



**B.COM. PART I  
SEMESTER-I**

**B.C. 106  
PRINCIPLES OF ECONOMICS-I**

**UNIT NO. 1**

**Department of Distance Education  
Punjabi University, Patiala**

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**LESSON NO. :**

- 1.1: Utility Analysis
- 1.2: Indifference Curve Analysis
- 1.3: Law of Demand
- 1.4: Elasticity of Demand

**NOTE :** Students can download the syllabus from department's website [www.pbidde.org](http://www.pbidde.org)

**CONSUMER BEHAVIOUR UTILITY APPROACH**

An individual consumer has to satisfy his numerous wants. He goes to the market and makes a number of purchases of goods and services which he needs. He purchases them at various prices which rule in the market on a particular day. Like him many more consumers do the same. Thus, they create either separately, the individual demand or collectively, the market demand for various goods. We are mainly concerned here with demand for good which possess some power to satisfy human wants. We are to inquire into the economic tools, namely the Marginal Utility Analysis and the Indifference Curve Analysis, which will help us in having a better understanding of the meaning and nature of demand, consumer's equilibrium with regard to the purchase of various goods and the maximisation of satisfaction which he strives for. But here, we will deal with only the former technique, that is Marginal Utility Analysis and use it in analysing the problems of a consumer's demand in the market. The tool of indifference curves will be explained in the next lesson.

We propose to deal with the topic hereafter in the following manner :

- A. The meaning of Utility and the concepts of Marginal Utility, Average Utility and Total Utility.
- B. The Law of Diminishing Marginal Utility and the Law of Equi-marginal Utility and also the relation between the Law of Diminishing Marginal Utility and the Law of Demand.
- C. The Individual Consumer's Equilibrium with the help of Utility Analysis in the case of :
  - (a) Single Commodity and
  - (b) Two or more than two commodities.
- D. Assumptions of the Utility Analysis.
- E. Shortcomings of the Utility Analysis.

**A. Meaning of Utility**

Utility means wants satisfying power of a commodity. The term utility is not to be confused with either satisfaction or usefulness. Satisfaction pre speaking, is the state of mind of a consumer soon after the act of consumption. Similarly, the usefulness gives the idea of whether the consumption or use of good is good or bad from the point of the consumer. Utility on the other hand has quite different meaning. In economic terminology, utility means the power possessed by a good to satisfy the human wants. Whether it satisfies a good or bad want, it has nothing to do with the definition itself.

It will be appropriate to mention that utility in a commodity is often added or created through the act of (i) changing the form of a good, (ii) changing the place of a good and (iii) carrying the good over a different period. All these acts add to the utility of good if it is not already there.

**Marginal, Average & Total Utility :** Average Utility and Total Utility can be better illustrated with the help of the table given below :

**TABLE NO. 1**

<i>No. of Units</i>	<i>Marginal Utility</i>	<i>Total Utility</i>	<i>Average Utility</i>
1	20	20	20
2	15	35	17.4
3	10	45	15
4	7	52	13
5	3	55	11
6	0	55	9 nearly
7	-5	50	7 nearly

*Note : Assumption of the table is that utility can be measured.*

A consumer has the above mentioned schedule to utility from the various units of the good consumed. His marginal utility will be given at the last unit where the consumer stops the consumption. Let us suppose, he stops at the 5th unit, the marginal utility for the fifth unit will be 3. This is clearly shown by the table. Thus, we are in a position to define the term; Marginal, Utility. It is defined as the utility derived from the last unit of a commodity consumed. If total utility from the various units is given, the Marginal Utility can be easily calculated i.e. Total Utility from 5 units minus the total Utility from 4 units (say 55-52=3). It simply means the addition to the total utility by the consumption of one more unit. Algebraically, it can be written like this :

$$\text{Marginal Utility} = \text{Total utility on } n \text{ units} - \text{Total utility of } (n - 1) \text{ units.}$$

It may be pointed out that as margin of consumption shifts, the marginal utility changes. Thus, the marginal utility is variable, as is clear from the table No. 1.

The concept of Total Utility is very simple. It means the sum total of the utility derived from the various units consumed. In other words, the sum total of the marginal utility will give us the total utility. For example, "the total utility from 5 units is 55." Total utility varies according to the marginal utility. Since marginal utility diminishes in accordance with the law of diminishing marginal utility, it is total utility that determines the shape and slope of total utility curve. This is clear from Figure No. 1.

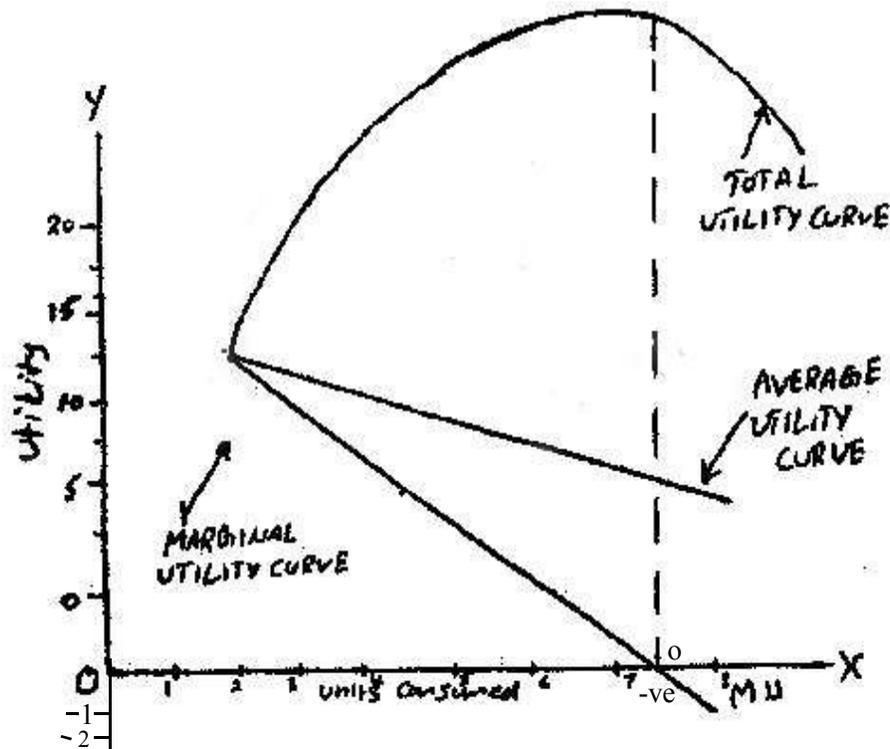


Fig. No. 1

The average utility is derived by dividing the total utility by the number of units consumed. For example, if the consumer stops at the fifth unit, the total utility is 55 and hence average utility will be 11. It may be pointed-out that the average utility will increase or decrease as and when the marginal utility increases or decreases. The point is again illustrated with the help of Fig. No.1.

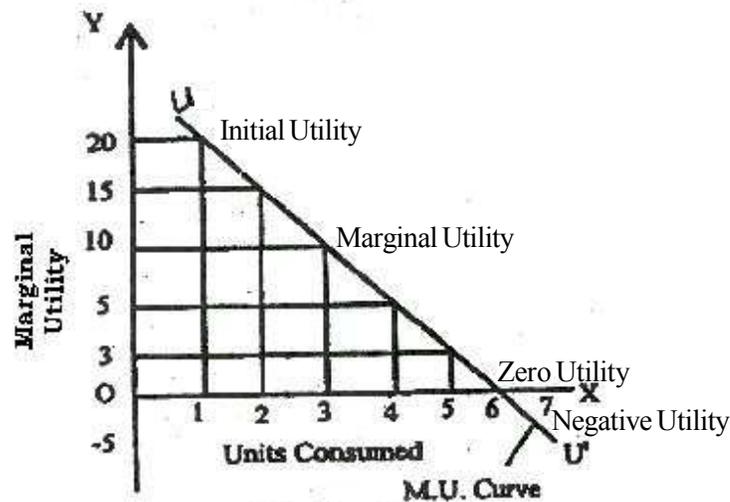
Certain important points in Fig. No. 1 may be understood. These points are :

- (i) Total Utility Curve is a rising one, through rising at a diminishing rate. It starts falling only when the marginal utility is negative, that is when the 7th unit is consumed.
- (ii) Marginal utility is -ve though at an uneven rate. It could be negative as shown in the diagram.
- (iii) Average Utility also falls in sympathy with the marginal utility. But average utility remains above the marginal utility.

### **(B) (a) The Law of Diminishing Marginal Utility**

Let us now explain a fundamental Law of economics. This Law is called the Law of Diminishing Marginal Utility. The law simply states that when a person has more of a certain thing, his keenness to have still more of that decreases. His urge

for the successive units of the same good diminishes with every increase of the stock he already has. This is simply a common experience. The statement of the law can be explained with the help of Utility Schedule and Table No. 1. The marginal utility goes on falling as successive units are consumed. The marginal utility from 20 to 15, falling then to 10 and so on for the additional units. If units are consumed up to the 6th or 7th unit, the marginal utility may become even zero or negative, as is evident from the table. The law can be illustrated with the help of the following diagram :



**Fig. No. 2**

Units of the commodity consumed are measured along OX and units of utility along OY. The marginal utility curve is falling from left to right indicating the fact that, as we consume more of a commodity, the marginal utility goes on diminishing.

Like all economic principles, the law of Diminishing Marginal Utility is also hypothetical in nature. It is based on the following assumptions :

**Assumptions**

- (i) The utility can be measured in cardinal numbers.
- (ii) Normal behaviour on the part of the consumer.
- (iii) No time interval between the consumption of successive units.
- (iv) Standard sized units rather than very small ones.
- (v) Units of uniform quality and
- (vi) Limited means at the disposal of the consumer.
- (vii) No change in tastes and preferences of the consumer.
- (viii) No change in prices and income of the consumer.

**(b) Relation between the Law of Diminishing Marginal Utility and the Law of Demand.**

The price that a consumer pays for a commodity is equal to its marginal

utility. According to law of diminishing marginal utility, as a consumer goes on purchasing more and more units of a commodity, its marginal utility goes on diminishing. As such, a consumer will buy more units of a commodity only when its price goes down. When marginal utility is expressed in terms of money, in that case, positive part of marginal utility curve will be the demand curve. When marginal utility is shown on OY-axis then the curve obtained will be called marginal utility curve. In case, price is shown on OY-axis then the curve obtained will be called demand curve, as is indicated in Fig (i) and Fig (ii) respectively.

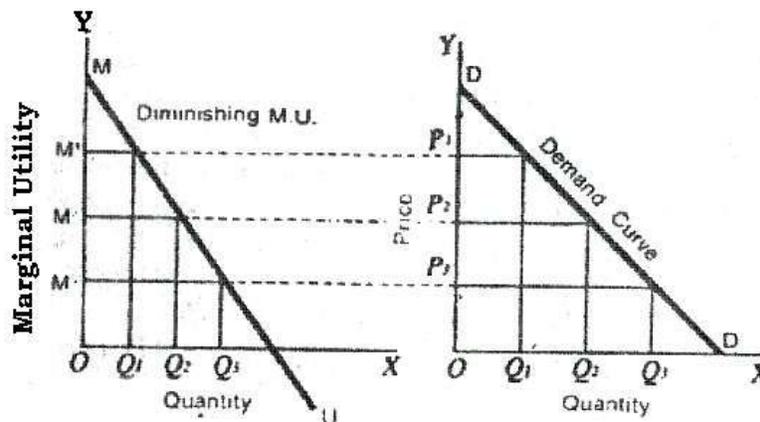


Fig. No. 3(i)

Fig. No. 3(ii)

Fig. (iii) represents marginal utility curve and Fig. 3 (iv) demand curve. This DD demand curve has been drawn with the help of MU marginal utility curve.

### C. Individual Consumer's Equilibrium with the help of the Utility Analysis

We know that a consumer buys more of a thing at a lower price and less of the same thing at a higher price other things remaining the same. But now the question is given the price of good, the price of other goods and the size of the income at his disposal up to what extent a consumer will make his purchases? When will he be in equilibrium? All of these we are to explain with the help of utility technique.

Before taking up the analysis of the consumer's equilibrium, it may be useful to explain the term equilibrium of the consumer. By equilibrium of the consumer we mean such a position of the consumer reached after spending his income on a single good or two goods that need for rearranging his pattern of consumption expenditure for he feels that he has maximised his satisfaction from the goods purchased. With this simple meaning in our mind we approach the problems of consumers equilibrium in the following manner :

- (a) Consumer's equilibrium in a single commodity case with the help of utility analysis.
- (b) Consumer's equilibrium in a two-commodity case with utility analysis.

**(a) Consumer's Equilibrium : Single Commodity Case**

We approach the problem with the following assumptions :

- (i) Limited income at the disposal of the consumer.
- (ii) Price of the good is given.
- (iii) Price of other goods are given.
- (iv) Rational behaviour on the part of the consumer; and
- (v) Apparatus of utility analysis is given.

Under the set of the assumptions; a consumer will spend his income on the commodity in such a way that at the margin (when the consumer stops the purchase of good under reference the utility derived from the good is just equal to the disutility of the money spend (price paid) on the acquisition of the unit of the good i.e. utility derived from the last unit purchased is equal to the disutility of units of money spent on this unit. Only when this condition is fulfilled, the consumer maximises satisfaction and feels that he is in equilibrium. This can be illustrated with the help of the table given below :

**TABLE NO. 2**

<i>Units purchased</i>	<i>Units of utility</i>	<i>Price per unit (in Paise)</i>
1	20	5
2	15	5
3	10	5
4	5	5
5	3	5

Note : (i) Let us suppose that 1 unit of utility is equal to 1 Paise.

(ii) Price remains the same, market being perfectly competitive.

The consumer under the circumstances will buy up to the 4th unit, as this will equate marginal utility, which is 5 to the prices of 5 paise. This will ensure the consumer the maximum satisfaction. No alternative rearrangement will give the same amount of total utility. Let us suppose he buys the 5th unit. His marginal utility being 3 and price being 5 paise, he will lose more of money that warranted by the marginal utility of the commodity. The position will equally be so if the consumer buys only 3 units (you have to draw the diagram yourself based on the Law of Diminishing Marginal Utility. The only addition to be made therein is drawing a horizontal line indicating the price).

**(b) Consumer's Equilibrium Two-Commodity Case**

With the same set of assumption as mentioned above in case (a) a consumer

will spend his income on two or more than two commodities in such a way as will equalise the marginal utility obtained from the various commodities. In simple words, a consumer will stop the purchase of various commodities when the marginal utility obtained from commodity by spending the last unit of money on it is the same in all cases, the following table clarifies this point further.

**TABLE NO. 3**

<i>Units of money spent (Rs.)</i>	<i>M.U. of Commodity A</i>	<i>M.U. of Commodity B</i>
1	40	30
2	32	23
3	24	16
4	16	10
5	10	5
6	6	4
7	3	2

*Note : The following are the assumption underlying the table :*

- (i) Size of income is limited to Rs. 7
- (ii) There are only two commodities.
- (iii) Law of diminishing marginal utility holds.
- (iv) Price of both the commodities is Rs. 1 per unit.

It is evident from the table that out of Rs. 7, the consumer will spend four rupees on A and three rupees on B. This arrangement of expenditure will equalise the M.U. for both commodities. According to the Law of Maximum Satisfaction, this will ensure him the maximum satisfaction say 8 units of utility. This is an ideal pattern of consumption expenditure and the consumer will not shift from this position of equilibrium. Any other arrangement of his expenditure will reduce his total utility. Suppose he spends rupees five on A and rupees two on B, then the marginal utility from A is 10 from B 13 and the two are not equal.

The equilibrium position of the consumer can be expressed more precisely and exactly in another way, as was done by Prof. K. Boulding. A consumer will maximise his utility/satisfaction if he distributes his expenditure on the purchase of various goods in such a way that will equalise the weighted marginal utilities of the commodities bought. In mathematical terms, the maximum satisfaction is obtained when

$$\frac{\text{M.U. of A}}{\text{Price of A}} = \frac{\text{M.U. of B}}{\text{Price of B}} = \frac{\text{M.U. of C}}{\text{Price of C}} \text{ and so on.}$$

The term marginal utility of A divided by price of A is called marginal utility of A. With the help of data given in Tables below, we can easily calculate the total satisfaction and so determine the consumer's equilibrium position.

**TABLE NO. 4**

<i>Units of goods purchased</i>	<i>M.U. of A</i>	<i>M.U. of B</i>
1	20	16
2	16	12
3	12	8
4	10	4
5	8	2

In this case consumer buys two commodities A and B. We can see from the above table that a consumer has 5 units of a commodity as he can use it in two forms. When consumer uses first unit he get MU=20 units but if he uses it on B, he gets MU=16 units. Therefore, the consumer uses first unit of commodity for A and second unit for B and so on. By dividing so, he gets total satisfaction equal to  $20+16+12+16+12=76$  units

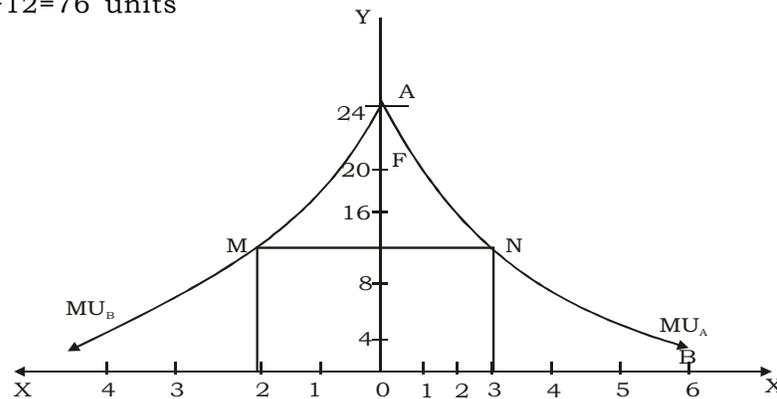


Fig. 4

In the fig. 4 Marginal utility of X commodity for A has been shown by AB live and marginal utility of X for B commodity has been shown by EF live. Consumer has five units of a commodity. If he uses 3 units for A, two units for B, he gets same satisfaction. As has been shown by MN live, There the consumer will be in equilibrium.

Thus, from the discussion above, we can easily conclude as to what quantities of commodities a consumer will buy; given the size of his income, price of the goods and his rational behaviour etc. With the help of the utility apparatus we have been able to chalk out his demand for a commodity at a certain price; variation in his demand because of a change in price and also his pattern of expenditure on various goods he buys and the resultant demands for various goods. The basis of all this

discussion was the utility approach.

Let us examine the assumption of Marginal Utility Analysis.

#### **D. Basic Assumptions of the Marginal Utility Analysis**

As pointed out above, the Utility approach provides frame work for the analysis of the consumer's demand and his equilibrium is regard to his purchase in a given set of circumstances. The assumptions, enunciated from time to time by various advocates of the utility approach; are as follows :

- (i) The utility (or satisfaction), though subjective, is yet measurable. As a result of all concepts such as marginal utility, average utility and total utility could be measured, though not very precisely.
- (ii) The utility system is cardinal in nature. The utility from the various units can be summed up and total utility calculated. Thus, total satisfaction can be found out.
- (iii) The utility of the intra-marginal units (units before the marginal units) is something absolute and fixed. It is not subject to variation if additional stock of the good is acquired. (See in Table 2, the utility of 1st, 2nd, 3rd and 4th units does not undergo any change when more units are being purchased).
- (iv) The marginal utility of money (income) is assumed to be constant. Advocated of utility approach, particularly Dr. Marshall ignored the variation in the stock of utility of money caused by variation in the stock of money.
- (v) Certain important factors which affect consumer's demand and his equilibrium are assumed to be constant; e.g. the size of income, the prices of other related goods and the tastes and preferences of the people.

Thus, the entire analysis with the above mentioned assumptions, makes the approach rather static in nature and scope of its operation. The analysis fails to answer many questions posed by economists like Prof. J.R. Hicks, Prof. Samuelson etc. It fails also to provide solution to many vexed problems Therefore, let us examine the shortcomings of utility analysis.

#### **E. Shortcomings of Marginal Utility Analysis**

The marginal utility analysis suffers from many drawbacks. It is recognised by all that its theoretical validity as an economic tool for analysing the problems relating to demand is limited. It is replaced by the tool of Indifference Curves and Revealed Preference Theory etc. which are being consistently advocated by the modern economists. It is no exaggeration to say that the latter tool has already been constantly used by the new generation of economists in the analysis of demand theory.

The Marginal Utility Analysis suffers from the following drawbacks :

- (i) Marginal Utility being something subjective and relative, cannot be measured. Therefore, the concepts of marginal utility, average utility and total utility suffer badly in their scientific and precise calculation. As a result, the analysis based on these concepts suffers from similar limitations.
- (ii) Since utility can neither be measured nor added so the concept of maximum satisfaction cannot operationally be sound and scientific. Additive or cardinal nature of the utility system has, therefore, to be discarded.
- (iii) The objection is also taken to the assumption of constancy in the matter of utility of the intra-marginal units. The utility of these units is subject to variation when additional stock is acquired. A process of continuous evaluation of utility of these units must be there. This is such a change which will jeopardize the whole system.
- (iv) Prof. Hicks and others also take strong exception to the assumption of constancy of marginal utility of money. The law of diminishing marginal utility applies as much to money as it does to other commodities. Therefore, while calculating the maximum satisfaction obtained by the consumer the variation in the utility of money should be taken into consideration. Unfortunately, the utility analysis ignores this fundamental point.
- (v) The utility analysis does provide an approach to the demand theory but this approach is only partial. The Law of demand is stated under static conditions. Prices of the related goods and size of income are assumed to be constant. Hence the analysis suffers badly in treating the demand problem dynamically.
- (vi) The utility analysis also fails to underline, the precise relationship between price and demand. It only talks about the price effect i.e., the effect of change in price on demand, a simple and direct effect. It does not go deep into factors bringing about this effect. It does not spotlight the income-effect and substitution-effect which alter the demand as a result of a change in price.

Thus, it is clear that the analysis based on the utility approach is defective and another analysis is gradually taking its place to treat the various aspects of the Demand Theory in a more satisfactory manner. This approach has come to be known as the Indifference Curves Analysis. We will deal with this approach in our next lesson.

#### **Derivation of Demand Curve through the Law of Equi-marginal Utility**

Demand curve can also be derived through the law of equi-marginal utility Suppose a consumer buys two commodities 'A' and 'B'  $MU_A$  and  $MU_B$  are their respective

marginal utilities and  $P_a$  and  $P_b$  are their respective price. A consumer will be in equilibrium when he spends his income on different goods in such a manner that the ratio of marginal utility and price of each commodity is equal.

The position of consumer's equilibrium can be explained through table No.1 Suppose a consumer has Rs. 5.00 to be spent on potatoes and peas. Price of each vegetable is Re. 1.00 per kg.

**Table No. 5 : Derivation of Demand Curve**

Quantity in kg.	M.U. of Peas	M.U. of Potatoes
1	12	10
2	10	8
3	8	⑥
4	⑥	4
5	4	2

Table No. 5 shows that the consumer will spend Rs. 3 on peas and Rs. 2 on potatoes. In other words, at the price of Re. 1.00 per kg. he will buy 3 kgs of peas and 2 kgs of potatoes. The last unit of money so spent will yield the consumer equal marginal utility (8 units). The consumer thus fulfils the following condition of equilibrium :

$$\frac{\text{MU of Peas } 8}{\text{Price of Peas (Re 1)}} = \frac{\text{MU of Potatoes } 8}{\text{Price of Potatoes (Re 1)}}$$

$$\text{or } \frac{8}{1} = \frac{8}{1} = 8 \text{ utils.}$$

Suppose the price of peas rises to Rs. 2.00 per kg. while the income of the consumer and the price of potatoes (Re. 1 per kg.) remain unchanged. The consumer will so change the demand for both the commodities that the marginal utility per rupee of each commodity becomes equal.

$$\frac{\text{MU of Peas } 12}{\text{Price of Peas (Rs 2)}} = \frac{\text{MU of Potatoes } 6}{\text{Price of Potatoes (Re 1)}}$$

$$\frac{12}{2} = \frac{6}{1} = 6 \text{ utils.}$$

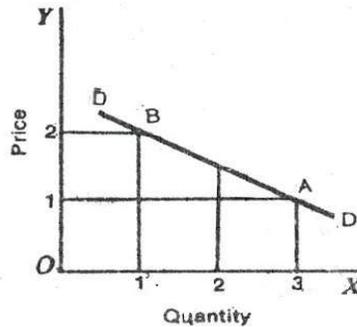
Thus at Rs. 2.00 per kg. the consumer buys only 1 kg. of peas whereas at Re. 1.00 per kg. he was buying 3 kg. of peas. To be in equilibrium, the consumer will buy 1 kg. of peas and 3 kgs of potatoes, because then alone the marginal utility per rupee

of peas and potatoes becomes equal (6 utils).

On the basis of the above data regarding change in the price of peas and consequent change in its demand, the following demand Schedule and demand curve of peas can be made.

**Table No. 6 : Demand Schedule of Peas**

Price	Quantity demanded (kg.)
Re. 1	3
Rs. 2	1



**Fig. No. 5**

In fig. No. 5 quantity of peas is shown on OX-axis and price on OY axis. When price of peas is Re. 1 per kg. then demand is for 3 kg. as shown by point 'A'. On the other hand, when price rises to Rs. 2 per kg. then demand contracts to 1 kg. as shown by point 'B'. By joining points A and B we get DD demand curve of peas.

**SUGGESTED QUESTIONS FOR YOUR PRACTICE**

1. Define the following terms : Marginal Utility, Average Utility and total Utility.
2. Explain the Law of Diminishing Marginal Utility. Explain its assumptions.
3. Give the reason for the downward slope of Consumer's Demand Curve. Does the same reasons hold true for the Market Demand Curve ?
4. What is meant by Consumer's Equilibrium ? Explain the consumer's equilibrium in case of two commodities.
5. Examine the assumptions (postulates) of the Utility Analysis. How far are these true in modern times ?

6. Explain the shortcomings of the Utility Analysis.
7. What is meant by Consumer's equilibrium ? Use Marginal Utility Approach to explain it in the case of two commodities.

**BOOKS FOR REFERENCE**

1. Dewett, K.K. : *Modern Economic Theory.*
2. Samuelson, P.A. : *Economics : An Introductory Analysis.*
3. Stonier, A.W. & Hague, D.C. : *A Text Book of Economic Theory.*

**INDIFFERENCE CURVES ANALYSIS**

We have already explained consumer behaviour with the help of Utility Analysis in the previous lesson. The Utility Analysis, as it was based on certain unrealistic assumptions (already explained), could not deal with certain aspects of the individual demand in a detailed manner. This approach was criticised by Prof. J. R. Hicks and Prof. P.A. Samuelson owing to certain shortcomings particularly the unrealistic cardinal assumptions of constancy of marginal utility of money and also the measurement of utility. They have tried to replace that approach by the techniques of Indifference Curves and Revealed Preference respectively. Here in this lesson, we are mainly concerned with the former analytical tool, i.e., Indifference Curve Analysis. We shall try to analyse the problems of individual Consumer's demand and the Consumer's Equilibrium with the help of this tool.

We propose to analyse the various problems relating to individual consumer's demand in the manners given below :

- (A) Indifference Curves, Map of Indifference Curves and the Marginal Rate of Substitution;
- (B) Properties of the Indifference Curves;
- (C) Consumer's Equilibrium including the Price Line;
- (D) Various Effects : Price, Income and Substitution effects;
- (E) Derivation of Individual Demand with the help of Indifference Curves.
- (F) Superiority of the Indifference Curves technique; and
- (G) Criticism of the Indifference Curves technique.

**A. Indifference Curves**

We know that utility cannot be measured nor can it be added. Therefore, the question of maximisation of Utility (or satisfaction) does not arise at all. The consumer's equilibrium becomes meaningless under these unrealistic assumptions. Therefore, Professors Hicks and Allen derived the technique of Indifference Curves. Without depending in any way, on the much criticised assumptions of marginal utility analysis, they gave the Indifference Curves method to analyse the theory of demand. They based their technique of Indifference Curves on the following assumptions :

- (i) The scale of preference of a consumer is given. A consumer knows in his mind whether he likes commodity A more than commodity B;
- (ii) The size of the income of a consumer is given;
- (iii) The price of goods being consumed are also given in the market;
- (iv) The level of satisfaction (indicated by the respective Indifference Curves) can be distinguished ordinally, i.e., in order of higher or lower level as

- compared to other levels of satisfaction; and
- (v) The consumer knows the state of his mind when he becomes indifferent to various combinations which ensures the same level of satisfaction.
  - (vi) There is consistency in consumer's behaviour i.e., if at any given time a consumer prefers A combination of goods to B combination then at another time he will not prefer B combination to A combination.
  - (vii) The consumer is rational in his behaviour.

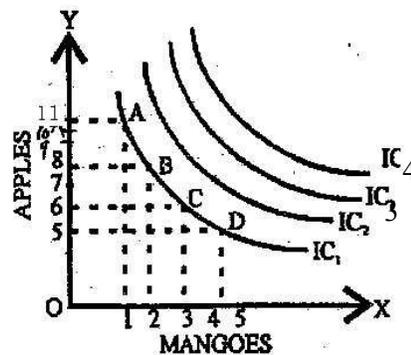
The technique as developed by Hicks and Allen, can best be explained with the help of the following table :

**TABEL NO. 1**

<i>Combination</i>	<i>Apples</i>	<i>Mangoes</i>	<i>MRS of Mangoes for apples</i>
Ist	15	0	—
2nd	11	1	4 : 1
3rd	8	2	3 : 1
4th	6	3	2 : 1
5th	5	4	1 : 1

Note : This is based on the above mentioned assumptions, viz, the size of the income, price of both the goods and scale of preference etc. are given.

For table No. 1, it is clear that consumer, under a given set of assumptions likes to have the Ist combination of 15 Apples zero Mango or even the 2nd combination of say 11 Apples 1 Mango. Or, for that matter, say a combination of 8 Apples and 2 Mangoes, 6 Apples and 3 Mangoes and so on. The point, an important one, is that all these combinations give the consumer the same level of satisfaction. The consumer is, in fact, indifferent to any of these combinations in the matter of satisfaction as each one gives him equal satisfaction, the indifference of the consumer is geometrically illustrated in the diagram given below :

**Fig. No. 1**

As is shown in the diagram no. 1 above, all the combinations which give the consumer the same level of satisfaction lie scattered on same curve i.e.  $IC_1$ . This curve  $IC_1$  is termed as the indifference curve. We may say that the consumer is indifferent between all these combinations of apples and mangoes which give him the same level of satisfaction and are represented by the curve  $IC_1$  passing A, B, C and D. These combinations occupy the same position in the consumer's scale of preference.

Similarly, we show various other combinations of apples and mangoes warranted by a different set of assumptions, representing lower higher satisfaction. For example,  $IC_4$  and  $IC_3$  curves represent higher levels of satisfaction in the altered situation of either higher income or lower prices of both goods (again an increase in real income). All these curves  $IC_1$ ,  $IC_2$ ,  $IC_3$ ,  $IC_4$ , and so on constitute the Map of Indifference Curves.

One or two points by way of explanation in connection with the above diagram may be mentioned for our benefit :

1. Firstly, it may be stated that any indifference curve may start from either of the axis. This could be so if any combination starts from zero quantity of either of the two commodities. But generally speaking, a curve touches Y-axis, if a combination with zero units of the commodity plotted the X-axis is possible.
2. Secondly, the curves are numbered as, 1, 2, 3 and so on. It simply means that curve number 2 is higher than curve number 1; and curve number 3 is higher than curve number 2 in matter of satisfaction. By how much different curves differ in the matter of satisfaction is not known.
3. The levels of satisfaction indicated by  $IC_1$  and  $IC_2$  cannot be added to give us the level of satisfaction indicated by  $IC_3$ .
4. All the curves slope downward just like demand curves without cutting each other.

Another significant point and of course of far-reaching importance, which is illustrated by table No. 1, is the rate at which mangoes being substituted in place of apples, by the consumer without disturbing, in any way, are level of satisfaction. It is clear from the table that the rate of substitution of mangoes for apples has been 4:1, 3:1, 2:1 and 1:1 when combination 2nd, 3rd, 4th and 5th are being chosen by the consumer. The rate of substituting mangoes in place of apples is a diminishing one. This economic statement is given the name of the **Law of Diminishing Marginal Rate of Substitution**. It simply states that a consumer, while remaining on the same level of satisfaction, will part with increasingly less quantity of one good, say

apples whose stock is decreasing in place of a given unit of another good say mangoes, whose stock is increasing. This rate of substitution will go on diminishing. In more technical terms, we may define the **Marginal Rate of Substitution** of X for Y as the quantity of Y which would just compensate the consumer of the loss of the marginal unit of X.

It may be pointed out for our benefit that this law of Diminishing Marginal Rate of Substitution replaces the law of Diminishing Marginal Utility which is used in utility approach to a consumer's demand. It serves practically the same purpose though in a better way. This will be explained later on.

### B. Properties of the Indifference Curves

We have already explained the meaning of indifference curves. Let us now examine their characteristics. The following are the main properties of indifference Curves :

#### (a) Higher Indifference curve represents higher level of satisfaction

An Indifference curve that lies above and to the right of another Indifference curve represent

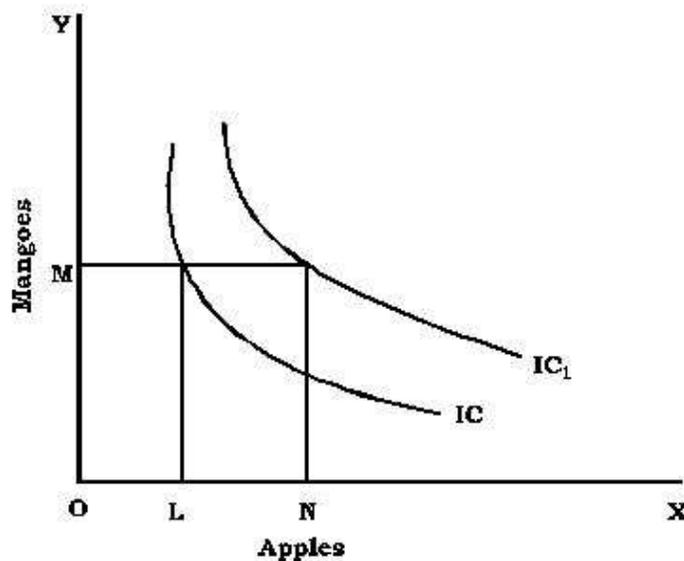
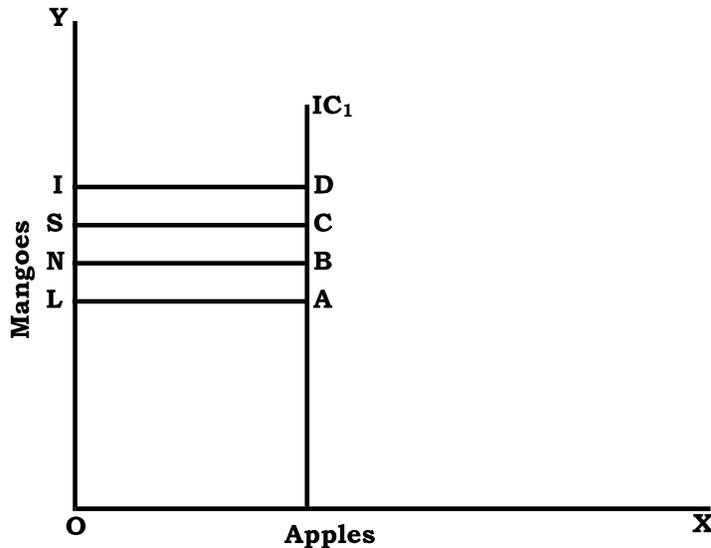


Fig. No. 2

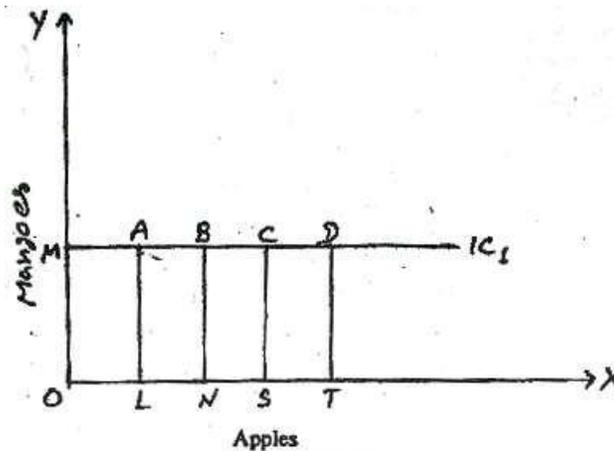
In diagram No. 2 the Indifference Curve  $IC_1$  lies above and to the right of IC. Since  $IC_1$  is a higher Indifference curve it shows more units of apples although the consumption of mangoes continues to remain the same.

**(b) Indifference Curves must slope downward from left to right**



**Fig. No. 3 (a)**

(a) Let us suppose that the indifference curve is like IC, in diagram 3(a). Points A,B,C and D on this curve indicate various combinations which give same level of satisfaction of Apples, But the satisfaction obtained from mangoes is continuously increasing from point A to B to C and D which is not possible. In accordance with the law of Diminishing Marginal Rate of Substitution, in order to obtain more units of mangoes, the consumer will have to sacrifice some units of apples at a diminishing rate. All curves must slope downward. This is on account of the fact in order to have more of one thing, consumer must have less of the other thing while enjoying the same satisfaction. The property can be explained as follows :



**Fig No. 3 (b)**

(i) Let us suppose that the indifference curve is like  $IC_1$  in diagram No. 2(a) Points A, B, C and D on this curve indicate various combinations which give the same level of satisfaction. But the satisfaction obtained from Apples is continuously increasing from point A to B to C and D which is not possible. In order to have more units of apples, the consumer must sacrifice some units of mangoes.

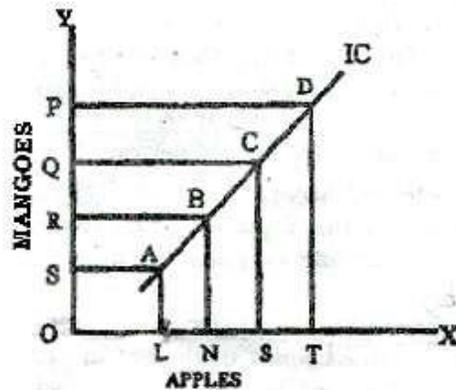


Fig. No. 3(c)

(ii) In diagram No. 2 (b) the consumer is able to consumer more and more units of mangoes as well as oranges as is clear from combinations A, B, C and D. But this is against the assumption of diminishing marginal rate of sale stitution. Which states that in order to consume more units of apples, the consumer will have to sacrifice some units of mangoes.

Thus it is clear that the indifference curve must slope downward.

(c) Two Indifference curves cannot intersect each other :

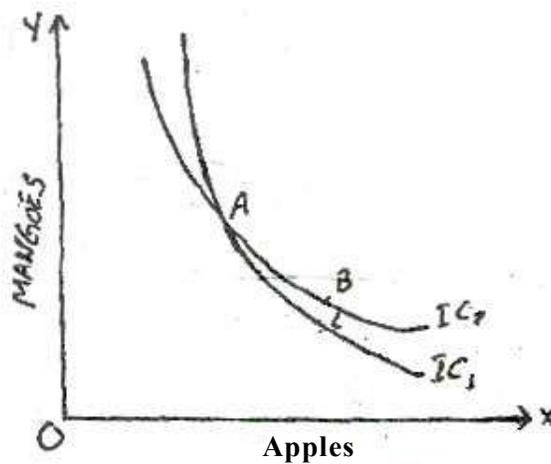
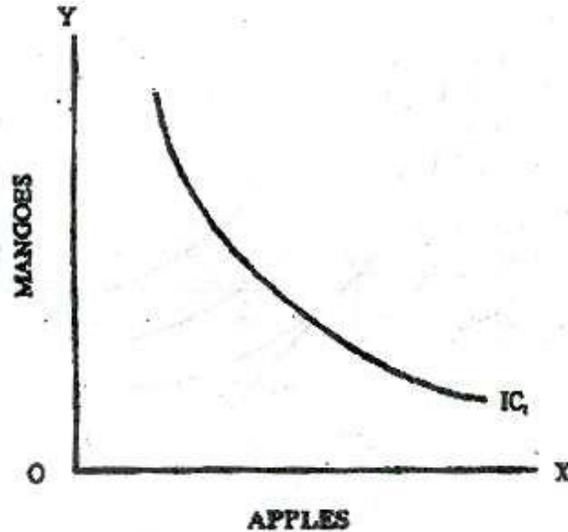


Fig. No. 4

Since points A and B (Diagram No. 4) lie on the same curve i.e.  $IC_2$ , combinations indicated by A and B give the same satisfaction. Similarly, the points A and C lie on the curve,  $IC_1$  therefore the combinations indicated by A and C must give the same level of satisfaction as indicated by the curve  $IC_1$ . Thus, it is evident that point A and its corresponding combinations on the two curves give same levels of satisfaction. It is something contradictory. Hence the supposition that indifference curves can intersect is wrong.



**Fig. No. 5**

(d) Indifference Curves are generally convex to the point of origin : Generally all indifference curves must slope downward and be convex to the point of origin. This property is based on the diminishing marginal rate of substitution. As we acquire more of commodity X, the quantity of commodity Y needed to replace a unit of X decreases. This is clear from diagram no. 5

### **C. Consumer's Equilibrium and Price Line**

We noted in the utility analysis of demand how a consumer maximises his satisfaction by following the law of equi-marginal utility. In the indifference curves approach also we will study how a consumer maximises his satisfaction.

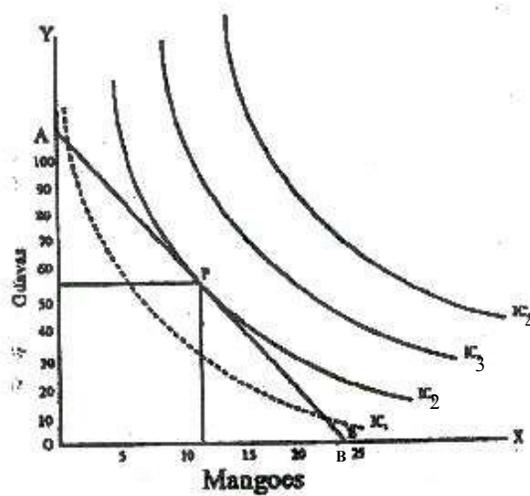
We can draw a map of indifference curves of a consumer under the following assumptions :

- (i) His income is constant;
- (ii) His scale of preference is given;
- (iii) He behaves in a rational manner and wants to obtain maximum satisfaction.

(iv) Prices of goods are given.

(v) He can spend his income in small amounts.

Now suppose that a consumer has 50 rupees which he is to spend on mangoes and guavas. Suppose further that the Price per mango is 2 rupees and that per guava is 50 paisa. The consumer will buy that combination of mangoes and guavas which will give him maximum satisfaction. If he spends the entire amount on mangoes he can buy 25 of them and if he does the same on guavas, he can buy 100 of them. The line A, B in Diagram No. 6 indicates the various alternative combinations that he can buy.



**Fig. No. 6**

Now which of these combinations he will buy depends on his choice. The line AB is shown as simply the Price Line or the Budget Line. This line also indicates the ratio between price of mangoes and guavas that 25 mangoes are equal to 100 guavas. A consumer will buy that combination of these commodities which is on the price line, that is, which is within his reach to buy. Any combination that is away from this line is beyond his means to buy and any combination that lies below this line cannot give maximum satisfaction. As shown in Diagram No. 5 combinations on  $IC_3$  and  $IC_4$  are beyond the limited income of the consumer. If he buys, any combination on  $IC_1$  he gets less satisfaction and by using the same amount he can buy certain combinations on the higher indifference curve  $IC_2$ . He gets maximum satisfaction at point P and so other combination on the curve gives him more satisfaction. In other word, point P indicates the equilibrium position of the consumer.

At the point P the price line AB is tangent to the curve  $IC_2$  that is the slope of the indifference curve  $IC_2$  and P and that of the price line are equal. At this point the marginal rate of substitution is also equal to the ratio between the price of the two

commodities. The basic condition for the equilibrium of the consumer is this that the marginal rate of substitution of mangoes for guavas should be equal to the price ratio between the two. More precisely the equilibrium position will be indicated by the following condition :

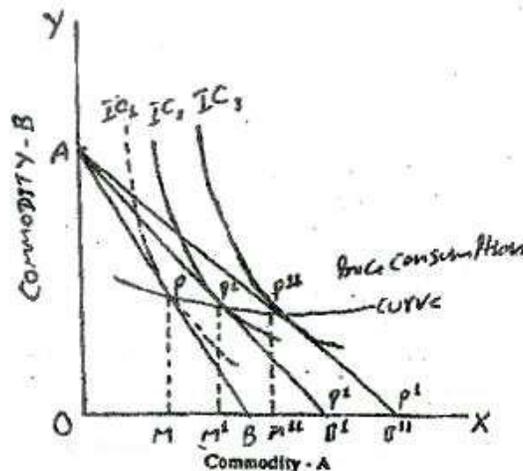
$$\text{MRS}_{\text{mg}} = \frac{\text{Price of Mangoes}}{\text{Price of Guavas}}$$

The case explained above deals with two commodities only. The use of this technique can be explained to the case of more than two commodities also but it is difficult to illustrate that by a diagram. To simplify this problem, money is taken as representative of a collective of goods. So the equilibrium of the consumer is studied by taking of money on one axis and commodity on the other.

So far we have examined the problem of consumer's demand or equilibrium when certain assumptions are made. That is, the treatment has been somewhat static in nature. Let us now analyse the problem rather dynamically. This could be possible if we examine the various effects. We would follow the method of releasing our assumptions one by one and try to work out the effects of this on the consumer's demand or goods.

**D. Price, Income and Substitution Effects**

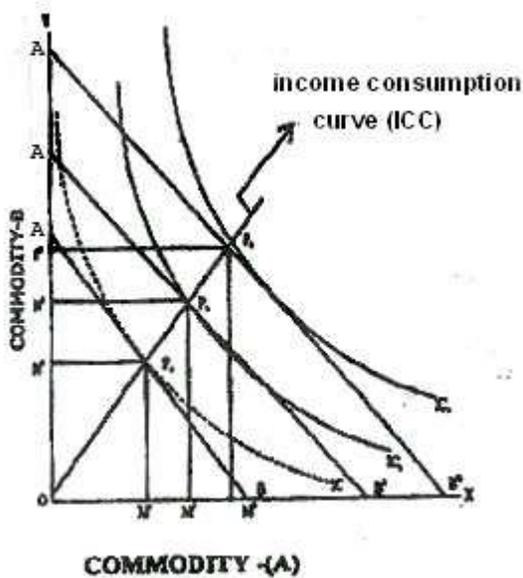
We worked out the consumer's equilibrium on the preceding assumptions of given (i) Money income, (ii) Price of commodities A and B, (iii) the scale of preference and (iv) rational behaviour. Let us now relax our assumption regarding price of commodities A or B and work out its effect, on equilibrium position of the consumer. This could be illustrated better with the help of diagram no. 7 given below :



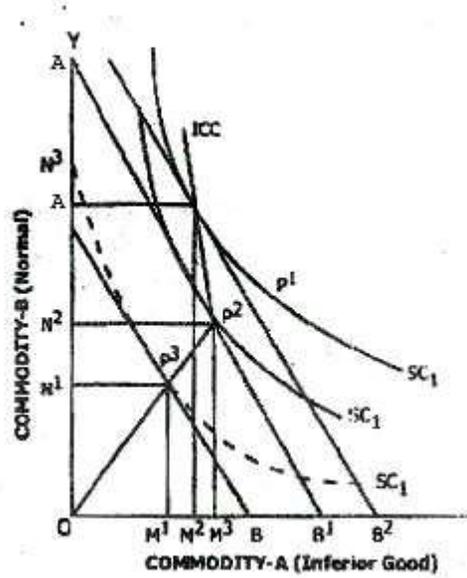
**Fig. No. 7**

Let us suppose that the price of commodity A falls while that of B remains the same as shown in diagram no. 7. The income is also constant. The price line shifts from AB to AB' and then to AB". Consequently the consumer's equilibrium position shift from P to P' and to P" on the indifference curve  $IC_1$ ,  $IC_2$  and  $IC_3$ . The consumer will, as a result of a fall in the price of A, buy more of commodity as indicated by  $OM_2$ ,  $OM'$  and  $OM''$ . In simple words, the fall in price of A will induce the consumer to buy more of the commodity. The line joining the points P, P' and P" will be termed as Price-Consumption Curve. It shows the functional relationship between price of a commodity and individual's demand for that commodity. It also shows the income and substitution effect due to the fall in the price of a commodity. These effect are examined below.

(i) Income effect : Let us now relax the assumption that the size of money income is given. Let us assume that the size of the income goes up while the price remains the same, what will be effect of this on the consumption of commodities A and B. This could again be illustrated with the help of the diagram given below :



**Fig. No. 8(a)**



**Fig. No. 8(b)**

In diagram 8(a) the size of the money income goes up. The price line (or the Budget Line) shifts upwards, indicating that more could be bought of both commodities. The consumer can buy now with increased money-income  $OB$  to  $OB''$  and so on of commodity A and similarly  $OA$ ,  $OA''$  of commodity B with increased money income. The consumer would also more his equilibrium position from  $P^1$  to  $P^2$  and then to  $P^3$ .

As he would consume more quantities of both the goods & i.e.  $OM^1$ ,  $OM^2$  and  $OM^3$  of A and  $ON^1$ ,  $ON^2$  and  $ON^3$  of B as an income effect. He would also be on a higher level of satisfaction with each increase in his money income he would be on  $IC_1$ ,  $IC_2$  and  $IC_3$ . But this is the effect of increased money income provided both of the goods are normal goods.

The line joining the points  $P^1$ ,  $P^2$  and  $P^3$  will be termed as Income Consumption Curve. It is an upward sloping curve showing the positive effect of increased money income on the demand for both goods.

In diagram 8(b) the effect of increased money income is shown on an inferior good, say A while B commodity is a normal one. Increased money will induce the consumer to buy more of the normal goods (say  $ON^1$ ,  $ON^2$  and  $ON^3$  of B) and less quantities of an inferior good (say  $OM^1$ ,  $OM^2$  and  $OM^3$  of A). It may be pointed out that in the first instance the quantity purchased of inferior good may also increase (See the Diagram 8 b), though ultimately, demand for it will decrease. It is daily experience that once income rises substantially, the people may buy less of inferior goods. The same fact is illustrated in this diagram.

(ii) Substitution Effect : A Substitution effect occurs, it may be pointed out, when relative price of goods change in such a way that the consumer is neither better off nor worse off than he was before but he has to rearrange his purchase of goods in accordance with the new relative prices. This could again be illustrated with the help of Diagram No. 9 which is given below :

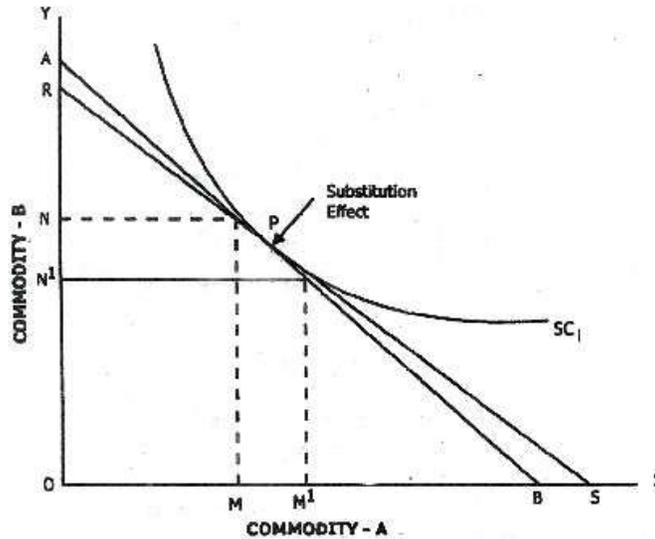
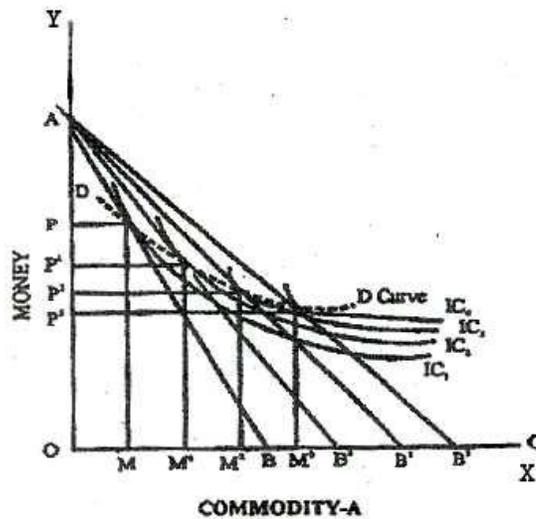


Fig. No. 9

Other things remaining the same, let us suppose that price of commodity A has fallen. This would disturb the equilibrium position of the consumer. He would have to rearrange his purchases. If he was at point P on  $IC_1$ , he preferred the combination on P i.e. OM of A and ON of B. But in the case of a substitution effect the consumer should neither be better off nor worse off. Let us suppose that the income of the consumer is changed from AB to RS budget line so that consumer being at point P and  $IC_1$ , is neither better off nor worse off in the matter of satisfaction. This he has realised through the substitution of  $MM'$  of A (whose price has fallen and become cheaper) in place of  $NN'$  of B (a relatively dearer commodity). This is described as the substitution effect. It simply states that a consumer will buy more of relatively cheaper good.

**E. Derivation of Individual Consumer's Demand Curve**

The technique of indifference curves could profitably be used for the derivation of individual consumer's demand curve. This could be illustrated with the help of the following diagram No. 10.



**Fig. No. 10**

Let us measure commodity A along the X-axis and commodity B, which is money in this case, along the Y-axis. Further, suppose that the price of A falls, the point of consumer's equilibrium will shift from P to P' and then to P<sup>2</sup> and so on P<sup>1</sup>. As the price falls, a consumer would buy more of A, such as  $OM_1$ ,  $OM_2$  and then  $OM_3$ . This shows the working of the law of demand. The line joining the points on various curves  $IC_1$ ,  $IC_2$ ,  $IC_3$  and  $IC_4$  gives the individual consumer's demand curve. A separate demand curve can be plotted on the basis of data which are deduced from the above diagram as given below.

<i>Price per unit</i>	<i>Quantity of Demanded</i>
OA/OB	OM
OA/OB <sup>1</sup>	OM <sup>1</sup>
OA/OB <sup>11</sup>	OM <sup>11</sup>
OA/OB <sup>111</sup>	OM <sup>111</sup>

The demand curves of various individuals, thus derived could give us the market demand curve.

#### **F. Superiority of Indifference Curves Technique**

The method of indifference curves as developed by Prof. Hicks and Allen was a significant contribution to the box of analytical economic tools. The new technique is positively a superior method of economic analysis in the field of Demand Theory as compared to the Marginal Utility Approach. It has the following points of superiority over the utility analysis.

- (i) The method does not rest on the unreal assumption of measurability of utility. Again, it does not rest on the additive nature of utility. The indifference curves technique simply avoids the pitfalls of the utility analysis.
- (ii) The technique of indifference curves explains the phenomenon of falling marginal rate of substitution in a better and more comprehensive way than done by marginal utility analysis. It explains the significance of both the goods when their stock changes.
- (iii) This technique explains the price-demand relationship in a more detailed manner. It shows that the price effect is the result of income effect and substitution effect. The ordinary law of demand based on utility approach could not explain the reason behind the price effect.
- (iv) This technique could also throw light on the nature of demand for inferior goods. The utility approach could not explain the theory of demand in case of these goods.
- (v) This technique, with fewer assumptions explains in a better way a large number of problems in the field of demand.
- (vi) This technique examines the theory of demand more dynamically than done by the Utility analysis.

Thus, it is admitted on all sides that this approach has freed the theory of demand of many unwanted assumptions. It has placed at the disposal of a student of economics a better economic tool which could be widely used with a greater degree of reliance.

**G. Criticism**

The technique, though widely and much praised, has provoked much criticism at the same time. The following points may, in brief, be mentioned.

- (i) The technique is based on the assumption of 'scale of preference' and given tastes and likings. In the background of the assumption of 'scale of preference', the concept of utility works. A consumer prefers the good which gives more utility.
- (ii) The technique of indifference curves assumes that the consumer becomes indifferent and that he knows his state of mind. But Professor P. A. Samuelson is of the opinion that the consumer rather reveals his preference. He knows which combination is preferable under a given set of assumptions. Thus, according to him, the basis of Theory of Demand should be the revealed preference rather the state of indifference of consumer.
- (iii) The indifference curves method has given only new name to old terms and concepts. Some examples to quote as the law of diminishing marginal rate of substitution in place of the law of diminishing marginal utility, the principle of marginal significance of good being equal to its price, in place of principle of proportionality between marginal utilities and their prices. Again, in the case of consumer's equilibrium we now say that a consumer will be in the equilibrium when the marginal rate of substitution between two commodities is equal to their price ratio. Critics, thus, say that the new approach supplies old wine in a new bottles.
- (iv) This approach cannot analyse the demand problems in the midst of risk and uncertainty.

This is how this technique is criticised. New tools are being perfected. Even the old ones utility tool-are being refashioned. The Theory of Demand for its complete analysis yet needs better and more satisfactory treatment.

**BOOKS FOR STUDY**

1. Dewett, K.K. : *Modern Economic Theory.*
2. Stonier, A.W. and Hague, D.C. : *A Text Book of Economic Theory.*
3. P.A. Samuelson : *Economics : An Introductory Analysis.*

**SUGGESTED QUESTIONS FOR YOUR PRACTICE**

Explain the following terms :

1. Explain the properties of Indifference Curves. Illustrate with diagrams where necessary.
2. Explain the meaning of Consumer's Equilibrium. Explain it with the help of Indifference curve Technique.
3. Explain Consumer Equilibrium with price, income and substitute effect.

4. Define the concepts of Price Effect, Income Effect and Substitution Effect. Give diagrams to illustrate them.
5. What will be the effect of increase in money income on the demand for a 'normal good' and that for an 'inferior good' ? Explain with diagrams.
6. How is the Individual Consumer's Demand Curve derived with the help of Indifference Curves Method ? Illustrate with a diagram.
7. In what respect is the Indifference Curves Technique superior to the Utility analysis ?
8. Explain the assumption of the Indifference Curves Technique. Give the criticism of this approach also.
9. Write short answers of the following questions :
  1. Define Indifference Curves.
  2. Map of Indifference Curves.
  3. Marginal rate of substitution.
  4. Price consumption curve.
  5. Substitution effect.
  6. Income Effect.
  7. Price Effect.

**LAW OF DEMAND****1. Meaning of Demand**

We know that man has bundle of wants. In order to satisfy these wants we need goods and services. This need makes us desire certain commodities. But the mere desire for a commodity does not constitute demand in economics. For example, a man standing at a sweet shop may feel a strong desire for the varieties on display. But if this man has money in his pocket and he is prepared to spend it on these sweets then, his desire becomes demand. Thus desire becomes demand when it is backed by ability and willingness to pay for things that we desire to acquire.

A good is demanded because of the utility it possesses and it is paid for because it is scarce. Demand, therefore, always has a reference to price and it can thus, be defined as that quantity of a good which is bought at a given price.

Demand plays a very important role in Economics. Consumer's demand is the main reason of all economic activity. Producers prefer to invest in those lines of production, demand for the output of which is not only high but is also continuous. This ensures them more profits than would otherwise be the case.

**2. Demand Schedule**

As already mentioned; demand is always at a price. If the price changes, the amount demanded will also change. This relationship between the two is usually shown in the form of a list or a table known as Demand Schedule which may be defined as tabular statement that the consumers are willing to buy per unit of time.

The demand schedule indicates quantities of commodity demanded at different possible prices, assuming that other factors do not change. Since a change in price leads to a change in demand, thus, demand and price are related and this relationship is often known as the functional relationship.

A hypothetical demand schedule, given in Table No. 1, indicates a consumer's demand for sugar at various prices.

**TABLE NO. 1**  
**Demand Schedule for Sugar**

<i>Price per kg. (in Rs.)</i>	<i>Demand (in Kgs)</i>
14	5
13	9
12	12
11	15

A careful look at this table reveals that the just mentioned relationship between demand and price is of an inverse type, i.e., movements in price and demand are in the opposite direction.

### 3. Market Demand Schedule

The demand schedule for the whole market is obtained by adding the quantities demanded by all the prospective buyers in the market. In other words, the market demand in a market may be quite large, they are often divided for this purpose, into a number of categories and demand coming from various categories is aggregated to obtain the market demand at various prices. table no. 2 gives an illustration of market demand schedule for oranges.

**TABLE NO. 2**  
**Market Demand Schedule for Oranges**

Price (Rupees per orange)	Demand of Product A	Demand of Product B	Demand of Product C	Total Market Demand =A+B+C
5	100	75	25	200
4	200	150	50	400
3	400	200	100	700
2	550	300	150	1,000
1	800	450	250	1,500

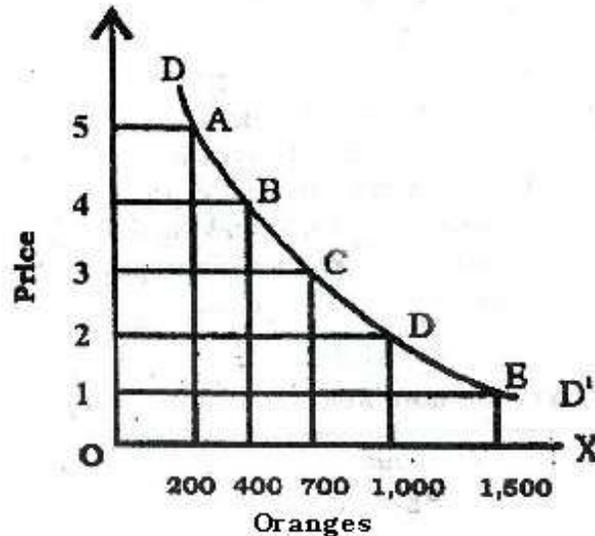
Let us suppose that there are three different categories of consumers A, B and C in the market. At the price of rupees 5 per orange the market demand is 200 oranges and when price falls to rupees 4 per orange the market demand increases to 400 oranges and so on.

**Difficulties in preparing a Demand Schedule :** It is very difficult to prepare an actual demand schedule. It is not easy to know how much of a commodity a consumer will buy at any particular price. All figures used for this purpose are therefore, imaginary. The problem is all the more complicated in the case of a market demand schedule because here the number of consumers are very large. In spite of this difficulty a hypothetical demand schedule serves, within certain limits, as a very good guess as to how much people are likely to buy at various prices and these figures are often used by businessmen and taxation authorities to take certain important decisions.

### 4. Demand Curve

A demand schedule can be converted into a demand curve. We measure the quantities demanded on the X-axis and the prices on the Y-axis. In case of the example

given in table no. 2 we take the number of oranges on the X-axis and their price on the Y-axis. We then draw perpendiculars from points indicating quantities demanded as well as from points indicating price. These perpendiculars will intersect at points A, B, C, D and E.



**Fig. No. 1**

When joined by a free hand, it will give us a curve DD' which is known as the market demand curve. This curve is also called the price quantity curve because it expresses a relationship between price on the one hand and quantity demanded on the other. This reveals us that as the price of oranges falls, the number of oranges demanded goes on increasing. For example, when oranges are sold at Rupees 3 each, the demand is that of 700 oranges. But when the price falls to Rupees 2 per orange, the demand increases to 1000 oranges. That is why the demand curve slopes downward from left to right.

### **5. Law of Demand**

The relationship between price and quantity demanded can be expressed in a very general form. We have already noted that more of a commodity is bought at a price lower than a given price and vice-versa. The law of demand therefore, states : other things remaining the same, the quantity of a commodity demanded varies inversely with price. In the words of Prof. Marshal, "more amount to be sold the smaller must be the price at which it is offered in order that it may find purchasers for, in other words, the amount demanded increases with a fall in price and diminishes with a rise in price." The phrase 'other things remaining the same', is quite important and it denotes the assumption that (i) people's taste and income do not change, (ii) prices of other related goods do not change, (iii) there are no substitutes for the

commodity in question (iv) people do not expect a further change in the price of the commodity. In reality, however, these assumptions do not always hold good and the law consequently fails to hold under certain particular circumstances.

According to this law, as the price of a commodity falls, its demand goes up. This is due to two reasons :

**(i) Income Effect :** The people who have used this good before, its demand is more now since its price has fallen. A fall in the price of a commodity amounts to an increase in the consumer's real income. For example, if the price of a commodity falls from Rs. 5 to Rs. 3, consumer may have to pay only Rs. 9 to buy 3 units of it instead of Rs. 15 and he will feel richer by Rs. 6. In other words, the purchasing power of money increases and with same amount of money which consumers used to spend on this particular commodity they can buy more of it.

**(ii) Substitution Effect :** When the price of a commodity falls, this means that (other things being equal) it has become cheaper, relatively to other goods. This fall in its price makes it more attractive as against substitutes whose price have not fallen. This makes people substitution it in place of other goods. For example, with the fall in the price of tea, coffee's price remaining the same, tea will be substituted for coffee. In other words, the demand for tea would go up.

Out of these two effects substitution effect is stronger because the consumer will always substitute the cheaper for the dearer commodity. Further, whereas substitution effect is always positive the income effect may be positive in some cases and negative in others e.g. in the case of an inferior commodity, the income effect is negative. But since a consumer spends only a small fraction of his income on a particular commodity, the income effect is generally very weak and the substitution effect is generally so powerful that the net result is positive.

**Exceptions to the Law of Demand :** There are some situations where the law of demand does not apply. These are given below :

- (i) When the people, expect that the price of a good will rise in future, they will buy more of it even at a higher price for fear of a further rise in its price. This is what happens during war times, especially in the case of necessities of life.
- (ii) The demand for things, which are symbols of social prestige and which confer a distinction on the holder like diamonds and jewellery does not behave according to this law. The demand for such things increases with a rise of their price because such commodities are demand because of their high price.
- (iii) The demand for the so-called inferior goods also provides an exception to this law. According to this law, as the price of a good falls, the quantity demanded increases and vice-versa. For example, the poorer sections

of a community cannot afford to buy superior varieties of foodgrains like wheat etc. and are hence contented with inferior varieties like maize. Now when the price of maize falls, there is an increase in their real income. Consequently they do not buy more of maize as the law of demand will require. Rather they will begin to demand superior variety like wheat to substitute if for maize.

- (iv) When a thing goes out of fashion the demand for it will not go up even, if its price goes down. In the opposite case, when the fashion for a article is growing people will buy more of it even though its price may be rising. In both of these cases, the law of demand gets violated.

These exceptions, however, do not invalidate the law of demand which holds in the case of number of commodities sold in the market. Though in certain cases some of the individuals may not act according to this law yet broadly speaking the law of demand does operate.

#### **6. Factors on which Demand depends**

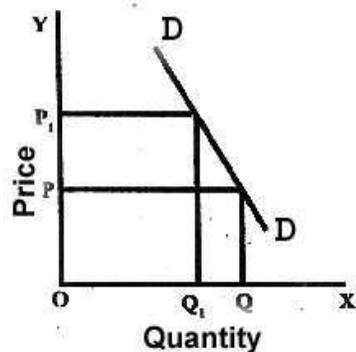
We now come to 'other things' which were assumed to remain constant, while stating the law of demand. It therefore's not necessary that only changes in price will bring change in demand. Change in other factors can do the same as explained below:

- (a) **Price of a Commodity :** The most important factor affecting quantity demanded is the price of the commodity. Normally, rise in price is accompanied by fall in demand and fall in price is accompanied by rise in demand. This relationship between price and demand is called the law of demand.
- (b) **Change in Income :** This change exerts a great influence on demand because when a consumer's income rises, his ability to pay also increases and naturally he can buy more of a good than before. Changes in the income distribution in favour of the poorer sections of the community increase purchasing power of these sections and their demand for goods in general and for necessities of life in particular is bound to increase. On the other hand, the demand for costly generally purchased by the rich will go down.
- (c) **Change in Size and Composition of Population :** Increase in the population of a country exerts an important influence on demand because, large the number of mouths to be fed greater will be the quantity of a commodity demanded. The age structure of the population also affects not only the size of demand, but also the composition of demand.
- (d) **Change in Tastes and Fashion :** Changes in tastes and fashions also affect demand. The growing fashion of wearing cotton cloth has reduced the demand for synthetic cloth. The popularity of coffee these days has

reduced the demand for tea. In big cities, regular number of people take their meals in hotels and this has increased demand for hotels, when things go out of fashion, demand for these disappear altogether.

- (e) **Technical Progress** : Technical progress makes manufacturing of new and better variety of articles possible and these reduce the demand for articles which go out of date. For example, invention of television had reduced the demand for radios.
- (f) **Prices of Substitutes** : Demand for a commodity also depends on the availability and price of substitutes. A rise in the price of a commodity will make people use of a substitute for this provided that is available at a cheaper price. This will reduce the demand for the commodity in question and increase the demand for the substitute. For example, if price of tea rises, people will start taking coffee and demand for coffee will go up. A fall in the price of tea may, on other hand, reduce demand of coffee.
- (g) **Change in Season** : Demand for certain commodities will change with the change in season. For example, the demand for woollen clothes increases in the winter season. Similarly, fans and cold drinks are in great demand during the summer season.
- (h) **Expectation about Future Price** : If there is a general feeling among people that prices in future will go up, there will be a greater demand for goods and everyone will buy more than his normal requirement. If however, prices in future are expected to go down, people will try to postpone their purchases and wait for the fall in prices. This will reduce the present demand for goods to a considerable extent.

**Extension and Contraction in demand** is due to fall and rise in price when price rise demand contracts and vice versa.

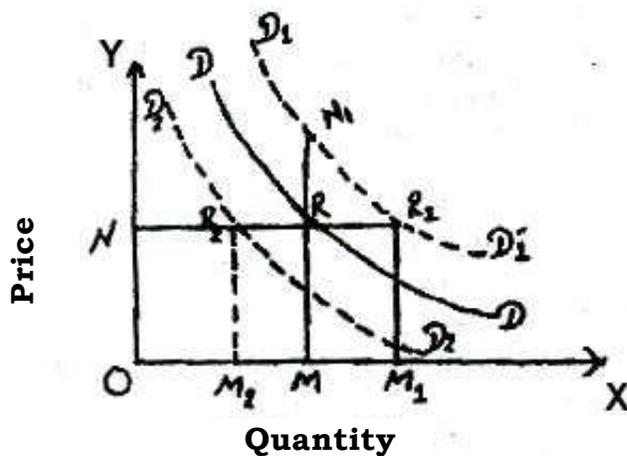


In this figure, when price is  $P$ , quantity is  $Q$ . Now there is price rise from  $OP$  to  $OP_1$ , then quantity demanded will decrease from  $OQ$  to  $OQ_1$ . This is known as contraction in demand. Similarly price is  $OP_1$  demand is  $OQ_1$ . now fall in price from  $OP_1$  to  $OP$  will lead to increase in demand from  $OQ_1$  to  $OQ$ . This is called extension in demand. Extension and Contraction can be shown on same demand schedule.

### Increase and Decrease in demand

We have noted above that demand on price and some other factors like consumer's income, their tastes etc. But the influence exerted by price is distinct influence exerted by price alone. Therefore, when demand rises due to fall in price or falls due to rise in price, this is called extension of demand and contraction of demand respectively. It is change in the quantity demanded since we remain on the existing demand curve. Thus, a change in price leads only to change in the quantity demanded.

When, however, factors other than price influence demand, they change the conditions of demand as a result of which more or less is demanded than before at the same price. This is not a change in quantity demanded, but a change in demand itself and it is known as Increase or Decrease in demand. An increase in demand implies that more of a good is demanded at the same price or the same quantity of that good is demanded at a high price. Here, we are on a new demand curve which is to the right of the old demand curve. A decrease in demand means that less of a good is demanded at same price and more quantity of that good is demanded at a lower price. Here, too, we are on a new demand curve which is to the left of the old demand curve. Both Increase and decrease in demand are shown in diagram No. 2



**Quantity**

**Fig. No. 2**

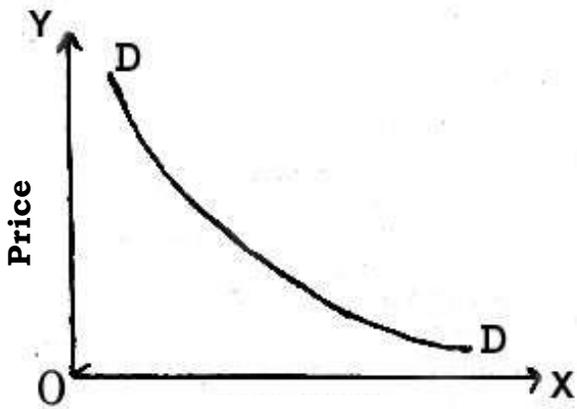
At price  $ON (=MR)$   $OM$  of a good is demanded. Curve  $D_1 D_1$  indicates increase in demand because the same quantity  $OM$  is now demanded at a higher price  $MR_1$  or at the same price  $MR$  quantity demanded has increased from  $OM$  to  $OM_1$ . Curve  $D_2 D_2$  indicates decrease in demand because the same quantity  $OM$  is now demanded at price  $MR$  or, at the same price  $MR_2$  demand has decreased from  $OM$  to  $OM_2$ .

Marshall says, "when we say that a person's demand for any thing, increase we mean that he will buy as much of it as before at a higher price. A general increase in his demand is an increase throughout the whole list of prices at which he is willing to purchase different amount of it and or merely that he is willing to buy more of it at the current price."

### 8. Types of Demand

The quantity of consumer's goods bought depends on prices of those goods, prices of substitutes and consumer's income. Thus, there are three types of demand,

price demand, income demand and cross demand.



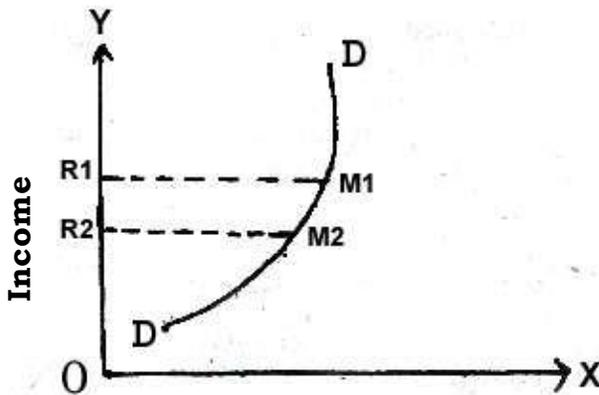
**Quantity**  
**Fig. No. 3**

**(a) Price Demand :** We have already discussed the relationship between demand and price. Price demand therefore, refers to those quantities of a commodity which consumers demand at various prices under the assumption that other things remain the same. The law of demand deals with this type of demand and its graph is shown in fig. No. 3.

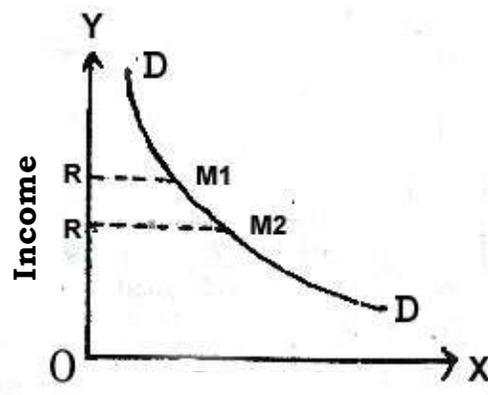
**(b) Income Demand :** This refers to those quantities of a good which consumers will buy at different levels of their income under the assumption that price of the good in question and those of its substitutes will remain the same. Income replaces price. In this case, we can prepare an income demand schedule from which an income demand curve can be drawn.

Such a curve is shown in Figure No. 4 (a) and it indicates that, as the level of income rises, demand for a commodity also increases.

But we know that there are goods (known as inferior goods) the quantity demanded in the case of which decreases as the consumer's income increases. The income demand curve for such cases is shown in figure No. 4 (b).



**Quantity**  
**Fig. No. 4(a)**



**Quantity**  
**Fig. No. 4(b)**

**(d) Cross Demand :** Cross Demand denotes the different quantities of a commodity which consumers buy at different prices of a related good under the assumption that price of the commodity in question and the level of consumer's income do not undergo a change.

There are certain goods which are either substitutes or complements to other goods. In the case of the former, a rise in the price of one good may increase the demand for the other and this case is shown in figure No. 5.

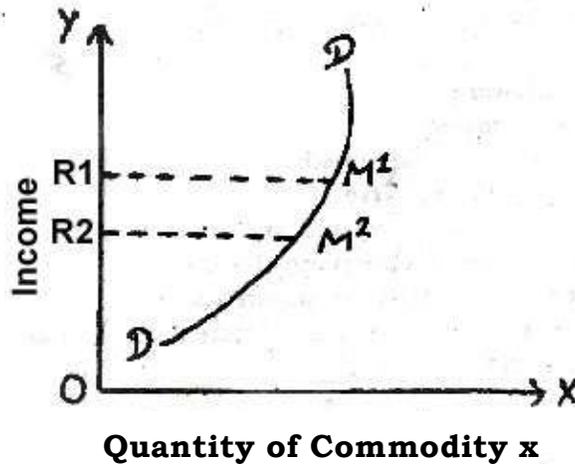


Fig. No. 5

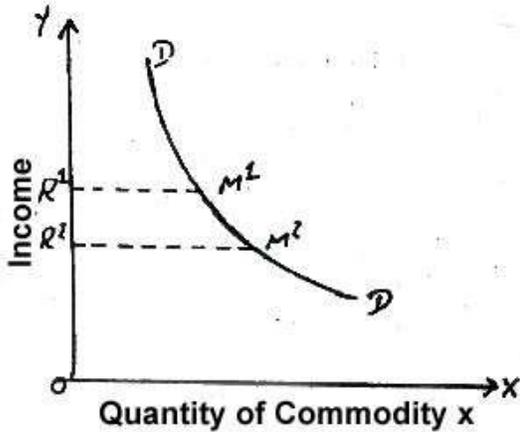


Fig No. 6

Coming to the case of complements, we know that these goods are jointly demanded e.g. scooter, petrol, bread butter, pen-ink etc. If the price of good rises, demand for it may go down and consequently demand for the allied good will also go down. This case has been shown in figure No. 6 e.g. price of scooter rise then demand for scooter will fall, at the same time demand for petrol will fall.

**ELASTICITY OF DEMAND**

- I. Meaning
- II. Degrees of Elasticity of Demand
- III. Measurement of Elasticity of Demand
- IV. Factors Affecting Elasticity of Demand
- V. Importance of Elasticity of Demand

**I. Meaning :** The law of demand reveals the inverse relationship between demand and price and a change in price will, therefore, bring a change in the quantity demanded. The responsiveness of the quantity demanded to changes in price is called elasticity of demand which may be defined as the degree of response to change in price. A.L. Meyers says, "The elasticity of demand is a measure of the relative changes in amount purchased in response to relative changes in price on a given demand curve." In the case of certain goods, the quantity demanded increases more relatively to the fall in its price, but in the case of others, quite a big fall in price does not lead to any substantial increase in the quantity demanded. The demand for former type of goods is relatively elastic while that for the latter type, relatively inelastic. According to Prof. Marshall, "The elasticity (or responsiveness) of demand in a market is great or small according as the amount demanded increases much or little for a given fall in price and diminishes much or little for a given rise in price." It should however, be remembered that all demands are elastic to some extent and the difference is only of a degree.

$$\text{Price elasticity} = \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in price}}$$

$$= \frac{\frac{\text{Change in demand}}{\text{Original demand}}}{\frac{\text{Change in price}}{\text{Original price}}}$$

or, in symbolic terms

$$ep = \frac{\frac{\Delta q}{q}}{\frac{\Delta p}{p}} = \frac{\Delta p}{q} \times \frac{p}{\Delta p} = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

Where,  $e_p$  stands for Price elasticity  
 $q$  stands for quantity demanded.  
 $P$  stands for Price.  
 $\Delta$  stands for infinitesimal change.

We know that the consumer's income and prices of other goods all effect demand for a commodity. The change in the quantity demanded in response to these influences is known as income elasticity and cross elasticity of demand respectively.

The income elasticity of demand may be defined as the ratio of the proportionate change in the quantity demanded of a good to proportionate change in income.

$$\begin{aligned} \text{Income elasticity} &= \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in income}} \\ &= \frac{\frac{\text{Change in demand}}{\text{Original demand}}}{\frac{\text{Change in price}}{\text{Original price}}} \end{aligned}$$

In symbols,

$$e_y = \frac{\frac{\Delta q}{q}}{\frac{\Delta y}{y}} = \frac{\Delta q}{q} \times \frac{y}{\Delta y} = \frac{\Delta q}{\Delta y} \times \frac{y}{q}$$

Where,  $q$  stands for quantity demanded.  
 $y$  stands for income.  
 $O$  stands for infinitesimal change.  
 $e$  stands for income elasticity of demand.

The cross elasticity of demand measures the degree of change in demand for one good in response to the change in price of related good.

Coefficient of cross elasticity of demand of x for y =

$$\frac{\frac{\text{Proportionate change in quantity demand of X}}{\text{Proportionate change in price of good Y}}}{\frac{\Delta q_x}{q_x}} = \frac{\Delta q_x}{q_x} \times \frac{p_y}{\Delta p_y}$$

Where, or  $e_{xy}$  stands for cross elasticity of demand of x for y.  
 $q_x$  means original quantity demanded of x.

$$\frac{\Delta q_x}{\Delta p_y} \times \frac{p_y}{q_x}$$

$\Delta q_x$  stands for change in quantity demanded of x.

$P_y$  stands for the original Price of good y.

$\Delta P_y$  stands for change in the Price of good y.

We have discussed above three main types of elasticity of demand. In the rest of this lesson, however, we confine ourselves only to price elasticity of demand.

**II. Five Degrees of Elasticity of Demand :** Goods differ so far as the change in the quantity demanded consequent from a change in price is concerned. In some cases, this response is negligible whereas in others it is considerable. Elasticity of demand therefore, varies between zero and infinity. But the five well-known categories are mentioned below.

**(i) Perfectly Elastic Demand :** The demand for a commodity is said to be perfectly elastic when at the same price; consumers will buy all that they can obtain of the commodity, while at even slightly higher price they will buy nothing at all. The demand curve in the case is parallel to the X-axis as shown in figure no. 7

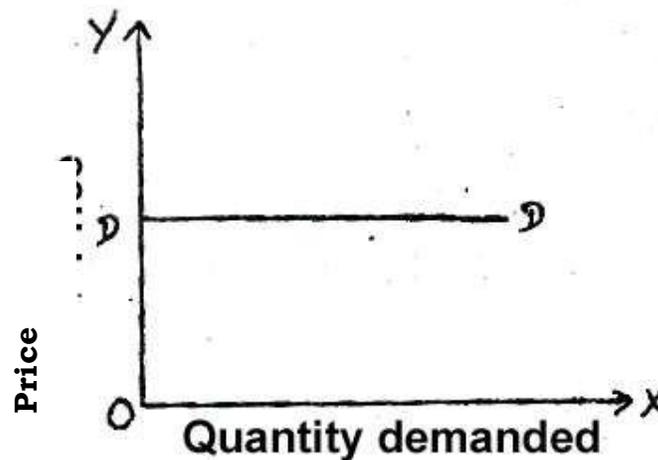


Fig No. 7

### Quantity demanded

Fig. No. 7

**(ii) Perfectly Inelastic Demand :** When a sharp rise or a considerable fall in price is not followed by any change in the quantity demanded, the demand is said to be perfectly inelastic. The demand curve in this case is a vertical straight line parallel to the Y-axis as shown in fig. no. 8. For example, with a fall or rise in the price of salt there is no change in the quantity demanded.

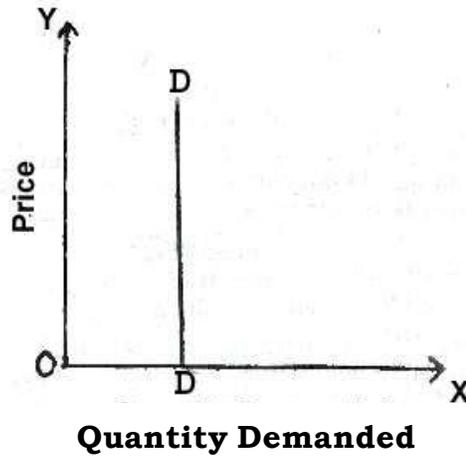


Fig. No. 8

(iii) **Demand with Elasticity Greater than Unity** : When the percentage change in quantity demanded is greater than percentage change in price, elasticity of demand is said to be greater than one. For example, the demand for colour televisions and air conditioners rises considerably in response to a small fall in their price. fig. no. 9 illustrates this case.

(iv) **Demand with Elasticity Less than Unity** : When the percentage change in the quantity demand is less than the percentage change in price, elasticity of demand is said to be less than unity. Most of the necessities like wheat, rice or

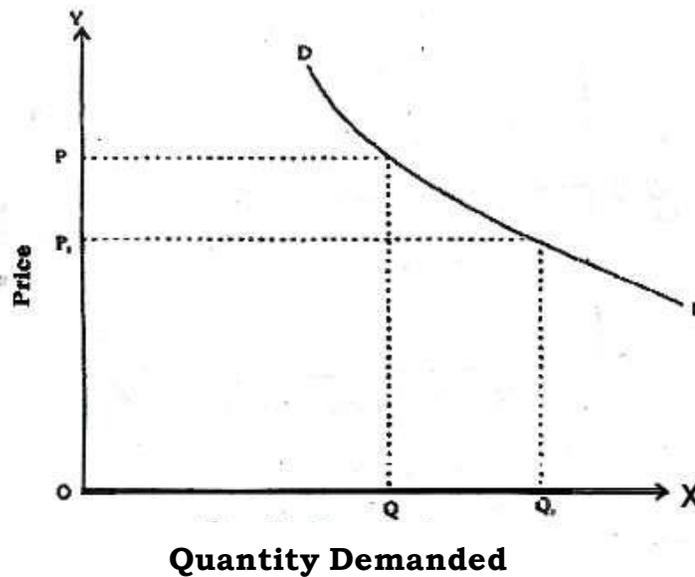


Fig. No. 9

sugar of life belong to this category of goods. fig. no. 10 illustrates this case.

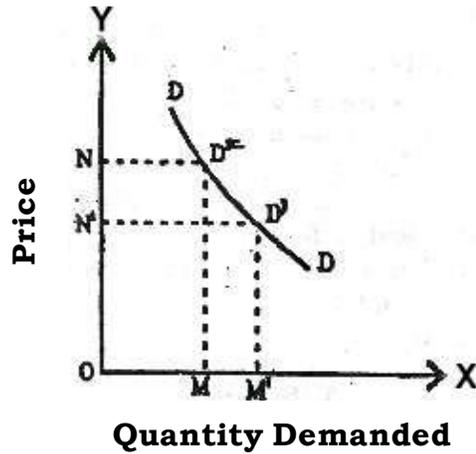


Fig. No. 10

(v) **Demand with Elasticity Equal to Unity** : When the percentage change in quantity demanded is equal to the percentage change in price, elasticity of demand is said to be equal to unity. For example, if the price of the commodity doubles and its quantity demanded is reduced to one half of that previously demanded, the elasticity of demanded is equal to unity. fig. no. 11 illustrates this case.

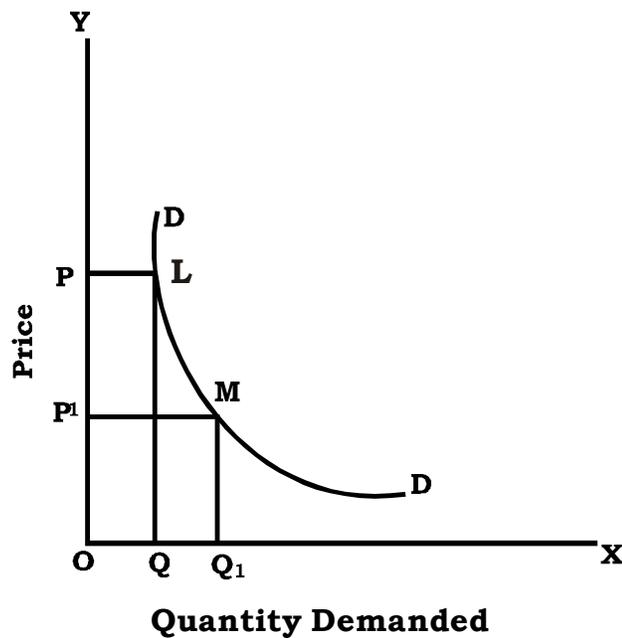


Fig. No. 11

**III. Measurement of Elasticity of Demand :**

Elasticity of demand can be measured in various ways. The following methods are very commonly used :

- (a) Total Outlay Method
- (b) Percentage Method
- (c) Point Method

**(a) Total Outlay Method :** It was introduced by Marshall in his book "Principles of Economics." According to Marshall, if a fall in price results in an increase in total outlay and a rise in a price results in a fall in total outlay the elasticity of demand is more than unity. If after a fall or rise in price, the total outlay remains constant the elasticity of demand is equal to unity if a rise in price results in increased outlay and a fall in price results in decreased outlay, the elasticity of demand is less than unity. Under this method we measure elasticity by examining the change in total outlay due to change in price. This can be explained by means of a table.

**TABLE NO. 1**

<i>Sr. No.</i>	<i>Price (per Kg.) in (Rs.)</i>	<i>Demand (Kgs)</i>	<i>Total outlay in (Rs.)</i>
1	1.00	4	4.00
2	0.75	6	4.50
3	0.50	9	4.50
4	0.30	12	3.60

The above table consists of four columns. The first column shows the serial number, the second shows the price per Kg. of a commodity and the third column quantity demanded. By multiplying the price with the corresponding quantity demanded. We get outlay as shown in column No. 4 Demand between serial No. 1 and 2 has elasticity more than unity, between serial No. 2 and 3 demand has unity elasticity and between serial No. 3 and 4 the elasticity is less than unity.

This can be illustrated by means of a diagram. The curve E in fig. no. 12 shows total outlay at outlay at various prices.

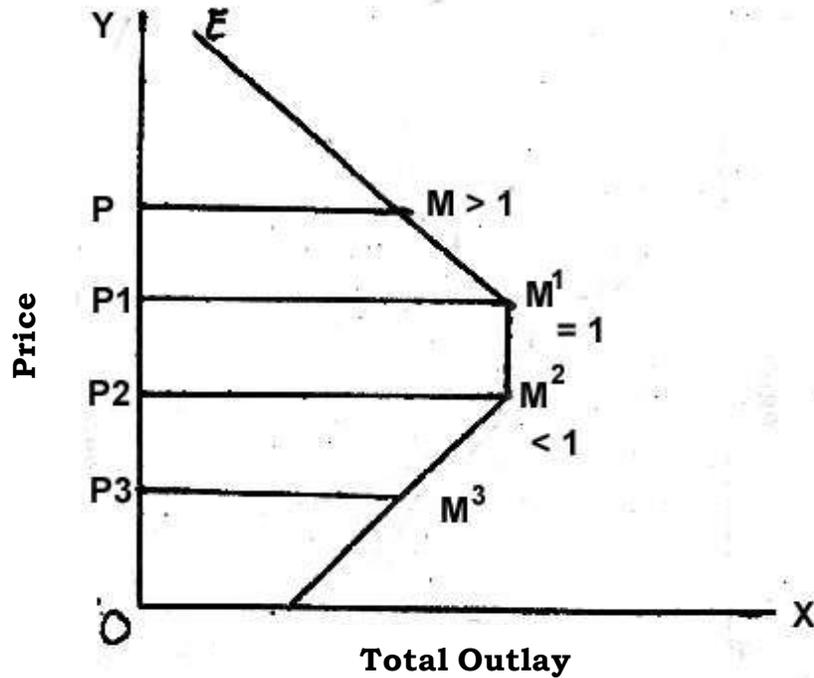


Fig. No. 12

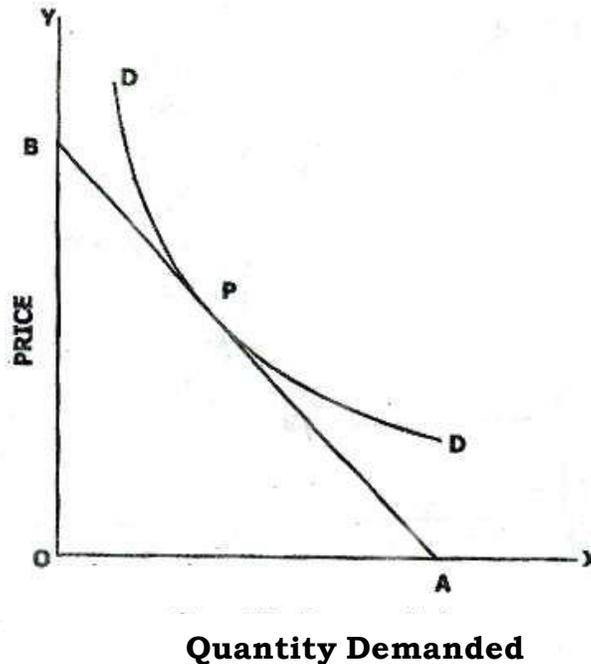
At price  $OP$ , the total outlay is  $PM$ , When price falls from the  $OP$  to  $OP^1$  the total outlay increases from  $PM$  to  $P_1M_1$ , and elasticity of demand is more than unity. Similarly when price falls from  $OP^1$  and  $OP^2$  total outlay is  $P^2M^2$  which is the same as  $P^1M^1$ . Here the elasticity of demand is "equal" "to" unity. When the price falls from  $OP^2$  to  $OP^3$  total outlay falls  $P_3M_3$ . Here the elasticity of demand is less than unity.

**(b) Percentage Method :** The second method to measure elasticity is explained by dividing the percentage change in quantity demanded by the percentage change in price. Here the elasticity of demand is equal to percentage change in quantity demanded by percentage change in price.

According to Marshall, if a given proportionate fall or rise in price causes an equal proportionate rise or fall in the quantity demanded, the elasticity of demand is equal to unity or in other words, if 1% falls or rise in price leads to 1% rise or fall in the quantity demanded, elasticity of demand is equal to unity, if 1% fall or rise in price leads to less than 1% rise or fall in demand, elasticity is more than unity. Thus, elasticity is the ratio of the percentage change in the quantity demanded or the percentage change in the price charged.

$$\text{i.e., Price Elasticity} = \frac{\text{Proportionate change in demand}}{\text{Proportionate change in Price}}$$

(c) **Point Method** : (or Geometric method); Since the degree of elasticity of demand may vary on different parts of a demand curve, we are sometimes interested in measuring elasticity of demand at a particular quantity.



**Fig. No. 13**

Figure no. 13 shows how to measure this elasticity. If P is any point on a demand curve DD. A tangent is drawn to this curve at P and this tangent touches X-axis at A and Y-axis at B. The elasticity of demand at P is given by the ratio PA/PB. Since PA is longer than PB elasticity of demand at P is greater than one. The following formula is used for measuring elasticity of demand at a point.

$$ED_P = \frac{\text{Lower Segment}}{\text{Upper Segment}}$$

#### **IV. Factors affecting Elasticity of Demand**

We have seen that elasticity of demand is different for different goods. This is because of following reasons :

- (a) In general, the demand for necessities of life (e.g. food, cloth etc.) is inelastic and the demand for luxury goods is elastic. This is because consumption of certain minimum of these necessities is indispensable for human existence. However high the price of these goods may be, no body can live without them. But on the other hand, demand for luxuries

can be cut short if their prices rise above a certain level. A necessity does not necessarily mean a necessity of life. If a person gets accustomed to the consumption of a thing it becomes an indispensable part of his consumption pattern and consequently his demand for it becomes inelastic. The elasticity of demand for wine for an addict is less than unity.

- (b) Elasticity of demand also depends upon the number of alternative uses to which a thing can be put. If a good has several uses its demand will be elastic. For example, coal can be used in workshops, railways, factories and for domestic purposes. If the price of coal falls, it will begin to be used where before the falls in price, it was not worthwhile to use. Goods which have specified use have inelastic demand.
- (c) The goods having substitutes have elastic demand. For example, if the price of coffee rises, people will turn to tea and demand for coffee will fall to large extent.
- (d) The elasticity of demand for particular good also depends upon the possibility of the postponement of its use. Goods, the demand for which can be postponed have elastic demand. The demand for these commodities consumption of which cannot be postponed is inelastic.
- (e) The elasticity of demand depends on the prevailing level of prices. If the price of a good is very high, the amount demanded will not increase much in response to any small fall in its price. A very steep fall in price will be required to increase demand. If the price of a good is very low, further, all may not lead to any appreciable increase in demand because most of the people must have already bought it. When the prices are already too high or too low, a small change in them will not affect the demand much. Thus, the demand is inelastic when the price is too high or too low, but elastic in the middle range of price.
- (f) Elasticity of demand also depends upon the proportion of consumer's income spent on the commodity in question. If a consumer spends only a very small proportion of his income on a particular good, the quantity demanded will not change much as a result of a change in its price. In other words, the demand for such things is inelastic.
- (g) Standard of living of the people is another factor which determines the elasticity of demand. We know that rich people are less affected by change in price. It can thus be said that elasticity of demand for a commodity is usually low in that part of a country where standard of living of the people is high as compared to that in the other part which may be inhabited by the people with low standard of living.

**V. Importance of Elasticity of demand**

The concept of elasticity of demand has a great significance in Economics as discussed below :

- (i) The producers under imperfect competition and monopolistic competition are both guided by elasticity of demand for their products while fixing their prices. In case the demand for a commodity is inelastic, a monopolist can fix a high price for it because, in such cases, he is almost sure about the sale of his product. Again it is the knowledge about the elasticity of demand for his product in different markets that helps a monopolist practising price discrimination.
- (ii) The concept is very useful to the government in framing its taxation policies. If the government wants to increase its income from indirect taxes, these taxes should be imposed only on those goods which, have inelastic demand.
- (iii) Elasticity of demand determines the extent to which a particular factor of production can get its remuneration raised. For example, if in the construction industry demand for a particular type of labour is inelastic, it can be paid higher wages as compared to those paid to other categories.
- (iv) The concept plays an important role in the determination of terms of trade between two countries when international trade is going on Terms of trade will move in favour of that country whose demand for the product is comparatively more elastic.

**BOOKS FOR STUDY**

1. Dewett, K.K. : *Modern Economic Theory.*
2. Stonier, A.W. and Hague, D.C. : *A Text Book of Economic Theory*
3. Lipsey, R.G. and Steiger, P.O. : *Economics*

**SUGGESTED QUESTIONS FOR YOUR PRACTICE**

1. Explain the concept of elasticity of demand and give the various methods of measuring elasticity of demand. What is its importance in Economics?
2. Write short answers of the following questions :
  - (1) Explain the concept of Elasticity of Demand.
  - (2) Give various methods of measuring Elasticity of Demand.
  - (3) What is cross price elasticity of demand.
  - (4) How elasticity of demand can be measured with the total outlay method?
  - (5) What are the factors affecting elasticity of demand.
3. Explain the law of Demand why does a demand curve slope downwards from left to right ?
4. Explain the factors which determine the demand for a good.