, industries are those that produce non-standard products, such as specialized/craft work, and require less capital investment in plants, equipment, and machinery.

17. Quaternary industry, a branch of tertiary industry that is classified as its own sector, is focused on information-based or knowledge-oriented goods and services.

18. When a company is in equilibrium, it has no need to increase or decrease its output.

19. Duopoly is a market situation where two competing companies share the market. Under such circumstances, two brands can collude to set prices/ quantities and make customers pay more money. As under duopoly there are only two players within the market, actions of one will affect the other's response and activity. Firms in a duopoly don't strive to bring new products/services to the market, instead focus on innovation of their existing products/services. Considering that the market is divided only between two businesses, and they are the only ones to control prices and prevent other companies from entering the market.

20. Discriminating Price discrimination is a distinctive aspect of monopoly, which is implied by the term. The practise of charging different prices to different buyers is known as price discrimination or differential pricing. Monopolist can use this technique to raise overall revenues.

21. The market condition where the companies band together to fix the pricing and outputs of the industry is referred to as a collusive oligopoly. A tacit agreement exists in a collusive oligopoly. Open collusive action is illegal. Many collusive organisation like cartels, trusts and trade associations perform many activities through indirect ways.

22. In a non-collusive oligopoly, there is no understanding or agreement between the firms. According to the firms' understanding or agreement, this classification is made.

4.16 KEY TERMS

- **Market:** The word "market" typically refers to a location where items are bought and sold. However, in an economic sense, a market is a system by which buyers and sellers negotiate a product's price, agree on a price, and conduct business. Alternately, it alludes to the context in which buyers and sellers engage in unrestricted rivalry. As a result, the notion of a specific locality or geographic location is not necessary to the concept of market. Therefore, buyers and sellers do not need to interact personally. Rather, all that is required for the market to function is communication between buyers and sellers so that a transaction can happen between them at a predetermined price.

- **Perfect competition:** In a market with perfect competition, the number of enterprises and their sizes can fluctuate freely due to the fluidity and mobility of the production variables. Buyers and sellers behave rationally, there is total knowledge, there is no friction, the production elements are perfectly mobile and divideable, and there is absolute static condition.

- **Imperfect competition:** When the product is not homogeneous, the market, even one with a huge number of customers and sellers, is rendered flawed. The product is unique; what one company creates is not exactly similar to what any other company does. There are many distinctions among varieties of a certain family of related commodities. Quality, style, packaging, container, type of service, retail location, credit terms, etc. could all vary.

- **Product Homogeneity:** When the products offered by various vendors are homogeneous or identical, making it impossible for a customer to distinguish between the offerings of other businesses.

- **Market period:** The market period is a relatively little time frame during which the supply is fixed, meaning that there can be no modification to the supply situation.

- **Firm:** The term 'firm' in the field of economics may be defined as any company which seeks to earn profit by way of manufacturing/goods or services – or both – for buyers. For instance, 'law firms,' that sell services in relation to the law.

- **Industry:** A set of productive businesses that generate or offer goods, services, or sources of money can be referred to as an industry. Industries in economics are typically divided into primary, secondary, tertiary, and quaternary categories. Secondary industries can also be divided into heavy and light categories.

- **Primary sector:** Agriculture, mining, fishing, quarrying, mineral extraction, and forestry are all included in this industry.

- **Secondary sector:** This sector includes the manufacturing industry, which turns primary industries' raw materials into consumer goods,

refines those items after other secondary industries have turned them into finished goods, and produces capital goods that are used to make both consumer and non-consumer goods.

● **Tertiary sector:** This industry, which consists of both private and public businesses, is often known as the service sector and includes businesses that produce wealth or intangible benefits rather than tangible items. Wholesale, retail, and resale commerce, transportation, consultancy, legal, tourist, hotels, restaurants, and maintenance services are all included. In addition, there are also services related to health, social welfare, administration, police, security, and defence.

● **Quaternary sector:** Quaternary industry, a branch of tertiary industry that is classified as its own sector, is focused on information-based or knowledge-oriented goods and services. It consists of a combination of commercial and public businesses. Information systems and information technology (IT) are included, as are scientific research, technological development, financial and strategic analysis, consultancy, media, and education.

● **Excess capacity:** It is obvious that over the long-term, a business in equilibrium does not produce at capacity, or at the optimum level for equilibrium at the equilibrium point. Every business produces less than it can. Chamberlin and Joan Robinson assert that a corporation will ultimately generate less than its maximum output at the equilibrium point. Therefore, surplus capacity—which under monopolistic competition is viewed as wastage—is defined as the amount of long-run output that falls short of the optimal output. Therefore, it is true that monopolistic competition leads to resource misallocation. Consumers, on the other hand, prefer a wide selection of goods. Differentiation in products reveals consumer want. Even customers are willing to pay more for a wider selection of goods that result in surplus supply.

● **Duopoly:** Two rival businesses are sharing the market in this scenario. In such cases, two brands may conspire to set pricing and/or quantities in order to raise the price for consumers. Due to the fact that there are only two players in a duopoly market, each player's activities will have an impact on the other's reaction and activity. Businesses in a duopoly concentrate on improving the present products and services rather than trying to enter the market with new ones. Given that there are only two companies competing in the market, and that they are the only ones with the power to set pricing and bar competitors from joining the market.

● **Price leadership:** In oligopoly, one seller is acknowledged as a leader and other sellers follows the leader. The leader fixes the price and other sellers accept it unchanged for months, even for years.

● **Discriminating Monopoly:** Price discrimination is one of monopoly's unique characteristics. The practise of charging different prices to

different buyers is known as price discrimination or differential pricing. Monopolist can use this technique to raise overall revenues.

- **Collusive Oligopoly Model:** The market condition where the companies band together to fix the price and outputs of the industry is referred to as a collusive oligopoly. Collusive oligopoly is a tacit agreement. Open collusive action is illegal. Many collusive organisation like cartels, trusts and trade associations perform many activities through indirect ways.

- **Non-collusive oligopoly:** In a non-collusive oligopoly, there is no understanding or agreement between the firms. According to the firms' understanding or agreement, this classification is made.

4.17 SELF-ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. What is the concept of market?
2. Explain the term Perfect competition.
3. Explain the term Monopolistic Competition.
4. What do you understand by the term imperfect competition?
5. Explain the term Product homogeneity.
6. Explain the concept 'Excess capacity'.
7. What is selling cost?
8. What are Peculiarities of Selling Cost?
9. Define the term Duopoly. What are its features?
10. Explain in brief – Advantages and disadvantages of duopolies.
11. Distinction between Duopoly vs. oligopoly.

Long Answer Questions

1. Explain in detail the classification of forms of market.
2. What are the assumptions of perfect competition?
3. According to Marshall Market period, Short-run, Long-run are the categories on the basis of which response of supply to a given and permanent change in demand takes place – Explain.
4. Marshall, who propounded the theory that price is determined by both demand and supply, also gave a great importance to the time element in the determination of price – Comment.
5. Illustrate the concept of Equilibrium of Firm and Industry.
6. Explain in detail 'Short-run equilibrium under monopolistic Competition'.
7. Explain in detail 'Long-run equilibrium or Group equilibrium'.
8. Explain in detail Stackleberg model of oligopoly.
9. Illustrate in detail Oligopolistic Theories.

10. Illustrate the concept 'Price discrimination'.

11. "Monopoly is always in an advantageous position to fix the price of a commodity in a way it likes and exploit the society." Comment.

12. Illustrate Kinked Demand Curve.

4.18 REFERENCES

1. S.K. Misra & V.K. Puri. 2011. Principles of Microeconomics. Himalaya Publishing House, Mumbai.

Unit V	**General Equilibrium and Welfare Economics**

Learning Objectives:

By end of this unit the learners would be able to understand:

- Concept of equilibrium
- Static, dynamic and neutral equilibrium
- Partial vs general equilibrium
- Walrasian general equilibrium theory
- Welfare economics
- Problems in measuring welfare
- Classical welfare economics
- Pigovian welfare condition
- Pareto's criteria
- Value judgment
- Concept of a social welfare function
- Compensation principle
- The Kaldor-Hicks criterion

Structure:

5.1   INTRODUCTION

In this unit, we shall study General Equilibrium and Welfare Economics. In the beginning we shall start with static, dynamic, and neutral equilibrium; partial vs. universal equilibrium; welfare economics; and the basic idea of equilibrium. As this subject progresses, we'll talk about classical welfare economics, Pigovial welfare conditions, Pareto's criteria, value judgement, compensation principle, and Kaldor-Hicks criterion.

Check Your Progress

1.   Define the term 'General equilibrium'.

2.   What is the importance s of General equilibrium?

5.2   CONCEPT OF EQUILIBRIUM

Economic theory heavily emphasises the idea of economic equilibrium. Some economists like to refer to equilibrium analysis as the very definition of economics. According to Professor Samuelson, the idea of an equilibrium system can be applied to both the situation of a single variable and the so-called universal equilibrium, which involves thousands of variables. An equilibrium may be partial or a general equilibrium.

5.2.1 General Equilibrium

It refers to an overall equilibrium of an economy. A general equilibrium relates to the numerous variables. The general equilibrium study conducted on many economic sectors would inevitably have an impact on those sectors as well. For example, the start of a conflict will initially disrupt the defence sector. The examination of general equilibrium tracks the overall impact of a disturbance across all economic sectors.

In the general equilibrium analysis, the basic emphasis is on the inter-dependence of economic units. Economic disturbance in one sector spreads to other

sectors and affects the entire economy. The theory of how each component of the economy interacts with one another is known as general equilibrium theory.

5.2.2 Importance and Uses of General Equilibrium

1. The general equilibrium analysis helps to study the various sectors of the economy and their composition, structure and working.

2. It assists us in analysing the original disruption's primary and secondary consequences on any economic sector.

3. It helps the Govt. to formulate well integrated economic policies.

4. It was the basis for the input-output analysis developed by Leontiff.

Limitations

1. The general equilibrium method is too complex and complicated in character.

2. This method includes assumption of perfect competition which is highly unrealistic.

3. This analysis assumes that all economic units take place simultaneously without the time-log. Thus is an entirely wrong assumption.

   Despite the aforementioned drawbacks, the general equilibrium analysis offers a comprehensive view of the country's economy. This study has grown to be very helpful and well-liked.

5.2.3 Static, Dynamic and Neutral Equilibrium (Types of Equilibrium)

Regarding the state of a body, we can categorise the equilibrium into two groups:

1. **Static equilibrium:** Static equilibrium, or all stationary bodies, is the equilibrium where all forces and all torques acting on the body are zero.

2. **Dynamic equilibrium:** Dynamic equilibrium is a state of uniform motion when there is no net force acting on the body and no net torque acting on it.
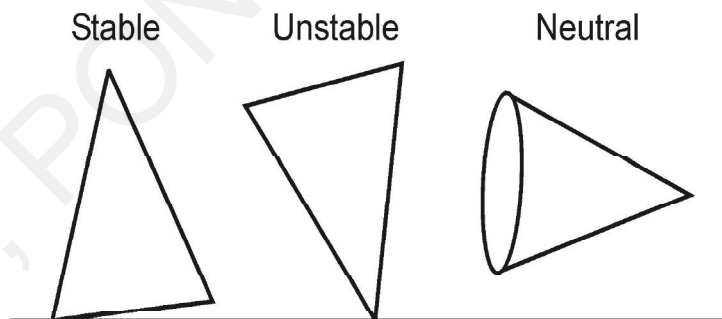
Fig. 5.1: Stable, Unstable and Neutral Equilibrium Stable, Unstable and Neutral Equilibrium

3. **Stable Equilibrium:** Any object will be in a stable equilibrium if a small movement causes it to return to its initial state.

Examples

- A cell phone that is lying on a simple table is an example of stable equilibrium because, if moved from one side of the table to the other, it will revert to its original position.

- Flat side of a cone on horizontal side of floor, while the clone tilts a little and then settles back into place.

4. **Neutral equilibrium:** If a ball is pushed slightly to roll, it will neither come back to its original nor will it roll forward, rather it will remain at rest.

Examples

- If a ball is displaced on a floor, then it will not make any impact.

Check Your Progress

3. Define Static equilibrium.
4. Define Dynamic Equilibrium.
5. Define Neutral equilibrium.

5.3 PARTIAL VS. GENERAL EQUILIBRIUM

Basis	Partial Equilibrium	General Equilibrium
Definition	In case of Partial equilibrium, while equilibrium in one market is obtained, it is also presumed that there is no change in other market.	In case of General equilibrium various markets are studied at a time.
Uses	Partial equilibrium is considered in Microeconomics.	General equilibrium is considered in Macroeconomics.
Inter-dependence	There is no inter-dependent relation in the partial equilibrium.	In general equilibrium there is an inter-dependence between prices in the market.
Confinement	Partial equilibrium confines itself to a single organisms.	General equilibrium deals with all the organisms functioning in the economy.
Others	The partial equilibrium may be regarded as a worm's eye view.	Bird's eye view is considered of General equilibrium.

Check Your Progress

6. Differentiate Partial vs. general equilibrium on the basis of confinement.

5.4 WALRASIAN GENERAL EQUILIBRIUM THEORY

The extensive analysis of several economic factors, interrelationships, and interdependences is known as general equilibrium theory. As Stigler has said, general equilibrium theory provides interrelationships between entire fragments of the economy.

5.4.1 Walrasian Model

First to develop a model of the overall equilibrium of a strictly competitive economy was the French economist Leon Walras. Although the Walras model has been improved, no significant changes have yet been implemented. All prices are viewed as dependent upon one another and this theory of prices becomes general equilibrium theory. Walras model is simple and based on mathematics. The mathematics gives a version of the interdependence of prices.

Assumption of Walrasian Model

The following presumptions are made by the Walrasian model::

1. The market for commodities and factors is dominated by pure competition.

2. No unemployment of labour and other resources.

3. The consumers who are offered have known and consistent tastes and incomes.

4. Assumes constant scalability returns.

5. Every business operates under the same cost conditions.

The Model

Given these assumptions, an economy will be in a state of general equilibrium and the demand for every commodity and service will be equal to the supply for it.

Walras model has house holds and firms in a self contained economy. Price connects the actions of all households and firms. The firms sell commodities to the households and in turn, sells factors of production or resources i.e., labour, land, equipment etc. to the firm.

House Hold (Demand)

Each Household's demand consists of quantities of commodities in accordance to tastes, income, price of goods and the price of all other commodities. In buying any one commodity, a household assess all commodity prices. This is the special emphasis of general equilibrium theory. The quantity of each commodity demanded is based in addition to price of goods, and availability of goods in the market.

The households, in Walras model, spend their entire incomes on consumption. They make money by selling the resources they have. The value of their own resources determines how much money they make. Consumer demand for products

is influenced by factor and commodity prices. Prices for factors and products are thus established concurrently.

Firms (Supply)

In the supply side, the firm sells the commodities at a price equal to the full cost of production. Unit cost are constant in the Walrasian model. Each commodity's price is the sum of its cost components, presuming returns to scale are constant and similar across all enterprises.

The cost to the firm determines the total amount of goods available in the market, and the supply of goods in the market is based on the cost rates and volume of services the firm needs.

5.4.2 Equality of Demand and Supply

The Walrasian global equilibrium system depends on the equality of supply and demand.

Demand for a factor must match its supply. Firms create the demand, and households create the supply. Every market for a factor is in equilibrium.

When all of the markets for commodities and factors are in equilibrium, an economy is said to be in a condition of general equilibrium. It also means that there is balance between all of the producers and consumers in the economy.

Adjustment to Equilibrium

Walras described the adjustment to equilibrium as a process of grouping. At the set prices, each buyer and seller declares the quantities they desire to acquire and sell. If there is negative excess demand, sellers offer low prices and if there is positive excess demand, the buyers offer high prices. They keep working out the details until they determine a price that brings about market equilibrium. Only the agreed-upon price can equalise supply and demand. The system will eventually attain its equilibrium pricing.

Limitations of the Model

1. It is a static model. It operates with the assumption of fixed tastes and co-efficient of production.

2. It is based on a number of unrealistic assumptions which is a myth.

Uses

1. The general equilibrium model of economic efficiency gives a standard of economic efficiency.

2. Economic process can be explained by general equilibrium.

3. The general equilibrium theory provides theoretical apparatus for establishing interlinks among various sectors of the economy.

4. The equality of demand and supply forces establishes the general equilibrium model.

5.5 WELFARE ECONOMICS

Pigou defined economic welfare as a component of social welfare, which can be utilised both directly and indirectly for measuring money and/or in exchange for products and services. Pigou offered explicit definition to the concept of welfare or material welfare. Pigou considered national income as the quantitative indicator of economic welfare.

5.6 PROBLEMS IN MEASURING WELFARE

Economists must compare interpersonal utility in order to determine a set of regulations or economic conditions that maximise social utility. A person must create minimum wage laws which will be helpful to low-skill workers especially those lose jobs.

Detractor/opponents of welfare economics believe that doing such comparison will not be appropriate. Studying the relative impact of price changes on a person's utility will be suitable. According to British economist Lionel Robbins, it is less useful to compare the values that various consumers place on a group of products. Robbins highlighted the absence of impartial yardsticks for measuring usefulness across various market actors.

However, Kenneth Arrow's introduction of the Impossibility Theorem in the early 1950s, which contended that determining social preferences by averaging individual ranks is fundamentally wrong, was the most effective critic of welfare economics.

5.6.1 Classical Welfare Economics

Classical economists did not formulate any particular theory of economic welfare. They related to the thought process of Smith, Ricardo and J.S. Mill regarding raising nation's wealth. Prof. Hla Myint believes that the classical belief regarding welfare is normally restricted to material wealth production only. Smith clarified real national income of a nation at par physical output, as an index of its economic welfare. Real value of any commodity is its labour price. It is the segregation of labour that motivates labour to increase productivity. Further, Smith associated increase in welfare with a curtailment/reduction in sacrifices required to boost productivity.

A person's wealth is measured by the value of a commodity produced by his own labour/his purchasing power over others. More labour implies larger total product or the increase in real income that leads to improvement in overall welfare.

Smith has belief on the strategy of invisible hand of the market. Because each individual tries to maximise his satisfaction level, for normal working of the economic system, satisfaction of the entire community is maximised. So, attitude of self interest in a free market system, raises economic welfare by improving physical productivity of labour, works expenditure like highways, canals, bridges, dams and so on. He desired that greater portion of expenses on public works must be advantageous by way of toll taxes upon their utilization and rest will be from local revenues as well as general revenue.

According to Ricardo, decrease in human effort per unit of output leads to improvement in the welfare and productivity of each person. His idea of welfare is based upon the term values as well as riches. As riches are concerned with the size of physical output – more the riches, more will be the real income – On contrary, value differs inversely to labour time required for each unit of output.

J.S. Mill does not specifically comment on economic welfare. But economists have commented their opinion based upon objections to the Factories Act. Mill says, decrease (increase) in working hours, with constant wage rate will decrease productivity per worker and that will cause unemployment. He will not support working duration of 10 hours. The Bill of 1842, does not consider working women from factories, although women were free agents as men.

5.6.2 Pigovian Welfare Condition

Meaning of Welfare

Pigou holds that a person's thinking and knowledge of their welfare are based on their level of satisfaction and utility. Thus, the degree to which a person's needs are met is the basis for welfare. Therefore, he defines economic welfare as social/general welfare, which may be related to money either directly or indirectly. Pigou therefore argues that economic welfare denotes everyone's happiness with the use of exchangeable goods.

Pigovian Welfare Conditions

Pigou stated two requirements for maximising welfare since, in his opinion, economic welfare and national income must work in harmony. When there is a national income, the welfare condition worsens. If taste and money are taken into consideration, a gain in national income results in an increase in welfare. Pigou thinks that even though employment will become less useful, the national income would most likely increase.

For welfare maximisation, the national income distribution is crucial. This is because shifting income from rich to poor will boost welfare if the national income stays constant. According to Pigou, such transfers imply less to the wealthy than to the underprivileged. Consequently, economic status of the latter will increase.

Therefore, the economic welfare depends upon dual Pigovian postulates i.e., to retain equilivalent capacity satisfaction level and also diminishing marginal utility of income.'

Pigou believes that individual meet similar level of satisfaction from identical real income. In contrast, income declines as marginal utility increases. Increased social welfare results from a shift in money from the wealthy to the poor because it satisfies the needs of the latter group at the expense of the former. It indicates economic equality that leads to maximisation of welfare.

Dual Criterion

To map social welfare improvements, Pigou adopts following dual criterion:

1. The increase in national income is seen as improving wellbeing without sacrificing the percentage of the poor by increasing a few commodities without devaluing others or by shifting resources to activities with higher social value.

2. An increase in social welfare is also regarded as occurring when the economy is reorganised in a way that increases the part of the poor community without lowering national income.

Assumptions of Pigovian Conditions

Followings are a few major assumptions of Pigovian conditions and dual criterion:

1. Every person spends money on various goods in an effort to maximise their level of enjoyment.

2. Socially, utilities are comparable.

3. Applying the law of diminishing marginal utility of income, which states that as income rises, the marginal utility of money decreases Therefore, the utility gain from each additional dollar of income for a poor person should be greater than the utility loss from the same amount of income for a rich person.

4. Equivalent capacity degree of satisfaction is required.

It suggests that each person experiences a comparable degree of happiness from a comparable level of money in order to fulfil the Pigovian requirement of maximum social welfare based on the appropriate dual criterion.

Its Criticism

Pigou's welfare economics has received a lot of criticism despite being a unique critique of contemporary welfare economics. Its major criticism are as follows.

1. **The Notion of maximisation is not clear:** Notion of maximization is not distinct in the sense that Pigou asserted upon welfare maximization, instead of clarifying particularly its notion. In fact he tried to prefer optimizing instead of maximising – which is unstable, because it varies with variation in National Income:

1. **Pigou measures 'welfare' cardinally:** Pigou opted to measure welfare based upon cardinal utility, i.e., in terms of utility. As we know that social welfare is in fact summation of utilities of commodities/services (exchangeable) to each individual, which is not agreed upon by other economists. This is due to the fact that utility cannot be quantified, as is common knowledge. Hence, modern economist opted to measure it ordinaly.

2. **National Income is not an Accurate Measure of Welfare:** Once more, national income cannot be regarded as a true indicator of welfare. Besides, Pigou's welfare basically relates to National income which is not easy to compute. As we know national income differs because of inflationary price hike, which affects the poor adversely. So, modern economist opted for choice instead of national income.

3. **Pigou's assertion that all people have the same capacity for happiness is based on moral principles:** Pigou's assumption that all men have an equal capacity for happiness is founded on an ethical premise.

4. **Pigou does not elaborate on the moral significance of welfare:** Pigou omits elaborating on the moral precept of welfare. Although Pigou has disregarded it, welfare economics is connected to ethics.

Check Your Progress

10. What are the problems in measuring welfare?
11. Mention few names of Classical economists.

5.7 PARETO'S CRITERIA CONCEPT OF PARETO'S OPTIMALITY

Pigou's welfare economics is not treated as objective study against the welfare causes.

The New Welfare Economics starts with Pareto. Pareto boldly defined a position of maximum welfare for a society and indicated positive criteria for increase or decrease in social welfare.

Objectives

(i) To clarify and quantify the vague concept of riches or Opulence.

(ii) To clarify, the economists, are required to set specific standards by events and policies. It can be decided as economically desirable though on political, national and ethical grounds.

(iii) To develop propositions, which are scientifically free from ethical judgements.

Assumptions

1. Pareto assumes ordinal measurement of utility, non-admissibility of inter-personal comparisons of utility.

2. Interdependence of utility functions of individuals differ from one another.

3. Pareto made use of indifference curve technique for the derivation of his theoretical propositions.

Pareto's optimality explains about efficient allocation which comprises of basis to judge welfare economics. It is impossible to create any kind of tiny alteration in a position of maximum wellbeing or ophelimities. The ophelimities of every person stay consistent; they either all rise or all fall.

Marginal Condition of Paretian Optimum

In social optimum, number of marginal conditions that can be derived are:

Basic Conditions

(i) **Marginal requirement for exchange:** Marginal Rate of Substitution between a pair of consumer items must be equal for all to reach Pareto maximum.

(ii) **Marginal requirement for factor substitution:** MRTS for each input should be the same for all manufacturers in order to attain Pareto maximum.

(iii) **Marginal condition for product substitution:** Marginal Rate of Transformation must equal Marginal Rate of Substitution in order to achieve Pareto Maximum. In this situation, Pareto's ideal organisation is attained.

Condition for Optimum Allocation

The condition for Pareto Optimum implies that resources are optimally allocated, but does not imply fairness. MRS between any pair of commodities for all individuals, assuming all individuals consume both commodities.

Dy/dx = (MUX/MUY) for A = (Mux/MUy) for B

In this model two person and two commodities exchange and this conditions can be explained with the help of fig. 5.2.
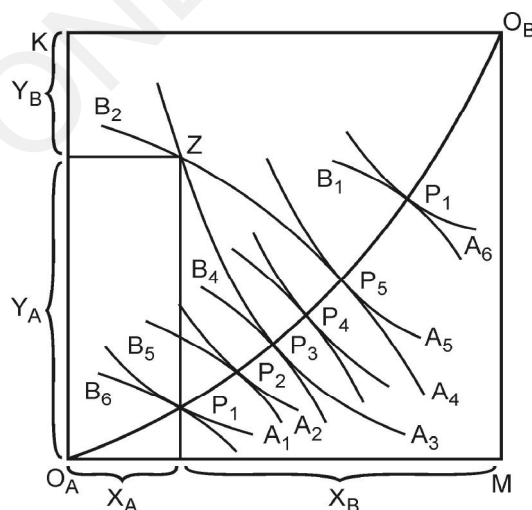

Fig. 5.2: Edgeworth Box Exchange

Points on the OA OB contract curve in fig. 5.2 satisfy the Pareto ideal condition. Any additional dissemination from outside is ineffective. Point Z is a waste of time. Between P_3 and P_5, the commodities start to be redistributed. The usefulness of B will rise as we get towards P_3.

Points moving in the direction of P_2 will make A more useful without making B less useful. Therefore, every point between P_3 and P_5 represents an improvement in social welfare when compared to the distribution at Z. A decline in social welfare is indicated at the contract curve's intersection. At each point on the contract curve, P_1, P_2, P_3, etc., the contract curve displays the location of the Pareto optimal or Pareto efficient distribution of products amongst customers.

The conditions satisfied

$$\underset{XY}{\underset{A}{MRS}} = \underset{XY}{\underset{B}{MRS}} = \ldots\ldots = \underset{XY}{\underset{N}{MRS}}$$

Therefore the theorem states circumstances for Pareto efficient/optimal distribution of inputs among buyers needs that MRS of two goods should be equal.

Check Your Progress

12. Define Pigovian welfare.
13. Define Dual Criterion.
14. What are the Assumptions of Pigovian Conditions?

5.8 VALUE JUDGMENT

Every ethical decision should be influential. Dr. Brandt stated that a decision carries weightage, if it doesn't go against common judgments like "is a good thing that" or "is a better thing that," "is generally required," "is unacceptable," and "is normally commendable," then it is acceptable.

Value judgments aim to persuade others by changing their opinions by empathetically presenting evidence. All of these reforms will improve economic welfare and hasten economic growth, while reducing income disparities. In actuality, the word "welfare" is ethical. Therefore, all ideas pertaining to welfare are ethical in origin and will include morally responsible choices. Since they are emotive, these concepts are referred to as utilitarian. Similar to how emotive words like social and national as opposed to economic are also ethical.

As welfare economics is basically about the policy issues, it comprises ethical terms like rise of social welfare/benefit. So, welfare economists were aware of utility measurement and interpersonal comparisons. But, Pigou's income distribution theory, which is at par with Mrshall's theory of equal capacity satisfaction, shows that it is possible to do interpersonal comparisons. However Robbins criticized this view.

According to him if economics was to be an objective and scientific study, economists should refrain from making such interpersonal comparisons, for policy recommendations to make certain individual better off and remaining worse off. Thus, under such circumstances, it is not possible to make interpersonal comparisons i.e., we cannot compare welfare of two different individuals. Majority avoid the strategy of interpersonal comparisons. Subsequently, Klaldor, Hicks and Scitovsky provided compensation principle free from value judgements.

Accordingly, economist makes policies at par efficient considerations. Objective test as regards to economic efficiency, indicates gainers can compensate the losers. But this test of enhanced efficiency is a valued decision, as gainers can compensate losers. So, the principle of compensation includes values and so economists of new welfare economics failed to finalize value free welfare economics. Pareto theory (welfare of individual) is not value free.

According to this theory, optimum position implies from the situation that it will not be feasible to make each individual better off without making one individual worse off by the reallocation of available resources. These are all valued decision, which Pareto could not avoid despite the fact that he followed/adopted the ordinal measurement of utility.

Check Your Progress

15. What are the objectives of Pareto's criteria Concept of Pareto's Optimality?
16. What are the assumptions of Pareto's criteria and concepts of Pareto's Optimality?

5.9 CONCEPT OF A SOCIAL WELFARE

Social Welfare is the aggregate of satisfactions of all individuals in the society. Social welfare is the sum total of individual utility functions. Individuals are ruled by choices and different choices of individuals conflict with each other.

Bergson's Welfare

Bergson's Welfare was proposed by Abram Bergson and developed by P.A. Samuelson. They make some persons better off to make other person worse off. There is a need for interpersonal comparisons and value judgements. Value judgement is taken as given by the society. Bergson's idea of social welfare is the change in combination of individual welfare in the society.

There are two ways of combining individual utility functions to give social welfare:

1. The existence of paternalistic authority feels for all the people in the society. It's gives due weightage to differing views and formulates social welfare function. It is the paternalistic concept of social welfare.

2. The value judgement of policy markets derive social welfare function.

Social welfare approach is good so far as it is general and practical. But it is too general to judge ordinary situations.

The concept of welfare is far from search for clear expression. The analysis of the efficiency of the economy for maximum welfare is judged in terms of social satisfaction. The fundamental work of a welfare economist is to formulate tools of analysis immediately applicable to economic policy. Economic policy is oriented towards the achievement of maximum welfare, or optimum welfare. Welfare economist has to define optimum (what?) and prescribe policies lead societies.

Social welfare is the aggregation of the individual welfare constituting the society. The central problem of welfare economics is to get the welfare from individual welfare functions. Bergson's generalised social function is a group of valued decisions introduced explicitly from outside.

Social Welfare Function

Social welfare function was developed by A. Bergson. It is an index of society's welfare and is the utility level of all individuals in a society.

It is generally represented by

$W = N/1(U_1, U_2,\ldots, U_N)$

U_1 is the level of utility index of the individual. It is a kind of social indifference curve showing the society's level of satisfaction. There can be higher or lower levels of welfare function.

The dictator's personal preference function is societal welfare.

Social welfare function construct the Bliss point that an be achieved as represented in fig. 5.3.
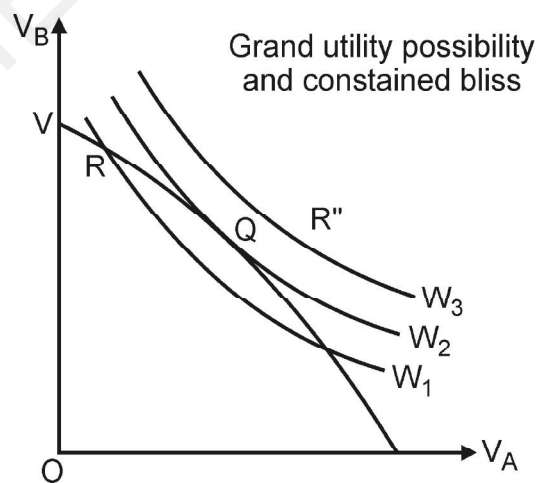
Fig. 5.3: Social Welfare Function

In fig. 5.3, W_1, W_2, W_3 are various levels of social welfare functions. The individual is a consumer and citizen for a society. U_BW represents all possible combinations of A and B. At point Q social welfare is represented by W_2 curve. The infinity of possible equilibri is reduced to a unique equilibrium point. The point of Constrained Bliss is where this is located. It stands for the distinct way that production, trade, and distribution are organised. The society is happier at W_2 level. But this level is unattainable given the constraints of resource endownment.

Limitations of Social welfare function:

1. Social welfare function attempts are very logical and scientific. This field still remains confused.

2. The concept of welfare rationality and proper status of income distribution remain difficult to handle.

3. The prevalence in actual life of imperfect competition, oligopoly, Govt. interference, public goods etc. can not be considered.

Check Your Progress

17. Explain the concept of Value judgment.

5.10 COMPENSATION PRINCIPLE

Economists like Kaldor and Scitovsky have worked to assess the welfare changes brought on by economic reorganisation. These economists have worked to eliminate uncertainty from the Pareto optimality study. They have proposed a standard called the Compensation Principle.

Assumptions

1. Utility of a person does not depend on others and he can take right decision for welfare.

2. No externalities lie there for consumption and production.

3. The tastes/choice of person is constant.

4. Compensation principle accepts social welfare level as a function of production level.

5. Utility is measured as per ordinal principle and interpersonal comparisons are not possible. Kaldor Criterion is suitable to measure welfare implications of any activity. In this model, either movements on contract curve, as per Edgeworth box diagram, can be shown.

As per Prof. Baumol, Kaldor's criterion, he asserts that any variation will be a betterment and analyse gains at a higher level from value than that of losers. Change is improvement and evaluates their gains at a higher figure than that of losers. Prof. J.R. Hicks also asserted Kaldor to employ analysis social welfare variation caused due to economic re-organisation, which makes few people better off or worse offs than others.

This criterion states that, if A becomes better by the change, he can compensate B for loss. The re-organisation in unequivocal improvement.

Check Your Progress

18. Explain the Concept of a social welfare.

19. What is Bergson's welfare?

20. What are the Limitations of Social welfare function?

5.11 THE KALDOR-HICKS CRITERION

As a measure of Pareto improvement, the Kaldor-Hicks improvement, named after Nichlas Kaldor/John Hicks, is a successful redistribution of resources among individuals. If A makes up for his loss, then there is reorganisation in undeniable improvement, and this results in a Pareto-improving result, then the allocation is a Kaldor-Hicks betterment.

If there is no potential Kaldor-Hicks improvement from a scenario, it is viewed as being Kaldor-Hicks efficient or meeting the Kaldor-Hicks criterion. An outcome is said to be Hicks-optimal if it is the best possible outcome.

Re-arrangement will be Pareto improvement provided one individual is better off while none is worse off. Although, actually it is not possible to take any such social action.

Now, in case of Kaldor-Hicks improvement, any outcome will be a betterment provided it makes better off to compensate those that make others worse off and consequently a Pareto betterment result can be attained.

As per Kaldor-Hicks efficiency, any development makes few people worse off, but every Pareto improvement may really make other people's situation worse. Each person must benefit from Pareto improvements in order for there to be no losers.

While each Kaldor-Hicks improvement is a Pareto improvement, Kaldor-Hicks improvements are not Pareto improvements, and Kaldor-Hicks criterion use is more flexible than Pareto criterion use.

Use in Policy-making

Instead of using the Kaldor-Hicks procedures to achieve efficiency goals, they are employed as tests of possible development. They are used to examine if economic activity leads to Pareto efficiency, or any changes that benefit a small number of people at the expense of others. What would occur if losers were made whole by gainers.

Kaldor Criterion	Hicks Criterion
Kaldor criterion is that if any movement comes nearer,it moves the economy closer to Pareto efficiency provided highest quantity gainers are ready to offer to the to the losers.	**Hicks criterion** is that any movement that moves towards Pareto efficiency is subjected to highest possible extent losers will compensate gainers.
Kaldor test assumes losers can restrict the system and decide whether gainers can compensate losers to consider the entire system.	**Hicks test assumes** that gainers may go ahead with the changes and also decide whether losers will think their loss worthless than the cost, in case, they sacrifice for gainers.

The Kaldor-Hicks criteria is typically relevant in non-zero sum games from game theory, such as cost-benefit analysis, management economics, and welfare economics. In a cost-benefit analysis, a project's effectiveness is assessed in relation to its overall costs.

Criticism

1. Tibor Scitovsky demonstrated that the Kaldor criterion alone is not antisymmetric; nonetheless, it is conceivable in circumstances where A's activity is superior to B's activity while B also outperforms A.

2. The Kaldor-Hicks criterion is non-transitive, unlike A, hence it does not have this problem, a improved activity over B, and B over C. So, A is not to be considered to have done an improvement over C.
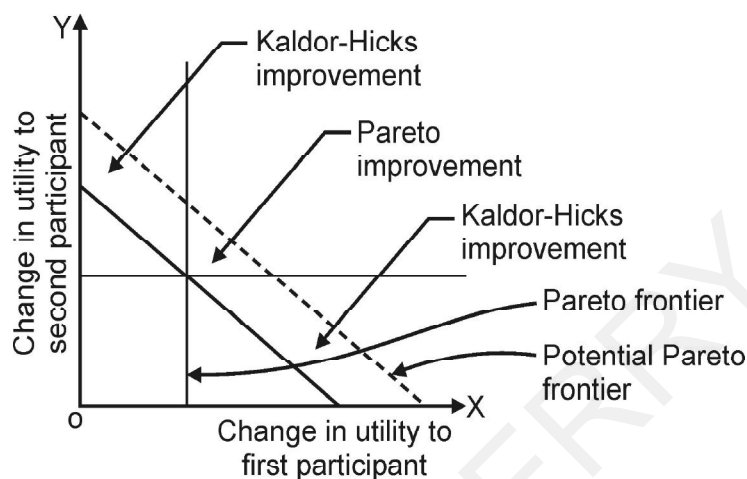
Fig. 5.4: Pareto's Improvement is a Small Subset of Kaldor-Hicks Improvement

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Check Your Progress

21. Explain the term Compensation principle.
22. What are the assumptions of Compensation principle?
23. What is Kaldor-Hicks efficient?

5.12 ANSWERS TO 'CHECK YOUR PROGRESS'

1. It refers to the overall equilibrium of an economy. The many variables are related via a general equilibrium. The general equilibrium study conducted on many economic sectors would inevitably have an impact on those sectors as well.

2. Are following:

   (a) The general equilibrium analysis aids in the study of the many economic sectors, including their structure, composition, and functioning.

   (b) It assists us in analysing the original disruption's primary and secondary consequences on any economic sector.

(c) It helps the Govt. to formulate well integrated economic policies.

(d) It was the basis for the input-output analysis developed by Leontiff.

3. Static equilibrium, or all stationary bodies, is the equilibrium where all forces and all torques acting on the body are zero.

4. Dynamic equilibrium is a state of uniform motion when there is no net force acting on the body and no net torque acting on it.

5. If a ball is given a small push to start rolling, it won't return to its starting position or move forward; instead, it will stay at rest.

6. Only one creature can exist in partial equilibrium. The entire ecosystem that makes up the economy is subject to general equilibrium.

7. First to develop a model of the overall equilibrium of a strictly competitive economy was the French economist Leon Walras. Although the Walras model has been improved, no significant changes have yet been implemented. All prices are viewed as dependent upon one another and this theory of prices becomes general equilibrium theory. Walras model is simple and based on mathematics. The mathematics gives a version of the interdependence of prices.

8. The Walrasian models assumes following asumptions:

   (a) Pure competition prevails in the commodity and factor market.

   (b) No unemployment of labour and other resources.

   (c) The revealed Consumer preferences and earnings are well-known and reliable.

   (d) Assumes constant scalability returns.

   (e) Every business operates under the same cost conditions.

9. Pigou provided a precise definition for the term "welfare" or "material welfare." He describes economic welfare as a component of social welfare that can be measured in terms of money and the trade of products and services, as well as used directly or indirectly. Pigou regarded national income as a measure of the health of the economy.

10. Economists must compare interpersonal utility in order to determine a set of laws or economic conditions that maximise society utility. Individual has to derive minimum wage laws, which will be helpful to low-skill workers, especially those lose jobs.

    Detractor/opponents of welfare economics believe that doing such comparison will not be appropriate. It will be appropriate to study its relative effect on utility of changes in prices for the individual. British economist Lionel Robbins stated that comparing the value that different consumers place on a set of goods is less practical. Robbins criticized lack of objective units of measurements to compare utility among different market participants.

However, most potent criticism on welfare economics came from Kenneth Arrow, who during early 1950s introduced the Impossibility Theorem, that suggested that deducing social preferences by way of aggregating individual rankings is inherently flawed.

11. Smith, Ricardo and J.S. Mill.

12. Pigou believes welfare stays in an individual's mindset/awareness that depends upon his satisfaction/utilities. Basis of welfare thus implies the extent to which person's necessities are fulfilled. Hence he clarifies economic welfare in social/general welfare, which directly or indirectly may relate to money. So, according to Pigou, economic welfare implies satisfaction derived by any person from using exchangeable commodities.

13. Pigou uses the two criteria listed below to map changes in social welfare:

   (a) An increase in national revenue that benefits a select few goods without affecting others or that transfers funds to projects with higher social value is regarded as a welfare improvement that doesn't penalise the poor.

   (b) Improvements in social welfare are also regarded as occurring when the economy is reorganised in a way that increases the part of the poor community without lowering national income.

14. Followings are a few major assumptions of Pigovian conditions and dual criterion:

   (a) Every person spends money on various goods in an effort to maximise their level of enjoyment.

   (b) Utilities are comparable interpersonally.

   (c) Applying the law of diminishing marginal utility of income, which states that as income rises, the marginal utility of money decreases Therefore, the utility gain from each additional dollar of income for a poor person should be greater than the utility loss from the same amount of income for a rich person.

   (d) Equivalent capacity degree of satisfaction is required.

   It indicates that each person receives a comparable level of happiness from a comparable level of wealth in order to fulfil the Pigovian requirement of maximum social welfare based on their particular dual criterion.

15. Are following:

   (a) To clarify and quantify the vague concept of riches or Opulence.

   (a) To clarify, the economists is required to make/set specific standards by events and policies. It can be decided as economically desirable though on political, national and ethical grounds.

   (b) To develop propositions scientifically free from ethical judgements.

16. Are following:

    (a) Pareto assumes ordinal measurement of utility, non-admissibility of inter-personal comparisons of utility.

    (b) Interdependence of utility functions of individuals differ from one another.

    (c) Pareto made use of indifference curve technique for the derivation of his theoretical propositions.

17. Value judgments aim to persuade others by changing their opinions by empathetically presenting evidence. All of these reforms will improve economic wellbeing, hasten economic growth, and on the other hand, reduce income inequality. In actuality, the word "welfare" is ethical. Therefore, all ideas pertaining to welfare are ethical in origin and will include morally responsible choices. Since they are emotive, these concepts are referred to as utilitarian. Similar to the way that emotive words like social and patriotic are more ethical than economic.

18. Social Welfare is the aggregate of satisfactions of all individuals in the society. Social welfare is the sum total of individual utility functions. Individuals are ruled by choices and different choices of individuals conflict with each other.

19. A welfare concept was proposed by Abram Bergson and developed by P.A. Samuelson. Bergson's concept embraces all changes in an economic organisation. They make some persons better off to make another person worse off. There is a need for interpersonal comparisons and value judgements. Value judgement is taken as given by the society. Bergson's idea of social welfare is the change in combination of individual welfare in the society.

20. Are following:

    (a) Social welfare function attempt is very logical and scientific. This field still remains confusing.

    (b) The concept of welfare rationality and proper status of income distribution remains difficult to handle.

    (c) The prevalence in actual life of imperfect competition, oligopoly, Govt. interference, public goods etc. can not be considered.

21. Economist like Kaldor and Scitovsky have made efforts to evaluate the changes in welfare leading from economic re-organization. These economists have sought to remove indeterminancy in the analysis of Pareto optimality. They have put forward a criterion known as the Compensation Principle.

22. Are following:

    (a) Utility of a person does not depend on others and he can take right decision for welfare.

    (b) No externalities lie there for consumption and production.

    (c) The tastes/choice of person is constant.

(d) Compensation principle accepts social welfare level as a function of production level.

(e) Utility is measured as per ordinal principle and interpersonal comparisons are not possible. Kaldor Criterion is suitable to measure welfare implications of any activity.

23. As a measure of Pareto improvement, the Kaldor-Hicks improvement, named after Nichlas Kaldor/John Hicks, is a successful redistribution of resources among individuals. A re-allocation is a Kaldor-Hicks betterment; if A makes up for his loss, the re-organization is unquestionably better, and the result is Pareto-better.

    If there is no potential Kaldor-Hicks improvement from a scenario, it is viewed as being Kaldor-Hicks efficient or meeting the Kaldor-Hicks criterion. An outcome is said to be Hicks-optimal if it is the best it could possibly be.

5.13 SUMMARY

1. A general equilibrium relates to the numerous variables. The general equilibrium analysis upon different sectors of other areas of the economy will inevitably be affected by the economy.

2. Static equilibrium, or all stationary bodies, is the equilibrium where all forces and all torques acting on the body are zero.

3. Dynamic equilibrium is a state of uniform motion when there is no net force acting on the body and no net torque acting on it.

4. Any object will be in a stable equilibrium if a small movement causes it to return to its initial state.

5. When a ball is given a tiny push to start rolling, it won't return to its previous position or go ahead; instead, it will stay at rest.

6. First to develop a model of the overall equilibrium of a strictly competitive economy was the French economist Leon Walras. Although the Walras model has been improved, no significant changes have yet been implemented. All prices are viewed as dependent upon one another and this theory of prices becomes general equilibrium theory. Walras model is simple and based on mathematics. The mathematics gives a version of the interdependence of prices.

7. Pigou believes welfare stays in an individual's mindset/awareness that depends upon his satisfaction/utilities. Basis of welfare thus implies the extent to which person's necessities are fulfilled. Hence he clarifies economic welfare in social/general welfare, which directly or indirectly may relate to money. So, according to Pigou, economic welfare implies satisfaction derived by any person from using exchangeable commodities.

8. The welfare economics of Pigou is not regarded as an impartial analysis of welfare causes. Pareto is where the New Welfare Economics begins.

The stance of maximum social welfare was forcefully articulated by Pareto, who also provided criteria for determining whether social welfare should increase or decrease.

9. The total level of contentment among all members of a society is known as social welfare. The total of all individual utility functions is social welfare. People are driven by their choices, and those choices often conflict with one another.

10. A welfare concept was proposed by Abram Bergson and developed by P.A. Samuelson. Bergson's concept embraces all changes in an economic organisation. They make some persons better off to make another person worse off. There is a need for interpersonal comparison and need for value judgement. Value judgement is taken as given by the society. Bergson's idea of social welfare is the change in combination of individual welfare in the society.

11. Attempts have been made by economists like Kaldor and Scitovsky to assess the changes in welfare resulting from economic reorganisation. These economists have worked to eliminate uncertainty from the Pareto optimality study. They have proposed a standard called the Compensation Principle.

12. As a measure of Pareto improvement, the Kaldor-Hicks improvement, so named after Nichlas Kaldor and John Hicks, involves an efficient redistribution of resources among individuals. A re-allocation is a Kaldor-Hicks betterment; if A makes up for his loss, the re-organization is unquestionably better, and the result is Pareto-better. If there is no potential Kaldor-Hicks improvement from a scenario, it is viewed as being Kaldor-Hicks efficient or meeting the Kaldor-Hicks criterion. An outcome is said to be Hicks-optimal if it is the best it could possibly be.

5.14 KEY TERMS

- **General equilibrium:** A general equilibrium relates to the numerous variables. The general equilibrium study conducted on many economic sectors would inevitably have an impact on those sectors as well.

- **Static Equilibrium:** Static equilibrium, or all stationary bodies, is the equilibrium where all forces and all torques acting on the body are zero.

- **Dynamic equilibrium:** Dynamic equilibrium is a state of uniform motion when there is no net force acting on the body and no net torque acting on it.

- **Pareto's criteria Concept of Pareto's Optimality:** Pigou's welfare economics is not treated as objective study against the welfare causes. The New Welfare Economics starts with Pareto. Pareto boldly defined a position of maximum welfare for a society and indicated positive criteria for increase or decrease in social welfare.

● **Stable Equilibrium:** Any object will be in a stable equilibrium if a small movement causes it to return to its initial state.

● **Neutral equilibrium:** If a ball is given a small push to start rolling, it won't return to its starting position or move forward; instead, it will stay at rest.

● **Walrasian Model:** First to develop a model of the overall equilibrium of a strictly competitive economy was the French economist Leon Walras. Although the Walras model has been improved, no significant changes have yet been implemented. This theory of prices becomes general equilibrium theory when all prices are seen to be interdependent. The Walras model is straightforward and based on arithmetic. A representation of the interdependence of prices is provided by mathematics.

● **Pigovian welfare condition:** Pigou believes that welfare stays in an individual's mindset/awarenes that depends upon his satisfaction/ utilities. Basis of welfare thus implies the extent to which person's necessities are fulfilled. Hence he clarifies economic welfare in social/general welfare, which directly or indirectly may relate to money. So, according to Pigou, economic welfare implies satisfaction derived by any person from using exchangeable commodities.

● **Social Welfare:** The total level of contentment among all members of a society is known as social welfare. The total of all individual utility functions is social welfare. Choice is what drives people, and people's choices often conflict with one another.

● **Bergson's welfare:** A welfare concept was proposed by Abram Bergson and developed by P.A. Samuelson. Bergson's concept embraces all changes in an economic organisation. They make some persons better off to make another person worse off. There is need for interpersonal comparisons and need for value judgements. Value judgement is taken as given by the society. Bergson's idea of social welfare is the change in combination of individual welfare in the society.

● **Compensation principle:** Attempts have been made by economists like Kaldor and Scitovsky to assess the changes in welfare resulting from economic reorganisation. These economists have worked to eliminate uncertainty from the Pareto optimality study. They have proposed a standard called the Compensation Principle.

● **The Kaldor-Hicks criterion:** A measure of Pareto improvement is the Kaldor-Hicks improvement, named after Nichlas Kaldor and John Hicks, which is an efficient redistribution of resources among people. Redistributing resources is a Kaldor-Hicks improvement if A makes up for his loss. An outcome that improves on Pareto as a result of the reorganisation. If there is no potential Kaldor-Hicks improvement from a scenario, it is viewed as being **Kaldor-Hicks efficient** or meeting the **Kaldor-Hicks criterion**. An outcome is said to be Hicks-optimal if it is as high as it can possibly be.

5.15 SELF-ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Define the term equilibrium.
2. Define General equilibrium.
3. What is the importance of General equilibrium?
4. What are the limitations of General equilibrium?
5. Define Static, Dynamic and Neutral equilibrium.

Long Answer Questions

1. Explain in detail the Walrasian general equilibrium theory.
2. Differentiate between Partial vs general equilibrium.
3. Explain in detail about the Pigovian welfare condition.
4. Explain in detail about the Pareto's criteria Concept of Pareto's Optimality.
5. What is Value judgement?
6. Explain Bergson's welfare.
7. Explain Compensation principle.
8. Explain the The Kaldor-Hicks criterion.

5.16 REFERENCES

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