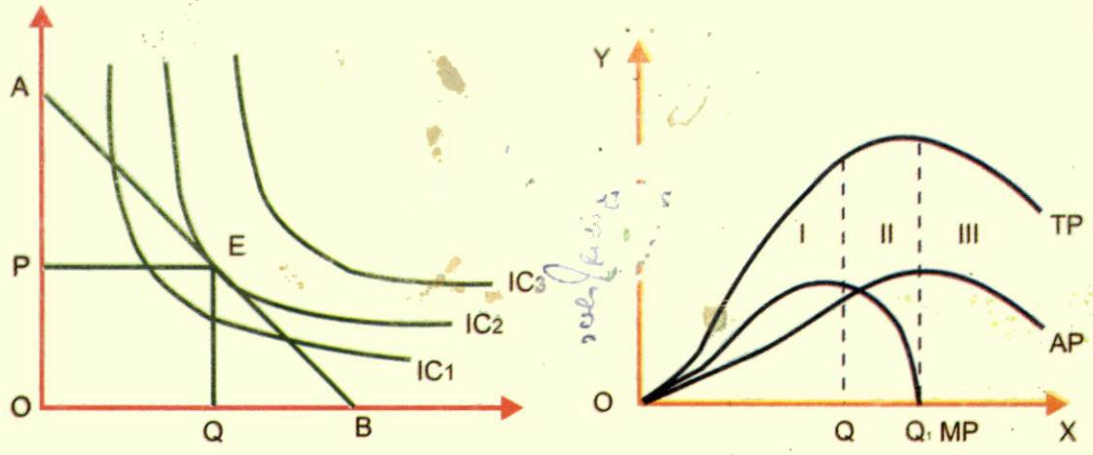
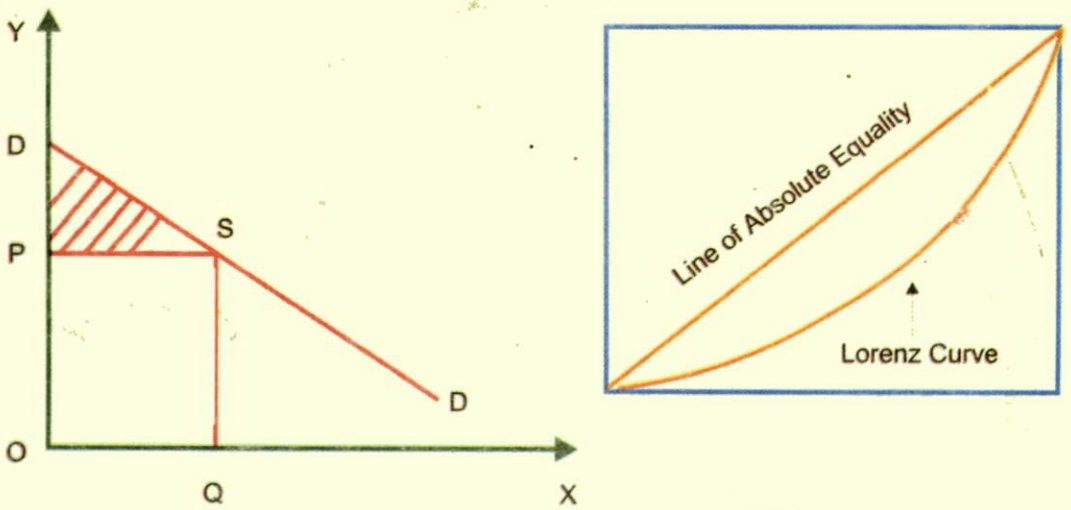
Karnataka State Open University
Manasagangothri, Mysore- 570 006

ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮುಕ್ತ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ
ಮಾನಸಗಂಗೋತ್ರಿ, ಮೈಸೂರು ೫೭೦ ೦೦೬

COURSE : 1

M.A. (PREVIOUS)
MICRO-ECONOMIC ANALYSIS





ಉನ್ನತ ಶಿಕ್ಷಣಕ್ಕಾಗಿ ಇರುವ ಅವಕಾಶಗಳನ್ನು ಹೆಚ್ಚಿಸುವುದಕ್ಕೆ ಮತ್ತು ಶಿಕ್ಷಣವನ್ನು ಪ್ರಜಾತಂತ್ರೀಕರಿಸುವುದಕ್ಕೆ ಮುಕ್ತ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ವ್ಯವಸ್ಥೆಯನ್ನು ಆರಂಭಿಸಲಾಗಿದೆ.

ರಾಷ್ಟ್ರೀಯ ಶಿಕ್ಷಣ ನೀತಿ 1986

ಮುಕ್ತ ವಿಶ್ವವಿದ್ಯಾನಿಲಯವು ದೂರಶಿಕ್ಷಣ ಪದ್ಧತಿಯಲ್ಲಿ ಬಹುಮಾಧ್ಯಮಗಳನ್ನು ಉಪಯೋಗಿಸುತ್ತದೆ. ..... ವಿದ್ಯಾಕಾಂಕ್ಷಿಗಳನ್ನು ಜ್ಞಾನ ಸಂಪಾದನೆಗಾಗಿ ಕಲಿಕಾ ಕೇಂದ್ರಕ್ಕೆ ಕೊಂಡೊಯ್ಯುವ ಬದಲು, ಜ್ಞಾನ ಸಂಪತ್ತನ್ನು ವಿದ್ಯೆ ಕಲಿಯುವವರ ಬಳಿ ಕೊಂಡೊಯ್ಯುವ ವಾಹಕವಾಗಿದೆ.

ಡಾ. ಕುಳಂದೈಸ್ವಾಮಿ

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Economics
Course 1

Block 2

Introduction

Block 7

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Block - 2

Block Introduction

This block consists of 5 units. Unit 5 deals with demand, determinants of demands, elasticity of demand and its importance. Unit 6 deals with theories of demand. It consits of law of diminishing marginal utility and law of equi-marginal utility and its importance. Unit 7 deals with indifference curves and its properties and consumer's equilibrium. Unit 8 deals with Revealed preference theory of demand and its related aspects. Unit 9 deals with recent development in demand analysis i.e. a pragmatic approach, linear expenditure.

Course I
Block II
Unit - 5

Demand Analysis and Consumer Behaviour

5.1 : Objectives

This unit introduces the concept of 'Demand' and examine how demand for a commodity responds to changes in its price. This also examines the degrees of responsiveness and its measurement. After studying this unit you would be able to have a clear knowledge of :

a) the concept of demand
b) the law of demand and its operation
c) the changes in demand.
d) Elasticity of demand and its measurement.

5.2 : Introduction

The concept of demand features significantly in the study of economics. In fact demand is one of the key driving forces of the economy. A sound knowledge of the nature of demand and its determinants is of great significance in the theory of demand, where we study the consumer's behaviour in the process of attaining this objective of utility maximization. Let us begin our discussion with the concept of demand.

5.3 : The Concept of Demand

The term demand has a very definite meaning to the economists. The demand for a commodity is not just a desire or a need for that commodity. Needs and desires must be backed up by an ability and willingness to buy. If this ability or the necessary purchasing power is lacking, the desires no matter how intensive they may be, will not be made known in the market. Where economists use the term demand, they refer to the amount of a good or service that consumers are willing to buy at a specific price and at a specific time. Without any reference to price and time, demand carries no measuring. Therefore, demand may be defined as a desire backed up by ability and willingness to buy at a specific price and time.

5.4 : Determinants Of Demand

Demand for a commodity depends on a number of factors. The following factors seem to be important in determining the amount of a commodity that people will buy; the price of the commodity, the income of the consumer, the price of other related commodities, the taste of the consumer, population, climate, state of business and the government policy. Let us consider each of these factors in turn.

a) The price of the commodity: -

The price of the commodity is the most important factor that determines the demand. Normally higher the price of the commodity, the lower the demand of the commodity and vice-versa. It is not only existing price but also all the expected changes in price affect the demand.

b) The income of the consumer: -

The demand for a commodity is also influenced by the size of the consumer income. The demand for a normal commodity increases when income rises and decreases when income falls.

c) The prices of the related commodities: -

The demand for a commodity is also affected by the changes in the prices of related goods. In some cases, demand for a commodity will increase as the price of the other commodity increases. This refers to a situation where goods are substitutes. For examples: demand for a tea increases when price of coffee increases. In some other cases, the demand for one good decreases when the price of the other good increases. This refers to a situation, where goods are complements. For ex: demand for ink decreases when the price of pen increases.

d) Taste of consumer: -

Demand is also influenced by consumer's taste. If consumer has developed a taste for a particular commodity, he will demand more of that commodity. If he changes his taste, then less of it will be demanded at a particular price.

e) Population: -

Increase in population increases demand for necessaries of life. Besides, the composition of population also affects demand. A change in composition of population affects the demand for different goods.

f) Climate: -

Climate and weather also affect the demand. For ex: in winter season and in cold areas, demand for woolen cloth increases.

g) State of business:-

Demand also depends on business conditions. During boom period there will be marked increase in demand and during depression the level of demand goes down.

h) Government policy: -

Government policy also affects the demand for goods. For ex: taxing on commodity increases its price and demand falls. On the other hand, government's financial help viz: subsides increases demand.

5.5 : Law of Demand

The law of demand explains the tendency of the consumer behaviour when two variables namely the quantity of a commodity and its price are given. We now return to the relationship established between the price of a commodity and the quantity that people will be willing to buy. We have noted that the higher the price, the less will be bought and the lower the price, the greater will be the quantity demanded. This relationship between price and quantity demanded of a commodity has been enunciated in the form of a law known as the 'Law of Demand'. Marshall states the law of demand as follows: " the amount of demand increases with a fall in price and diminishes with a rise in price". In other words " other things remain constant a rise in price leads to a fall in demand and a fall in price leads to rise in demand". Other things means as we have already examined, consumers income, prices of other commodities, taste of the consumer, population, climate, govt policy, are assumed to be constant. This is because as the demand for any commodity for that matter is influenced by these factors to identify the inverse relationship between the price and demand for a commodity the factor mentioned above should assumed to be constant.

The law of demand can be explained with the help of a demand schedule, which reflects the inverse price-demand relationship numerically.

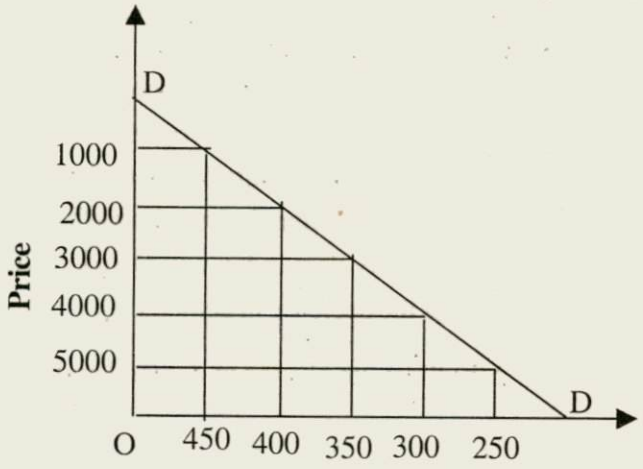
Demand Schedule

Price per shirt	Quantity demanded(in thousands)
Rs. 450	1000
Rs. 400	2000
Rs. 350	3000
Rs. 300	4000
Rs. 250	5000

This demand schedule should be read as follows:-

At higher price quantity demanded will be lower and at lower price quantity demanded will be higher. This can be represented by the following diagram:-

Figure 5.1



In the above figure vertical axis measures the price of shirts and horizontal axis measures the quantity demanded of shirts. DD is the demand curve denoting that quantity demanded will be more at lower price and less at the higher price. Look at the figure 5.1 why does the demand curve slope downward from left to right? a question would arise. There are two reasons for this. First, if the price of the commodity goes up, that commodity relatively expensive. Consumers will therefore substitute cheaper goods for the good whose price has risen. This is referred to as the " Substitution Effect". For example if the price of apple goes up, people will switch over from apples to other relatively cheaper fruits. Secondly when the price of a commodity rises consumer becomes worse off and he gets less of it for the same amount of money for which he was getting more. This is referred to as "Income Effect" in economic jargon.

5.6 : Changes in Demand

Changes in demand are two types.

1. Change in demand
2. Changes in quantity demanded.

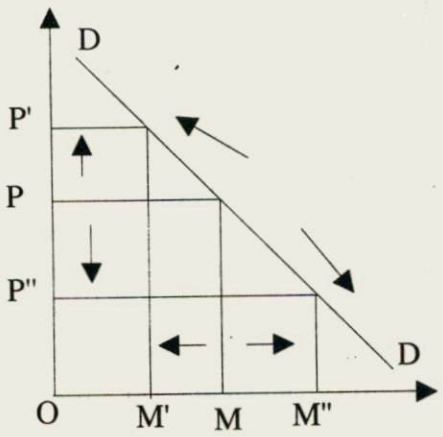
It is important not to confuse a change in demand with a change in quantity demanded. Whenever demand for a commodity changes due to changes in the price level it is called " change in demand". Change in demand implies either a rise in demand or fall in demand. Other things remaining constant when price of a commodity falls, the amount demanded increases. This is called "Extension of Demand".

On the other hand when the price of a commodity rise quantity demanded is reduced. This is called "Contraction of Demand".

A change in demand due to change in other factors other than the price of the commodity is called "changes in quantity demanded". Such changes in quantity demanded are known as increase and decrease in demand. When there is a change in factors like population, income, production, taste, habits etc and when price remains constant, the demand curve shifts to the right or left side of the original demand curve. For example, when population increases the quantity demanded will also increase. This is called increase in demand. The right side shifting of the demand curve shows the increase in demand. On the other hand if population decreases, the quantity demanded will also decrease. This is called decrease in demand. The left side shifting indicates the decrease in demand.

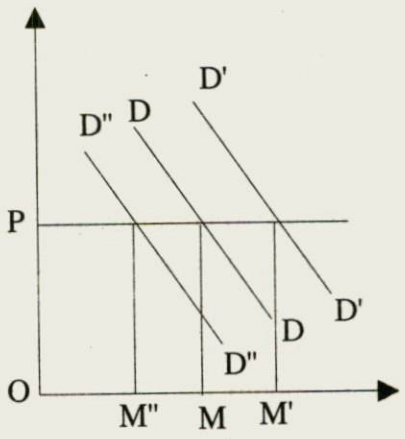
The following figure 5.2 (a) and 5.2 (b) illustrate change in demand and changes in quantity demanded respectively.

Fig 5.2 (a)



Change in demand

Fig 5.2 (b)



Changes in Quantity demanded

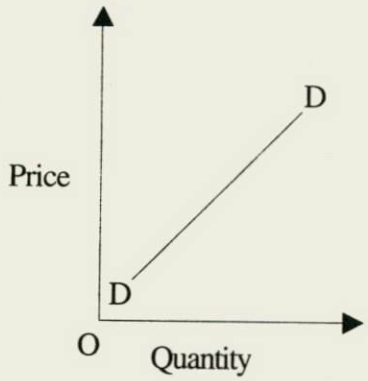
In figure 5.2 (a) DD is the demand curve. At price OP the amount demanded is OM. When price rises from OP to OP' demand falls from OM to OM'. This is called 'contraction of demand'. For a lower price OP' amount demanded goes up to OM'. This change is called Extension of Demand. The movement along the same demand curve is called contraction and extension of demand.

Figure 5.2 (b) illustrates that OP is the fixed price. When other factors like income or population increase, demand also increases. This increase in demand is shown by a shift of the entire demand curve to the right side of the original demand curve DD. Now the new demand curve is D'D'. The amount demanded rises from OM to OM'. On the other hand when income or population decreases, the demand curve shifts to left hand side of the original demand curve. Now D"D" is the new demand curve, which indicates decrease in demand. The amount demanded falls from OM to OM". Thus extension and

contraction in demand follow a change in price. Increase or decrease in demand takes place when price remains constant, and other factors affecting demand are changed.

5.7 : Exceptions to Law of Demand

Law of demand is generally believed to be valid in most of the situations. However, some exceptions to the law of demand have been pointed out. In these cases the demand curve slopes upward to the right and not down ward as shown in the following figure;



The following are the exceptional cases:

1) Sir Robert Giffen observed that some times people buy less of good at lower price and more of it at a higher price. He has pointed out that in the early period of 19th century in U.K. a rise in the price of bread caused the wage earners to buy the same amount of bread as before. Hence all such inferior goods are known as Griffen goods and they are considered to be an exception to the law of demand.

2) American economist Veblen has pointed out that some consumers measure utility of a commodity entirely by its price. For them the greater the price of a commodity the greater will be the utility. For example, diamonds are considered as prestige goods in the society. For the upper strata of the society the higher the price of diamonds the higher prestige value of them and therefore the greater utility. This is because rich people desire for distinction is satisfied better when the articles of distinction are highly priced and poor people cannot buy them. The demand for such articles falls when their price falls.

3) The law of demand does not apply in case of speculation. If prices show a trend to increase, the demand also increases because people anticipate of further rise in prices. If the prices show a decreasing tendency the demand decreases because people anticipate further fall in prices.

4) Sometimes a consumer may be ignorant about the prices prevailing in the market. Due to ignorance it may not be possible for him to purchase more goods at a lower price.

Check your progress - I

1) Explain what is demand? What the downward-sloped demand curve indicates?

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2) Explain the situation in which demand curve slopes upward. What does it indicate?

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3) Explain how changes in price affect demand in the case of substantial goods?

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5.8 : Elasticity of Demand

The law of demand states that there is the inverse relationship between the price of a commodity and its quantity demanded. The law explains that the demand for a commodity increases when its price falls and vice-versa. In other words the law of demand indicates direction in which the quantity demanded varies but does not indicate the rate at which demand changes. In order to measure the rates of degree of change in demand, Prof.. Marshall formulated the concept " Elasticity of Demand".

The " Elasticity of Demand" refers to a particular behaviour of a demand curve. During any given period of time, the amount of goods demanded in the market depends upon the price of that commodity, consumer's income, taste, prices of other commodities etc. Therefore the amount demanded will change whenever there is change in these demand determinants. But the extent of change is not uniform in all cases. In some cases the variations may be wide and in some other cases it may be nominal. There are certain goods like vegetable, ghee, salt etc whose demand does not contract much with the rsie in their prices. But in case of goods like radio, television etc their demand contract when their price rises.

5.9 : Definition

Prof. Lipsey defines elasticity demand as " the ratio of the percentage change in demand to the percentage change in price". According to this definition the term elasticity of demand is commonly refers to as price elasticity of demand. But elasticity of demand also measures the responsiveness of demand for a commodity to change in income, prices of other related goods etc. As such in precise sense there are three important kinds of elasticity of demand.

It should be clear from the above definition that elasticity of demand can be mainly of three types: -

1. Price elasticity of demand
2. Income elasticity of demand
3. Cross elasticity of demand.

5.10 Price Elasticity of Demand

Price elasticity of demand may be defined as the ratio of percentage change in the quantity demanded to a given percentage change in the price of a commodity. It measures the relative change in quantity demanded of a commodity resulting from a given change in its price. This can be expressed in a different way by stating that the price elasticity is the percentage change in quantity of demanded divided by the percentage change in the price of the commodity. This relationship expressed as follows: -

$$\text{Elasticity of demand} = \frac{\text{Percentage change in amount demanded}}{\text{Percentage change in price}}$$

$$i.e = \frac{\Delta q / q}{\Delta p / p}$$

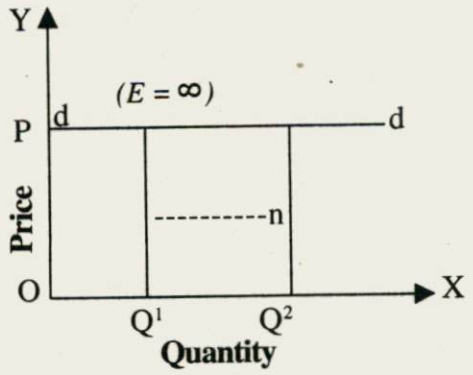
This can be explained with an example. If quantity demanded changes by 50% in response to 25% change in price, then elasticity demanded is $\frac{50}{25} = 2$

5.10 a) Types of price Elasticity

Depending upon the degree of change in demand in response to a given change in price, we can distinguish between five variations of price elasticity. Price elasticity of demand may be unity, greater than unity, less than unity, zero and infinite. These five types are discussed below.

1) Perfectly Elastic Demand: *- ($E = \infty$)*

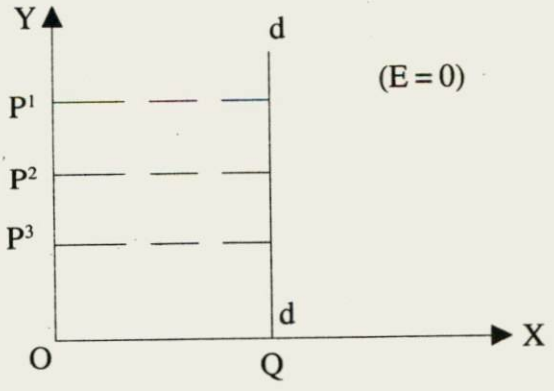
Demand is said to be perfectly elastic or infinitely elastic when a small change in price of a commodity leads to an infinite change in demand. For example, a slight rise in price of a commodity causes an infinite fall in demand, i.e. demand falls to zero. Similarly a slight fall in price causes an infinite rise in demand. When E = ∞ (infinity) the demand curve assumes a shape of horizontal line. The following figure indicates perfectly elastic demand.



In the figure demand curve is horizontal, at price OP consumer buy as much of the given commodity as he can obtain i.e. an infinite quantity. At slightly higher price he would buy nothing. Therefore, E=.∞ In the above figure OP is the price, the quantity demanded is continuous to increase from OQ^1 to OQ^2.....n. Cases of perfectly elastic demand are rare and hence are not any practical interest.

2) Perfectly inelastic demand (E= 0 Zero)

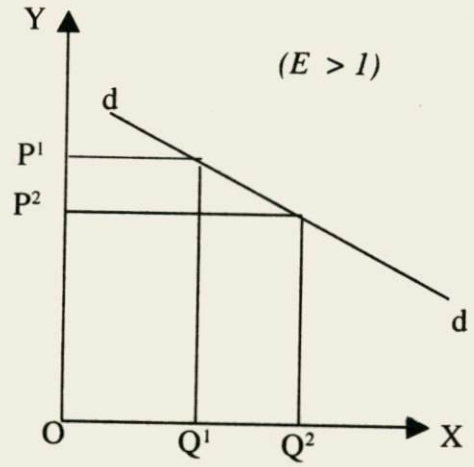
When the quantity demanded remains constant irrespective of any rise or fall in price of a commodity, the demand is said to be perfectly inelastic. E=0 i.e. elasticity is zero. This shown in the following figure.



The vertical shaped demand curve is shown in the above figure. This indicates the inelasticity of the demand curve. When price falls from OP^1 to OP^2 and OP^2 OP^3 the quantity demanded remains the same, i.e. OQ only. For example, a 20% rise or fall in price leads to no change in the quantity demanded, $E = \frac{0}{20\%} = 0$, so it seems to have perfectly inelastic demand. Like perfectly elastic demand in the case of perfectly inelastic demand Q (quantity demanded) also a case of theoretical extremity and hardly encountered in practice. But in case of some commodities of absolute necessity like salt seems to have perfectly elastic demand for most of the consumers.

3) Relatively elastic demand (E > 1)

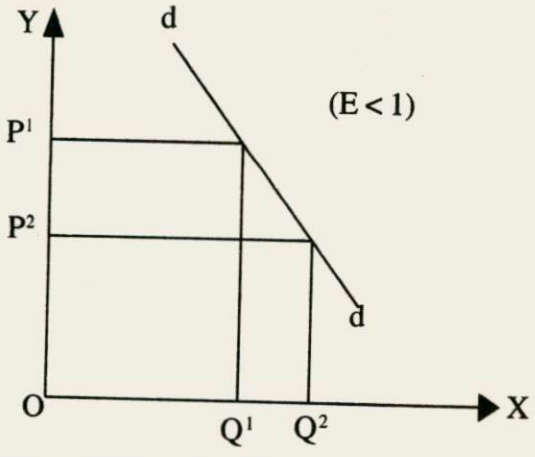
In case of relatively elastic demand, a given change in price leads to a more than proportionate change in demand. If price falls by 25 % it may cause a 50 % increase in demand i.e. $E=\frac{50\%}{25\%}=2>1$ This is represented by a gradual sloping demand curve shown in the following figure.



In the figure when price OP^1 to OP^2, demand increases from Q^1 to Q^2. This is a case of realistic one and many commodities have such elastic demand.

4) Relatively inelastic Demand : (E < 1)

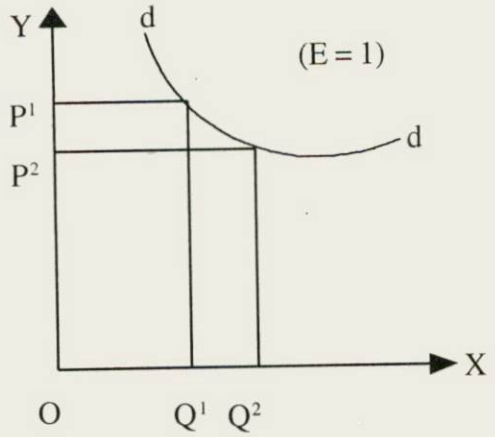
A given change in price causes a less than proportionate change in demand. The following figure reveals that;



In the figure when the price falls from OP^1 to OP^2 it causes an increase in demand from OQ^1 to OQ^2 which is lesser than change in the price level i.e. E<1, when 20 % fall in price leads to 10 % increase in demand then $E=\frac{10\%}{20\%}=\frac{1}{2}<1$

5) Unitary elastic demand: (E = 1)

Price elasticity of demand is said to be unity, when the change in demand is exactly proportionate to the change in price. In this case the demand curve would be a rectangular hyperbola curve as shown in the following figure.



In the figure when price falls from OP^1 to OP^2 demand increases from OQ^1 to OQ^2 which is the same proportion to change in price. For example a 25 % change in price leads to 25 % change in demand, therefore elasticity is equal to unity $E = \frac{25\%}{25\%} = 1$ $E = 1:1$

Check your progress - II

1) Explain the concept of elasticity of demand.

.....

.....

2) Explain in which case the demand curve is horizontal.

.....

.....

5.11 : Measurement of Price Elasticity

There are four important methods of measuring price elasticity of demand. They are

1. The percentage method
2. Point method
3. Arc method
4. Expenditure method or Outlay method

1) The percentage method: - According to this method elasticity is regarded as the percentage change in quantity demanded to the percentage change in the price of the commodity. It may be written as;

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

$$\therefore \text{Elasticity demand} = \frac{\dfrac{\text{change in amount demanded}}{\text{Amount demanded before change}}}{\dfrac{\text{change in price}}{\text{price before change}}}$$

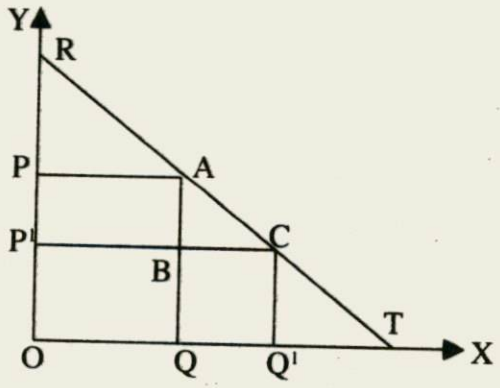
In algebraic terms it can be written as ;

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

Q → Original demand P → Original price

ΔQ → ΔP Change in demand & Change in price respectively.

2) Point method : - Point method is also called as geometric method devised by Marshall. This can be explained with the help of a diagram.



In the figure RT is the demand curve, points A and C on demand curve show small change in price from OP to OP1. Due to change in price from OP to OP¹ demand increases from OQ to OQ¹.

$$\text{Price elasticity of demand} = \frac{\text{Proportionate change in demand}}{\text{Proportionate change in price}}$$

In figure Change in demand is OQ^1

Change in price is OP^1

Now,

$$Ed = \frac{\text{Absolute change in demand}}{\text{Original demand}} \Big/ \frac{\text{Absolute change in price}}{\text{Original price}}$$

$$= \frac{OQ^1}{OQ} \div \frac{OP^1}{OP}$$

$$= \frac{BC}{OQ} \div \frac{AB}{OP} \quad (\because OQ^1 = BC \text{ and } PP^1 = AB)$$

$$= \frac{BC}{PA} \div \frac{AB}{QP} \quad (\because OQ = PA \text{ and } OP = QA)$$

$$= \frac{BC}{PA} \times \frac{QA}{AB} = \frac{BC}{AB} \times \frac{QA}{PA} \quad (1)$$

$\angle ABC$ and $\angle AQT$ are right angles and ABC and AQT are similar traiangles

Thus $\frac{BC}{AB} = \frac{QT}{QA}$

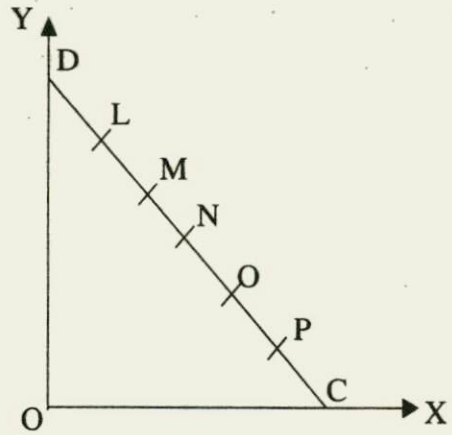
Substituting this in relation (1) we get

$$Ed = \frac{BC}{AB} \times \frac{QA}{PA} = \frac{QT}{QA} \times \frac{QA}{PA} = \frac{QT}{PA}$$

Since triangles AQT and APR are similar

$$Ed = \frac{QT}{PA} = \frac{AT}{AR}$$

With the help of the point method we can easily point out the elasticity at any point along a demand curve. The following figure illustrates this.



In the figure DC is the demand curve which is 6 centimeters. On this demand curve, there are five points LMNOP. Point N is the mid point. Both ends of the demand curve i.e. D and C are joined to Y and X axis respectively.

Now elasticity at point N will be

$$E = \frac{CN}{ND} = \frac{3}{3} = 1 \quad \text{(E =1 Unity)}$$

Elasticity (in upper segment) above N increases i.e

At point M. $E = \frac{CM}{MD} = \frac{4}{2} = 2.0$ (E >1 greater than1)

At Point L. $E = \frac{CL}{LD} = \frac{5}{1} = 5$ (E > 1 greater than1)

At Point D. $E = \frac{CD}{D} = \frac{6}{0} = E\infty$ (Infinity)

Elasticity in lower segment of DC i.e below N goes on decreases, i.e.

At O Point, E = 1/4 = 0.25 (E < 1 less than one)
At P point, E = 1/5 = 0.2 (E < 1 less than one)
At C point, E = 1/6 = 0 (E = 0 Zero)

We can conclude that at mid point N on the demand curve, elasticity of demand is unity. Moving up the demand curve from the mid point N, elasticity becomes greater and when it touches Y axis (at D) elasticity is infinity. On the other hand, any point below the mid point N, demand is less elastic, when demand curve touches X axis (at C) elasticity becomes zero.

3) The Arc method: - According to the Arc method elasticity is measured between the two points on the same demand curve. According to Baumol, "Arc elasticity is the measure of the average responsiveness

to price change exhibited by a demand curve over finite stretch of the curve". Any two points on the demand curve makes an arc. In the fig-6 the area between A and B on the demand curve is an arc, which measures elasticity. The formula for Arc elasticity is.

$$Ed = \frac{\text{Change in quantity demanded}}{\text{original quantity + new quantity after change}} \Big/ \frac{\text{change in price}}{\text{original price + newprice after change}}$$

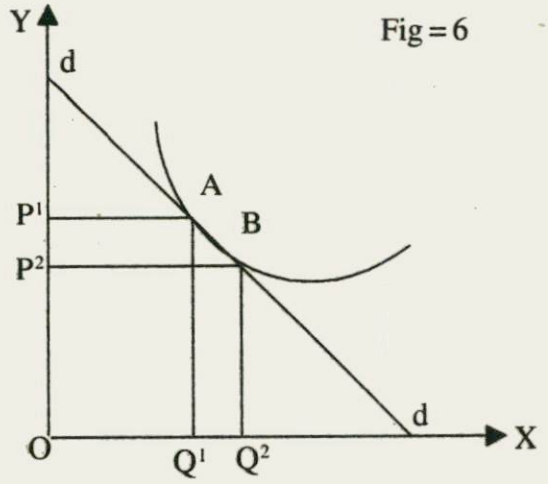
In algebraic term :

$$Ed = \frac{Q - Q^1}{Q + Q^1} \div \frac{P - P^1}{P + P^1}$$

Q = Original quantity demanded
Q^1 = Quantity demanded after change
P = Original price
P^1 = New price after change

Arc elasticity is an average elasticity as it takes in to consideration prices and quantities before and after the price change. In fig - 6. D.D is the demand curve, the area between A & B is an arc which measures elasticity over certain range of price and quantities. Suppose at point A on the demand curve, 10 uits of a commodity demanded at Rs. 8 and at point B, 12 units at Rs.6. An average the two calculated on the basis of the following formula.

Fig = 6



$$Ed = \frac{Q - Q^1}{Q + Q^1} \div \frac{P - P^1}{P + P^1}$$

$$= \frac{10-12}{10+12} \div \frac{8-6}{8+6} = \frac{-2}{22} \div \frac{2}{14}$$

$$= \frac{-2}{22} \times \frac{14}{2} = \frac{7}{11} = .63$$

Therefore elasticity between points A and B is

$$\frac{[P+(P+\Delta P)]}{[Q+(Q+\Delta Q)]} = \frac{\Delta Q}{\Delta P} = \frac{\text{Difference in Q}}{\text{Sum of Q}} \div \frac{\text{Difference in P}}{\text{Sum of P}}$$

P and Q ⟶ Original price and quantity

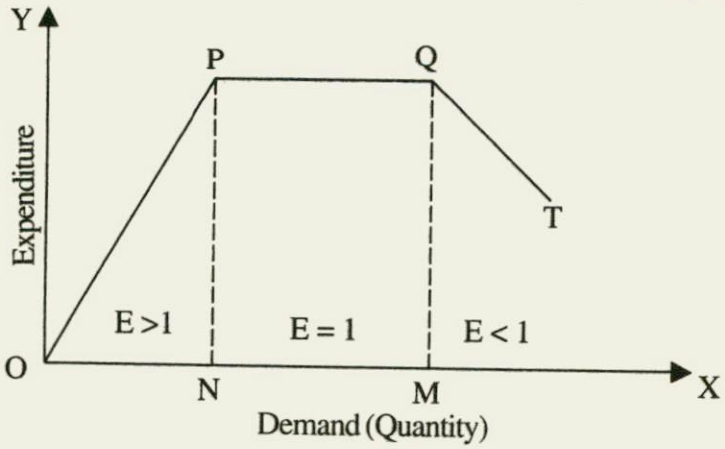
$P + \backslash P$ *and* $Q+\Delta Q$ ⟶ New price and change in quantity demanded for new price.

ΔQ and ΔP ⟶ Change in Quantity and change in price

4) Out lay method: - Marshall evolved the total outlay method as a measure of elasticity. This method is known as Total Revenue or Total Expenditure method. By comparing the total expenditure of a person both before and after change in price, we can find out whether demand is elastic, unity or less elastic. Total outlay is price multiplied by the quantity of goods purchased.

i.e. Total outlay = Price ×quantity demanded.

Demand for a good is said to be elastic. When a fall in its price leads to a large total expenditure on it. Elasticity is unitary when the total expenditure remains unchanged with a fall or rise in the price of goods because ratio of change inprice. When price falls total out lay also falls. In such a situation elasticity of demand will be less than unity. Because the change in demand is relatively less than proportion of change in price. This can be explained with the help of a diagram.



In the diagram quantity demanded is measured on OX axis and outlay on OY axis. OT is the total outlay curve. From point O to N demand is elastic (greater than 1) because a small change in price

leads to a greater change in demand, therefore expenditure i.e. outlay increases up to point P the OT curve has an upward slope as shown in the diagram. From N to M elasticity is said to be equal to one. Because a small percentage of fall or increase in price does not affect demand, so expenditure also remains constant. (between P to Q Point the O.T curve remains constant). From point N to M elasticity is said to be equal to one. Beyond M small percentage of fall in price results in fall in demand and expenditure also falls. (From point Q the O.T. curve slopes downward) i.e. change in expenditure will be less than change in price. Therefore elasticity is less than one.

For example:

1) Price of onion is Rs.6 Per k.g, quantity demanded is 5 kgs, then total expenditure is Rs.30, (6x5=30). When the price of onion falls from Rs.6 to 4 per kg quantity demanded is 8 kgs, the total expenditure is Rs.32 (4x8=32) ie, with the fall in price the total expenditure increases. Therefore the demand is elastic i.e. E >1.

2) Price of onion is Rs.6 Per kg, quantity demanded is 5 kgs, then total expenditure is Rs.30, (6x5=30) when there is small change is price of onion i.e. Rs.5 per kg, quantity demanded is 6 kgs. (5x6=30) then the total expenditure remains unchanged. Therefore elasticity of demand is unity E=1.

3) Price of onion is Rs. 4 per kg, quantity demanded is 7 kgs, then the total expenditure is Rs.28. (4x7=28). When price falls from Rs.4 to 3 per kg, then quantity of demand is 8 kgs, the total expenditure will be Rs.24 (3x8=24). Therefore the elasticity of demand is E<1.

5.12 : Income Elasticity of Demand

Income elasticity is one which measure the degree of change in demand due to changes in income. It may be written as;

$$\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income.}}$$

In algebraic term

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

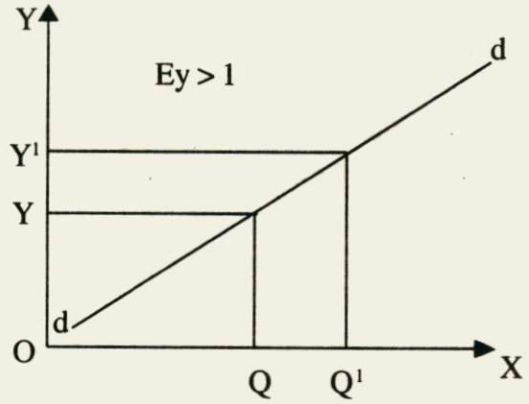
Q = change in demand Q = initial demand

Y = change in income Y = initial income

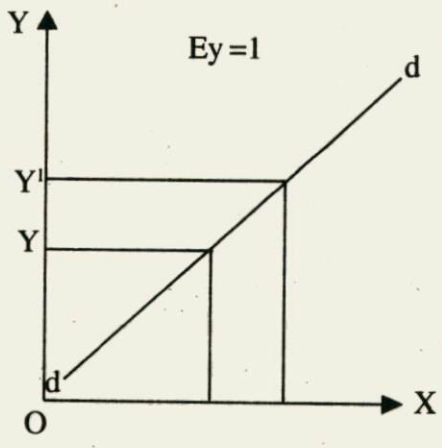
The income elasticity of demand is positive for all normal goods because consumers demand for a good moves in the same consumers demand for a good moves in the same direction of the change in his income. Income elasticity is negative in the case of inferior goods.

Like price elasticity, income elasticity can be classified as follows:-

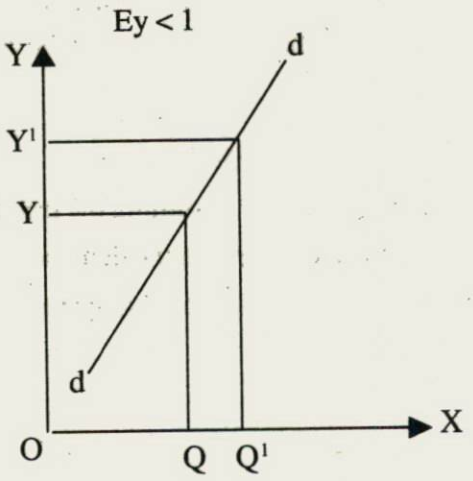
1) Greater than unity : Income elasticity may be greater than unity. Assuming the prices of goods remain constant, if income of the consumer increases y 10% and as a result the demand increases by 20% then $Ey=\frac{20}{10}=2>$The demand curve will be flatter as shown in the following figure. The increase in demand QQ' is twice increase in income YY'.



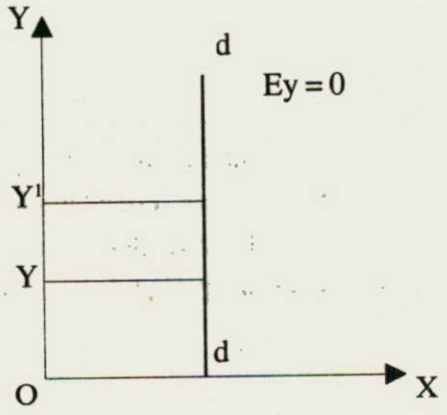
2) Unitary Income elasticity :- When the percentage change is demand is equal to the percentage change in income, the demand is said to be unitary-income elastic ie. Ey =1. For example, if income increases by 10% demand also increases by 10%. The increase in demand QQ is exactly equal to increase in income YY'. The demand curve will be at 45 angle having an upward slope as shown in the following figure.



3) Elasticity is Less than unity :- For example 10% increase in income leads to 5% increase in demand. $Ey=\frac{5}{10}=\frac{1}{2}<1$. The increase in demand QQ' is less than increase in income YY'. The demand curve is steeper as shown in the following figure.

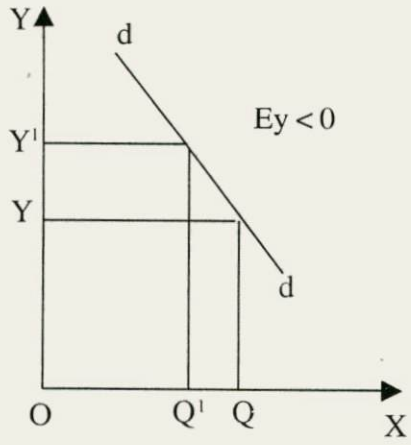


4) Income in-elasticity :- When income changes in any direction, it has no effect on demand and it remains constant. Therefore Ey = 0. The following figure illustrates the income inelasticity.



If income changes by 10% then demand remains constant $Ey = \frac{0}{10} = 0$. In this case demand curve will be a vertical line is shown in the above figure.

5) Negative Income Elasticity :- Where an increase in income causes decrease in demand. The demand is said to be negative income elastic (Ey < 0). If the commodity is inferior. The consumer will reduce his purchase of it. For example 10% increase in income leads to 5% fall in the demand. This shown in the following figure.



In the figure where income increases from Y to Y^1 quantity demanded falls from Q to Q^1. Therefore Ey<0. In this case demand curve slopes downward.

Income elasticity helps to classify the commodities into essential and non-essential commodities. In the case of luxury goods like Car, T.V. etc income elasticity will be greater than one. In case of necessities like food grains, income elasticity is positive but less than unity. In case of some goods like salt, match box etc income elasticity will be zero i.e. inelastic. In case of inferior goods like bajra, income elasticity will be less than zero. When income increases demand for inferior goods falls.

5.13 : Cross Elasticity of Demand

The cross elasticity of demand refers to the relation between the percentage change in the quantity demanded of a commodity to the percentage change in the price of related commodity. This can be expressed as follows:-

$$Ec = \frac{\%\ \text{Change in the demand for commodity X}}{\%\ \text{Change in the price of Y commodity}}$$

In algebraic terms:-

$$Ec = \frac{\frac{\Delta qx}{qx}}{\frac{\Delta py}{py}} = \frac{\Delta qx}{qx} \times \frac{py}{\Delta py} \times \frac{\Delta qx}{\Delta py} \times \frac{py}{qx}$$

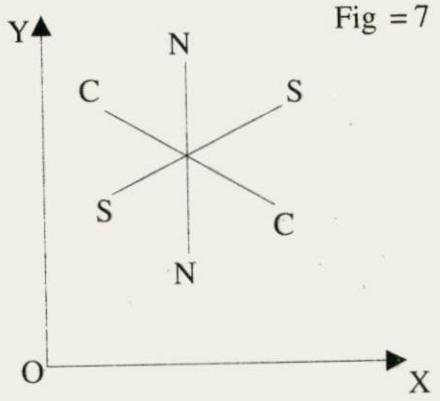
The relation between two commodities X and Y may be substitutive or complementary or neutral. Cross elasticity may be zero between two goods when they are not related to each other. Depending upon the degree of substitutability, cross elasticity of demand will range between zero and infinity.

In the case of complementary goods, cross elasticity will be negative. An increase in the price of one good tends to fall in the demand of the other. For example, a rise in price of car will bring a fall in demand for petrol. When the price of the cars falls, the demand for petrol rises. In the case of complementary goods, price and demand vary inversely. Therefore cross elasticity will be negative. In fig :7 the curve shows cross elasticity.

When X and Y are substitutes cross elasticity will be positive Expy >1. In this case an increase in price Y, the price of X remaining the same will result in an increase in the demand for X. This shown in fig:7.

In fig 7, SS curve shows cross elasticity is positive when X and Y are unrelated, cross elasticity is zero. Expy = 0. Eg : Car and Pen. Fig 7 shows different types of cross elasticity. In fig 7, the S,C and N curves present the cases of substitutes, complementary and neutral relationship between X andY.

Fig = 7



In fig = 7, CC is curve showing the negative elasticity between X and Y. NN curve represents neutral relation between two goods, SS curves indicates positive cross elasticity between X and Y goods.

Check Your Progress - III

1) Mention different methods that are used in measuring price elasticity.

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2) Explain the different types of income elasticity

5.14 : Factors determining Elasticity of demand

Whether the demand for a commodity is elastic or in elastic depends upon the number of factors. We may note some of them here.

1) ***Nature of commodity :-*** Whether the demand for goods is elastic or inelastic depends upon the nature of goods. Demand for luxuries like T.V, Radio, Car etc is elastic. Where as demand for essentials like food grains is inelastic.

2) ***Substitutes :-*** Commodities which are close substitutes their demand will tend to be elastic. Demand for salt, matches etc is highly inelastic as they have no close substitutes. Where as demand for coffee, tea etc is elastic because they are close substitutes.

3) ***Variety of uses :-*** The demand for a commodity having composite demand of variety of uses is more elastic. For example, coal, electricity etc. Coal is used for heating, for power generation, in locomotives etc. If there is a fall in the price of coal, demand for it will increase. In the case of some commodities, which cannot be used for multipurpose, demand will be less elastic.

4) ***Durability :-*** In the case of durable commodities, demand will be elastic in the short run. If the price of these articles rises, people will postpone their purchases. But in the case of perishable goods like milk, vegetable etc. The demand tends to be less elastic.

5) ***Income :*** Larger the income, demand for commodities will be less elastic and for low income groups demand will be elastic. Demand for higher income group for good quality oranges is low because expenditure is a small fraction or total expenditure. But elasticity for high quality oranges from low income group is high.

6) ***Habit and customs:-*** Some people have in habituated to the consumption or particular commodities. For example Coffee, Tea, Cigarette etc. These goods will have inelastic demand.

7) ***Level of Price :-*** Where the price level is high, demand for goods is elastic and price level is lower, demand for goods is less elastic.

8) ***Time Factors :-*** Generally in short period demand for goods will be less elastic and in long period it becomes more elastic. Because it takes long time to inform the news of price change to all buyers. People are reluctant to change their habits, speculation etc.

9) ***Demonstration effect :-*** When the demand for a product is the result of demonstration effect, the demand will be elastic.

5.15 : Importance of Elasticity of Demand

Elasticity of demand is of great practical importance. It guides the producer in determining the price policy for his products. For example if the demand is inelastic, he rises prices and vice-versa. It also helps monopolist to follow discriminatory price policy depending upon the use to which it is put. In determining fiscal policy also, the concept elasticity of demand helps the government in framing fiscal policy. Selecting the commodities for taxation depends upon elasticity of demand. Taxes are levied on

those goods like kerosene, sugar, cigarette etc, whose demand is in elastic. It also helps in formulating export and import policies.

In the case of agricultural products like food grains, demand is inelastic. When there is a bumper crop, it can be sold only by cutting prices. Hence the total income of the farmer will be lower. Elasticity of demand also plays an important role in determining the wages. If the demand for labour is elastic, strikes and trade union tactics will not induce the employers to rise the wages. However, if the demand for labour is inelastic, trade union will induce the employers to rise the wages. Thus, the concept of elasticity has a great significance in the field of applied economics.

5.16 : Summary

Demand means willingness and ability of the consumer to purchase a good or a service.

Law of demand explains the relationship between price and demand. Because of the inverse relationship between price and quantity demanded the demand curve slopes downward.

Demand is determined by number or factors viz, income, price, taste etc. During emergency period, and in the case of interior goods, changes in demand and price will be direct.

Elasticity of demand is a measure of the responsiveness of demand for a commodity to change in income, prices of related goods etc.

Elasticity of demand can be measured by applying point method or Arc method or outlay method or percentage method.

Elasticity depends on price, income, nature of goods, taste-habits, customs etc.

5.17 : Key Words

1) Demand schedule : A table showing the amount demanded of a commodity at different prices.

2) Income Effect : It shows the effect of a change is income of the consumer on the quantity demanded of a commodity.

3) Substitution Effect : It explains how with a change in the price of a commodity, when prices of other commodities remaining constant, a consumer substitutes one commodity for the other.

4) Demand curve : The curve which shows the relationship between the price and demand. It normally slopes downward indicating inverse relationship between price and quantity demanded.

5) Exceptional Demand Curve : In the case of inferior goods, flood, war, speculation - demand curve slopes upward indicating direct relationship between price and quantity demanded.

6) Giffen goods : The volume of purchase of inferior goods declines with increase in individual income. The demand for these goods varies directly with the price, i.e. people purchase fewer goods at lower price and vice-versa.

7) Elasticity of Demand : It is a quantitative measure of the relationship between quantity demanded of a commodity and the price of the commodity or income of the consumer or price of another commodity which is related to the commodity in question.

8) Price Elasticity : It is the ratio of percentage change in the quantity demanded to a given percentage in the price of a good.

9) Income Elasticity: It is the responsiveness of demand to a given change in the income of the consumer.

10) Cross Elasticity : It refers to the measurement of change in quantity demanded of a commodity X to a given change in the price of commodity Y.

11) Substitute commodity : It is the commodity whose demand is inversely is related to the demand of the commodity in question.

12) Complementary commodity : It is the commodity whose demand is directly related to the demand of the commodity in question.

5.18 Reference Books

1) A.W. Stonier & D.C. Hague - A text book of Economic Theory.
2) P.N. Chopra - Advanced Economic Theory.
3) M.L. Seth - Principles of Economics
4) M.L. Jhingan - Micro Economics.
5) Sundram & Vaish - Principles of Economics.

5.19 Questions

1) Explain the Law of demand with the help of a demand schedule and demand curve.
2) Distinguish between income and substitution effects.
3) Explain the difference between expansion and increase in demand and contraction and decrease in demand.
4) Why demand curve has a downward slope?
5) What is the nature of exceptional demand curve?
6) Explain the main determinants of demand.
7) Define the term Elasticity of Demand. Distinguish between price, income and cross elasticities.
8) Explain different types of price elasticity, and importance of price elasticity.
9) How do you measure Elasticity of Demand.
10) What are main determinants of Elasticity of Demand.

Fill in the blanks :-

a) The curve with the greatest elasticity is.....
b) The curve with the lowest elasticity is.....

* * * *

UNIT : 6 THEORIES OF DEMAND

Structure :

6.0 OBJECTIVES

After studying this unit you will be able to

- know the meaning of cardinal approach
- understand the difference between Total Utility and Marginal Utility
- analyse the principles of Law of Diminishing Utility and Law of Equi-Marginal Utility
- appreciate the doctrine of Consumer's Surplus

6.1 INTRODUCTION

Theories of Demand relate to the theories of consumer behaviour. These theories offer the behavioural foundation for the analysis of demand. It is a well know fact that a consumer in order to get maximum satisfaction with his limited resources i.e., income, he makes choice among innumerable commodities available to him. Consumer's Choice generates demand for goods. Many economists have contributed to the theories of demand which explain the consumer behaviour or consumer choice. These economists have followed different approaches in explaining the consumer behaviour. This unit analyses the cardinal approach to the theory of consumer behaviour.

6.2 CARDINAL UTILITY APPROACH

Cardinal approach to the theory of consumer behaviour was first adopted by the classical economists and later developed by the neoclassical economists like Alfred Marshall and A.C.Pigou. According to this approach, a consumer purchases certain commodities because they possess utility. The concept utility refers to power of satisfying the consumers want. According to Marshall, utility can be measured cardinally, i.e., it is possible to know exactly the number of Units of Utility that a commodity or a service contains for the consumer. The measurement of utility is called "Util". To measure the utility, Marshall followed cardinal approach which implies introspection. Introspection is the ability of the observer to reconstruct the events and which go in the mind of another person with the help of self observation. This form of comprehension is just a guess work or the result of experience. Thus, introspection implies that a given response to stimulate in one's mind will generate similar response in the minds of other persons. For example if a person feels that with every increase in the quantity of a commodity the utility derived from that commodity declines, then others also would have a similar experience.
The cardinal utility analysis is based on some basic assumptions. They are:

a) **Rationality**:- The consumer is thought to be a rational human being. His main aim is to maximize his utility with his limited income. In order to maximize his satisfaction he has to make consistent choice : that if he prefers A to B and B to C, then he does not prefer C to A.

b) **Cardinal Measurability of Utility**:- The exponents of cardinal utility analysis have assumed that utility can be measured in terms of cardinal numbers such as 1,2,3,4 etc., According to Marshall, Utility is quantifiable and measurable in terms of money; and also comparable. Since utility can be measurable, a distinction can be made between Total Utility and Marginal Utility. Total Utility is the sum total of the utility, a consumer gets by consuming a given number of units of a commodity. Marginal utility is the additions made to total utility by the consumption of one more unit of the commodity.

c) **Independent and additivity assumption**:- According to this assumption, Utilities of different commodities are independent and additive. The utility derived from the consumption of a commodity is a function of the quantity of that commodity alone and it is not influenced by the consumption of another commodity. Additivity characteristic of utility implies that utilities of different units of commodity are to be added to arrive at total utility. For example: $U = U_1 (X_1) + U_2 (X_2) \ldots\ldots\ldots U_6 (X_6)$

d) **Constancy of the Marginal Utility of Money**:- According to this assumption, 'Money' being the unit of measurement of utility, it should remain constant, as the consumer spends more and more on a commodity. It the marginal utility of money itself changes, as he consumer spends, then it can not correctly measure the marginal utility of a commodity.

6.3 LAW OF DIMINISHING MARGINAL UTILITY

Marshall explains the marginal utility analysis of demand which is based on the fundamental assumption about marginal utility behaviour called The Law of Diminishing Marginal Utility. The law states that, others things remaining constant marginal utility derived by the consumer from the consumption of the commodity, goes on diminishing as the consumer consumes more and more of it. This law applies to single want with a commodity in one use. The law is based on the common experience. The law of diminishing marginal utility may be attributed to two factors: viz., that individual wants are satiable and different commodities are imperfect substitutes of one another in the satisfaction of particular wants. Thus, the law is based upon the Psychological fact that as the consumer consumes more and more units of a commodity, the intensity of his want for it goes on diminishing and when he reaches the point of satiety he needs no more of the commodity. The point of satiety means zero marginal utility of the commodity.

6.3.1 ASSUMPTIONS:

The Law of Diminishing Marginal Utility is based on certain assumptions:

1. Different Units of Good (regarding size, taste) consumed are homogeneous.
2. There is no time interval between the consumption of two units.
3. Taste, fashion etc: of the consumer remain constant.
4. There is only one commodity on which the consumer spends his income and price of that good remains constant.
5. Income of the consumer is limited.

Based on the above assumptions, the law states that when a person acquires more and more units of the same commodity at a given time, the utility from the successive units will diminish. For example; the satisfaction which a consumer derives from the first apple will be definitely more than the second apple. Similarly the satisfaction/utility derives from the consumption of the second apple will be greater than the third apple and so on. This can be explained with the help of an imaginary schedule given below:-

Table : 6.1

Utility Schedule of a consumer

No. of apple	Total Utility (in units)	Marginal utility (in units)
1	10	10
2	16	6
3	20	4
4	22	2
5	22	0
6	20	-2

Table : 6.1 explains that the more we have a thing, less is the utility that we derive from every additional utility, other things being equal. Here marginal utility refers to additional utility and total utility refers to the sum of marginal utility. Table 6.1 shows that the first apple is the marginal apple yields 10units and total utility is also 10 units. The second apple is marginal unit yields 6 units and total utility is 16 units. Third and fourth apples yield 4 units and 2 units respectively. The fifth apple yields zero units. Total utility reaches maximum i.e., 22 units. When the consumer consumes 6th apple he gets disutility i.e., 2 utils. Total utility also decreases from 22 units to 20 units. Thus when marginal utility goes on decreasing, total utility goes on increasing but at a diminishing rate. When marginal utility becomes negative, total utility declines from the maximum.

6.3.2 DIAGRAMATIC EXPLANATION

On the basis Table 6.1, the law of Diminishing Marginal Utility can be graphically explained.

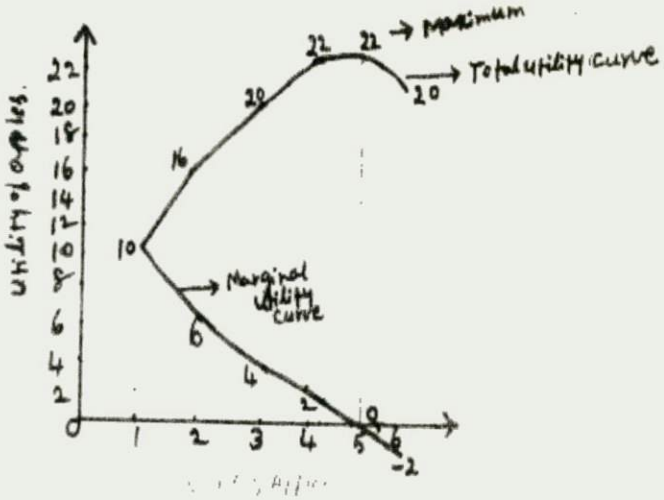


Figure 6.1 shows the behaviour of total utility and marginal utility. The total utility curve shows an increase at a diminishing rate. Whereas marginal utility has a negative slope, indicating a decline with successive consumption of the same commodity. The marginal utility indicates the rate of increase in total utility. Hence the slope of total utility represents the marginal utility. While marginal utility curve is downward sloping, total utility curve is positively upward sloping curve. When marginal utility curves reaches zero, total utility will be maximum as shown in the diagram 6.1. As shown in the fig:6.1, the marginal utility curve cuts through the 'x' axis at the 6th unit of apple indicating disutility.

6.3.3 Merits and Limitation

The law of diminishing marginal utility is the basis of all other laws of consumption viz, Law of Equi-Marginal Utility, law of Demand etc:

There are a few limitations to the law of diminishing utility:-

a) In the case of liquor it is said that more a person drinks, the marginal utility of liquor is said to be raising instead of falling.
b) In the case of miser, it is said that more one has of it, the greater is the desire to acquire still more.
c) This law does not had good in the case of rare collections like stamps, coins, rare picture etc.In all there cases marginal utility tends to increase instead of diminishing.
d) Besides, the law of diminishing marginal utility is applicable to single want with a commodity in one use. But in reality there may be a number of wants to be satisfied with many goods at a time.

Check Your Progress : I

1. Distinguish between Marginal Utility and Total Utility
2. What is meant be cardinal approach
3. State the Law of Diminishing Marginal Utility.
4. Explain the limitations of the law of diminishing marginal utility.

6.4 LAW OF EQUI-MARGINAL UTILITY

Law of Equi-marginal utility is an extension of the law of diminishing marginal utility. This law explains how a consumer will allocate his limited income among different goods to get maximum satisfaction. When a person purchases more of one commodity, the lower is his marginal utility to him. Now he has less money left with him for purchase of other goods. Now the consumer with great care allocates his limited income on various commodities so as to attain maximum total satisfaction. Marshall explains this law as follows: If a person has a thing which he can put to several uses, he will distribute it among these uses in such a way that it has the same marginal utility in all for if it had a greater marginal utility in one use

than had a greater marginal utility in one use than other, he would gain by taking away some of it from the second use and applying it to the first.

6.4.1 Assumptions:

The law of Equi-marginal utility is based on the following assumptions:

1. Marginal utilities of different commodities are independent of each other and diminish with more and more purchases.
2. Since the income of the every consumer is limited, he has to make a choice and purchase limited amount of each commodity.
3. Income remains constant.
4. Prices of goods remain constant.

6.4.2 Equilibrium of the Consumer through the Law of Equi-Marginal Utility:

The law of Equi-marginal states that, to get maximum utility from the expenditure of his limited income, the consumer purchases such amount of each commodity that the last unit of money spent on each of them yields him the same marginal utility. Marginal utility of money expenditure on each good will be the same, when marginal utilities of different commodities are proportional to prices. Therefore this law is also known as Law of Maximum Satisfaction.

The law of Equi-marginal utility is also called Law of substitution. Because if the marginal utility of money expenditure on one good is greater than the second good, then the consumer will gain by spending more on first good and less on the second good. Consumer gets maximum satisfaction by substituting good of higher utility for good of lower utility. Thus the essential conditions for the consumer equilibrium are:-

a) Marginal utilities of commodities must be equal to their prices
b) Marginal utility of money should be equal to marginal utilities of different commodities.

6.4.3 Explanation of the Law through an example

Consumer's equilibrium through equi-marginal utility can be explained with the help of an example. Let us assume the consumer has a given income Rs.5/-. The consumer has to distribute this income Rs.5/- on two goods-A and B; their prices are respectively Re.1 per unit. With the given income and price, let us see how he distributes his income on two goods with the help of imaginary schedule shown in the Table 6.2

Table : 6.2

Units	MUA	Units	MUB
1	20	1	20
2	18	2	15
3	15	3	10
4	10	4	5
5	4	5	2

Table 6.2 indicates marginal utilities of commodities A and B. Through making comparison of marginal utility of the two commodities, the consumer decides the scheme of expenditure that affords him maximum utility. Table 6.2 shows that, the consumer secures maximum satisfaction by spending Rs.3 on the commodity A, and Rs.2 on the commodity-B. By paying Rs.3, he purchases more units i.e., 3 units of good A and for Rs.2, he buys two units of good B. This scheme of expenditure ensures him maximum total utility of 88 units i.e.,

$TU_A = 20+18+15 = 53$

$TU_B = 20+15+ = 35$

$TU = 53+35 = 88$

This scheme of expenditure fulfils the condition of equi-marginal utility i.e., marginal utilities of both A and B are equal to each other and marginal utility of money is equal to marginal utilities of Goods: A and B. Therefore this law is called Law of Equi-marginal utility or law of maximum utility, this may be expressed mathematically as:-

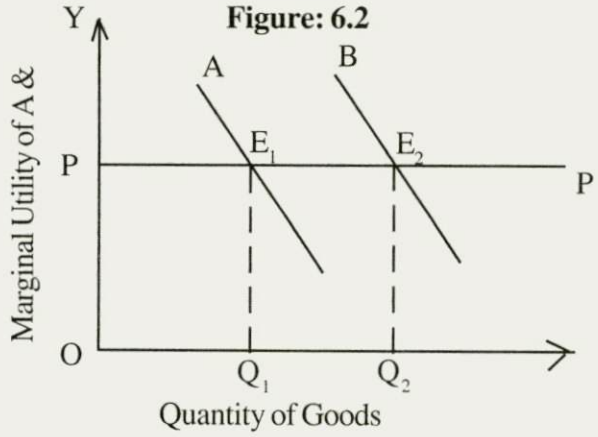
$$\frac{MU_A}{P_A} = \frac{MU_B}{P_B} = MUm$$

The law of equi-marginal utility is also known as Law of Substitution, since the consumer substitutes A which yields higher utility for B which yields lesser utility.

6.4.4 Diagramatic Representation

On the basis of our imaginary schedule i.e., table 6.2 the law of Equi-marginal utility can be explained Graphically.

Figure: 6.2



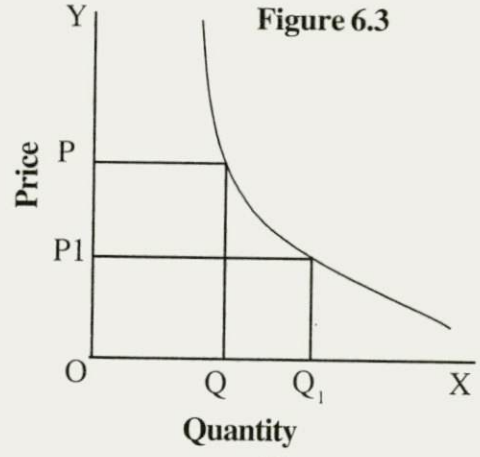
In the fig: 6.2, A and B are the marginal utility curves of commodities. The horizontal line PP is the price line which implies that prices of A and B commodities are same and remain constant. The consumer is in equilibrium by purchasing OQ_1 (3 units of A) quantity of A and OQ_2 (2 units of B) quantity of B, for the marginal utilities of both commodities are equal to each other. At the points E_1 and E_2, marginal utilities of the two goods are equal to each other and also at these points (E_1 & E_2), marginal utilities of two goods are equal to their prices, and at these points, marginal unit of money is equal to marginal utilities of two goods. Thus the consumer is said to be in Equilibrium.

6.4.5 Derivation of Demand Curve

Marshall has shown that with the help of equi-marginal utility rule, demand curve of a single consumer can be derived. According to equi-marginal rule, consumer will be in equilibrium when MU=price. When price of good falls, marginal utility will be greater than price i.e., MU>price and equilibrium is disturbed. To restore equilibrium i.e., to maintain equilibrium between marginal utility and price (MU=P), the consumer has to buy more of the commodity, so that marginal utility falls and becomes equal to price. This the law of equi-marginal utility which is based on the law of diminishing marginal utility explains the inverse price-demand relationship i.e., the law of Demand.

The derivation of law of demand from the law of equi-marginal utility which is based on the law of diminishing marginal utility can be illustrated diagrammatically. This is explained in the fig:6.3

Figure 6.3



In the fig:6.3 MU curve is the diminishing marginal utility of the commodity measured in terms of money. At the price OP, the consumer buys OQ quantity of commodity. At that price OP, MU=P. Suppose, price falls from OP to OP_1 consumer equilibrium is disturbed, because MU>OP_1. To restore equilibrium the consumer has to purchase OQ_1 quantity of commodity at OP_1 price. By doing so marginal utility falls to the level of OP_1 (MU=OP_1) and equilibrium will be restored. Thus it is clear that when the price of good falls, the consumer buys more of that good to equate marginal utility with the low price. Therefore, amount demanded is inversely related with the price of commodity. This is shown by the downward sloping MU curve.

6.4.6 Significance and Weakness of the Marginal Utility Analysis

The law of equi-marginal utility has universal application. The tendency to distribute a commodity or a factor among various uses in such a way that the marginal utility from each of the various uses is equal-is common to all branches of economics.

Each individual tries to distribute his limited income between present and future needs in such a way that marginal utility in each case is the same.

In a household economy the housewife distributes the limited income of the household between different needs viz., food, cloth etc, and maximizes the satisfaction of the entire household.

To maximize the profits, the entrepreneur or a businessman or a farmer is constantly substituting the factor which gives him larger returns for the factor which contributes less to total output and stops the process of substitution at the point where marginal returns from all the factors employed are equal.

Inspite of these merits, utility analysis has certain limitations:-

1. The basic defect of the utility analysis arises from the fact that since utility is subjective and psychological phenomenon, it is not measurable in terms of cardinal numbers. Since utility cannot be measured quantitatively it is not correct to assume that utility is additive.
2. Marshallian assumption of constancy of marginal utility of money is not acceptable. Hicks argues that money is also a commodity and therefore its marginal utility also diminishes. In practice, marginal utility of money is not constant.
3. The utility analysis does not analyse clearly the income and substitution effects of a fall in the price of a commodity.
4. Marshall assumes that each commodity to be independent and utilities are independent. But in reality goods are related the utilities of different goods are interlinked. Consumers normally prefers two or more goods together eg: car and petrol.
5. The marginal utility analysis fails to explain the demand for indivisible goods (bulky goods) because consumers normally buys only one such goods. It would be ridiculous to construct demand schedule for a car on the basis of diminishing marginal utility such as one car of Rs.4 lakhs, 2nd car for Rs.3 lakhs, 3rd car for Rs.50 thousand and so on.

6. Marshall assumes that others things viz, income, price, taste, fashion etc., remain constant. But in reality they do'not remain constant.

6.5 CONSUMER'S SURPLUS

The concept of Consumer's Surplus occupies an important place in Marshallian system of welfare economic analysis. The concept of Consumer's Surplus was invented by A.J.Dupuit and developed by Prof.Marshall. Marshall points out that the utility which a consumer derives from the purchase of a commodity exceeds the money value he pays for it. This excess of satisfaction is called "Consumer's Surplus".

Prof.Marshall has worded the doctrine of Consumer's Surplus as follows; " the excess of the price which a person would be willing to pay rather than go without the thing over that which he actually does pay"

Consumer's Surplus refers to the difference between willing price and actual price i.e., what we would like to pay and what we actually pay. That means Consumer Surplus is the difference between potential price(willing price) and Actual price (i.e., market price) It can be expressed as follows:-

CS=PP-AP

CS®Consumer Surplus, PP®Potential Price, AP®Actual Price Doctrine of consumer's surplus can be explained with the help of an example. A consumer who is fond of mango is ready to pay 90 paise for first unit and 70 paise for 2nd unit and 60 paise for 3rd unit of mango and so on. Here we should note that the consumer is ready to pay lower price for the successive units of mangos. This is due to the application of the law of diminishing marginal utility. Let us assume that the price of mango is 20 paise. He is ready to pay more price till the utililty equals the price. The following table 6.3 explains the Consumer's Surplus.

Table : 6.3

Units	Potential Price (willing price) paise	Actual Price (market price) paise	Consumer's Surplus (units)
1	90	20	70
2	70	20	50
3	60	20	40
4	40	20	20
	260	80	180

According to the table 6.3, when the consumer purchases the first unit of mango he is ready to pay 90 paise, but he pays only the market price i.e., 20 paise . So he gets a surplus utility that is equal to 70 units.

When he purchases the second unit of mango, he is ready pay 70 paise because he gets 70-2=50 units of surplus. When he buys the 3rd unit of mango he gets a surplus i.e., 60-2=40 units of surplus for the fourth unit of mango, he is ready to pay 40 paise and gets surplus (i.e., 40-2-=20 units) which is equal to market price. The total consumer's surplus in purchasing 4 units of mangoes is 70+50+40+20=180 units i.e.,

CS= Total Utility – Market Price x Number of units consumed

CS = 260 – (20 X 4)

CS = 260 – 80 = 180 Units

6.5.1 Diagramatic Representation

Consumer's Surplus can be illustrated diagrammatically:-

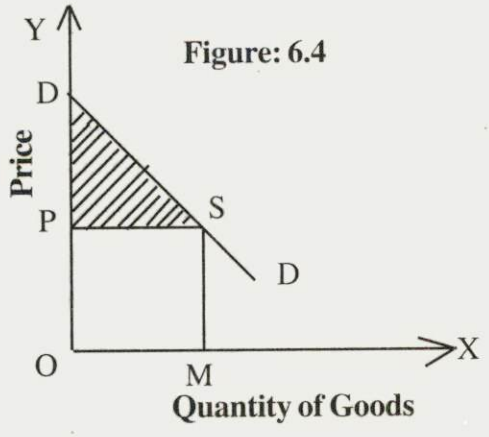


Figure: 6.4

Fig:6.4 shows DD is the demand curve. OP is the price level. At OP price level, consumer purchases OM quantity of commodity. At this price level, price is equal to marginal utility (P=MU). When the consumer purchases OM quantity of commodity his utility derived from it is ODSM. He is ready to pay OD SM price (i.e., willing price). But actually he pays market price for OM quantity i.e., OPSM price. By comparing the satisfaction received and sacrifice made while purchasing the commodity, we find that the consumer gets more satisfaction than the sacrifice he makes. As shown in the fig:6.4, the willing price i.e., ODSM is greater than the market price i.e., OPSM therefore, consumer's surplus is:

ODSM – OPSM = DPS

As shown in the fig:6.4, the shaded area i.e., DPS is the consumer's surplus.

6.5.2 Assumptions

The Doctrine of Consumer's Surplus is based on the following assumptions:-

a) Utility can be measured. Utility derived from the consumption of a commodity can be put in exact number.
b) Marginal utility of money remains constant.
c) Income and price are given.
d) Fashion, taste remain constant.
e) There is no substitute for the commodity
f) Consumer surplus is based on the law of diminishing utility.

If the above mentioned assumptions are accepted then Marshall's Doctrine of consumer's surplus holds good.

6.5.3 Importance of Consumer's Surplus

Doctrine of consumer's surplus has some theoretical and practical importance:

a) Theoretical importance of the doctrine of consumer's surplus lies in the fact that it pleads a case for the imposition of direct taxes in place of indirect taxes. When direct tax is imposed, it reduces his consumption. Now the consumer has to sacrifice the marginal units of some goods. The total amount of sacrifice is very small. But in the case of indirect taxes, the consumer has to sacrifice not only marginal units but also units before marginal units. In this case fall in total utility is higher.
b) The doctrine of consumer's surplus guides the Government to provide subsidy to an industry, if the loss by granting subsidy is lower than the surplus earned by consumers.
c) The concept of consumer's surplus is useful in taking decision about public goods viz., dams, railways, roads etc., The use of such public goods gives lot of consumer's surplus to individuals. State should discriminate between various users of public utilities according to the measure of consumer's surplus, they get from it.
d) The concept is useful in comparing the living standard of people in different regions of a country or indifferent countries.
e) Consumer's surplus also helps the monopolist in fixing the price for his product. He can use his power to increase his profits, as his product has no immediate substitutes. A monopolist can fix very high price for his product to squeez the whole of consumer's surplus.
f) The concept helps in explaining the advantages of international trade. A country tries to arrange its imports and exports in such a way that consumer's surplus in the country is maximized. So that the Government can tax relatively cheap imports to extract the part of the consumer's surplus. It helps in framing the tax policy.
g) Consumer's surplus is considered as the index of welfare of the community. The level of both development and welfare of the people is considered to be higher in those countries where the consumer's surplus is more.

Thus, the doctrine of consumer's surplus has both theoretical and practical importance.

6.5.4 Criticisums

Though the doctrine of consumer's surplus is of great theoretical and practical importance, it has some short comings:-

a) It is argued that Marshall's idea of consumer's surplus is not applicable to luxuries and necessaries of life. The utility of luxuries and prestige goods like demand depend upon the prevalence of high prices. If prices were low, utility of these goods would disappear and surplus also disappears. Regarding the bare necessaries of life like water, utility will be very high while their market prices are low due to their abundant supply. Eg: A thirsty rich man stranded in a desert may be prepared to pay Rs.1,000/- for a glass of water although he might get it for next to nothing. Here, water is necessary for existence, its consumption does not yield any positive satisfaction but the absence of the same will be infinitely painful. In such case, the surplus is a sort of negative element. Thus, the concept of consumer's surplus does not apply to bare necessaries of life.

b) Marginal utility of money cannot remain constant.

c) Consumers have option to purchase less or more of a commodity. In the case of rare commodity, they purchase less. It is said that consumer's surplus applies to normally traded, independent and unimportant commodities.

d) Doctrine of consumer's surplus neglects the income effect of the change in price.

e) It is also criticized that, since utility is subjective and psychological concept, it cannot be measured in terms of cardinal numbers. Inspite of these limitations doctrine of consumer's surplus has practical importance.

6.5.5 Measurement of Consumer's Surplus

Marshallian concept of consumer's surplus is based on the cardinal approach, according to which utility can be measured inc cardinal numbers. But according to Hicks and Allen, since utility is subjective it cannot be measured definitely in cardinal numbers. Therefore, to analyse utility, Hicks and Allen followed ordinal approach. Hicks measured consumer's surplus, without assuring cardinal measurability of utility, constancy of marginal utility of money and utility being an independent entity. According to Hicks, consumer's surplus is a monetary gain to the consumer due to the fall in the price of the commodity. Hicks tries to measure consumer's surplus with the help of indifference curve. Hicksian measurement of consumer's surplus can be illustrated in the following diagram- 6.5

In the fig 6.5, money is measured on OY axis and quantity of commodity on OX axis. Let us assume, the consumer has OM amount of money and he does not know the price of the commodity at present. In this situation, the consumer is in the equilibrium at the point T on IC_1 originating from point M. Hence the consumer is having ON amount of commodity and OY_1 of income. The consumer is ready to pay MY_1 amount of money for getting ON amount of commodity.

Now suppose, the consumer is informed of the market price of the commodity. Now let ML be the budget line. The slope of the budget line (price line) shows the price of the commodity. :Point S on IC_2 is tangent to the budget line. Now the consumer buys the same amount of commodity i.e., ON amount of commodity by paying MY_2 amount of money. Previously he was ready to pay MY_1 amount of money, which is higher than actual amount of money, now he pays MY_2 for the same quantity of commodity. Therefore, $MY_1 - MY_2 = Y_2 Y_1$ i.e., the money measure of the consumer's surplus.

Thus, Hicks has measured consumer's surplus with the aid of indifference curve technique..

6.6 LET US SUM UP

Utility is the power of a commodity to satisfy a human want. Marshall followed cardinal approach to measure the utility, according which utility can be quantifiable cardinal utility analysis is based on certain assumptions viz., consumer's rationality, constant utility of money, independent and additively. The behaviour of cardinal utility has been hypothesized by Marshall in the Law of Diminishing marginal Utility. The law states that, other things being equal, the successive consumption of a commodity, marginal utility of it tends to decline. The law of diminishing utility is based on the common experience of the individual. This law is the basis for all other laws of consumption viz., Law of Equi-marginal Utility, law of Demand etc., But this does not hold good in the case of consumption of liquor, miser, collection of rare pictures.

The Law of Equi-marginal Utility which is based on the law of diminishing utility, explains how a consumer will allocate his limited income among different goods and reaches equilibrium when he gets maximum satisfaction. The consumer gets satisfaction when he obtains equi-marginal utilities from all the goods purchased at a time.

The consumer derives maximum total utility and attains equilibrium when $\frac{MU_A}{P_A} = \frac{MU_B}{P_B} = MUm$

Therefore this law is known as law of maximum utility. This law is also called law of substitution, because the consumer attains equilibrium through a process of substitution. The law of Equi-marginal utility has universal application. This law holds good only when other things like taste, fashion, income etc., remain constant. But in real world they do not remain constant. Marginal Utility analysis has certain limitations. Marginal Utility of money does not remain constant in real world. Utility can not be measured in cardinal numbers since it is subjective in nature.

Consumer's Surplus:- According to Marshall, consumer's surplus is the difference between willing price and market price. The amount of satisfaction derived by the consumer generally exceeds the amount of scarifies he makes. Marshall calls this excess satisfaction "consumer's surplus". It is based on cardinal measurability.

But Hicks-Allen criticized that doctrine of consumer's surplus is based on unrealistic assumptions. Inspite of this, it is of great importance to finance minister, monopolist, in International Trade and Public Goods.

Hicksian measurement of consumer's surplus with the help of indifference curve is superior to marshallian approach, since it explains real income effect which is the result of fall in price.

6.7 KEY WORDS

Utility :- Want satisfying power of a commodity.
Cardinal Measurement of Utility:- Cardinal measurement means numerical expression according to which utility of a commodity is quantifiable.
Marginal Utility :- Marginal utility refers to additional utility derived from purchasing additional unit.
Total Utility :- Addition of all marginal utilities.
Potential Price :- The price which the consumer is ready to pay.
Actual Price :- The price refers to market price.
Consumer's Surplus :- Difference between Potential Price and Actual Price.
Indifference Curve :- A curve which implies number of two commodities, which yield same level of satisfaction, consumer select any one of the combinations and indifference to other combinations.
Real Income :- When price of commodity falls, purchasing power of the consumer increases. Real income refers to purchasing power.

6.8 REFERENCE BOOKS

1. P.N.Chopra - Advanced Economic Theory
2. Ahuja.H.L - Principles of Economics
3. Stonier and Hague - A Text Book of Economic theory

Check Your Progress : II

1. Explain the Law of Diminishing marginal Utility.
2. State the law of Equi-marginal Utility . pointout its limitations.
3. What is meant by consumer's surplus ? How do you measure consumer's surplus ?

UNIT : 7 ORDINAL APPROACH – INDIFFERENCE CURVE ANALYSIS

Structure

7.0 OBJECTIVES

The main objectives of this unit are:-

- To explain the meaning of ordinal approach
- To define the Indifference Curve
- To describe the features of IC
- To understand how a consumer reaches equilibrium through IC analysis
- To analysis the Price, Income and Substitution effects
- To appreciate the application of IC analysis in different branches of economics

7.1 INTRODUCTION

In the last unit you studies cardinal utility analysis of demand. But since utility is subjective concept, it cannot be measured in numbers. Therefore, Edge worth, Hicks and Allen followed ordinal approach to study utility analysis. Hicks and Allen propounded "Indifference Curve Theory or Ordinal Utility Analysis". Which is also called Indifference Curve Analysis. In this unit let us discuss Indifference Curve Analysis in detail.

7.2 ORDINAL APPROACH TO MEASURE UTILITY

Hicks and Allen followed the ordinal approach to measure utility. Ordinal approach has been crowed to supersede the marginal utility analysis. According to Hicks and Allen, utility being psychological feeling is not quantifiable. Therefore, the cardinal utility approach is untenable. Hicks and Allen employed ordinal measurement of utility. Ordinal utility implies that consumer is capable of comparing the different levels of satisfaction. Since the consumer may not be able to indicate the definite amount of utilities that he derives from the commodity, he may be able to judge whether utility obtained from a good or combination of goods is equal to another good, lower or higher than another good. According to ordinal approach, consumer is able to rank his preference consistently, among various combinations of goods by comparing their levels of goods. Therefore, ordinal utility is qualitative in nature. Indifference Curve analysis centres around ordinal measurement of utility.

7.3 INDIFFERENCE CURVE ANALYSIS:- (IC Analysis)

Indifference Curve Analysis is an improvement over Marshallian utility analysis. Indifference Curve analysis explains the consumer behaviour in the form of indifference curve. An Indifference curve is one which represents all those combinations of goods which yield same level of satisfaction to the consumer. The consumer prefers anyone of the combination and is indifferent to other combinations as they yield same level of satisfaction. Thus it is based on the assumption of "Indifference Preference"

7.3.1 Meaning of IC

The Indifference Curve is a geometrical device which represents number of combinations of two goods yielding equal level of satisfaction. An Indifference curve can be defined as follow: "An Indifference Curve is the locus of points representing all the different combinations of two goods which yield equal level of satisfaction to the consumer". Therefore, Indifference curve is one which represents different combinations of two goods that yield the same level of satisfaction. Each indifference indicates one level of satisfaction. Higher the indifference curve yields higher level of satisfaction and lower indifference curve yields lower level of indifference curve.

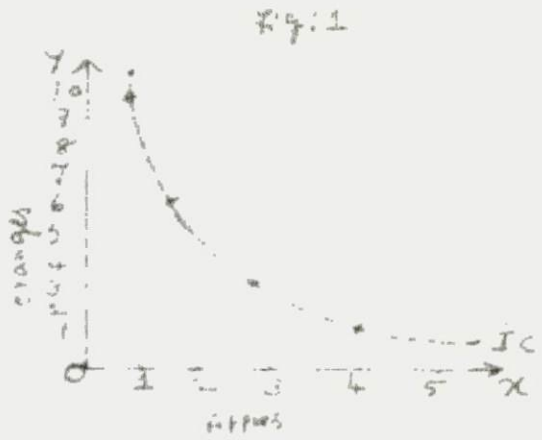
7.3.2 Indifference Shedule

Indifference curve has been devised to represent ordinal measurement of utility. In this regard Hicks has introduced the concept, "Scale of Preference" of a consumer. Scale of preference consists a number of alternative combinations of two goods which yield the consumer same amount of satisfaction. A rational consumer which seeks to maximize his level of satisfaction would certainly rank them according to the different levels of satisfaction in order to decide priorities from the scale of preference, the consumer chooses one of the combinations and he is indifferent about the other combinations.
Table : 7.1 is an imaginary indifference schedule which explains scale of preference of a consumers.

Table : 7.1
Scale of Preference

No of combinations	Combinations of Apples & Oranges (A) (O)	Level of satisfaction	Ranking order of preference
a	10 oranges + 1A	Highest satisfaction	I
b	6 oranges + 2A	Lesser than 'a' combination	II
c	3 oranges + 3A	Lesser than 'b' combination	III
d	1 oranges + 4A	Lesser than 'c' combination	IV

Table 7.1 shows that the consumer derives the highest satisfaction from a larger stock i.e., 10 oranges + 1 apple. Therefore, he assigns higher priority to the first combination than the other combinations in the same schedule. He assigns the least priority to the 'd' combination since it yields lowest level of satisfaction in the schedule on the basis of the imaginary schedule explained in the table 7.1, an indifference curve can be drawn as shown in the figure : 7.1



In fig : 7.1 apples are measured on OX axis and oranges on OY axis. The points a,b,c,d – indicate different combinations of orange and apple. All these combinations yield equal satisfactions yield equal satisfactions. Therefore, the consumer is indifferent to them, as he will be neither better off nor worse off in choosing any of the combinations at these points. If the consumer moves downwards, from one point to another point, the level of satisfaction remains unchanged. Therefore, an IC is also known as "Equal-satisfaction curve or Iso-utility curve"

7.3.3 Assumptions of IC Analysis

Indifference curve analysis is based on the following assumptions:-

1. Consumer behaves rationally. That means he tries to obtain the maximum satisfaction from his expenditure on consumer goods. To get maximum satisfaction consumer always prefer more quantities of goods to a lesser quantities.
2. Consumer is able to arrange a number of combinations I a ascending or descending order and he is able to rank his preferences also able to indicate the combinations among which he is indifferent.
3. The IC analysis is based on the concept of ordinal utility. According to this assumption, the consumer is able to rank the alternative combinations available to him by a simple comparison of satisfaction obtainable from the combinations.
4. It is also assumed that the consumer is willing to buy two goods in combinations.
5. It is assumed that the consumer's choices are transitive. That means the consumer is always consistent in his choice. When he prefers A to B, B to C and C to D, then he also prefers A to D. This is called assumption of transitivity.
6. Diminishing Marginal Rate of Substitution is another assumption of the IC analysis. According to this assumption, as the quantity of commodity with the consumer goes increasing, he is prepared to exchange lesser and lesser of the other commodity for equal units of the commodity whose amount is increasing.

7. It is assumed that the consumer is not influenced in his preference or indifference between combinations by the market prices of different goods. That means he should not thin that a higher priced commodity as superior to lower priced commodities.
8. It is further assumed that, IC analysis is based on weak ordering. This implies that there is a possibility of as the consumer being indifferent between any two combinations along with the possibility of preferring one combination to the other. The consumer may prefer A to B or B to A or he may be indifferent between two combinations. As against weak ordering in strong ordering, the consumer is allowed to indicate his preference only.
9. Hicks and Allen assumed ordinal measurement of utility. The height of the indifference curve indicates the level of satisfaction without qualification.

7.4 BASIC CONCEPTS OF IC ANALYSIS

The following are the basic concepts of IC Analysis

7.4.1 INDIFFERENCE CURVE MAP

Indifference curve analysis assumes that many indifference curves may be derived for a individual on the basis of imaginary indifference schedules. These indifference curves which represent an individual preference is called an "Indifference Map". An Indifference curve map refers to a set of indifference curve representing the difference levels of satisfaction obtainable from different individual schedules. As such we can form various indifference schedules of two goods with more quantities that can be purchased with higher levels of income and set out a complete schedule of scale of preference by putting indifference schedules in the order of their levels of significance. Table 7.2 explains different imaginary indifference schedules.

Table : 7.2

Imaginary Indifference Schedules

Utility of IC_1		Utility of IC_2		Utility of IC_3		Utility of IC_4		Utility of IC_5	
1		2		3		4		5	
App	Orange	App	Orange	App	Orange	App	Orange	App	Orange
1	8	2	10	3	15	4	20	5	25
2	4	4	6	5	10	6	14	7	20
3	2	6	3	7	6	9	10	10	15
4	1	8	2	9	3	11	8	12	10

On the basis of table 7.2 we can draw several indifference curves. Fig 7.2 illustrates indifference curve map.

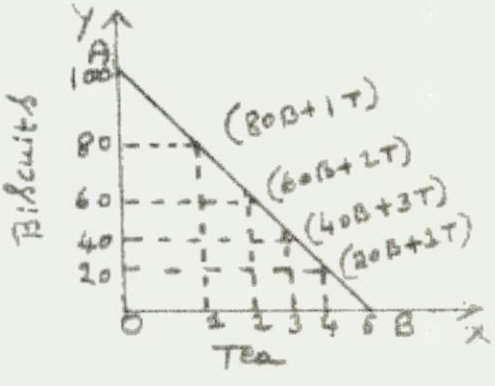
Figure : 7.2

Fig : 7.2 shows Indifferent Curves of different levels of satisfaction drawn with the help of imaginary indifference schedules (Table : 72). IC1, IC2, IC3, IC4, IC5 – are the indifference curves which represent different levels of satisfaction derived from various combinations of Apple(A) and Orange (O). As the consumer moves from lower Indifference curve to higher and higher indifference curve he derives more and more satisfaction because of the increased quantities of the two goods. Utility of IC2 > Utility of IC1, U of IC3 > IC2 and utility of IC4 > IC3 and so on. Thus higher the indifference curve higher will be the level of satisfaction. The Indifference Curve Map is Geometrical expression of consumer's choice and scale of preference. But his choice is determined by the Budget-line of the consumer. Now let us know what is Budget line.

7.4.2 BUDGET LINE

The consumer's choice depends an income of the consumer and prices of the goods. Income and price act as constraints or limits; on what the individual is able to buy can be expressed in the form of budget line. The budget line shows the combinations of the two goods measured on the axis that can be purchased by the consumer who has a particular income and who faces particular prices for those goods. This is explained with the help of a diagram 7.3

fig : 7.3



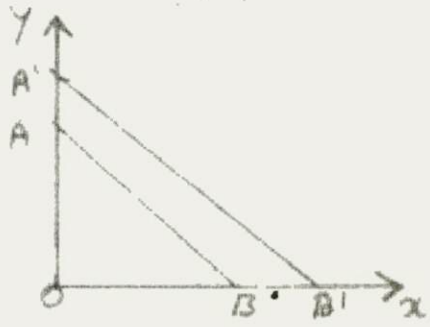
As shown the figure 7.3, AB is the budget line. Let us assume the price of biscuits is 5 paise and price of the tea per cup is 1Re. The consumer has an income of Rs.5 Rs to spend on biscuits and tea. If he spends his entire income on biscuits he purchases 100 biscuits and no tea. If he spends entire income on tea, he gets 5 cups of tea and not biscuits. These are two extreme points of choice. But, generally he purchases both biscuits and tea. As shown in the fig:7.3, if he spends 3Rs on biscuits, he gets 60 biscuits and 2 cups of tea spending 2Rs on tea on the other hand, if he spends 2Rs on biscuits, he gets 40 biscuits and spends 3Rs on tea and gets 3 cups of tea. He chooses anyone of the combinations on the budget line and indifferent o other combinations, since all combinations, since all combinations yield same level of satisfaction. Therefore, budget line is the locus of points representing different combinations of the two goods that can be purchased by the consumer, given his income and the prices of the two goods.

The slope of the budget line (i.e., OA/OB) indicates the ratio of prices of two goods. Therefore, it is also known as price line. Since it shows possible combinations of consumer's consumption, it is also called, "The consumption possibility line". As illustrated in the fig:7.3, the price line slopes downward. The negative slope of the purchase more of one commodity only by foregoing some units of another commodity.

The position of the budget line or price line is determined by two factors viz., 1) money income of the consumer and 2) prices of the two goods he wants to buy. If consumer income changes or price changes, then budget line also changes its position.

Changes in Income:- Suppose price remaining constant, consumer's income increases. This change in income leads to a shift of the budget line to the right side of the original budget line, in a parallel position. This is shown in the fig:7.4.

7.4



Due to increase in income budget line AB has been shifted to the right side i.e., $A^1 B^1$. Similarly when income falls, budget line moves left side.

Changes in the prices:- Income of the consumer remaining constant, when price of any one of the two goods changes, it leads change in the position of the budgetline. This is explained in the diagram:7.5

Figure:7.5

Part 1 **Part 2**

Fig:7.5, part: 1 shows that, when the biscuits remaining constant, if the price of tea falls the budget line changes from AB to AB_1. It moves towards X axis this indicates consumer now purchasing more tea. Likewise, in the fig:7.5, part-2, price of tea remaining constant, when the price of biscuit falls, the budget line tends to move from BA^1. thus changes in income or price of the goods change the position of the budget line.

7.4.3 MARGINAL RATE OF SUBSTITUTION:- (MRS)

The concept of marginal rate of substitution is an important tool of indifference curve analysis. Marginal rate of substitution refers to the rate at which the consumer substitutes one good for another. It measures the rate at which the consumer is ready to give up Y commodity for an additional unit of X. The marginal rate of substitution between X and Y is written as:-

$$MRS_{xy} = \frac{\Delta Y}{\Delta X}$$

Where MRS_{xy} = marginal rate of substitution of x and y.

Y = change in the quantity of Y

X = Change in the quantity of X

The main characteristic of the MRS is that it diminishes as one commodity is increased and the other commodity decreased in the consumer's indifference schedule. Thus, it is similar to the principle of law of diminishing marginal utility. Table 7.3 explains the marginal rate of substitution.

Table : 7.3

Combinations	Apples(x)	Oranges(y)	Marginal Rate of substitution
a	1	40	-
b	2	30	1 : 10
c	3	25	1 : 5
d	4	23	1 : 2
e	5	22	1 : 1

In table 7.3, all the combinations of apple(x) and orange(y) give the same satisfaction to the consumer. If he prefers first combination i.e., 'a' combination, he gets 1 unit of apple and 40 units of oranges. In the combination 'b', he gets one more unit of apple and he is prepared to give up 10 units of oranges for it MRS is 1:10. In the combination 'c' he is willing to sacrifice only 5 units of oranges to get one more unit of apple. Therefore, MRS is 1:5. In the successive combination 'd and e'. MRS continues to fall. This illustrates the diminishing marginal rate of substitution. As a result of diminishing marginal rate of substitution, the indifference curve slopes downwards from left to right, as shown in the fig:7.6

Figure 7.6

As shown in the fig:7.6, as consumer gets more and more of x commodity, his intensity of demand for it goes on diminishing. As a result, the consumer gives up less and less amount of Y commodity to get more and more of X commodity. In the fig 7.6, combinations a,b,c,d and e- are all on the same indifference curve, yielding same level of satisfaction but represent different combinations. Thus, MRS of X and Y is the ratio of the change in the quantity of y, which keeps the consumer on the same indifference curve for a change in the marginal quantity of X. Therefore:-

$$MRS_{xy} = \frac{\Delta Y}{\Delta X}$$

In the beginning intensity of substitution will be more and gradually it decreases.

Limitations of MRS:-

The MRS and the shape of the IC are determined by the nature of the goods. If goods are imperfect substitutes (not completely substitutable) MRS diminishes fro left to right as shown in the fig:7.6. If goods are perfect substitutes MRS becomes infinite and the shape of the IC will be parallel to the X axis as shown in the fig:7.7

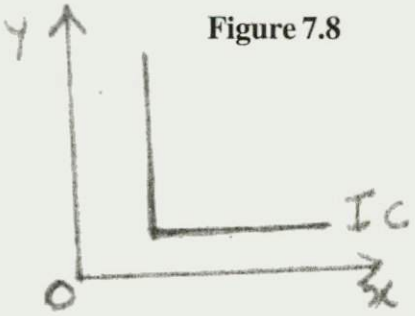
Figure 7.7

Part A **Part B**

Commodity X

As explained in the fig 7.7, Part:A quantity of commodity remains constant, and quantity of X increases. Total satisfaction increases. He cannot remain indifferent between combinations. Therefore, IC will not be parallel to X axis similarly in part B, it is explained that quantity of X remain constant, quantity of Y increases, from A to B he can't remain indifferent between combinations. Therefore IC cannot be vertical. If the goods are perfectly complementary, the shape of IC will be 'L' shape, which shows negative substitution effect. This has been illustrated in the fig : 7.8

Figure 7.8



If instead of diminishing if MRS increases (in the case of abnormal behaviour of the consumer) shape of the IC will be concave to the origin, as shown in the figure 7.9. But since it is against to the assumption of diminishing marginal rate of substitution.

Figure 7.9

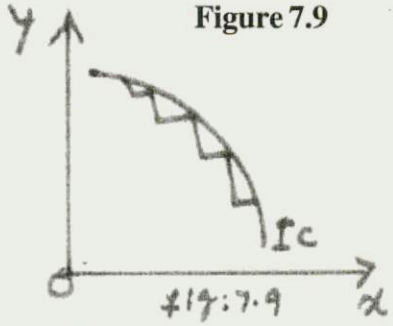


fig: 7.9

IC will never be concave to the origin. This, there are extreme cases not commonly found in consumer's choice.

7.3.6 PROPERTIES OF INDIFFERENCE CURVE

Properties of Indifference Curve are derived from basic assumptions viz., rationality, diminishing marginal rate of substitution and transitivity etc., The main properties (characteristics) of IC are:-

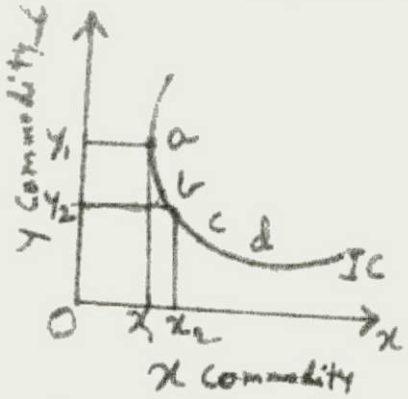
1) IC curves slope downward from left to right
2) IC curves are convex to the origin
3) IC curves cannot intersect each other

These properties are interpreted in their diagrammatical form

1. Indifference Curve has a negative slope:-

Indifference Curve has a negative slope, i.e., it slopes from left to right. The negative slope of the IC indicates that any increase in the amount of a commodity say X is accompanied by a reduction in the quantity of another commodity sat Y. But the consumer gets the same level of satisfaction and also remains on the same IC. He moves from a to b when units of x are increased from x_1 to $x_2 < x_3$ and unit of y are decreased from y_1 to $y_2 < y_3$ on the same line.

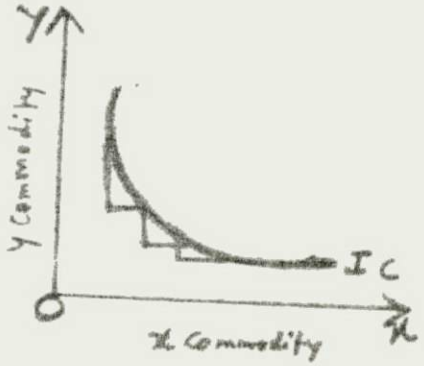
Figure:7.10



In the fig:7.10, IC is the downward sloping curve, indicating that any increase in the amount of X is accompanied by a reduction in the quantity of Y. On the basis of assumption, that IC represents equal satisfaction, possibilities of horizontal vertical and upward sloping Ics are ruled out. Because such Ics do not fulfil the assumption of equal satisfaction of two goods.

2. IC is convex to the origin:-

Generally, indifference curve is convex to the origin. The convexity of IC curve indicates that as the consumer moves left down to right along the IC, the marginal rate of substitution between the commodities diminishes. This is illustrated in the fig:7.11



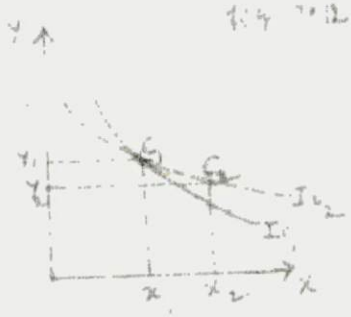
The slope of the IC measures the marginal rate of substitution. As shown in the fig:7.10, and IC is always steep at the top and relatively flat at the bottom. This is mainly due to the law of marginal rate of substitution. In the beginning substitution takes at a faster rate and then gradually, the rate of substitution diminishes. As the consumer moves on the indifference curve downwards, i.e., from left to right side,

quantity of X increases and quantity of Y decreases. When the consumer substitutes X for y, each tie he will sacrifice lesser and lesser amount of Y in exchange of X, in order to keep to keep the level of satisfaction unchanged.

3. <u>Indifference curves never intersect each other:-</u>

Indifference curves do not intersect each other. This is because each indifference curve represents specific levels of satisfaction. Eg., IC, represents U_1 satisfaction and IC_2 represents U_2 satisfaction. If these two Ics intersect each other, it leads to observed results. As explained in the fig 7.12

Figure 7.12



Two Ics cut each other at the point C_1, both C_1 and C_2 lie on the same IC i.e., on IC_2. Since they yield same level of satisfaction and consumer is indifferent between them. Therefore, U of C_1=U of C_2 therefore C_1=C_2 and C_1=d, then it follows C_2=d. d lies on IC_1 But this is irrational. Because IC is based the assumption of transitivity which implies consistency in choice making. A rational consumer would always prefer a larger quantity to a smaller one. If two indifference curves intersect each other, then the assumption of transitivity i.e., consistency in choice making is violated.

In addition to the above mentioned basic properties, the Ics passess some other characteristics which are explained as follows.

a) <u>Higher indifference curve represent higher level of satisfaction</u>:-

An indifference curve that lies above and right of another indifference curve represent higher level of satisfaction. This is illustrated in the fig 7.13

Figure 7.13

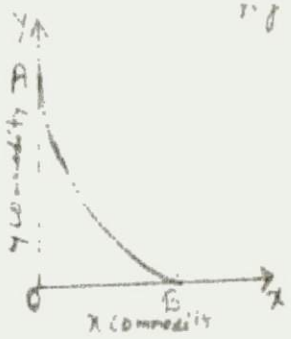
In the fig 7.13, IC2 lies above the IC, indicating that the combinations on IC2 yield higher level of satisfaction than the combinations on IC1, Similarly, IC3 lies above the IC2. Therefore, combinations on IC yield highest level of satisfaction. Thus higher indifference curve represent higher level of satisfaction.

b) Indifference curves need not be parallel to each other. Because, the rate of substitution between two goods is not going to remain the same. There is no proportionality in the differences among the different levels of satisfaction indicated b y each particular indifference curve.

c) Indifference curves do not touch the horizontal or the vertical axis:-

In IC analysis, it is assumed that the consumer purchases combination of different commodities. Therefore, he is not supposed to purchase only one commodity. If he purchases only one commodity then it indicates that he lacks interest in other commodity. This is explained in the fig;7.14

Figure 7.14



In the fig:7.14, IC curve meets the horizontal axis at B and vertical axis at A. This indicates that the consumer is purchasing OB amount of X commodity and zero amount of A commodity. This is against the basic assumption that the consumer purchases two commodities in a combination.

Check Your Progress : I

1) Define Indifference Curve. Explain the basic assumptions of IC.
2) What are the properties of IC ?

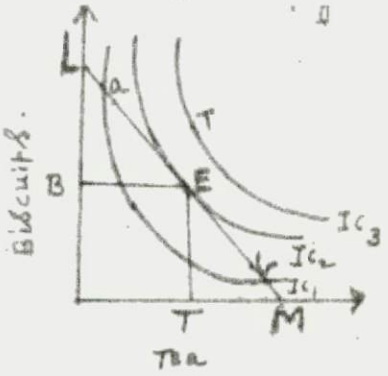
7.6 CONSUMER'S EQUILIBRIUM THROUGH IC ANALYSIS

According to Hick's ordinal approach, a consumer is said to be in equilibrium when he obtains maximum satisfaction. i.e., highest level of satisfaction. The consumer's equilibrium through IC depends on the following assumptions:-

1) The consumer purchases two commodities in a combination
2) The consumer is rational and he seeks to reach the highest possible point on the indifference curve in order to obtain the highest level of satisfaction
3) Consumer's income remains constant
4) Prices of two goods (X & Y) remain constant
5) Each unit of two goods is homogeneous
6) The consumer's has definite taste and preference and his scale of preference which is expressed through indifference map remains constant.

To find out the consumer's equilibrium we should consider the indifference curve map and the budget line. The indifference curve map represents the scale of preference of the consumer which indicates the consumer's taste, habit etc., The budget line represents budgetary constraints. That means the budget line is determined by the consumer's income and the market prices of two goods. Given the indifference curve and the budget line we can find out the equilibrium point, at which the combination yields maximum satisfaction for this, the budget line/price line should be superimposed on consumer's indifference map. To get maximum level of satisfaction, the consumer tries to choose the combination on the highest indifference curve attainable with his given budget line. The consumer reaches the equilibrium and obtains maximum level of satisfaction only at the point where the budget line is touching the indifference curve. This is illustrated in the fig:7.15

Figure 7.15



In the fig 7.15 LM is the budget line or price line. IC_1, IC_2, and IC_3 are indifference curves. The consumer is said to be in equilibrium only when the indifference curve is tangent to the price line (budget line) and indifference curve should be convex to the origin. At the point E, IC_2 is tangent to the price line and at this point IC_2 is convex to the origin. At this point, the slope of the price line is equal to the slope of the IC_2 point E also indicates that the marginal rate of substitution between two goods and the ratio of price of two goods are equal. Therefore, point E on IC_2 indicates the ideal combination giving the highest level of satisfaction possible with the limited income and at this point he is purchasing OT of tea and OB of biscuits and getting the highest level of satisfaction & in equilibrium. If the consumer prefers point 'a' on the budget line, which intersects IC_1, he derives U_1 satisfaction (represented less the IC_1) that is lower level of satisfaction.

Suppose he prefers point 'b' on the budget line. The consumer gets lower level of satisfaction. That means if the consumer moves right side of the point 'a' level of satisfaction increases. On the other-hand if the consumer moves right side of the point 'b' the level of satisfaction decreases. The movement of the consumer to the left side of the point 'b' would take him on to higher indifference curve and level of satisfaction increases. Thus, consumer equilibrium is attained at 'E'.

Generally, the consumer tries to move to the highest possible indifference curve i.e., IC_3. But since IC_3 lies out side the budget line, he cannot reach the IC_3. On the other hand, he can select combinations of goods on IC_1 but they yield lower level of satisfaction than combinations on IC_2. Therefore he chooses combination on IC_2 at the point E, where IC_2 is tangent to the budget and

$$MRS_{BT} = \frac{P_B}{P_T}$$

7.6.1 PRICE EFFECT:-

Price effect refers to change in quantity demanded of a commodity, resulting from a change in its price, the consumer's income being held constant. Consumer's equilibrium changes due to changes in price of any one of the commodity. The figure 7.16 (B)

Figure : 7.16

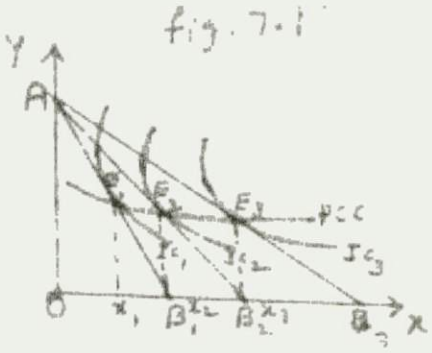


Fig:7.16 explains, that the consumer is in the equilibrium at the point E1 on IC1. He is purchasing OX_1 of X. Suppose price of X falls while price of Y remains constant. Now the price line AB shifts towards right side. The New price line (budget line) is A_1B_2 and the consumer is in equilibrium at the point E_2, purchasing OX_2 of X commodity. The price of X further falls and now the new price line is AB3. The amount of X demanded increases from OX2 to OX3. Thus with every change in the price of X1 the position of the price line changes, but its starting point on Y axis remains the same. If we join all the equilibrium points E_1, E_2 and E_3 effect. The movement on PCC from E1 to E2 and E3 implies that when the price of X falls more of X is purchased. A reverse movement on the PCC from E3 to E2 and E1 implies a rise in the price of X and fall in its demand, price effect applies to substitute goods.

The price effect is the result of two other effects, namely: 1) Income effect and 2) substitution effect. Income effect measures the change in the amount demanded of the commodity due to change in the real income of the consumer resulting from the change in price. When price falls it increases the real income of the consumer it purchasing power of the consumer. Therefore he demands more commodity. This is income effect price effect also depends on substitution effect.

According to substitution effect commodity becomes cheaper or clearer in relation to the other commodities in consumer's demanded due to change in the price. If the price of the commodity falls, it becomes cheaper compared to other commodities. As a result, the consumer substitutes cheaper commodity for the clearer commodity. Thus, the demand for cheaper commodity raise because of this substitution. This is called substitution effect.

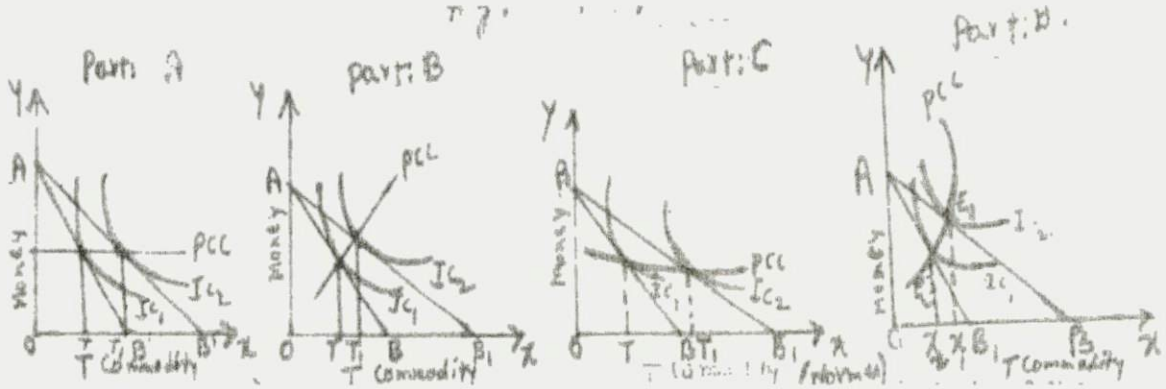
Price effect (Pe) = Income effect + substitution effect

(Ie) (Se)

Therefore price effect is the result of both income effect and substitution effect.

Elasticity of PCC:- PCC also gives an idea of price elasticity of demand for a good.This is illustrated in the fig 7.17, Part A, Part B, Part C, Part D. If we represent money on Y axis and T commodity on X axis, then slope of PCC explains nature of elasticity. If the slope of PCC is horizontal elasticity of demand for T commodity is unitary (Part A). When PCC slopes upward, elasticity of demand for T commodity will (part A) be less than unity (Part B). If the PCC has a negative slope elasticity of demand for T commodity is more than one. If PCC bends both ward, it shows that when price falls consumer purchases less i.e., less than zero. Fig:7.17 explains the cases of (Part C) unitary, less than unitary and more than unitary elasticity of demand for commodity T and backward sloping.

Figure : **7.17 (A)** **7.17(B)** **7.17(C)** **7.17(D)**



Part A
Unitary
(Superior Goods)

Part B
Less than Unitary
(Uncertain)

Part C
More than Unitary
(Normal Goods)

Part D
less than zero
(Inferior Goods)

Derivation of Individual Demand Curve from IC Analysis :- Both Marshallian curve and price consumption curve explain the effect of a change in price on the quantity demanded of a good. But PCC does not directly relate price with quantity demanded as in the case of Marshallian analysis. However it is possible to deduce individual demand curve (Marshallian demand curve) or price-demand relationship with the help of PCC. Both Marshallian individual demand curve and PCC give us inverse relationship between price and demand. This is illustrated in the fig:7.18 which consists A and B parts :-

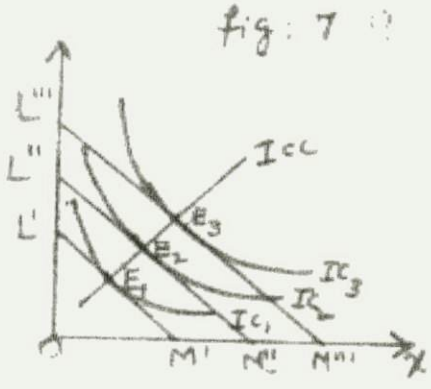
Figure 7.18

Part A of fig 7.18 indicates coffee on OX axis and money on OY axis. The curve PCC shows the amount of coffee the consumer would like to purchase at various prices but does so indirectly through total expenditure on this commodity. At the equilibrium point E_1, consumer likes to have OC_1 of coffee and OY_1 of income (price of coffee is) That means out of total money of OY_1, consumer spends Y_1 Y on coffee. This price is shown as OP_1 in part B for OQ_1 quantity. Similarly, at E_2 he spends Y_2 Y on OC_2 coffee. In part B, price is OP_2 for OQ_1 quantity. A point E_3, consumer is willing to spend Y_3 Y on OC_3. The price is OP_3 in part B for OQ_3 amount. If join all the points – L_1, L_2 and L_3 we get downward sloping demand curve, which is based on price effect & substitution effect of a change in price. Both PCC & demand curve have a downward slope.

7.6.2 INCOME EFFECT

Income effect refers to the effect of change in income on the consumer's equilibrium. It explains consumer's reaction to changes in income in relation top his demands behaviour. When his taste, price of goods remain constant. Generally, with an increase in income, consumer will buy more of both the commodities, which enables him to reach a higher indifference curve. A change in consumer's income i.e., an increase in income with the prices of goods remaining constant shifts the price line to the upward right. Fig : 7.19 explains the income effect on consumer's equilibrium.

Figure : 7.19



As shown in the fig 7.19, originally, the consumer is in the equilibrium at the point E, where the IC_1 is tangent to the budget line L 'M'. When the income of the consumer increases prices of the both goods remaining constant, the budget line shift to upward right. Now the new budget line is L^{11} and M^{11}, which is tangent to IC_2 at the point E_2. At the point E_2, consumer purchases more quantity of goods than at point E_1 on IC_1. At this point he is in equilibrium. Suppose, income increases further. As a result the budget line shifts to the right side i.e., the new budget line, now is L^{111} and M^{111}. At the point E3 both IC_3 and budget line L^{111} and M^{111} are tangent and the consumer is in equilibrium. At this new equilibrium point, the consumer purchases more quantities of goods than at the point E2. If we join all the equilibrium points i.e., E_1, E_2 and E_3, we get income consumption curve (ICC). ICC depicts relationship between changes in consumer's income and his demand. Normally, the income consumption curve has an upward slope which implies a positive income effect for both the goods. The positive income effect induces the consumer to purchase more quantities of both the goods.

However, in certain cases, income effect may be negative. A negative income effect implies that the consumer will tend to buy less of a commodity. When his income increases. This happens in the case of inferior goods (cheap quality goods – i.e., common consumption of goods of poor). In the case of negative income effect, ICC will have a backward slope as shown fig:7.20A

Figure : 7.20(A) Part A Part B Part C

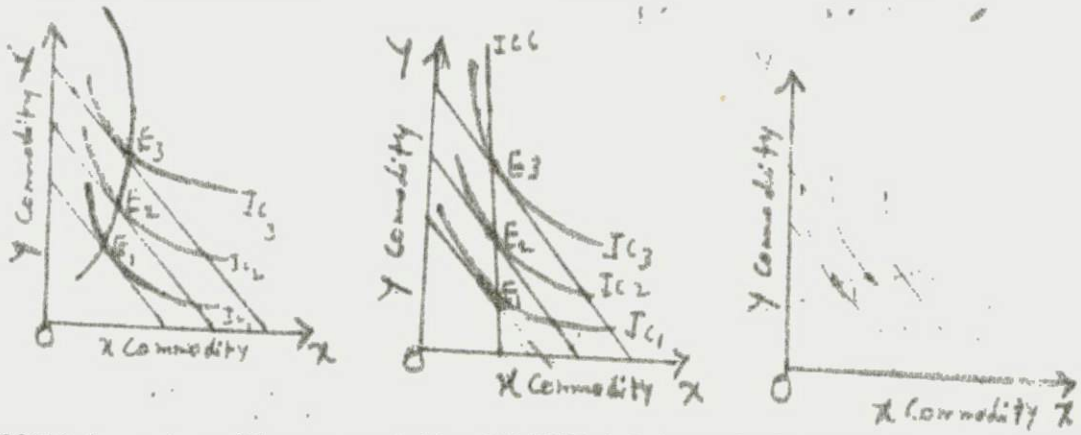
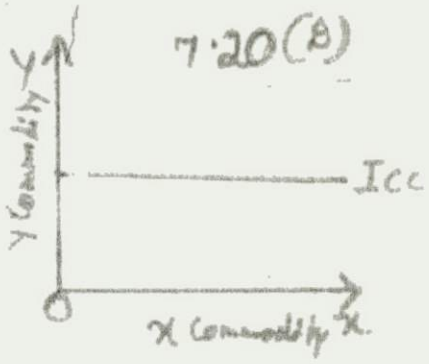


Fig : 7.20(A) shows that, of the two goods X and Y, if X is inferior and Y is relatively superior,. Then the income effect, after a point will be negative in the case of X. The ICC has backward slope indicating that consumer purchases less units of X, since X is inferior,

Fig : 7.20(C) If the ICC bends back on the X axis i.e., sloping downward, it indicates a negative income effect of the purchase of commodity that consumer purchases less units of Y, since Y is inferior.
Fig:7.20(B) shows the vertical slope of the ICC, which implies that X is neutral commodity having a zero income effect and Y is superior with a positive income effect. Likewise, ICC having a horizontal straight line suggests that Y is neutral commodity having negative income effect and X while superior with a positive income effect. This is explained in the fig:7.20(D)

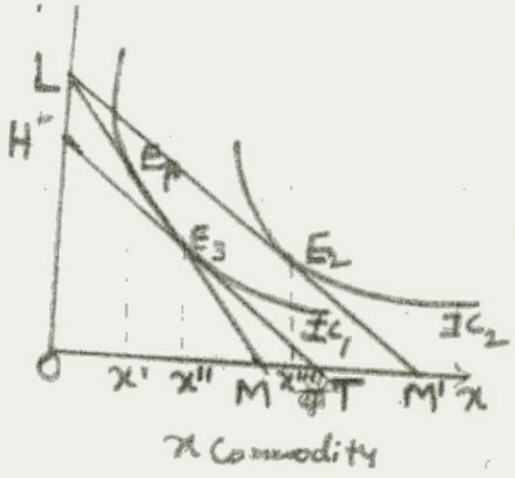


7.6.3 SUBSTITUTION EFFECT:- (Hicks-Allen substitution effect)

Substitution effect means change in the amount demanded of a commodity resulting from a change in its price relate to the prices of other commodities. Given a constant money income a change in the relative price of goods may force the consumer to rearrange his purchase of goods in such a way that his satisfaction remains the same. In order to find out the substitution effect, the change in the real income caused by the change in the price is to be kept constant. There are two methods to explain the substitution alone. Hicks-Allen substitution effect and Slutsky Substitution Effect.

Hicks-Allen Substitution Effect:- According to Hicks-Allen method, When price of X falls consumer's real income rises and now consumer can buy more as his given money income. To trace pure substitution effect, we have to eliminate the change in in his real income. To eliminate the effect of rise in income must be effected, so that his real income remains at the original level and he is neither better off nor worse off than before. The consumer is on the same indifference curve. The amount by which the money income of the consumer is changed to keep him on the same indifference curve is called "Compensating Variation in Income". Hicks and Allen method of tracing pure substitution effect is explained in the fig:7.21(A). As shown in the figure 7.21(A) the consumer is in equilibrium at the point E_1 on IC_1. The consumer is purchasing OX_1 of X commodity. Suppose, the price of Y remaining constant, the price of X falls. Now the new budget line is LM^1.

Figure 7.21(A)

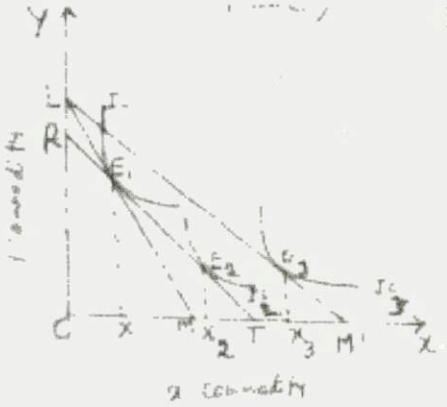


Now, he is in equilibrium at E_2, purchasing OX^{111} of X commodity. With the fall in the price of X_1 real income of the consumer increases. To trace out the substitution effect, the gain in the real income is to wiped out by reducing the money income of the consumer by much amount that the consumer would remain on the same IC_1. Now, we have to resort to compensating variation in income for this, a hypothetical budget line. HT is drawn which is parallel to LM_1 and tangential to the original IC_1. The consumer is in equilibrium at E_3 on the same IC_1. As could be seen from the figure real income has been reduced by LH in terms of Y or by MT in terms of X, such that the consumer remains on the same IC_1 getting same level of satisfaction. At the new relative price, X is cheaper than Y the consumer purchases more X i.e., OX^{11} and less Y. He moves from E_1 to E_3 on the same indifference curve IC_1. At the new equilibrium point he is purchasing more quantity of X than at the E1 point. Quantity demanded of X has increased from OX^1 to OX^{11} which represents the pure substitution effect.

7.6.4 SLUTSKYS' SUBSTITUTION EFFECT

In slutsky method, the real income is kept constant by compensating the income in such a manner that the purchasing power at his disposal in the same as it was before the change in the price. He defines real income in terms of original basket of goods and hence constant. That means real income implies purchasing of original basket of goods. According to slutsky's approach income is changed by the difference between the cost obtaining original basket (combination) at the old price and the cost of obtaining original basket of goods at the new prices. Thus in the slutsky's approach substitution effect is traced out by the cost difference. This has been graphically represented in the fig 17.21(B)

17.21(B)



As shown in the fig 17.21(B) the consumer was initially in the equilibrium at the point E_1 on the indifference curve IC^1 which is tangent to price line (budget line) LM. At E_1, the consumer is purchasing OX_1 amount of X commodity. Assume, price of X falls and price of Y and the money income of the consumer remain constant. As a result of this budget line shifts to LM^1 and his real income rises. On the new budget line LM^1, IC_3 is tangent at the point E_3, he is purchasing OX_3 amount of X. To trace out the pure substitution effect, the consumer's money income must be reduced by the cost difference for this imaginary budget line RT is drawn in such a way that it passes through the original equilibrium point E_1. consequently,

money income equal to LR (in terms of Y) and TM (in terms of X) has been withdrawn from the consumer. Now the consumer has the choice to purchase his old combination at point E_1. But will not choose E_1 now, because on the new budget line he has the opportunity to reach a higher indifference curve IC_2 on his Indifference Curve Map on new budget line RT, at the point E_2 on IC_2 he purchases of OX_2 of X commodity, i.e., more amount of X than before. Quantity demanded of X has increased from OX_1 to OX_2, which represents the pure price effect and X_3-X_2 represents pure substitution effect.

7.6.5 HICKS' Vs SLUTSKYS' TREATMENT

There are certain differences between two approaches:-

1. To trace out the pure substitution effect, both Hicks and Slutsky followed two different approaches. Hicksian method of compensating income enables the consumer to secure original level of satisfaction and to be neither better off nor worse off. Slutsky's method of compensating income enables the consumer to secure, if he desires the original basket of goods and makes him to be better off. Hicksian method of income compensation is called Compensating Variation in Income. Slutsky's method is called "Cost-difference Compensation"
2. In Sluksky's method the consumer's real income is shown by a higher indifference curve than original Indifference Curve when the price of commodity falls. When price rises, the consumer's constant income is shown by an indifference curve lower than the original indifference curve. But in Hicksian method, the substitution effect shows the constant real income of the consumer on the same indifference curve, whether the price falls or rises.
3. Sluksky's approach gives a greater substitution effect from Hicks.
4. In Slutsky's method, we have to give the consumer the opportunity to purchase the same combination under the new relative prices. It does not involve any asking of questions from consumer. In Hicksian method, there has to be compensating variation in the consumer's income so as to leave him on his old indifference curve. This involves asking him about the maximum income he can surrender while still remaining on his old IC. This is due to subjectivity in Hicksian analysis.
5. Slutsky's method is superior to Hicksian method. Therefore, slutsky's method of eliminating the income effect is preferable top Hicksian method because it is more objective in its approach compared to Hicksian approach.
6. Slutskian measure of substitution effect can be computed directly from observable phenomenon. It needs the knowledge of two combinations and two price ratios. But Hicksian measure of substitution effect cannot be computed in the absence of knowledge of consumer's indifference map.
7. Though Hicksian method helps us to analyse the welfare issues like analysis of consumer's surplus it is difficult to determine the extent of income compensation in the method. Whereas, in slutsky's method it is easier to find out the amount of income equal to the cost difference by

which the income of the consumer to be compensated. Thus, slutsky's method is superior to Hicksian method in tracing out the substitution effect.

7.6.6 ELASTICITY OF SUBSTITUTION

Elasticity of substitution measures the degree of substitutability between two commodities which the consumer purchases. It can be defined as "the ratio of proportionate change in combination in which the two commodities are brought to a given proportionate change in their price ratio. That means, as the commodities price ratio changes the ratio in which their quantities are combined and purchased by the consumer also changes. Therefore,

$$Es = \frac{\text{Proportionate change in combination ratio of A \& B}}{\text{Proportionate change in the price ratio of A \& B}}$$

ES = Elasticity of substitution

A & B = Combination of two goods

Substitution elasticity may be described as elasticity of an IC. It is a measure of the extent to which one good can be substituted for another with a small change in the marginal rate of substitution between the two, so that the consumer remains on the same IC.

Therefore,

$$Es = \frac{\text{Proportionate change in combination ratio (A/B)}}{\text{Proportionate change in MRS of A for B}}$$

Thus, there is a direct relationship between MRS between the commodities with their elasticity of substitution. When MRS is zero, there can be no substitution. Hence substitution elasticity is zero. On the other extreme, when the goods are perfect substitutes, MRS is infinite and substitution elasticity is also infinite.

7.6.7 SUPERIORITY OF IC ANALYSIS

After analyzing the consumer equilibrium we can compare both Marginal Utility analysis and Indifference curve analysis. There are some similarities between there two analysis:

1. Both approaches assume the rationality of the consumer, to be his attempt to maximize his utility/ satisfaction.
2. Both approaches assume proportionality condition in attaining equilibrium. In utility analysis there is proportionality rule between price and utility, in IC analysis it is between prices and the marginal rate of substitution.

3. Both approaches assume diminishing satisfaction of the consumer with more and more increments of a commodity. Marshallian analysis rests on law of diminishing marginal utility whereas Hicksian analysis rests on the law marginal rate of substitution between two goods.
4. Both analysis employ method of introspection, the Marshallian analysis is based an the psychological introspectively derived law of diminishing utility. Similarly, the Hicks analysis derives its indifference map from hypothetical experimentation on the consumer.
5. Both analyses reach the same conclusion about consumer behaviour.

Inspite of these similarities, Hicksian analysis is an improved form of the Marshallian Utility analysis. IC analysis considered superior to the Marshallian analysis in the following respects:-

a) while Marshall assumes cardinal measurement of utility which is unrealistic Hicks assumes it can be measured in ordinal terms which is more realistic.
b) The Marshallian analysis assumes the marginal utility of money remains constant. But this assumption is dropped in analysis which makes it more realistic.
c) IC analysis uses the concept of scale of preference with lesser assumptions than the Marshallian concept of utility that means, the scale of preference needs no information as to how much satisfaction gained but it aims only at knowing whether the level of satisfaction is lower or greater than other combinations of two goods.
d) Cardinal utility analysis completely by-passed the issue of inter-related goods-complementary and substitutes. But Hicks analysis covers complementary and substitute commodities.
e) Marshallian analysis explains consumer equilibrium with reference to only one commodity where as as IC analysis explains consumer equilibrium with two commodities.
f) IC analysis explains the effect of changes in income on demand, effect of changes in prices on demand and it also explains substitution effect on demand, whereas marginal utility analysis does not explain all there.
g) By breaking up the price effect into income effect and substitution effect, IC analysis explains relative nature of demand for inferior and superior commodities.
h) IC analysis is more objective, more scientific and more practically acceptable because of its fewer assumptions than Marginal utility analysis.

Thus IC analysis is superior to Marshallian analysis.

Limitations:- IC analysis is subject to the following criticisms:-

a) It has been pointed out that the meaning attached to the concept 'Indifference' is not clear. Prof.Armstrong argues that consumer is indifferent between two alternative combinations because of his inability to perceive the difference between the two. If we accept this view, then relation of indifference becomes non-transitive.

b) According to D.H.Robrtson, there is nothing new but old wine in a new bottle i.e., old utility in a new garb. It merely introduces new concepts and equations into old logic. For instance, in the place of utility, it introduces 'preference', in the place of cardinal number, it gives just ordinal number to denote the scale of preference, which is subjective and unrealistic as the concept of utility.

c) Hicksian principle of diminishing marginal rate of substitution is based on Marshall's law of diminishing marginal utility. Even after criticizing Marshall's assumptions, Hicks has himself utilised Marshall's assumptions.

d) Indifference curve map is highly static device. The analysis fails to recognize the way in which the individual preference may be shaped by advertising and opther selling tricks.

e) The IC analysis fails to explain individual behaviour when he has to select among alternatives involving risks. It also fails to analyse the demand for costly items.

f) IC analysis is based on weak ordering hypothesis, i.e., the consumer can be indifferent between a large number of combinations. But prof.Samuelson criticizes that it is unrealistic assumption, because it is not possible to find out very may situations of indifference in practice.

g) IC analysis is confined to the use of only two commodities. It becomes complicated when more than two commodities are involved.

But inspite of these limitations, IC analysis has been applied to explain practical issues.

7.7 APPLICATIONS OF IC ANALYSIS

Besides analyzing consumer's demand, Indifference Curve technique has been used to explain welfare aspects like consumer's surplus implications of income tax to commodity tax,Rationing, implications of subsidy, gains from foreign trade, supply curve of labour etc., Let us discuss same of there applications.

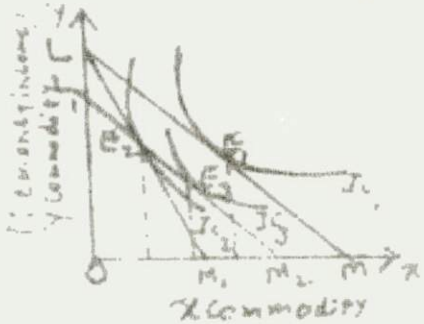
Rationing:- With the help of IC, we can trace out the effect of price control and rationing on the welfare of a consumer. Price control is imposed to check prices from rising, and rationing is introduced to avoid black market and also to distribute goods in short supply among consumers in an equitable manner. Every consumer is allowed to buy fixed quantity of goods like food grains at fixed price every week or month. Fig.7.22 explains the effect of rationing.

Figure 7.22

In fig:7.22 A has preference for rice and B for wheat. Their preferences are shown by the steepness of ICs of two consumers. If the government introduces rationing and at the same time prevents any exchange between consumers themselves, then A & B will have to be in equilibrium at the point E. But if they are allowed to exchange between, them, A giving up some quantity of wheat to B & getting some rice (viz G) from B, both will be better off after the act of mutual exchange of rice and have to higher Ics, representing higher satisfaction and higher welfare , within their income level. As a result their best combination will be $OX_b + OY_a$ for consumer A and OX_a and OY_b for consumer B.

Taxation:- IC analysis can be used to show how income tax is superior to excise tax. When a tax is imposed it is nothing but a burden to the tax payer. It is desirable from the point of welfare of community to impose that tax which is least felt by the tax payer.

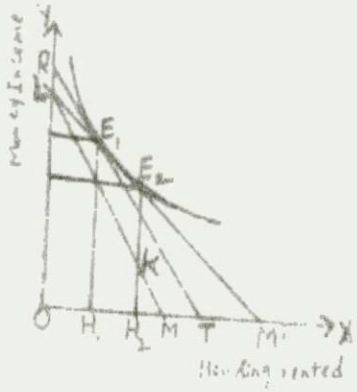
Figure 7.23



In the fig 7.23 a consumer is purchasing two commodities X and Y, LM is the initial budget line and E_1 is the equilibrium. Suppose government imposes 50% excise tax on the commodity X. So price of X increases. As a result budget line shifts downward LM_1 and now the consumer will be at a lower equilibrium position i.e., at E_2. Suppose now that the government were to impose the income tax to yield the same revenue as is earned by the excise tax. Since the income tax would not effect relative price, budget line corresponding to income tax would be a line parallel to the price line LM. But the new price line must pass through the point E_2, if the revenue from the income tax is to be equal to the revenue from the excise tax. Now the price line is L_1M_1 and at point E_3 on higher IC i.e., IC_3, consumer is in equilibrium. Therefore, income tax is better than an excise tax.

Effect of Subsidies to consumer:- To promote the welfare of the people, government pays subsidies to the individuals. The use of IC helps the government in taking decision about giving cash relief Vs consumption subsidies to its civil savants. This is illustrated in the fig:7.24.

Figure : 7.24



In the fig 7.24 LM is a straight line which shows employee's opportunity position without any subsidy. Suppose the government decides to give a percentage of house rent amount paid by the employee. This changes his price line to LM_1. Now, the employee chooses the combination of income and housing represented by E_2 in which housing rented is OH_2. The cost of housing subsidy given by the government is E_2H H_2K, which is equal to E_2K. But the value of the house renting facility to the employee is only RL which is less than subsidy E_2K. Instead of giving E_2K subsidy government pays the individual cash money equal to RL, the individual will reach the same welfare as he does with E_2K subsidy. But the government's view is that if it gives cash relief of RL to the employee, he would rent only OH_1 housing, which would not be in keeping with his status. Thus whenever a government wants to encourage consumption of a commodity or service, the commodity or service is subsidized.

Exchange:- Edgeworth an economist used IC to analyse the problem of exchange. He explains this with the help of a box type diagram called 'Edge worth box diagram'. With the help of this we can easily examine how on exchange between two consumers may benefit both of them. This is explained in the fig:7.25.

Figure 7.25

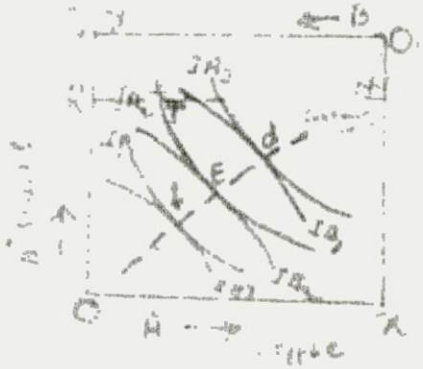
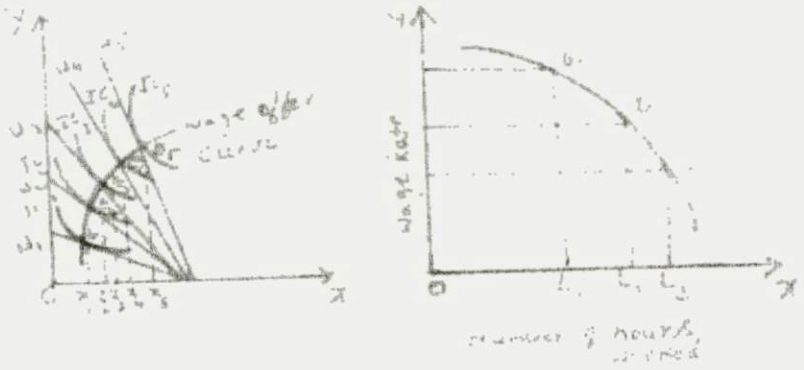


Fig 7.25 shows the scale of preference of consumers: A & B for two goods viz coffee and biscuits. B's preference for coffee and biscuits have been put upside down and superimposed upon A's indifference curves total amount of coffee and biscuits possessed by both A and B is OX of coffee and OY of biscuits. Suppose, at the beginning any exchange can take place A possessed OR units of biscuits and RT units of coffee. Therefore, B should possess the rest viz., O1N amount of biscuits and NT amount of coffee. In the beginning A has larger amount of biscuits and smaller amount coffee. On the other hand B has more amount of coffee and less amount of biscuits. If both A and B will be better off, is they enter into exchange, A giving up biscuits for B's coffee and B giving up coffee for A's biscuits. Both of them can reach higher indifference curve by means of exchange. Exchange will continue till the marginal rate of substitution between the two goods is equal to their price ratio for the two consumers. In market price ratio's between two goods will be the same for A & B. Therefore marginal rate of substitution between two goods must be same for two consumers. There conditions are satisfied at the points f, e, d as shown in the fig :7.25. The contract curve (it is called so because every point on contract curve indicates a position of final contract between two consumers) represents all possible positions of equilibrium in exchange where MRS of two consumers are equal. Two consumers are equal at the point E, maximising their welfare. Selection of the equilibrium points depends on the bargaining power of the consumers. The

equilibrium position will be nearer 'd' if A is successful bargainer on the other hand, nearer 'f', B is more successful bargainer than A.

Supply Curve of Labour and IC:- The technique of IC can be employed to explain the income leisure trade off to arrive at labour supply curve. In the fig:7.26 part A, work and leisure are measured on the X axis and income on Y axis.

Figure 7.26



W_1, W_2, W_3, W_4 and W_5 are wage lines represent wage level. Steeper the wage line, higher will be the wage rate. IC_1, IC_2, IC_3, IC_4 and IC_5 represent preference of the worker between leisure and income. With higher wage rate, the worker prefers income to leisure. The various points of tangency between wage lines and the ICs are joined together and the resulting line is called "wage offer curve", which shows different amounts of hours of work at different wage rates. It also shows that at higher wage and income, number of hours offered for work is reduced and worker prefers a larger amount of leisure's this fact is explained with the help of substitution and income effects: 1) As the wage rate increases, the worker will wage is in favour of large number of work hours and less leisure hours.2) As the wage rate goes up, the worker becomes better off because of increase in his money income. Therefore, income effect of a rise in wage rate is infavour of less work and more leisure.

In part B of the fig : 7.26 it is illustrated that with the help of wage offer curve, supply curve of labour can be drawn. This curve shows the relation between wage rate and number of working hours. As shown in the part :B of fig:7.26, the supply curve of labour is backward sloping. This denotes that individual preference leisure to income with every increase in the wage. Hence quantity offered at higher wage is lower than the labour offered at lower wage.

7.8 LET US SUM UP

Indifference curve analysis is based on ordinal measurability of utility, in which goods are ranked according to preference of the consumer. An Indifference Curve implies a locus of combination of two goods which yield some level of satisfaction. Consumer prefers any of the combination level of satisfaction. Consumer prefers any of the combination on an IC and indifference to other combinations. His preference depends on his income and price. An IC slopes downward to the right, convex to the origin and never intersect each other. In IC analysis consumer reaches equilibrium at the point where IC tangents to the budget line where MRS between two goods is equal.

Through IC analysis we can show how consumption changes when consumer's income increases, as prices of two goods remain constant. Similarly, we can also illustrate how consumption changes due to change in the price of one good and when the price of other good and when the price of other good and income of the consumer remain constant price effect on the consumers equilibrium is the result of income effect and substitution effect. With the help of IC Marshallian demand curve can be derived directly from the tangency points of ICs and price lines.

In analysis is an improved form of Marshallian analysis. IC analysis more objective, more scientific and practically acceptable with its fewer assumptions. Thus it is superior to Marshallian analysis.

IC analysis is subject to criticisms. It is based on weak ordering hypothesis. ICs are partly introspection derived. It is confined to only two goods.

Indifference curve technique has been used to explain the concept of consumer's surplus in Taxation, Rationing, Welfare implications of subsidy etc.,

7.9 KEY WORDS

IC Schedule :- IC Schedule is one which represents consumers scale of preference. It represents equal satisfaction combinations.

Scale of Preference:- Scale of preference is one which represents all combinations yielding different as well as equal level of satisfaction.

Indifference Curve:- IC is a curve which implies number of combinations of two goods which yield same level of satisfaction.

Marginal Rate of substitution:- refers to a rate at which exchange between same units of goods say X & Y which are equally preferred.

Budget line:- Budget line refers to a price line.

IC Map:- IC Map is a set of ICs combinations on higher IC yield higher level of satisfaction and combinations on lower IC yield lower level of satisfaction.

Price Effect:- refers to change in demand for a commodity on account of change in the income of consumer while prices remaining constant.

Income Effect:- refers change in demand for a commodity on account of change in the income of consumer while prices remaining constant.

Substitution Effect:- refers to change in the quantity demanded for a commodity resulting from a change in its price relative to the price of other commodities, the consumer's real income level being held constant.

Price Consumption Curve:- PCC shows the changes in the quantity demanded of a given good due to changes in its price.

Income Consumption Curve:- ICC shows the relation between change in money income and consumption of the two goods.

7.10 REFERENCE BOOKS

1. A.W.Stonier & Hague - A Text Book of Economic Theory
2. H.L.Ahuja - Modern Micro Economics

CHECK YOUR PROGRESS : II

1. Explain how the consumer reaches the equilibrium through Indifference Curve.
2. Explain Income and Substitution effects.
3. Explain how the IC technique is useful for evaluating economic policy measure.
4. Write a note on superiority of IC analysis over utility analysis.

UNIT 8 : REVEALED PREFERENCE THEORY AND THEORY OF DEMAND

Structure

UNIT 8 : REVEALED PREFERENCE THEORY AND THEORY OF DEMAND

8.1 OBJECTIVES

A Study of this unit enables you to understand

- Behaviourist ordinalist approach
- That demand is based on strong ordering
- The actual Behaviour pattern of a consumer in a market.

8.2 INTRODUCTION

The programme guide says that in unit 8 learning material is given to you on Revealed preference, Neumann Morgenstern model, Revision theory of demand by Hicks. All these theories have different approaches. These theories have to be dealt separately. Under unit 8 you will have unit which deals with Revealed Preference theory of demand. Unit 8a deals with Neuman Morgsenstern theory. Unit 8b deals with Revision made by Hicks and unit 8c deals with the theory of attributes. All these units will enable you to know about the consumer choice.

8.3 REVEALED PREFERENCE THEORY

The theory of demand has three different bases. You have studied the two bases one offered by A Marshall, the second offered by Hicks and Allen. The third is offered by P.A. Samuelson. The theory explained by Samuelson is called Revealed preference theory. Revealed preference hypothesis is described as Behaviorist ordinalist. There are two basic features of Revealed preference hypothesis (1) it employs behaviouristic method. (2) it makes use of the concept of ordinal measurement of utility.

Samuelson has employed the behaviouristic method. This methodology is considered as superior to the methodology used by Marshall and Allen and Hicks. Marshall, Hicks and Allen used the concept of utility. It is a psychological concept. The consumer's behaviour is explained in terms of motivation and psychological valuation. But Samuelson has used behaviouristic method. He explains the consumer's behaviour on the basis of the observed market behaviour.

Revealed preference theory is explained in 1938. Since then the literature in this field is proliferated. There are some assumptions made in this theory.

8.4 ASSUMPTIONS

i) *Rationality:* The behaviour of the consumer is rational. It means consumer prefers bundles of goods that include more quantities of the goods. This assumption is alternatively called non-saturation axiom.

ii) *Consistency Postulate*: This is a very important assumption in Samuelson's theory. He says " if an individual selects batch one over batch two he does not at the same time select batch two over one" It means that choice made by individuals does not provide conflicting evidence to the individual preference. It can be explained thus. If a consumer behaves consistently, if he chooses bundle A in a situation in which bundle B was available to him, he will not choose "B" in any other situation in which A is available. Symbolically if A < B, then B > A. Consistency postulate requires that if once A is revealed to be preferred by the consumer then B cannot be revealed to be prefer red to A by him at any other time when A and B are present in both the cases. Since choice observation is concerned between two situations, Prof Hicks calls this two-term consistency.

iii) *Transitivity:* If in a particular situation A is preferred to B and B is preferred to C, then A is preferred to C. Symbolically A>B>C then A>C.

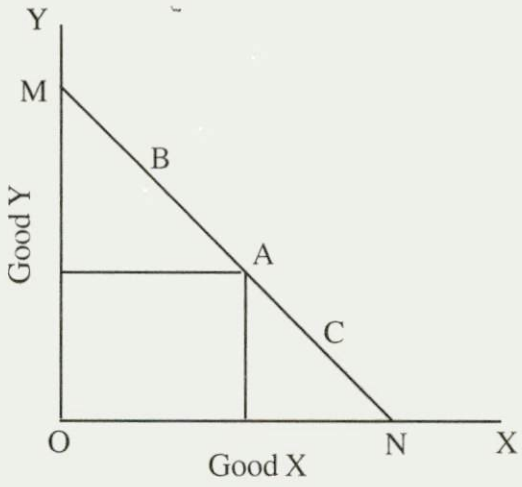
iv) *Strong Ordering Hypothesis*

Samuelson's Revealed preference theorem is based upon the strong form of preference hypothesis. Strong ordering implies that there is a definite ordering of various combinations in consumer's scale of preferences. Therefore the choice of a combination by the consumers reveals his definite preference for that overall other alternative combinations open to him. Thus, strong ordering hypothesis rules out indifference between various combinations confronted by the consumer.

8.5 CHOICE REVEALS PREFERENCE

Preference hypothesis is the basis for the theory of demand in revealed preference theory. According to this hypothesis when a consumer is observed to choose a combination "A" out of various alternative combinations open to him then he reveals his preference for A over all other alternative combinations. When the consumer chooses A he reveals his preference of A. He regards all other combinations inferior to A. He chooses A and rejects all other combinations. He favours the chosen combination A. So Samuelson's preference hypothesis dictates that choice reveals preference. The chosen combination is revealed to be preferred among all other alternative combinations made available by the budget constraint. The preference revealed for a particular combination of goods implies the maximization of the utility of the consumer.

Revealed preference theory can be explained with the help of a diagram.



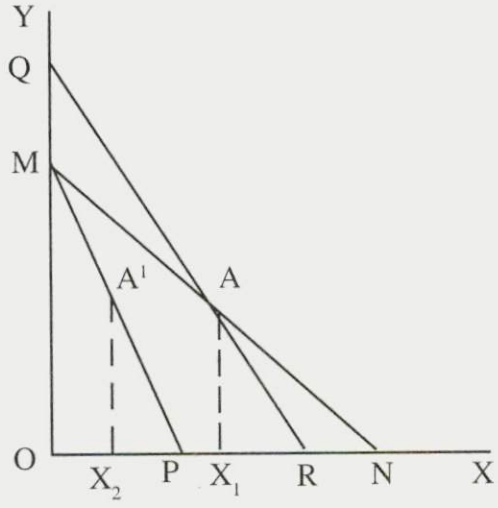
There are two goods X and Y. Their prices are given. The income of the consumer is also given. MN represents a given price-income situation. MON is the choice triangle. Consumer can choose any combination lying within the choice triangle or on the budget line. According to Samuelson preference hypothesis, all combinations lying within the triangle are rejected by the consumer because the rationality assumption necessitates the consumer to seek the combination that includes more quantities of two goods lying on the budget line. Among the combinations that lie on the budget line NM the consumer chooses combination A and thereby indicates his preference for A over all other combinations such as C and B. Preference is revealed by a single act of choice.

8.6 SAMUELSON'S DEMAND THEOREM

Prof. Samuelson has demonstrated demand theorem within the framework of Revealed Preference hypothesis. The theory of demand in simple is that 'an increase in a good's price must, if income and other prices held constant, decrease the amount demanded". This law has been deduced from the consistency postulate and is based on the assumption of positive income elasticity. Positive income elasticity implies a negative price elasticity. It is a methodological device to enunciate Marshallian inverse price – demand relationship or the law of demand.

Samuelson states his demand theorem He calls his theorem the fundamental theory of consumption in the following manner. "Any good (simple or Composite) that is known always to increase in demand when money income alone rises must definitely shrink in demand when its price alone rises." This theorem postulates a positive income elasticity of demand for the good in question which is cancelled by the negative price elasticity. Samuelson translates price change into income change. If the income elasticity is positive there is a positive then quantity relationship. Prof Samuelson has explained his

demand theorem in common sense words, by geometrical argument and by general analytic proof. The geometric proof of the theorem is explained with the help of the following diagram.



There are two commodities X and Y. X is a simple commodity and Y is a composite commodity. OM measures the income of the consumer in terms of Y. ON is the expenditure which is equal to income OM, if the entire amount is spent on X. MN is the budget line given the price of the commodity in the market. MON is the triangle. Consumer chooses a combination A on the line all, other combinations within the triangle and on the budget line. So the consumer reveals the preference for the basket or combination A. It means that all other combinations within and on the budget line are rejected by the consumer. He buys OX_1, of X at point A.

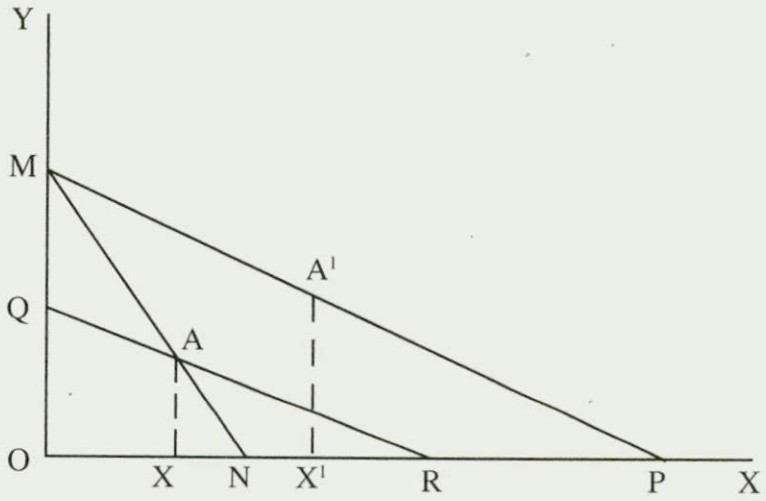
Suppose the price of X rises. MP becomes the new budget line. At the new price consumer cannot buy the combination A. He can have only A^1. It means that the demand for X has fallen from OX_1 to OX_2. The fall in demand for X is due to the fact that the rise in price of X has brought down the income of the consumer. Income factor is an important factor causing a fall in demand. Let us try to prove the importance of income factor in causing a fall in demand. Let us compensate the consumer by giving him extra income to enable him to buy exactly the same quantity of X which he would have bought before the rise in the price of X. The amount of extra income gifted to the consumer to buy the original quantity of X at a higher price is called "over compensation effect" In the figure MQ measures the amount of over compensation interms of Y. The over compensation effect brings about a change in budget line to QR. R passes through 'A' and lies parallel to the budget line MP. The new choice triangle is Q O R. A is revealed to have preferred to all other combinations before its price rose. Following the over compensation effect, all combinations falling on AR segment of the QR Budget line must be rejected in favour of A. The consumer has to choose any one of the combinations falling on the AQ segment of the QR budget line. It is clear that any point on AQ portion of the budget line reveals fall in the quantity demanded of X except the point A. The consumer may purchase either the same quantity or less of X

at a higher price. It is probable that when X becomes costly less X is brought. The over compensation effect like slutsky's substitution effect enables the consumer to reach a higher indifference curve by buying less quantity of X. It is the gift of income through over compensation effect that the demand for X has increased at a higher price from OX_2 to OX_1. If the gift of income is withdrawn then the consumer with original income and at a higher price of X will choose the combination of A^1 on the budget line MP. It means the withdrawal of income will reduce the demand for X from OX_1 to OX_2 if the income elasticity of demand is positive.

It may be summarized that the demand for X at a higher price is increased from OX_2 to OX_1 due to a rise in a income from OM to OQ. If this is admitted it follows that the fall in demand for X from OX_1 to OX_2 in the absence of over compensation effect must have been caused by the fall in income due to rise in the price of X. Since income effect is positive the rise in the price of X through causing a fall in income has reduced the demand for X.

Samuelson's demand theorem can also be explained geometrically in a situation of a fall in the price of X. A fall in the price of X causes a rise in demand for X. Following the logic of Samuelson the rise in demand for X is due to increase in income brought about by the fall in the price.

With the help of a diagrams let us discuss the fall in the price of X.



M.N. is the initial budget line. The consumer's choice reveals a choice preference to the combination A. OX is the quantity demanded. Let us assume that price of X falls. The new budget line is MP. A^1 is chosen on MP line. The demand for X has risen from OX to OX_1. The increase in demand for X is due to the fall in the price of X. But Samuelson attributes the increase in demand to the income effect. In order to understand Samuelson's reasoning we shall take up overcompensation effect. Let us over compensate the decrease in price by taking away the income from the consumer to the extent of

MQ in terms of Y. As a result the new budget line is QR. It passes through the point A which enables the consumer to buy the original quantity of X namely OX. When QR is the price income situation the consumer chooses the point A and rejects all other points within and on the budget line. The consistency postulate dictates that the consumer cannot choose any point on the segment AQ of the QR budget line because they were rejected for A, when they were available to him at the original price-income situation.

The consumer will choose either A or any other combination on AR. It means that the consumer will purchase either the same quantity or more of X at the reduced price. Even after deduction from income consumer will buy the same quantity or more of X at lower price. If the original income of the consumer is restored then the consumer will face the budget line MP and he will buy larger quantity of X at a lower price provided income elasticity of demand is positive.

With the fall in the price of X demand for X increases from OX to OX_1. After income is reduced the demand is reduced from OX_1 to OX. This reduction is due to fall in income by MQ. The increase in demand from OX to OX_1 may be said to have been due to rise in income caused by a fall in the price of X.

Samuelson in his demand theory points out the direct relationship between demand and income. He also says that income changes in the opposite direction to a change in price. The fundamental theorem of consumption states that any good whose demand varies directly with income must definitely shrink in demand when its price rises or expands in demand when its price alone falls.

Thus Samuelson in his fundamental theorem of consumption assumes consistency postulate and positive income elasticity of demand and concludes that the demand for any good must definitely shrink when its price alone rises.

8.7 ACHIEVEMENTS OF THE THEORY

Samuelson theorem has its own achievements and limitations.

The first achievement is that Revealed Preference theory is in the nature of a new foundation for economic analysis. Many economic propositions and welfare concepts are related to the preference hypothesis.

Revealed Preference theory has enabled the use of econometrics in the analysis of actual consumer behaviour patterns in the market place.

This theory is an improvement over Marshallian and Hicks-Allen theory of demand as it is not based on the assumption of measurability or the assumption of constancy of marginal utility of money.

Theory has given importance to income effect of a price change and neglects the substitution effect. Contrary to this version, Marshall gives importance to substitution effect. Hicks and Allen have given importance to both these effects. So Hicks-Allen version of demand theorem has legitimate claim for generality.

Marshall has established the inverse relationship between price and quantity demanded. Samuelson's theory establishes positive income quantity relationship translating price change into income change.

Samuelson, like Hicks and Allen followed ordinal approach.

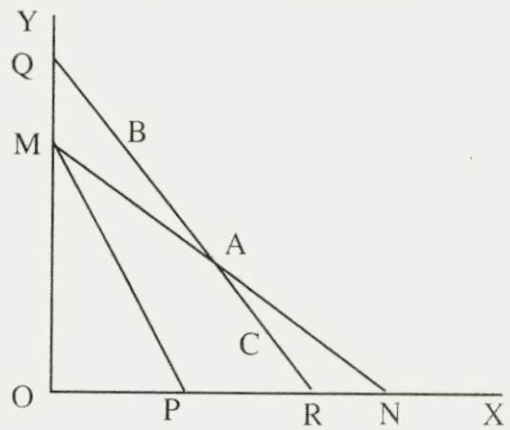
8.8 LIMITATIONS

There are some limitations to the theory.

1. It does not admit the relation of Indifference. Choice reveals a preference and there is no act of indifference in this theory. If a consumer is given an opportunity to reveal the choice from a series of observations it is likely that indifference relation may come into being between any two situations. But this possibility is not considered by Samuelson.

The possibility of indifference is seen in consumers behaviour. It can happen that the consumer may be indifference between a few combinations. Armstrong says that such a possibility comes in the way of the logic used by Samuelson.

Armstrong's view is explained with the help of a diagram.



MN is the initial budget line. A is revealed to be preferred to others. MP is the new budget line when price of X rises. QR is the budget line when a gift of income is given to the consumer to buy A if desired. Suppose consumer is indifferent between the points AB and C, then consumer may choose either A and B or A and C. In this case Samuelson's proof is vitiated as such a choice of B or C will violate the assumption of consistency.

Samuelson's theory does not consider the possibility of negative income elasticity. The theory cannot explain Giffen Paradox.

8.9 LET US SUM UP

Revealed Preference theory of Samuelson is an important landmark in the theory of consumer behaviour. This theory is based on the behaviouristic method and explains the observed market behaviour. The theory is based on few assumptions, the important assumptions are consistency postulate, strong ordering. Theory explains that a choice made reveals a preference of the consumer. The demand theorem has been demonstrated within the framework of preference hypothesis. Samuelson in his fundamental theorem of consumption has tried to establish that the demand for any good will shrink when price alone rises. Samuelson's theory has been the basis for many welfare concepts and econometric analysis. Despites its achievements theorem suffers from a limitation of not considering the possibility of indifference.

8.10 KEY WORDS.

1. **Consistency :** A consumer who is observed to prefer A to B voice never prefer B to A.
2. **Revealed Preference :** Consumer preference can be inferred from Sufficient number of observed choices.
3. **Transitivity :** If A is preferred to B, B to C then A is preferred to C.
4. **Strong ordering :** It implies that there is a definite ofdering of various combinations in consumer's scale of preference.

8.11 BOOKS

1. Dominick Salvature Micro Economic theory
2. S.K.Misra and Advanced Micro Economic theory

8.12 QUESTIONS

1. Discuss Revealed Preference theory
2. Outline the assumptions of samuelson theory of demand
3. Examine Samuelson's theory of demand

UNIT 8A - NEUMANN – MORGENSTERN THEORY OF MEASURABILITY OF UTILITY

Structure

UNIT 8A - NEUMANN – MORGENSTERN THEORY OF MEASURABILITY OF UTILITY

8a 1. OBJECTIVES

A study of this unit enables you to understand.

- That Consumers make choice under uncertainty
- The Method of measuring utility in situations involving risk or uncertainty.
- Cardinal utility analysis which helps to analyse consumer's choice in situation of risk

8a. 2 INTRODUCTION

Marginal utility analysis, Indifference preference, Revealed Preference analysis are the three logical roots of the theory of consumer behaviour. All the three theories explain the consumer choice or the decision making process by the consumer in the world of certainty. Consumers make choices when alternatives are reckless. But in the 18th century another approach emerged. Economists like Daniel Bernouli, developed modern utility theory. A Swiss mathematician, Daniel Bernouli tried to measure utility in situation involving risk and uncertainty. On Neuman, Milton Friedman, Savage, Armstrong developed hypotheses which explain consumer decision making in the context of varying degrees of risks or uncertainty. They have proved that cardinal utility analysis can successful measure of utility in the context of uncertainty. So modern theory of utility to some extent has received cardinalist approach. Neumann-Margenstern has offered "the statistical utility theory" to measure utility in the context of uncertainty. This theory is primarily interested in the expounding of a theory of consistent consumer behaviour in the presence of risk and its implications for individual welfare.

8a. 3 NEUMANN- MORGENSTERN THEORY OF MEASUREMENT OF UTILITY

Neumann – Morgenstern theory is described as Behaviourist – cardinalist. Like Samuelson utility is defined in terms of observed behaviour. It is admitted in N-M model that utility is measurable. They have developed probabilistic way of ranking alternatives based on cardinal measurement of utility.

8a. 4 EXPECTED UTILITY

Neumann and Morgenstern have developed a method of measuring utility in their celebrated work "the theory of Games and Economic behaviour". The measurement is theoretical and conceptual. It is practical. They have adopted controlled experiment test method to explain the consumer behaviour. The method of measurement enables the consumers to make rational decisions in situations involving risk. In this regard it is important to know that the consumer aims at measuring expected utility. Expected utility determines the choice of events. Neumann and Morgenstern have used numerical probabilities of the uncertain prospects and the certainty equivalent as tools to explain consumer behaviour.

8a. 5 ILLUSTRATION

Given the scale of preference the consumer can express whether he prefers or is indifferent between two events or alternatives, where one event is certain and other event is attached with some probability. Between two events one with certain outcome of Rs.1000 and another with an outcome of Rs.2000 – with some probability, the consumer can express the preference or indifference relation by making probability calculation.

Neumann and Morgenstern have given another example to explain their model. There are three situations for a consumer. They involve risk. Let the three situations be A.B and C. Situation A represents a possession of a new car. B is a situation of no car. C is a situation with a substandard car. Let us assume that consumer prefers A to B. B to C. Let us offer the consumer a choice between two alternatives.

i) Consumer can maintain status-quo, can have no car. The outcome in this choice is certain. The probability of outcome is equal to one or unity.

ii) Consumer can have lottery ticket with a choice of winning a fine car (A) or having substandard car (C). The decision of one consumer depends whether he prefers or is indifferent between two alternatives A and C depends on the value of probability. If the probability of winning "C" is greater than winning "A" the consumer prefers "B" to lottery ticket. If the probability of winning "A" is greater than winning 'C' 'A' the consumer prefers lottery ticket. So the choice among alternatives involving risk is to be predicted by the consumer from the stand point of maximising expected utility. A method of prediction of choice among risky alternatives has been developed by Neumann – Morgenstern. This form of prediction of choice may be called probabilistic prediction.

8a.6 AXIOMS

The construction of N-M index is necessary to predict the choice in uncertain situations. The construction of N-M index is possible provided the consumer confirms to the following axioms.

1. COMPLETE – ORDERING AXIOM

There are two combinations A and B. Consumer may be indifferent between A and B. Their alternatives are transitive. If A is preferred to B, B is preferred to C then it follows that A is preferred to C. Likewise indifference is also transitive.

2. CONTINUITY AXIOM.

Assume A is preferred to B and B is preferred to C. This axiom states that there is some probability and the consumer is indifferent between outcome B with certainty and any lottery ticket with out comes A and C with probabilities P and 1- P respectively.

3. INDEPENDENT AXIOM

Assume that the consumer is indifferent between A and B. C is some other outcome . Suppose that there are two lottery tickets L_1 with outcomes or prizes A and C with probability P, 1-P respectively and lottery tickets L_2 with out comes or prizes B and C with same probabilities. Then the consumer will be indifferent between L_1 and L_2. If A is preferred to B, L_1 is preferred to L_2.

UNEQUAL PROBABILITY AXIOM

Assume that A is preferred to B. Assume two lottery tickets, L_2 and L_1 with the same outcomes of A and B. Then L_1 is preferred to L_2 if the probability of getting A is more in L_1 than the probability of getting A in L_2. So A>B, if PA L_1>PA L_2 then $L_1 > L_2$.

COMPOUNDED PROBABILITY AXIOM

If a consumer is offered a lottery ticket whose out comes or prizes are again other lottery tickets then the consumer evaluates the compounded lottery tickets in terms of probabilities of obtaining the prizes.

8a. 7 N-M INDEX

Consumer intends to maximize expected utility. Consumer ranks his alternatives and the probabilities attached to each prize. If lottery ticket (L) offers two prizes A with a probability of P and B with a probability of (1-P) and if the respected utility numbers are U_A and U_B the expected utility of the lottery ticket is

$EUL_1 = P.U_A + (1-P)/U_B$. This linguistic convention is called N-M convention. With this convention it is possible to rank alternatives.

L is the lottery ticket. It has two prizes A and B. The consumer assigns 100 utiles to A and 50 utils to B. The probability of winning A is O.6 the probability of winning B is 1-0.6=0.4. So EU(L)=0.6.100+0.4.50 = 80 utils

For ranking prizes, events or outcomes any arbitrary outcomes have to be assigned utility numbers. Utility number assigned will reflect the preference of the consumer. Suppose A is preferred to B, the utils assigned to A must be greater than the utils assigned to B. The utility numbers express the psychological information about the satisfaction of the consumer expects from a given prize. Following the preference the consumer the utility number for A is 100 units for B of 20 units Assume a new alternative between A and B call it C. Then A is preferred to C and C is preferred to B. To measure the expected utility from C, we have to follow continuity axiom which states that there exists some probability P such that the consumer is indifferent between the two outcomes – one with certain outcome and another with uncertain outcome with two prizes. Eg. Let P_A=0.8 and the consumer is indifferent between B and C. By using N-M convention expected utility of C is

EU(C) $= P_A + (1-P) / B$

$= 0.8.100+0.2.20$

$80+4=84$ units

With the help of N-M convention and the axiom stated above expected utilities of different prizes can be calculated. N-M index helps to predict the choice of the consumers. There are let us say five prizes ABCD and E with assigned utility of 10,20,40,60 70 such that consumer places E>D>C>B>A. Let us assume that there are two lottery tickets L_1 and L_2. L_1 has an outcome B and C. L_2 has an outcome of A and E. The probability of getting B is 0.5 and of C is O.5. The expected utility from lottery L_1 is $EUL_1=0.5.20+0.5.40=30$ units

In the case of L_2, the probability of getting A is 0.6 and of E is 0.4.then

EU=0.6.10+0.4.60=30 utiles

Since expected utilities from L_1 and L_2 are the same consumer is indifferent between L_1 and L_2. So N-M index says that the choice of the consumer is governed by the calculated utility numbers of the lottery tickets.

8a.8 LET US SUM UP

N-M approach to the theory of consumer is the basis for modern utility theory. It explains the choice of a consumer when events or outcome are uncertain. In the presence of uncertainty consumers following certain axoims tries to maximize expected utility. The calculation of expected utilities enables the prediction of consumer choice under conditions of uncertainty

8a.9 KEY WORDS

1. The outcome is not certain.
2. continuity axiom – consumer's choice is consistent.

8a.10 QUESTIONS

1. Examine N.M. Index.
2. Analyse assumptions of N.M. convention.

8a.11 BOOKS

1. S.K. Misra and U.K. Puri Advanced Micro Economic theory
2. H.L.Ahuja - Advanced Economic theory

UNIT 8b - REVISION OF DEMAND THEORY BY HICKS

Structure

UNIT 8b - REVISION OF DEMAND THEORY BY HICKS

8b.1 OBJECTIVES

This unit enables you to know

a) The influence of Revealed preference on Hicks

b) the usefulness of econometrics in theory of demand

c) the disadvantages of the use of geometrical method in the choice of more than two goods.

8b.2 INTRODUCTION

Prof Hicks explained indifference curve analysis in his book value and capital. In 1956 he wrote "A revision of demand theory". He revised his theory of demand because he was influenced by Samuelson' Revealed preference theory. He revised his theory because econometrics was gaining importance, mathematical theories of strong and weak ordering were appearing. Simple logic was used to derive the demand curve.

8b.3 REVISION OF DEMAND THEORY

Hicks was influenced by Revealed Preference theory. Samuelson used strong ordering to derive demand theory. Hicks found that his theory of demand needed revision. He remarked "All this I owe to Samuelson and the Samuelsonians, though I can hardly count myself of their number since I retain a considerable skepticism about the Revealed Preference Approach".

Hicks emphasized econometric approach to theory of demand. He expressed the view that the demand theory which is useful for econometric purposes is definitely superior to the one which does not serve such purposes". Hicks said that his earlier theory of demand only had potential econometric reference. This reference needed to be explicit. Such an explicit reference was made by Prof Samuelson in his Revealed preference theory. Hicks wanted to make this more explicit than Samuelson. He said that he is close to Samuelson in technique. In the new demand theory the methodology of Hicks is more explicitly econometric than Samuelson.

8b.4 ORDINALIST APPROACH

Hicks used indifference approach in his earlier version. But in revised theory of demand he did not make use of Indifference curve. He pointed out various disadvantages of geometrical method of indifference curve.

(a) He pointed out that geometrical method of indifference curve is effective to analyze simple cases where choice concerns two commodities. Three dimensional diagrams have difficulties to be

drawn. Those diagrams are complicated. In such cases elaborate mathematics has to be used and economic point is concealed in such a use, many a times.

(b) In geometric method assumptions of continuity are made. In economics continuity as a property is difficult to be presumed. So Hicks gave up the assumption of continuity in his revised demand theory.

These difficulties made Hicks to give up the use of indifference curve. He adopted a new method which is said to be more effective in clarifying the nature of preference hypothesis. He said that his method has to be treated as a complement to his early method (if not a substitute) because the new method is more effective.

8.b 5 NEW METHOD

Empirically it is shown that demand for a good is determined by non-economic factors viz population changes, age distribution of population, social habits. There are economic factors viz prices and incomes which determine demand. The econometricians have to estimate the effects on the empirical data of demand which are due to the changes in current prices and incomes. To make such estimates, the economists need a technique for separating out the effects due to current price and incomes from those due to non economic factors. Such a technique can be provided with the help of a theory. The econometric purpose of the theory of demand is to give assistance in making this separate.

The theory of demand which is useful to econometric purposes tells us about changes in consumption arising out of changes in prices and incomes.

8.b 6. PREFERENCE HYPOTHESIS AND LOGIC OF ORDERING

Hicks considers a consumer who in ideal, preference hypothesis is the principle who governs the behaviour of an ideal consumer. Preference hypothesis is based on scale of preferences. He explains preference hypothesis.

Market conditions affect the behaviour of ideal consumers. Ideal consumer chooses that alternative which he most prefers. He ranks that alternative upper most. In one set of market he makes one choice. In another set he makes another choice. But when he makes the choice he follows the same ordering. It is consistent.

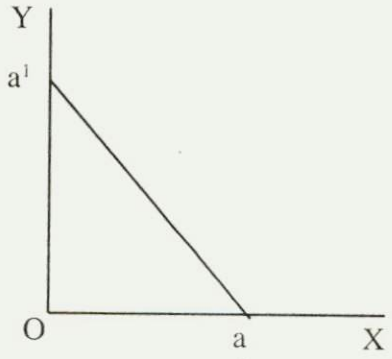
Hicks in 'value and capital' expressed the given scale of preference with the help of indifference. There was a direct introduction of geometrical device. In revision of "Demand" theory Hicks begins the logic of ordering. Demand theory is an application of the logical theory of ordering. In logical ordering a distinction is made between weak and strong ordering.

8.b.7 STRONG AND WEAK ORDERINGS DISTINGUISHED

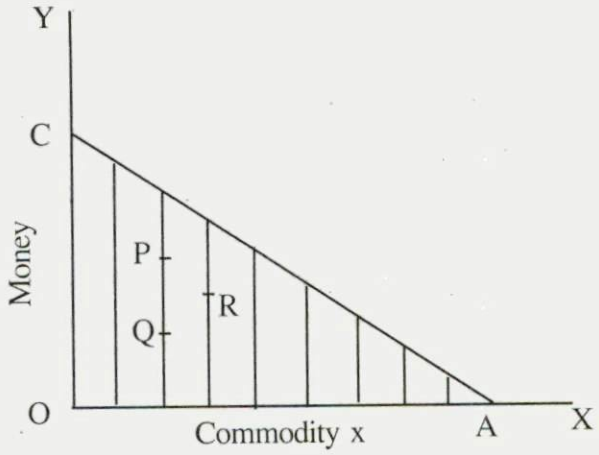
Hicks gives importance to strong ordering. Each item has a place of its own order. Each item can be given a number. To each number there would be one item. A set of items is weakly ordered if the items are clustered into groups. None of the item within a group can be put ahead of others.
In Indifference curves there is weak ordering. All the points on a curve are equally desired. They occupy same place in the order. In Revealed preference there is strong ordering and it assumes that the choice of a combination reveals consumer's preference for it over all other alternative combinations open to him.

8.b.8 HICKS CRITICISM OF THE LOGIC OF STRONG ORDERING

Prof Hicks criticizes the logic of strong ordering. If we interpret preference hypothesis as strong ordering it is not possible to say that points which lie within a triangle a o a are effective alternatives. A two dimensional continum point cannot be strongly ordered. If commodities are assumed to be available only in discrete units and if the diagram is assumed to have been drawn on squared paper, Hicks says the prints at the corners of squares are the effective alternatives. The selected point must also lie at the corner of a square only then the strong ordering hypothesis is acceptable according to Hicks. In the real world commodities are available in discrete units and the strong ordering hypothesis does not pose any problem. Prof Hicks says that money is a composite commodity. It is measured on OY axis when demand for a single commodity is discussed. Hicks regards money to be finally divisible.



According to Hicks when there is a choice between a commodity which is available in discrete units and money which is divisible, the possibility of equally desired combinations must be accepted and strong ordering has to be given up. We can explain the reason for giving up strong ordering with the help of a diagram.

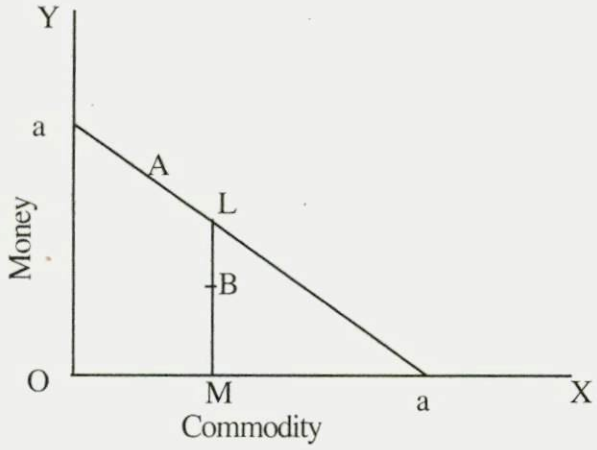


Money is measured on OY axis. Money is taken to be finally divisible. The effective alternatives will not be in square corners. They will appear in the diagram as parallal lines. All points on the stripes will be effective alternatives But they cannot be strongly ordered. The whole of one stripe has to be preferred to the whole of the other. It means a consumer prefers additional unit of X irrespective of price. This is not correct. So the effective alternatives appearing on stripes cannot be strongly ordered. Let us take P and A on a given stripe. They are preferred to R on another stripe. R is preferred to Q. It is possible to find a point between P and Q which is indifferent to R. So when various alternatives appear as a series of stripes, there can be a relation of indifference between some of them. So strong ordering cannot be maintained when alternatives consist of the composite commodity money which is finally divisible and actual commodity which is finally divisible only in "discrete units".

8.b –9 LOGIC OF WEAK ORDERING

Hicks makes out a case for logic of weak ordering. Weak ordering recognizes the relation of indifference. The choice of a particular combination does not indicate preference under weak ordering. It shows only possible alternative combinations. There is a relation of indifference. But weak ordering hypothesis does not yield information about the consumer behaviour and the basic propositions of demand theory cannot be de..... from it. Hicks therefore introduces an additional hypothesis that "the consumer rived will always prefer a larger amount of money to a smaller amount of money provided that the amount of X commodity at his disposal is unchanged. This hypothesis is implicit in economic analysis.

Let us understand the information provided by weak ordering with the support of additional hypothesis.



a o a is the triangle which shows the available combinations for the consumer choice. Let us assume A is chosen. The choice of A does not mean A is preferred to other combinations say B. It only says A is preferred to B or there is indifference between A and B.

Consider L in the diagram. On the additional hypothesis consider L and B. Then it is possible to say L is preferred to B. Because L contains more money than B. The amount of X is the same in both L and B. If A and B are indifferent, then transivity follows that L is preferred to A. L was available when A was selected. So L can be indifferent to A but L cannot be preferred to A. From this it follows that the rule A and B are indifferent must be ruled out. Hence when we adopt the weak ordering along with additional hypothesis it is possible to conclude that A is preferred to any combination such as B which lies within the triangle. It is not possible to say even with additional hypothesis that A is preferred to L as A and L lie on the line. Prof Hicks says that there is a difference between weak ordering and strong ordering. "under strong ordering the chosen position" is preferred to all other positions within or on the triangle. But under weak ordering the chosen position is preferred to all positions within the triangle. But it may be indifferent to other positions on the same boundary as itself.

The difference between effects of strong and weak ordering is very small. It only affects a class of limiting cases i.e. positions on the triangle line. Weak ordering has more tolerance and deals with limiting cases better according to Hicks. It is useful and desirable. It is practicable.

Weak ordering approach is useful with additional hypothesis and with the principle that preference is transitive.

8b.10 DIRECT CONSISTENCY TEST

Hicks developed direct consisten test. It is assumed that scale of preference of the ideal consumer does not change. Price and income are assumed to change. There in consistency is the consumer behaviour.

8b.11 DERIVATION OF THE LAW OF DEMAND

Hicks uses the logic of weak ordering and the theory of direct consistency test and derives the law of demand. He takes the case of a simple commodity at first. He divides the effect of a price change into two parts income effect and substitution effect. Substitution effects is deduced by consistent theory and income effect is based on empirical evidences.

Substitution effect is made up of two methods-

(a) the method of compensating variation
(b) method of cost difference. Hicks considers the superiority of cost difference method over compensating variation method for deriving the law of demand.

Hicks examined Giffen paradox and said that the law of demand usually holds good in case of inferior goods in practice.

8b.12 APPRAISAL OF HICKS REVISED THEORY

Hicks revision of demand theory is based on weak logical ordering. It goes deeper into the foundations of demand theory. It derives law of demand from a few simple and self-evident propositions

In his revision Hicks has corrected some mistakes of indifference curve. He relies on consistency in the behaviour of consumer.

Hicks distinguishes weak ordering and strong ordering and retains the merit of indifference curve analysis.

He divides the price effect into income and substitution effect and shows that the law of demand holds good in case of inferior goods also in practice.

8b.13 LET US SUM UP

It this unit we have discussed that Prof Hicks was influenced by Revealed preference theory of Samuelson. He adopted ordinalist approach and developed preference hypothesis and logic of weak ordering. He pointed out the importance of the logic of weak ordering. With the direct consistency test and the logic of weak ordering he derived the law of demand. He derived the law of demand by the method of compensating variation and the method of the cost difference. He maintained the superiority of the method of cost difference and said that the law of demand holds good in case of inferior goods

also in practice. Hicks revision of demand theory has taken away the mistakes found in indifference curve and has retained the merits of indifference curve analysis.

8b.15 KEY WORDS

1. Strong ordering - It implies that there is a definite ordering of various combinations in consumer's scale of preference.
2. Weak ordering -
3. Giffen goods -

8b.16 BOOKS

1. H.L.Ahujha - Advanced Economic Theory
2. S.K.Misra and V.K.Puri - Advanced Micro Economic Theory

8b.17 QUESTION

1. Write a note on Hicks revised theory of demand
2. Bring out the influence of Samuelson on Hicks

UNIT 8c CHARACTERISTICS OF GOODS APPROACH

Structure

UNIT 8c CHARACTERISTICS OF GOODS APPROACH

8c.1 OBJECTIVES

After studying this unit you will be able to explain

- the reason to buy a commodity
- the reason for expanding market by introducing a new product
- the reason for preferring one brand of commodity to another brand.

8c.2 INTRODUCTION

In the earlier units we have discussed the consumer behaviour with the help of Marshallian utility analysis, Hicks analysis of indifference curve and with the help of Revealed preference of Samuelson. In recent years a new approach to consumer's demand for products has been put forth. This approach stresses on the attributes or the characteristics which various products possess.

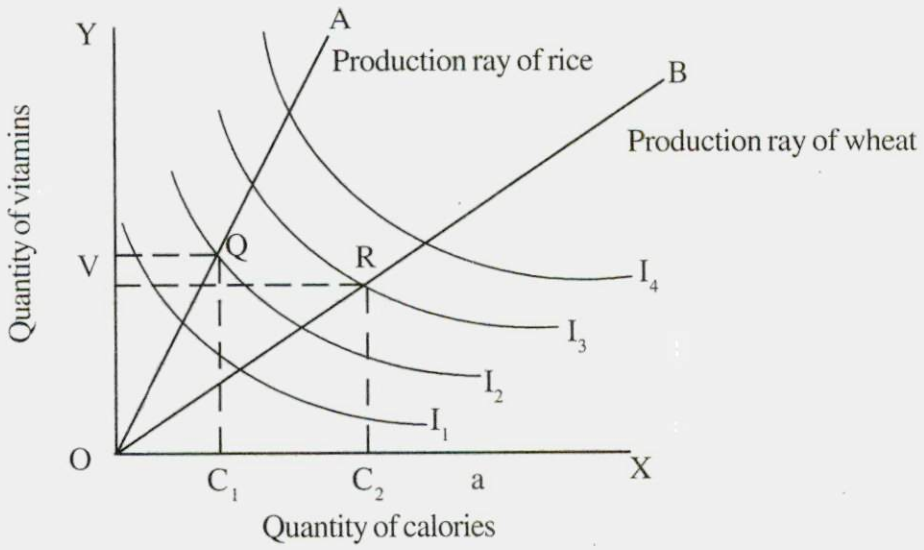
Earlier theories do not explain the reason why product A is preferred to product B. The traditional theory also fails to explain or predict whether the improvement in its product by a firm will increase its market share. Earlier theory does not explain the impact of introducing a new product on the marketing capacity of a firm.

The new approach explains the attributes possessed by the alternative products or the alternative brands of a product. Eg the attributes of a house refer to its size, number of its room, its floor, location, outlook, interior space etc. In the same way the attributes of a car include its look, fuel efficiency, its pick up etc. It is necessary to note that attributes cannot be purchased directly. They are contained in goods. So the new approach makes it clear that consumers want goods but goods have their own attributes. "The novelty of this approach is the notion that attributes of goods provide utility only to the extent that they contain desirable attributes".

8c.3 INDIFFERENCE CURVES OF ATTRIBUTES

Under indifference curve analysis an individual can express his preference or indifference between various combinations of two commodities. In the same way in the new approach it is possible to express indifference between attributes of goods. We shall try to understand this with the help of an example. An individual is interested in two attributes of food. Attributes are (a) amount of calories and (b) amount of vitamins it contains. Different amount of calories and vitamins are provided by different foods. An individual cannot buy these attributes directly. He buys food that contain these attributes. It is possible to rank food which contain the attributes wanted by a consumer. It is possible to graphically represent

the ranking of preference or indifference of various combinations of these attributes namely calories and vitamins. This is shown in the following diagram.



In the diagram OX measures quantity of calories and OY measures quantity of vitamins. Consumer has to choose two attributes and two food products. His aim is to maximize his utility. In this regard an important concept called product ray needs to be introduced.

In the example consumption of two products are chosen, rice and wheat. Rice and wheat contain the two attributes required. The different combinations of attribute of rice are shown on OA production ray. The production ray OB contains the different combinations of attributes of wheat. It is assumed that price of both rice and wheat is given.

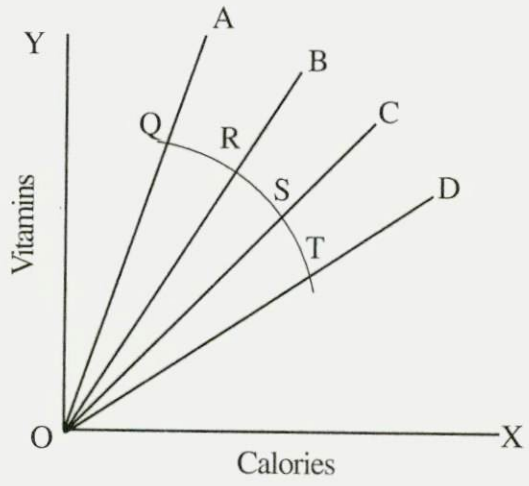
OA is the product ray of rice. It shows the attributes of rice. It also shows increasing expenditure on rice land therefore increasing consumption of rice. Increasing consumption of rice provides increasing amount of calories and vitamins. Point Q represents the expenditure on rice. It provides OC_1 of calories and OV_1 of vitamins, it yields a satisfaction on the indifference I_2. A movement upward along A shows increasing utility derived from increasing amount of calories and vitamins as a result of increasing expenditure on rice.

Similarly on OB, upward movement shows the increasing amount of vitamins and calories resulting from increasing expenditure on wheat. At R, OV_2 is the vitamin consumed and OC_2 is the calories enjoyed by the consumer.

8c.4 BUDGET CONSTRAINTS

It is necessary to know the choice likely to be made by the consumer. Choice depends on consumers income and prices of food product. The budget constraint in the present context is called efficiency frontier. Efficiency frontier represents various alternative combinations of the maximum amounts of attributes provided by various products which the consumer can buy given his income and price of the products.

Budget constraint can be explained with help of a diagram.



There are four food products and four production rays. If the consumer spends all his income an A, (when the price of A is given) he can purchase Q which provides a combination of vitamins and calories. If the consumer spends all his income on B, he can buy OR which provides some combination of vitamins and calories. If he spends all his income on C, he chooses S containing some combinations of the two attributes required. Consumer chooses T on D production ray by joining QRST budget constraints or efficiency frontier curve. He has to make a choice from the attributes on the efficiency frontier inorder to maximize utility.

8c.5 MAXIMISING SATISFACTION

It is possible to analyze the maximization of utility given the budget constraint of a consumer. We have to bring together the indifference map of the attributes and efficiency frontier. Indifference map has to be super imposed on the individual efficiency frontier.

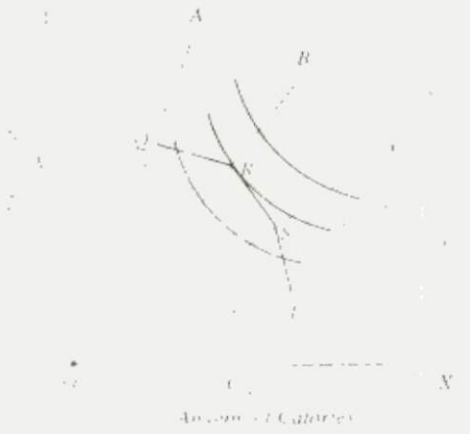


Fig. 14.3 Maximizing Utility from Attributes.

In the figure highest attainable indifference curve is I_2. R is the point of tangency of efficiency frontier and indifference curve. R lies on OB ray at which he will be maximizing utility. He purchases product B and enjoys OC_1 of calories and OV_1 of vitamins.

8c.6 EQUILIBRIUM

A consumer can buy a combination or bundle of two products to get the amount of two attributes. This can be explained with the help of a diagram.

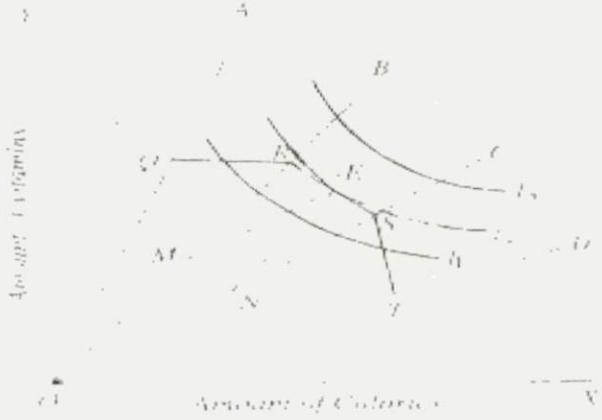


Fig. 14.4 Equilibrium with a mixed Bundle of Products.

In the diagram E is the position of equilibrium. It lies on the segment RS between two product rays OB and OC. At E, consumer buys products B and C. He spends OM on B and ON on product C.

8c.7 ATTRIBUTE APPROACH AND PRICE EFFECT

We have to examine how a change in price of one product affects the purchases of that product. Eg there are five brands of TV, A, B, C, D and E in the market. Clarity of sound and quality of its picture are the two attributes. These attributes are got in different proportions in the brands. The attributes are shown in the diagram.

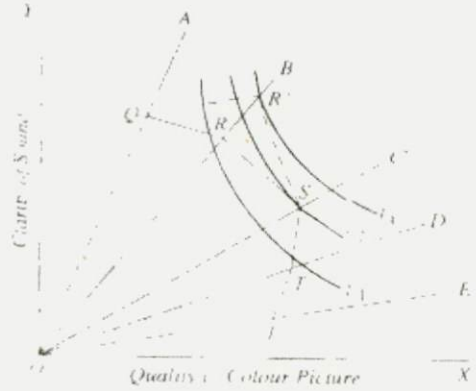


Fig. 14.5 Price Effect depicted by Attribute Approach.

RSTs represent efficiency frontier given the price of TV of various brands. Indifference curve IC_2 is tangent to the efficiency frontier at point S on brand ray OC. S is the maximum satisfaction point. Let us assume price of brand "B" T.V. falls. The efficiency frontier line changes on ray OB from R to point 'R[1]'. The new frontier efficiency frontier is QR[1]STJ. The new frontier efficiency frontier is tangent to indifference curve I . R[1] shows maximum satisfaction. B brand is preferred to all other brands. It also implies consumer has traded off between the attributes of T.V.

8c.8 ATTRIBUTE APPROACH AND LAW OF DEMAND

Price effects make the consumer to shift the consumption from one brand to another. In the example examined earlier brand "B" TV is preferred to other brands following a fall in the price of "B" brand T.V. A consumer reduces the demand for that brand whose price is risen and increases the demand for that brand whose price is fallen. This gives the proof of the Law of demand in the attribute analysis.

8c.9 INTRODUCTION OF A NEW PRODUCT

The attribute theory considers the case of introduction of a new product. If the ratio of the attributes provided by a new product coincide with those of the existing product, its impact can be studied. The new product may affect the demand for some commodities and may have neutral effect on others. These effects depend on attributes.

8c.10 EVALUATION OF THE NEW APPROACH

It is the possession of the attributes in a commodity which explain the consumer behaviour. This approach explain why people choose a commodity which is newly introduced.

Lancaster's new approach explains the reason for buying a number of commodities and not one commodity. A combination of goods provides greater quantity of attribution.

Substitution of goods can also be explained with "attributes" approach. It is possible to consider implicit price in this context. The new approach tries to explain scientifically substitutes and complements Goods containing common attributes are substitutes. In case of complements certain attributes are obtained by combining two or more goods.

This theory is having a limitation. People buy goods and not their attributes. Attributes are difficult to be identified. They are not well defined. However this theory is considered as a landmark in the field of behaviour of consumers.

8c.11 LET US SUM UP

A new approach to the theory of consumer behaviour has emerged in recent years. It explains the reason for buying a commodity. It says that a consumer buys a commodity because the commodity possesses its own characteristics which enable the consumer to satisfy his wants. It also tries to analyze the impact of an introduction of a new product in the market. In the new approach the consumer's equilibrium, the law of demand, price effect are explained keeping in view the attributes of a commodity.

8c.12 QUESTIONS

1. Explain the derivation of the law of demand in the theory of attributes.
2. Explain consumer's equilibrium in the theory of attributes.

8c.13 KEY WORDS

1. Attributes - Characteristics possessed by a commodity.
2. Law of Demand - Explains inverse relationship between price and quantity demanded.
3. Indifference curve - Contains locus of points yielding same satisfaction
4. Budget constraint - Explains the purchasing power of a consumer, given their come and price level.
5. Efficiency frontier - Represents various alternative combinations of the maximum amounts of attributes provided by the products.
6. Substitutes - Two goods are substitutes if they contain common attributes.
7. Complements - Two are more products are said to be complements if they are combined to get some attributes.
8. Indifference map - Contains more than one indifferent curve.

8c.14 BOOKS

1. H.L. Ahuja - Advanced Economic Theory
2. S.K.Misra and U.K.Puri - Advanced Micro Economi Theory

UNIT 9: RECENT DEVELOPMENTS IN DEMAND ANALYSIS

Structure

UNIT 9: RECENT DEVELOPMENTS IN DEMAND ANALYSIS

(Pragmatic approach, Linear expenditure)

9.1 OBJECTIVES

A study of this Unit enables you to understand

- the determination of demand in the real world.
- that demand for a commodity depends on a number of factors.
- the behaviour of consumers as a group.

9.2 INTRODUCTION

In the earlier units various utility approaches have explained theory of consumer's behaviour and demand. We have studied cardinal marginal utility analysis, Indifference curve analysis and Samuelson's analysis. But of late an attempt has been made to make use of pragmatic approach to demand analysis. In this unit we shall study the pragmatic approach and linear expenditure system.

9.3 PRAGMATIC APPROACH TO DEMAND ANALYSIS

The earlier theories of consumer behaviour are said to be theoretically impressive. But those theories were not able to explain the complexity of the real world. So many writers questioned the usefulness of the various theories of consumers' behaviour. Many economists have followed a pragmatic approach to the theory of demand. They accepted the fundamental law of demand.

The fundamental law of demand pointed out the inverse relationship between price level and quantity demanded. But this law was not enough to explain the behaviour in the real world. At present writers formulate demand functions directly on the basis of data collected in the market. They do not refer to theory of utility and to the behaviour of the individual consumer. Demand is expressed as a multivariate function. Demand is estimated with various econometric methods. Demand functions are referred to market behaviour of consumers. Consumers are taken as a group. Besides demand functions are referred to a group of commodities in this new approach eg. demand for food, demand for consumer durables etc.

When an attempt is made to estimate demand functions, there are some difficulties. It is necessary to make use of index numbers. But construction of index numbers faces some complexities. Demand function depends on a number of other statistical information. As there are difficulties in collecting the

necessary statistics, demand function based on these data is not reliable. Besides demand function depends on a number of variables. These determinants change simultaneously. All these difficulties make it very difficult to assess the influence of various variants of demand separately. Despite these shortcomings econometricians are estimating demand functions. There has been a continuous improvement in econometric techniques and currently demand functions are estimated statistically.

9.4 CONSTANT ELASTICITY DEMAND FUNCTION

Constant elasticity demand function is the commonly used form of demand function in applied research. It is written as follows.

$$Qx = bo \cdot p_x^{b1} \cdot p_o^{b2} \cdot y^{b3} \cdot e^{b4t}$$

Qx	=	Quantity demanded of commodity x.
Px	=	Price of x
P_o	=	Price of other commodities.
Y	=	Consumer's aggregate income.
e^{b4t}	=	a trend factor for taste (e - base of logarithms)
b_1	=	Price elasticity of demand.
b_2	=	cross elasticity of demand.
b_3	=	income elasticity of demand.

This function is called constant elasticity demand function because the coefficients b_1, b_2, b_3 are elasticities of demand which are assumed constant.

The followers of pragmatic approach do not adhere to utility functions. They incorporate the assumption of "no money illusion" of traditional theory of consumer. In technical term they express the demand as a homogeneous function of degree zero. To treat demand as a homogeneous function of degree zero, they introduce real income and relative prices in the function. In other words they make use of the following equation.

$$Qx = bo \left(\frac{Px}{P}\right)^{b_1} \cdot \left(\frac{Po}{P}\right)^{b_2} \cdot \left(\frac{Y}{P}\right)^{b_3}$$

P is the general price index. If prices and income change by the same proportion. eg. K percent the quantity demanded of x namely Qx does not change. Because price and income have changed in the same proportion. The new quantity demanded will be the same as the initial quantity demanded. There is no money illusion in the behaviour of the consumer.

Check your progress - 1

1. Demand function is a multivariate function. explain
2. Explain constant elasticity demand function.
3. What is pragmatic approach to theory of demand ?

9.5 DYNAMIC VERSION OF DEMAND FUNCTIONS

A recent development in demand studies is called dynamic version of demand function. It is also called "Distributed - lag models of demand".

In dynamic demand function, it is said that there is a time lag between quantity demanded and income. The current purchasing decisions are influenced by past behaviour.

The assumption is that current behaviour depends on past levels of income and past levels of demand. If a commodity is durable, past purchase constitutes a stock of this commodity. The stock affects the current (future also) purchases of such durables. If the commodity is not durable, eg. food, past purchase reflects a habit. Consumers have a habit to buy these commodities. So the level of purchases in previous periods influence the current pattern of demand. By incorporating the influence of past decisions and experiences in demand function, the demand function is made dynamic. There is another assumption in this regard. The more recent of past levels of income or demand have a greater influence on present consumption patterns than the remote past. E.g. we are influenced by our income in the last year than by the income we earned ten years back.

Models which include lagged values of demand of income are called distributed lag-models. The distributed lag models may be expressed as follows.

$$Qx(t) = f\left\{ Px(t) \cdot Px(t-1) \ldots\ldots Qx(t-1), Qx(t-2) \ldots\ldots Y(t) \cdot Y(t-1) \right\}$$

The number of lags depends on the particular relationship being studied. The necessity of a dynamic demand function has been recognised in the study of demand for a number of commodities. R. stone in 1960 extended the dynamic demand function to the study of a number of commodities. Houthekar and Taylor generalized the dynamisation of demand function in 1966 in their study of consumer demand in United States of America.

Dynamisation of demand and Investment functions are based on the "Stock-adjustment" principle. This model was developed by Nerlove. This model initially studied demand function for durable goods. Later Houthekar and Taylor extended the Stock adjustment principle to the study of consumer non durable goods by giving a name of "habit creation principle".

9.6 STOCK ADJUSTMENT PRINCIPLE

This was developed by Nerlove. The model gives the demand function as follows:

$$Q(t) = d_1 Yo + d_2 Q(t-1)$$

There is a desired level of durables called Qt. This is determined by current level of income. Consumer cannot get the desired level of durables because of limited income and credit facilities. Consumer tries to acquire only part of the desired level of durables in each period. In other words the desired level of durables is acquired gradually. In each period consumer comes closer to quantity Q (t).

In each period only certain quantity is bought. There is a change in the quantity bought in each period. This difference can be written as $Q t = Q(t-1)$. This change in actual purchases is a fraction of K of the desired change. $Q t - Q(t-1)$, K is the coefficient of stock adjustment.

9.7 HOUTHEKAR'S AND TAYLOR'S DYNAMIC MODEL

This model is based on Nerlove model. Houthekar and Taylor extended the earlier model to non-durables. The current demand of the stock of non durables depends on the purchase of such commodities in the past. Consumers get accustomed to buying certain commodities. It becomes habit to buy those commodities. According to Houthekar and Taylor, income, price, stock of the commodity are the determinants of demand. Demand in any particular period depends on price, stock of the commodities and current level of income.

Coefficient for some durables may be negative. Eg. If we have more furniture, electrical appliances the demand for these durables will be small. If non durables are bought and if the buying is strong then habit becomes stronger and demand increases.

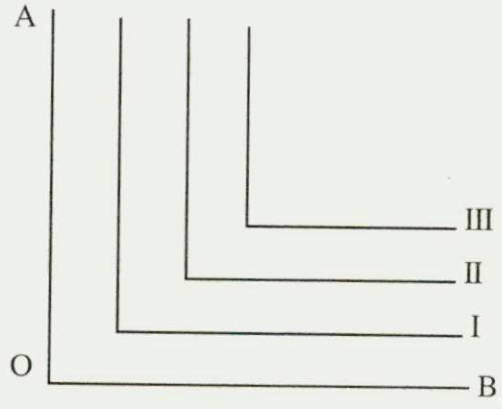
There are a few points to be noticed in case of "Stocks". (1) the stock of durables is made up of a number of hetrogeneous items of various ages. Some items may be very old. They may have to be replaced. Some commodities may be new. "Stock" is made of old and new and to measure Stock is difficult. Again to determine appropriate depreciation charges is also difficult. (2) The stock of habit is psychological variable and cannot be measured.

Check your Progress - 2

1. Examine dynamisation of demand function.
2. Write a note on Stock adjustment principle.
3. Explain Houthekar and Taylor model of demand function.

9.8 LINEAR EXPENDITURE SYSTEMS

The modern theory of demand discusses group of commodities and does not consider single commodity. When groups of commodities are added, the total consumer expenditure is got. This is studied in Linear expenditure Systems. Linear expenditure System is of interest in aggregate econometric models. These models provide disaggregation of consumption function. R. Stone was one of the earliest writers on Linear expenditure models. This model is based on utitlity function. Demand function is derived from utility in the normal way. The maximisation of utility and budgetary constraints are considered in this context as is being done under indifference curve analysis. Linear expenditure Systems unlike indifference curves deal with "groups of commodities". Between the "groups of commodities" substitution is said to be not possible. In Indifference curve analysis commodities have substitutes. Linear expenditure system can be analysed with indifference map. The map where Linear expenditure is represented can be studied with the following diagram.



The indifference map of Linear Expenditure System (LES) implies the non substitutability of group of commodities. The utility function is additive. The total utility (U) is the sum of utilities derived from various groups of commodities. Eg. assume that all the commodities bought by the consumers are grouped into five categories.

(a) Food and beverage.
(b) Clothing.
(c) Consumer durables.
(d) Household operation expenses.
(e) Services (transport, entertainment etc.)

If the total Utility is U, it can be written as

$$U = U(a) + U(b) + U(c) + U(d) + U(e)$$

All group of activities like a, b, c, d and e are independent. There is no possibility of substitution between groups a b c d and e. Within the group there is scope for substitution.

Consumers buy some minimum quantity from each group irrespective of prices. The minimum quantity is called subsistence quantities because they are the minimum quantities for keeping the consumers alive. The income left after buying the minimum quantity is allocated among the various groups of commodities on the basis of prices.

The income of the consumer is divided into subsistence income and supernumerary income. Subsistence income is spent for acquisition of the minimum quantities of various commodities. Supernumerary income is the left income after buying the minimum requirement. The Linear expenditure System model shows by how much the expenditure on group of commodities increases if total income changes by one unit. Changes of expenditure equal the changes in income.

Assumptions:

The LES model makes the following assumptions:

(a) Consumers are rational.
(b) Utilities are additive.
(c) Minimum quantity is not negative.
(d) Some quantity above minimum quantity is bought.

The model concludes that consumers maximize their total utility. Maximization of utility is done given the budgetary constraints.

There are various versions of Linear expenditure Systems model. Versions depend on utility functions. Various writers use various utility functions. So the demand functions are expressed in different ways.

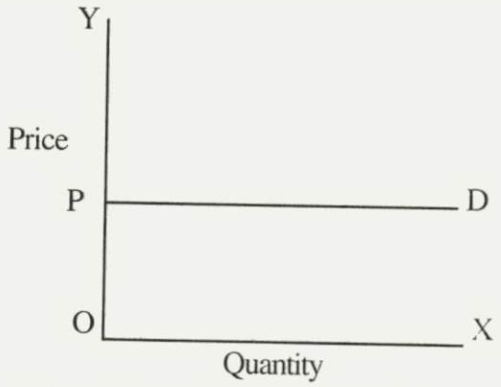
9.9 THE DEMAND FOR THE PRODUCT OF A FIRM

All models discussed so far concentrated on aggregate demand. When the demand for the product of a firm is studied in the context of decision making of a firm, Consumer's demand constitute a small portion of demand for the products of a firm. A large number of manufacturing commodities is sold to other businesses or other firms - for further processing or to traders - Wholesale and retail.

There may be firms who are selling the final goods. These goods are sold not directly to consumers. They are sold through wholesale and retail traders. Most products are sold to the consumers by retail traders. The traditional economic theory has ignored the distribution methods of commodities produced and their effects on the pricing policy of the firm. Traditional theory has also not made a distinction between long term demand and short term demand. Long term is not defined from the point of 'view of demand. It is defined from the point of view of production and cost. It is generally held that demand in the long term is very elastic. But the time involved is left in obscurity.

In traditional economic theory the shape of demand curve of a firm is different in different types of market.

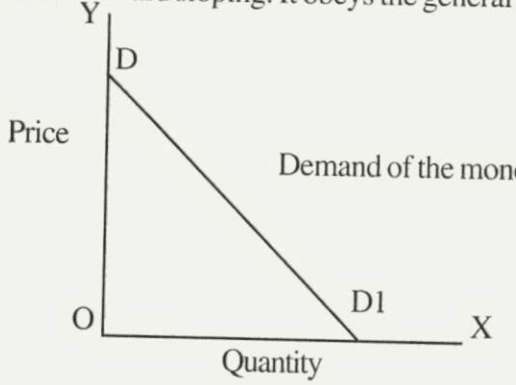
In pure competition the demand curve of a firm is perfectly elastic.



Demand curve in pure competition.

Demand is perfectly elastic because goods traded in perfect competition are homogeneous. There are large number of buyers in this market. So consumer offers a small part of the total quantity in the market and it cannot affect price. The firm is a price taker. The market price is determined by the forces of the market supply and demand. At this price the firm can sell any quantity it desires.

In monopoly the firm's demand is the industry's demand. Because in monopoly it is single firm industry. The monopolist is the price marker. He decides his price and output on the basis of market demand. Demand curve is downward sloping. It obeys the general law of demand.



Demand of the monopolist is as follows:

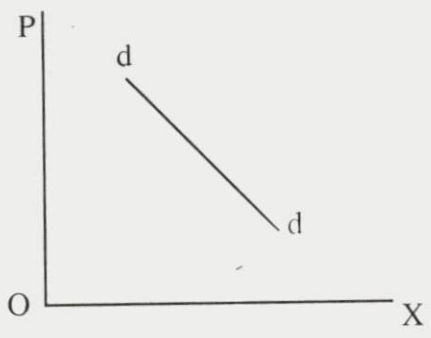
In monopolistic competition the demand of the individual firm is downward sloping. Chamberlin was the first economist to emphasise the multivariate nature of the demand of the individual firm. He said that under monopolistic competition, there is product differentiation. So the firm has some freedom in setting its own price. Each firm has its own customers who have a preference for the firm's products. A firm tries to maintain quality of its product to maintain the brand loyalty of the customers. It also advertises and incurs selling cost to enlarge the market for its products. So the demand for the product of a firm is multivariate.

$di = f(Pi, Po, P, Ai, Ao, Si, So, y, t)$

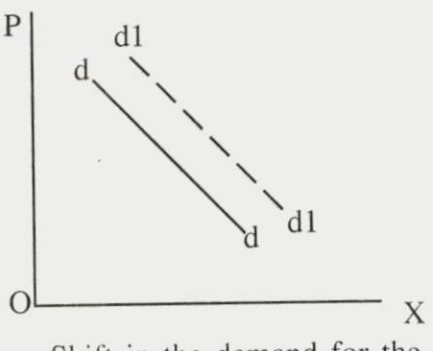
where

di	=	demand of the i th firm.
Pi	=	Price of the i th firm.
Po	=	Price of competitors.
P	=	Price of other commodities
Ai	=	Advertising and selling expenses of ith firm.
Ao	=	Advertising and other selling activities of competitors.
Si	=	Style of the product of ith firm
So	=	Style of the products of competitors.
Y	=	consumers' income
t	=	consumers' taste.

The firms demand curve can be drawn under ceteris-paribus assumption. It shows the quantity demand of the products of i th firm at different prices charged by the firm given the style of the product; selling activities etc., If any of these change the demand for the product also changes.



Demand of the firm in monopolistic competition.



Shift in the demand for the product of the firm in monopolistic competition

Chamberlin demand function is criticized. Chamberlin considered only the demand of final consumers. He ignored other buyers. The channels of distribution of commodities are also ignored.

Some writers have argued that chamberlin's demand curve is valid only for short period. Demand curve cannot have negative slope in the long period. Consumers aim to maximise their utility. What gives a consumer, higher satisfaction is subjective. A consumer. can visit a trendy shop. He may get satisfaction from such a visit. In the shop he may have paid a higher price for a commodity, which is available for a lower price elsewhere. One cannot say that this consumer's behaviour is irrational. A consumer is regarded as irrational if he adopts a course of action inconsistent with his preferences.

In Oligopolistic models there are assumptions of various shapes of firm's demand curve. There is great uncertainty regarding the demand curve of the oligopolist because there is interdependence of competitors and the uncertainty as to their reaction to any particular decision of a firm within the group.

The various shapes of firm's demand curve are made. Some writers draw downward sloping demand curve. Some other writers have drawn market share demand curve which is derived from market demand curve. It is assumed that at various prices the market share is the same. Elasticity is said to be constant. Some economists have assumed "Kinked" demand curve. "Kink" implies that the firm expects that its competitors will reduce prices with price cut but not when price rises. So to the left of the kink, demand curve has greater elasticity than at points to the right of the kink. There are economists who have assumed long-run demand curve which is very elastic. They have not pointed out determinants of the long run demand curve. they have also not specified the duration of the long run.

It is pointed out by economist that demand faced by a firm has uncertainty. This uncertainty makes the demand curve to have no relevance as a tool of analysis in the decision making process in a firm.

Modern theorists have taken the firm's demand as given. The interdepence of competitors is ignored in day to day decision of a firm.

The views expressed by various economists regarding the shapes of the demand curve stem from confusion between demand curve and demand function. Demand curve- exhibits the relationship that exists between the price level and quantity demanded under "Ceteris Paribus" condition. Demand function includes all the determinants of demand which may change simultaneously. Prices in some oligopolistic market are sticky. At those sticky prices there are fluctuations in sales. It suggests that there are other determinants of demand which cause shift in demand curve. These determinants have to be observed and understood.

9.10 SOURCES OF DEMAND FOR THE PRODUCT OF A FIRM

In modern theory a buyer of the product of a firm is another firm and is not a consumer. In consumer goods market also firm sells the consumer goods through retailers and wholesale dealers. They are intermediaries. They seek profit. The behaviour of the intermediaries is different from the behaviour of consumers.

It is possible to study the shape of demand of various types of buyers of a manufacturing firm.

9.10.1 Final consumers:

Some writers have argued that demand of consumers in the long run will not be downward sloping, for technically identical or similar products. Such a curve would point out that consumer is irrational. They argue that consumer's preference are not sticky in the long run. Consumers tastes change continuously. Consumers prefer cheaper goods and change their suppliers. This view cannot be accepted because in reality consumers have brand loyalty and different brand of commodities are sold at different prices. The market share of the product is maintained in the long period (ten or twenty years). This may be due to habit, inertia, incomplete knowledge, conspicuous consumption effects and other reasons. From this, it follows that very similar commodities are sold over long periods of time at different prices. Consumers' preferences persist and are responsible for negative sloping demand curve. This is the case in non durable goods. A large portion of household budget is spent on these goods. The choice of the consumer is mostly based on brand names and on the opinion expressed by friends and relatives who have tried these commodities and acquired experience on the quality of the products.

9.10.2 Other manufacturing firms:

There are two groups of goods; intermediary goods and investment goods. These goods are used as parts of the product of the buying firm. In case of investment goods, brand names are important. Machinery and other equipments are used for a long period. Brand name is important. Firms pay a higher price to get them from reputed companies. So the demand curve of investment goods is downward sloping. For intermediary goods, where goods are standardized, the firm purchases from suppliers charging low price. For standardized intermediary goods, the demand is very elastic both in the long run and in the short run. The market share of such firm suppliers will be determined by factors other than the price, such as prompt delivery and good services in general.

9.10.3 Wholesalers:

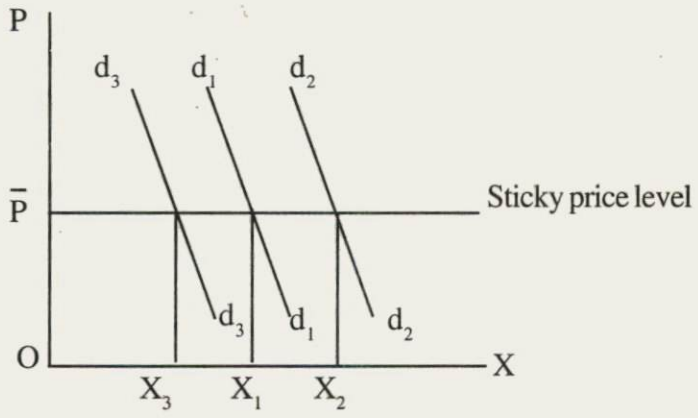
Wholesalers seek profit from their business. They affect customer's demand to some extent by their stock policy. They buy and build stocks of those commodities where they have big profit margins.

They buy similar commodities which have low prices. The discretion is limited. They can pass on the price rise to the customers if products traded are final goods; and if the demand for the product is strong. They keep their profit margins. If they are trading intermediary goods which are of standard specification they pay higher prices for goods technically identical because they can influence their buyers by offering cheaper products even if the brand is not yet established. If the goods traded are spare parts wholesalers have no power on the price that the manufacturing firm supplies. Here the demand curve is negative.

9.10.4 Retailers:

There are two actions of the retailers. A retailer can resell the manufactured product branded or he may sell a product under his own brand. Large supermarkets resell the final goods under their own brand names, they can influence the final consumers to some extent by not stocking a particular brand. Their power to influence the final consumer depends on the element of locational monopoly. This monopoly is lost if a new shop is established. Retailers are interested in their profit margins. They may pay a higher price for a branded commodity and pass on the price rise to the consumer. Consumers may have strong demand for this particular brand. If the retailers buy goods to be resold under their own brand, they are not prepared to buy at a higher price from their suppliers, if they could get similar commodity by paying low price. In such case the demand for the commodity for reselling is downward sloping. If the retailer buys the commodity as a raw material to sell under his brand name, his demand is going to be infinitely elastic.

In fine the shape of the demand curve of an oligopolist depends on the nature of his product and his distribution channels. The demand function of the oligopolist is multivariate. Even if the price is sticky there are other factors which change demand. In principle the demand for the product of a firm can be estimated statistically from historical observation of sales. Data may be collected on prices charged by the firm, prices charged by competitors, advertisement cost and other factors. But collecting such data is difficult. A very few firms do this. They estimate the demand statistically. But in the real world the determinants of demand of a firm are many and they change very fast. Demand function estimated becomes inappropriate for future decision. So the demand function should be continuously revised. Given the uncertainties of the environment firms tend to avoid price competition and rely on other competitive measures. In the modern oligopolist world the non price competition prevails. These trends suggest that in the real world demand curve is often subjective concept in the decision making of a businessman. Businessmen use non price measures such as style of the product, advertising, research and development programmes. These are less dangerous than price competition. Non price determinants determine market share along with dynamic changes in the market. The effect of market share on demand changes in oligopoly can be shown with the help of a figure.



Changing market price share of an oligopolist.

At the prevailing price OP, other determinants of demand change the market share. Demand is shifted from d_1 to d_2 at one time and to d_3 at some other time although price is sticky. If sales and hence market share change at a given price one has to look at the other determinants of demand in order to explain the change.

9.11 LET US SUM UP

Recent developments in the theory of market demand are studied in this unit. Modern theories trust the fundamental law of demand. But to make the market behaviour pragmatic they estimate demand function. Demand function is considered as multivariate function. They consider the market behaviour of consumers. Consumers are studied in groups, commodities are also grouped. Some of the approaches discussed are constant elasticity demand function, dynamic versions of demand functions, stock adjustment principle. In constant elasticity demand function it is said that money illusion is absent. In the dynamic version lagged values of the quantity demanded and of income are said to influence demand in any particular period. Current purchasing decisions are influenced by the past behaviour. Stock adjustment principle said that the desired quantity is acquired gradually Linear expenditure system explained that commodities are grouped and there is no substitution between groups. Within the groups it is possible to substitute one commodity for the other. The unit discussed the shape of the demand curve of a firm under different market structures. Under oligopoly the demand curve is not negative in the long run. Further it is pointed out that in the modern business world the channels of distribution are important for the shape of the demand curve. The shape of the demand curve should be discussed from the point of view of final consumers, wholesalers and retailers.

9.12 BOOKS FOR REFERENCE

1. A Koutsoyiannis Modern Micro Economics.
2. P.W.S.Andrews Competition in economic theory.
3. W.J.Baumol. Business Behaviour value and growth.

9.13 QUESTIONS FOR SELF-STUDY

1. Examine the pragmatic approach to demand analysis.
2. Explain the dynamic version of demand function.
3. How is the demand important in decision making according to modern theory of demand?

9.14 KEYWORDS

1. Consumer durables	-	Consumer goods like washing machines, TV, which yield utility overtime.
2. Index number	-	A single number with gives the average value of a set of related items.
3. Price elasticity of demand	-	Price elasticity of demand is the degree of responsiveness of the quantity demanded of a good to changes in its price.
4. Cross elasticity of demand	-	Cross elasticity measures responsiveness of demand for a commodity to the changes in the price of its substitutes.
5. Income elasticity of demand	-	Refers to the degree of responsiveness of the quantity demanded of a good to changes in income.
6. Subsistence income	-	Low income
7. Supernumerary income	-	Income which enables to have comforts and luxuries.
8. Kinked demand curve	-	It is a feature of oligopoly. It explain why prices are sticky.

NOTES

Block – 7

Partial and General equilibrium

Introduction

This is the last block in Micro Economics. In all the Six blocks you have studied partial equilibrium approach. In this block you study one unit wherein you study about the significance of partial equilibrium. You also study stability conditions of partial equilibrium according to Marshall, Hicks and Walras. Later you are introduced to general equilibrium. You will realize the mutual dependence in the economy. Walrasian model is studied here along with Input output model.

Programme guide says, that there are three units in this block. Units 29 and 30 are mathematical models and so it was decided to delete units 29 and 30. In fine you study 28 units in Micro economics. Block 7 is sent to you along with Block 2.

I wish you good luck.

UNIT 28 PARTIAL AND GENERAL EQUILIBRIUM

Structure

28.1 OBJECTIVES

After the study of this unit you will able to

- Explain that the markets are inter related
- Compare partial equilibrium and General equilibrium
- Understand General equilibrium of exchange

28.2 INTRODUCTION

In Micro Economics our discussion has considered one market at a time. We have studied price and quantity in each market - the market may be a product market or a factor market and the price and quantity were determined by the supply and demand conditions in that specific market, in isolation. The forces in other markets were not considered at that time. Each market was considered independent of other market. It was assumed other things remained constant or Ceteris Paribus.

But markets are interrelated. There are substitutes and complements which are closely related. Eg. Market for coffee and tea, automobile and petrol, pen and ink etc. Changes in one market effect the outcome in other markets. So a study of market in isolation is regarded as incomplete. Markets of all goods and services are related either closely or faintly related. So it is believed that all markets interact to some degree because they use inputs from the same pools and go to the same broad group of consumers.

28.3 GENERAL EQUILIBRIUM

Since markets are related a change anywhere causes ripples to spread in the economy like waves across a pool. A change any where affects the whole economy. It is said that the ripple effects are the process by which the economy absorbs changes and adjusts to them throughout its various sectors and segments. The adjustments seen are not random. All prices and output are affected and move towards equilibrium in all markets simultaneously. This is known as general equilibrium. General equilibrium analysis explains the mutual interdependence among markets.

28.4 PARTIAL EQUILIBRIUM AND GENERAL EQUILIBRIUM COMPARED

Partial equilibrium :

Partial equilibrium analysis is concerned with the equilibrium of an individual unit, a section of the economy. It is concerned with the given data. It explains the movement of individual economic units toward equilibrium positions in response to the given economic conditions. Given economic conditions,

refer to the "ceteris paribus" assumption. It means other things remain constant. Eg. When we consider the maximum utility of a consumer we assume income of the consumer is given. We ignore the point that income of the consumer depends on choices made in the factor market. In the factor market there are constraints like skill required, wage rates, the availability of jobs, availability of capital, rate of interest etc. All these are assumed to be constant when we make the assumption other things remaining constant. This assumption is helpful to study demand for different commodities in isolation.

When we study production decision of a firm we assume that technology is given, prices of commodities are given etc. Such assumptions help to study the minimization of cost in various input markets.

When we study price and output determination in various product markets we assume that other things remain constant and the market considered is studied in isolation.

The basic characteristic of a partial equilibrium is the determination of the price and quantity demanded in each market by demand and supply curves drawn on the assumption of other things remaining constant. So markets are regarded in isolation. Partial equilibrium is mainly developed by Marshall and this analysis is also known as Marshallian analysis.

28.4 STABILITY OF EQUILIBRIUM

Stability of equilibrium denotes the tendency in a system to return to equilibrium after any shock. In economics stability implies what mathematicians call 'asymptotic stability'. Every path starting sufficiently near equilibrium converges to equilibrium with the passage of time. Economists distinguish between local stability and global stability. An equilibrium is said to be locally stable if after a small initial deviation from equilibrium market values return to equilibrium values. It is said to be globally stable if after any deviation from equilibrium values, market values return to the equilibrium position. An equilibrium may be locally stable even though it is not globally stable.

We shall now consider two alternative stability conditions of equilibrium; (i) Marshallian stability condition and (ii) Walras Hicks stability condition. [5] Marshallian stability condition states that if, at a given quantity the demand price (D_p) is greater than the supply price (S_p) then the quantity supplied will increase. It means that a rise in demand will cause a rise in the supply of the commodity. Conversely, if, at a given Quantity, the demand price is lower than the supply price, then the quantity supplied will decrease. In other words. Equilibrium will be stable when a fall in the demand will cause a fall in supply. The Marshallian stability condition may be symbolically expressed as,

For given Q, ΔQ has the same sign as $(D_p - S_p)$.

Walras-Hicks stability condition states that if, at a given price the quantity demanded is greater than the quantity supplied, then the price will increase. It means, equilibrium is stable when the rise in demand brings about a rise in price. Conversely, if the quantity demanded is less than the quantity supplied, then the price will decrease. In other words a fall in the demand will cause a fall in price. Symbolically, Walras-Hicks stability condition may be expressed as,

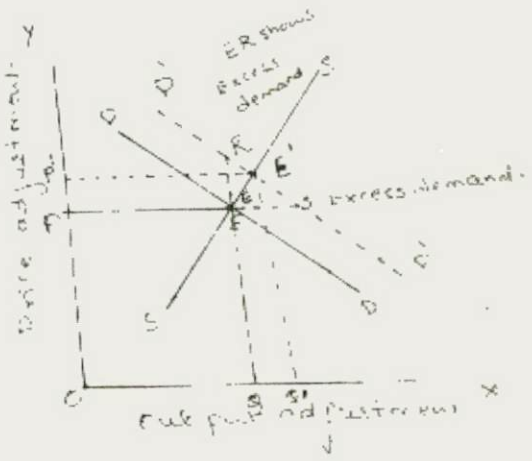
For given P, ΔP has the same sign as $(Q_d - Q_s)$.

The differences in the nature of these stability conditions may be noted, for Marshall price is a dependent variable and Quantity is the independent variable. For Walras-Hicks, price is the independent variable and Quantity is the dependent variable. The Marshallian. Price-dependent approach relies on movements of quantity to reach equilibrium while quantity-dependent Walras Hicks approach relies on movements of price. That is, Marshall offers an output adjuster model of the market. While Walras Hicks offers a price-adjuster model. However, both the stability conditions imply both price and quantity variation in disequilibrium and for simple problems both the approaches hold good.

Figure 1 shows the fulfillment of stability conditions of both Walras-Hicks and Marshall. D.D. is the demand curve and SS is the supply curve. Equilibrium price is OP (QE)and equilibrium quantity is OQ. Assume that the demand curve shifts to the right to the dotted line $D^1 D^1$. As a result, equilibrium is disturbed. Consequent upon the right-ward shift in the demand curve, there is excess demand price ER ($E_p > S_p$) at the quantity OQ, because demand price is greater than supply price. Following Marshall, it may be argued that output expansion is profitable. The increase in supply will take place and reduce the price. The fall in price in turn will increase the demand. Thus, both demand and supply change and converge towards each other and meet at E_1. At this equilibrium point excess price which was the cause for disequilibrium is eliminated. Thus, the increase in the quantity supplied to the extent of QQ^1 and this output adjustment denotes the fulfillment of Marshallian stability condition.

Now Walras-Hicks stability condition can be interpreted with the help of figure 1 At the equilibrium price OP, there is excess-demand ES($Q_d > Q_s$) which is due to the assumed right ward shift in the demand curve. This leads to a rise in price which in turn causes a rise in supply and a fall in demand. Thus, supply and demand move towards each other and meet at E', At the new equilibrium point E', excess demand, which caused the disturbance, is eliminated. The increase in the demand has thus brought about increase in the price to the extent of PP and this price adjustment is indicative of the fulfillment of Walras-Hicks stability condition.

Figure 1



The new equilibrium point E' demonstrates increase both in the price and the Quantity supplied, following a right-ward shift in the demand curve. While the price adjustment satisfies the Walras-Hicks stability condition, output-adjustment fulfils the Marshallian stability condition.

There may exist situations which satisfy either the Marshallian stability condition or the Walras-Hicks condition, but not both. In such situations, equilibrium which is stable according to Marshall will be unstable according to Walras-Hicks and vice-versa.

Figure 2

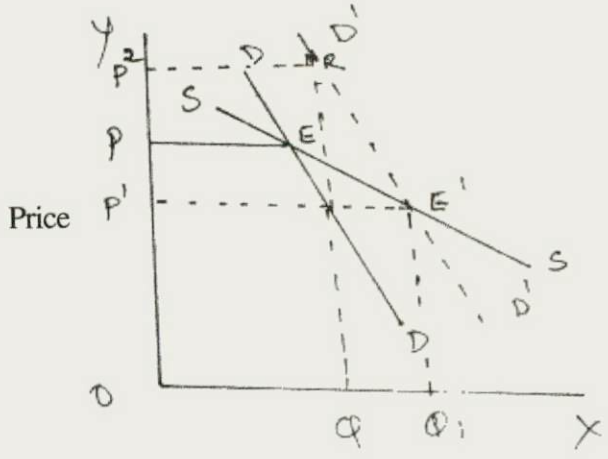


Figure 2 depicts a situation where equilibrium is stable according to the Marshallian condition but it is unstable according to the Walras-Hicks stability condition. In the figure 2 supply curve is a negatively sloping curve indicating that the industry is working under the conditions of increasing returns or decreasing costs. Market is in equilibrium at E. Equilibrium quantity supplied and demanded is OQ and equilibrium price is OP. As the demand curve shifts to the right, the demand price R (OP_2) exceeds the supply price E (op) for the output OQ. Since the supply curve is negatively inclined, more specifically forward falling, the excess demand price brings about expansion in output, which steadily narrows the gap between demand and supply price and a stable equilibrium is reached at Q_1. Point E_1 is the stable equilibrium for the positive excess demand price causes a rise in the quantity produced and vice versa. In a situation of negatively inclined supply curve output adjustment establishes stable equilibrium if only the algebraic slope of the supply curve is less than that of the demand curve. The new equilibrium is stable by the Marshallian criterion of stability but unstable by the stability criterion of Walras-Hicks.

Figure 3

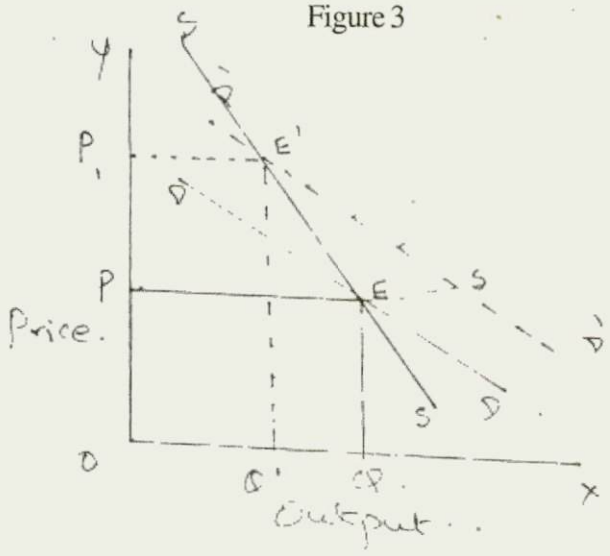


Figure 3 demonstrates where equilibrium is stable according to the Walras-Hicks criterion but is unstable according to the Marshall. Equilibrium quantity is OQ and equilibrium price is OP. Supply curve in figure 3 is negatively sloping, indicating highly inelastic nature. Now assume that the demand curve shifts to the right and takes the position D^1D^1. As a result of shift in the demand curve, excess demand equal to ES will emerge at the price OP. The positive excess demand will rise the price. Since the supply curve is backward rising or highly inelastic, the rise in the price tends to reduce the supply. Thus, it is the rise in the price which causes supply to fall by more than demand and thus excess demand is eliminated. In figure 3 the new equilibrium price is OP_1 (Q_1E_1). In a situation of negatively sloping supply price-adjustment will establish equilibrium, if only the algebraic slope of the supply curve is greater than that of the demand curve. The equilibrium point E_1 shows that the market system is stable by the Walras-Hicksian criterion of stability but it is unstable according to the Marshallian criterion of stability.

Marshallian and Walras-Hicks stability conditions lead to differenct conclusions about the stability of equilibrium. While Walras-Hicks stability condition regards price-adjustment as the leading force for restoring equilibrium, Marshallian stability condition regards output adjustment as the main force for establishing equilibrium in the market. The different conclusions are to be attributed to the assumption of different responses to non-equilibrium situation. Marshall had in the mind the case of long run forward-falling supply curve manifesting the existence of external economies. On this score, it is reasonable to argue that sellers adjust output to shifts in demand. On the contrary, Walras-Hicks kept in view the back ward-rising supply curve in market period, where stocks will be of a definite size. As a result, they assumed that buyers would adjust prices in response to change in demand. In fact, Marshall makes use of price-adjuster model to determine the price in the market period. Similarly, Walras makes use of output-adjustment model to explain that the price will be stable in the long-run. From these, it may be inferred that for explaining stability of equilibrium, Walras-Hicks condition is appropriate for the market period and Marshallian stability condition is more appropriate for the long period. In the short-run, when stocks of goods are not known and output can be expanded with the utilization of existing plant capacity, both the stability conditions of Marshall and Walras-Hicks are equally applicable. Only an empirical investigation can tell us accurately how the buyers and sellers behave or respond to a given situation of disequilibirium.

28.5 GENERAL EQUILIBRIUM ANALYSIS

General equilibrium exists when all the markets in the economy are in equilibrium simultaneously. This analysis emphasizes interdependence of various markets. With this analysis two objectives are attained (a) It enables to view the economy in its entirety (theoretically). (b) It helps to determine the first, second , third and higher order effects of an economic disturbance. Analysis first shows the big splash of change followed by ripples of various order and finally the ripple dwindles away. The general equilibrium analyses the entire series of readjustment.

28.6 WALRAS MODEL – GENERAL EQUILIBRIUM

Walras developed a model which was used for determination of outputs and prices of the system. He made a number of simplifying assumptions.

a). Each individual has a certain initial endowment of each productive factor such as land, labour and capital. The individual can buy and sell any of the factors or commodities produced using the factors at prevailing market price.

b). An individual, a consumer derives satisfaction or utility from the consumption or use of the factors or commodities that he or she retains or purchases. The individual producer maximises goods or profits from the production services.

c). Technology is constant and given by the production function for each of the commodity.

Excess demand:

With the assumption Walras postulated that the first order utility maximizing conditions or the first order of profit maximizing conditions for consumer or a firm. When the corresponding second order maximization conditions are satisfied provide the excess demand function solution for the consumer or firm. Excess demand functions either for consumer or for factors may be positive, zero or negative. The sum of excess demand of all consumers and producers for goods and factors will be a functions of all of the prices in the system. For the economy as a whole the number of excess market demand functions will be equal to the number of the variables i.e. the prices. The model specifying the excess demand function is consistent and it can be solved.

Let us assume that there are n commodities in the economy. It includes productive services. The market demand for a given commodity can be expressed as a function of the prices of all commodities in the market, income level and the number of consumers. The utility maximizing approach provides the first order of marginal analysis. On solution it provides the demand functions for each commodity by each consumer. By aggregating the demand curves we get the market-demand for the commodity. Suppose we keep the income level and the number of consumer fixed, then the market demand for anyone of the commodities can be written as

$$Di = Di (P_1 , P_2 , - - - - - Pn) \; i = 1 - - - - n \; ..... (1)$$

Under perfect competition the supply of each commodity in general will be a function of the price of all commodities.

The Supply function for the ith commodity can be written as

$$Si = Si (P_1 , P_2 , - - - - - Pn) \; i = 1 - - - - n \; ..... (2)$$

Excess demand function for the ith commodity is the difference between market demand and market supply. Excess demand for ith commodity is denoted as Ei. Then we have

$$Ei (P_1 , P_2 , - - - \; Pn) = Di (P_1 , P_2 , - - - \; Pn) - Si (P_1 , P_2 , - - - \; Pn) i = 1 .....n..... (3)$$

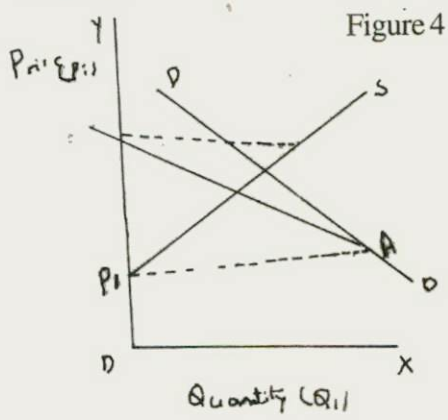
The excess demand is a function of all prices because both demand and supply are functions of all prices.

The excess demand supply and demand for a commodity can be explained with the help of a diagram.

Demand, Supply and Excess demand curve..

Demand, Supply and Excess demand curve..

Figure 4



D is the demand, S is the Supply of ith commodity. Supply intersects with demand at B. At B there is equilibrium and zero excess demand. At Po price excess demand for ith commodity is zero. If the price exceeds Po there is negative excess demand. Supply starts from P_1 Price. At P_1 there is minimum excess demand shown by P_1 A line. A is the origin of excess demand. By joining the points A and Po and extending it to E we get line to show the excess demand for the commodity. Excess demand is derived from supply and demand curves. The same methodology can be applied to factors of production.

Consumers are owners of the factors of production. They are the users of final products. The demand for factors of production is derived from the demand for final product. Supply of factors of production like labour is derived from income distribution theory.

In terms of excess demand supply can be treated as negative excess demand. In case of labour the amount of leisure, time for sleep, rest and entertainment is considered as positive demand by the consumer and the rest as negative excess demand or supply. For a producer his own output if used as input by him then it is positive demand and the rest of the output is supply in the conventional sense and is negative excess demand. So the aggregate excess demand for each commodity is the sum of the individual positive and negative excess demand functions. Same thing applies to factors of production also. So there is no distinction between factor and product markets.

In Walras model there are excess demand functions. Some of them are for productive services and some for produced commodities.

The equilibrium condition for the market is that supply equals demand. At equilibrium excess demand is zero. This condition of individual market can be extended to multi-market situation. When all the markets are in equilibrium we have

$$Ei (P_1 , P_2 , - - - \ Pn) Oi = 1 ..... n .....(4)$$

In this framework we have a system of n equations for n commodities. Walras says that all n equations are not independent. For an economy as a whole the total monetary value and purchases is always equal to the total monetary value of sales. The value of excess demand for commodities is zero.

$$\sum_{i=1}^{n} P_t E_T (P_1 , P_2 , - - - Pn) = 0 \quad \text{.....(5)}$$

According to Walras law if n-1 of the n markets are in equilibrium, the remaining one will be necessarily be in equilibrium. The maximum number of independent equations in the system of equation are expressed by (4) is n-1.

When we try to solve the system of equations (4) for n-1 unknowns. We will be in difficulty as we do not know which of the equations for unknown price is redundant or depending on other. One commodity chosen is called numeraire whose price is taken to be equal to unity. Let us consider money as a commodity and is chosen as numeraire. By dividing all prices by Pi it is possible to express excess demand equation system as

$$Ei\ C (1 .\ P_2 / P_1 , P3 / P_1 \text{ .....} P_n / P_1) = O,\ i = 1 \text{ .....} n \text{.....(6)}$$

We now have n-1 unknown. The relative prices P_2 / P_1 , P_3 / P_1..... P_n / P_1 and n-1 independent equations. The model is consistent and a unique set of values for n-1 price ratios is obtained on solution.

In Walras model the number of firms is taken as given. In the long-run under perfect competition the number of firms in an industry is variable. To find the optimum number of firm in an industry we have to impose one more restriction apart from the zero excess demand to find the general equilibrium situation. This restriction is that of zero profit for the industry. Each firm in the industry gets long-run equilibrium which means MR=AC=P. It means zero excess profit. The condition of zero profit results in an equations, one for each industry. The model has n prices, m number of firms. The unknowns are n + m. According to Walras model n + m -1 independent equations are present. After choosing numeraire with relative prices the number of unknown are also n + m - 1 and then solve the model. The equilibrium solution of the model satisfies the following condition.

a). Every consumer's utility is maximized.
b). Every producer's utility is maximized.
c). Every market is cleared.

Then Excess demand is zero. All prices are non negative. Prices are explicitly determined.

28.7 EXISTENCE, UNIQUENESS AND STABILITY OF EQUILIBRIUM

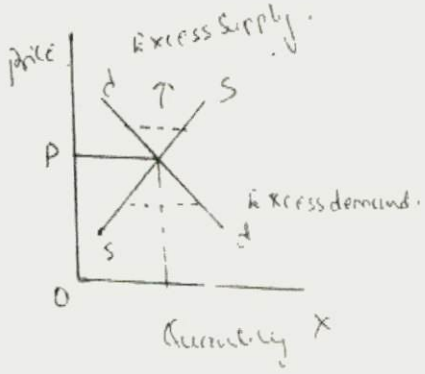
Three problems arise in connection with a general equilibrium.

1. Does a general equilibrium solution exist? It is called existence problem.
2. Is equilibrium unique? It is called uniqueness problem.
3. Is the equilibrium solution if exists stable ? This is called stability problem.

These can be tested with partial equilibrium of a demand – supply model. Assume perfect competition in both product and factor market. Individual consumers maximize utility and there is market demand function. At equilibrium price supply equals demand there is neither excess demand nor excess supply. So an equilibrium price is the price at which the excess demand is zero, the market is cleared and there is no excess demand.

The equilibrium is stable if the demand function cuts the supply function from above. An excess demand causes a price rise and excess supply pushes down the price. This is shown in diagram 5.

Figure 5



The equilibrium is unstable if the demand function cuts the supply function from below. In such a case excess demand exerises a fall in price and excess supply causes a rise in price. This is shown in diagram 6.

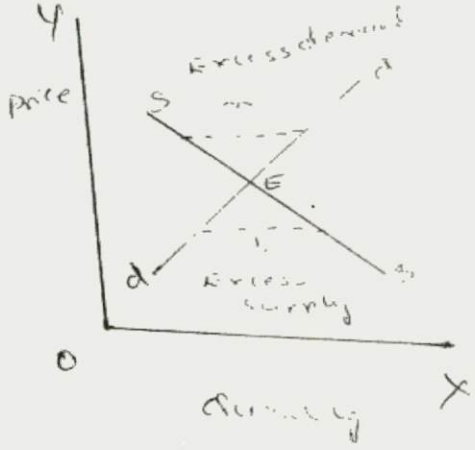
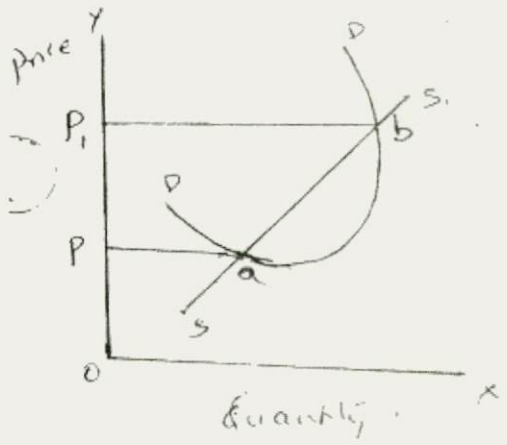


Figure 6

The multiple equilibrium can be explained with the help of a diagram

Figure 7



There are two positions of equilibrium a and b. b represents stable equilibrium and a represents unstable equilibrium. In some cases there is no equilibrium at positive prices.

The existence of equilibrium is related to the

a. Problem of whether consumers and producers behaviour ensures that demand and supply curves intersect at a positive prices.
b. The stability of equilibrium depends on the relationship between slopes of demand and supply curves.
c. The uniqueness of equilibrium is related to the slope of the excess demand function that is the curve which shows the difference between Qd and Qs at any one price. The three problems relating to existence, stability and uniqueness of the problems can be explained in terms of the excess demand function.

$$E_{(PT)} = Q_{D(PT)} - Q_{S(PT)}$$

28.8 INPUT – OUTPUT MODEL

It is expressed by Leontieff. In Leontieff general equilibrium model output levels of different industries and the quantities of primary factors of production are simultaneously determined. Demand for output and technical coefficients are given. The model is also used to determine the prices of different commodities in absolute to relative terms given some exogenous prices for the factors of production or commodities.

The output of an industry is assumed to be homogeneous. Output is used partly by other industry as inputs and partly by the consumers in the form of final demand or end use. The distribution of output of the industry can be expressed as

$$Q_i = Q_{i1} + Q_{i2} + Q_{i3} + Q_{in} + Y_i \; ; \; i = 1 \text{ ——— } n$$

Q_i is the total output. Q_y $(i - 1, — n)$ is the flow of output of ith commodity to ith industry. Y is the final demand or end use.

First we have to find the output levels of different industries. We can then find the requirements of primary factors of production. With the use of matrix the model can be built. A closed input-output model is expressed thus.

$$A^* = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{n1} & a_{n2} & a_{n3} \\ I_1 & I_2 & I_3 \end{pmatrix} \quad Q^* = \begin{pmatrix} Q_1 \\ Q_2 \\ Q_3 \\ I \end{pmatrix}$$

The closed input output model resembles Walras model. For solution we take one variable exogenously as given and find the rest of them. Or some component of final demand like capital formation or export might be exogeneously given. The model is semi closed.

Under general equilibrium prices of all commodities have to be determined simultaneously. Input – output model can be used for this purpose. Technology matrix and primary input coefficient vectors are considered. Let us also assume that the price of the primary input is given. It is the same in all industries. Let us also assume that profit rate is fixed and same for all industries. We have to consider the equality between revenue and cost plus profit margin.

Input-output method is explained with the help of an example. Let us assume that there are two industries, industry 2 and industry 1. The flows of output and input among these two industries are given as follows.

Input – output flows in value terms (Rs. 000)

	Inter mediate uses		Final uses		Total output
From / To	Industry 1	Industry 2	Consumers	Others	
Industry 1	2.0	5.0	2.0	1.0	10.0
Industry 2	5.5	3.0	3.5	2.0	14.0
Primary Inputs					
Labour	1.5	3.5	-	-	5.0
Others	1.0	2.5	-	-	3.5
Total Inputs	10.0	14.0	5.5	3.0	32.5

Out of total input of 10 of Industry 1, 2 units go to industry 1 itself and 5 units to industry 2 and to consumers 2 units. 1 unit goes to final uses such as exports investment etc. In the same way the distribution of 14 units of output of 2 are given in the table. The information given in the table shows that the total output is equal to total use of inputs. Total final demand for the product of both the industry is 8.5 units which is equal to total value added i.e. the sum of payments made to inputs. In this input output approach technological coefficient matrix and prices for the two products are worked out. The input output model makes use of several output levels and prices. The use of computers has helped the extensive use of this model.

28.9 LET US SUM UP

In this unit we have studied partial equilibrium, its significance and it stability condition. Marshall, Hicks and Walras views are considered. Later partial equilibrium is compared with general equilibrium. Walras approach is studied and existence, stability and uniqueness of stability are discussed. Input output model is considered wherein it makes us of several output levels and prices. The use of computes has helped the extensive use of general equilibrium approach in the form of input output model.

28.10 KEY WORDS

Please refer to Block - 1

28.11 BOOKS

1. Misra and Puri - Advanced Economic Theory
2. Sen. A - Micro Economics
3. Koutsoyiannis - Modern Micro Economics

28.12 QUESTIONS

1. Discuss Marshall stability condition.
2. Describe Input output model.
3. Explain general equilibrium.

NOTES

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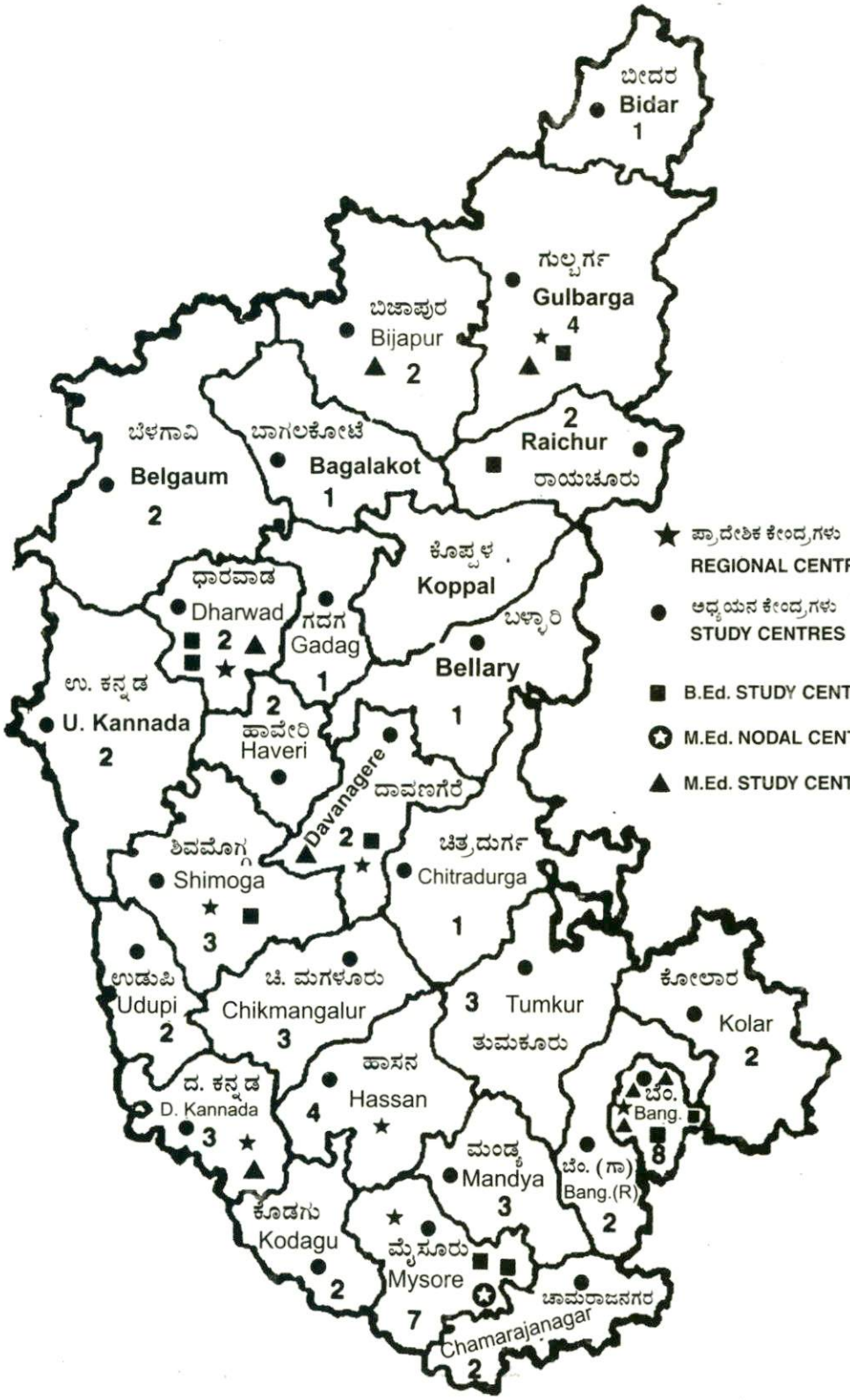
ಆದೇಶ ಸಂಖ್ಯೆ : ಕರಾಮುವಿ/ಒಪಾವಿ/4/517/2006–07 ದಿನಾಂಕ : 26/8/2006
ಮುದ್ರಕರು : ರಾಜಾ ಪ್ರಿಂಟರ್ಸ್, ಬೆಂಗಳೂರು – 560 027 ಪ್ರತಿಗಳು – 1000
ಕಾಗದ : ಎಂ. ಪಿ. ಎಂ. 60 ಜಿ. ಎಸ್. ಎಂ. 170 ಜಿ. ಎಸ್. ಎಂ. ಆರ್ಟ್ ಕಾಗದ
ಮುದ್ರಿಸಿದ ದಿನಾಂಕ : 2006

ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮುಕ್ತ ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ ಪ್ರಾದೇಶಿಕ ಹಾಗೂ ಅಧ್ಯಯನ ಕೇಂದ್ರಗಳು

Regional and Study Centres of Karnataka State Open Unviersity



(ನಮೂದಿಸಿರುವ ಅಂಕಿ -ಜಿಲ್ಲೆಯಲ್ಲಿರುವ ಒಟ್ಟು ಅಧ್ಯಯನ ಕೇಂದ್ರಗಳ ಸಂಖ್ಯೆಯನ್ನು ಸೂಚಿಸುತ್ತದೆ.)

(The Number indicate the total number of study Centres existing in that districts.)

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