Utility Approach

Theory of Consumer Behavior:

Cardinal Utility Analysis/Approach:

- **Definition and Explanation:**
- Human wants are unlimited and they are of different intensity. That means at the disposal of a man are not only scarce but they have alternative uses. As a result of scarcity of recourses, the consumer cannot satisfy all his wants. He has to choose as to which want is to be satisfied first and which afterward if the recourses permit. The consumer is confronted in making a choice.

- For example, a man is thirsty. He goes to the market and satisfies his thirst by purchasing water instead of tea.
- We are here to examine the economic forces which make him purchase a particular commodity. The answer is simple.
- The consumer buys a commodity because it gives him satisfaction. In technical term, a consumer purchases a commodity because it has utility for him.

Concept of Utility:

- Jevon (1835 -1882) was the first economist who introduces the *concept of utility* in economics. According to him:

- "Utility is the basis on which the demand of an individual for a commodity depends upon".

- Utility is defined as: "The power of a commodity or service to satisfy human want".

- Utility is thus the satisfaction which is derived by the consumer by consuming the goods.

- For example, cloth has a utility for us because we can wear it. Pen has a utility who can write with it. The utility is subjective in nature. It differs from person to person. The utility of a bottle of wine is zero for a person who is non-drinker while it has a very high utility for a drinker.

- Here it may be noted that the term ‘utility’ may not be confused with pleasure or usefulness which a commodity gives to an individual. Utility is a subjective satisfaction which consumer gets from consuming any goods or services.

- For example, poison is injurious to health but it gives subjective satisfaction to a person who wishes to die. We can say that utility of value is neutral.

Assumptions of Cardinal Utility Analysis:

- The main assumption or premises on which the cardinal utility analysis rests are as under.

- (i) Rationality. The consumer is rational. He seeks to maximize satisfaction from the limited income which is at his disposal.

- (ii) Utility is cardinally measurable. The utility can be measured in cardinal numbers such as 1, 3, 10, 15, etc. The utility is expressed in imaginary cardinal numbers tells us a great deal about the preference of the consumer for a good.

- (iii) Marginal utility of money remains constant. Another important premise of cardinal utility of money spent on the purchase of a good or service should remain constant.

- (iv) Diminishing marginal utility. It is also assumed that the marginal utility obtained from the consumption of a good diminishes continuously as its consumption is increased.

- Criticism:
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- Pareto, an Italian Economist, severely criticized the concept of cardinal utility. He stated that utility is neither quantifiable nor addible. It can, however be compared. He suggested that the concept of utility should be replaced by the scale of preference. Hicks and Allen, following the footsteps of Pareto, introduced the technique of indifference curves. The cardinal utility approach is thus replaced by ordinal utility function.

- Total Utility (TU):

- Definition and Explanation:
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- *"Total utility* is the total satisfaction obtained from all units of a particular commodity consumed over a period of time".

- For example, a person consumes eggs and gains 50 units of total utility. This total utility is the sum of utilities from the successive units (30 units from the first egg, 15 units from the second and 5 units from the third egg).
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- Summing up total utility is the amount of satisfaction (utility) obtained from consuming a particular quantity of a good or service within a given time period. It is the sum of marginal utilities of each successive unit of consumption.
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- Formula:
- $TU_x = \sum MU_x$

Marginal Utility (MU):

- Definition and Explanation:

- *"Marginal utility* means an additional or incremental utility. Marginal utility is the change in the total utility that results from one unit change in consumption of the commodity within a given period of time".

- For example: when a person increases the consumption of eggs from one egg to two eggs, the total utility increases from 30 units to 45 units. The marginal utility here would be the15 units of the 2nd egg consumed.

- Marginal utility, thus, can also be described as difference between total utility derived from one level of consumption and total utility derived from another level of consumption.

- Formula:
- $MU = \frac{\Delta TU}{\Delta Q}$

- It may be noted that as a person consumes more and more units of a commodity, the marginal utility of the additional units begins to diminish but the total utility goes on increasing at a diminishing rate.
- When the marginal utility comes to zero or we say the point of satiety is reached, the total utility is the maximum. If consumption is increased further from this point of satiety, the marginal utility becomes negative and total utility begins to diminish.
- The *relationship between total utility and marginal utility* is now explained with the help of following schedule and a graph.

Schedule:

Units of Apples Consumed Daily	Total Utility in units Per Day	Marginal Utility in units Per Day
1	7	7
2	11	4 (11-7)
3	13	2 (13-11)
4	14	1 (14-13)
5	14	0 (14-14)
6	13	-1 (13-14)

- The above table shows that when a person consumes no apples, he gets no satisfaction. His total utility is zero. In case he consumes one apple a day, he gains seven units of satisfaction. His total utility is 7 and his marginal utility is also 7.

- In case he consumes second apple, he gains extra 4 units (MU). Thus given him a total utility of 11 units from two apples. His marginal utility has gone down from 7 units to 4 units because he has a less craving for the second apple.

- Same is the case with the consumption of third apple. The marginal utility has now fallen to 2 units while the total utility of three apples has increased to 13 units (7 + 4 + 2). In case the consumer takes fifth apple, his marginal utility falls to zero units and if he consumes sixth apple also, the total showing total utility and marginal utility is plotted in figure below and explained the relationship of total utility and marginal utility.

Diagram/Curve:

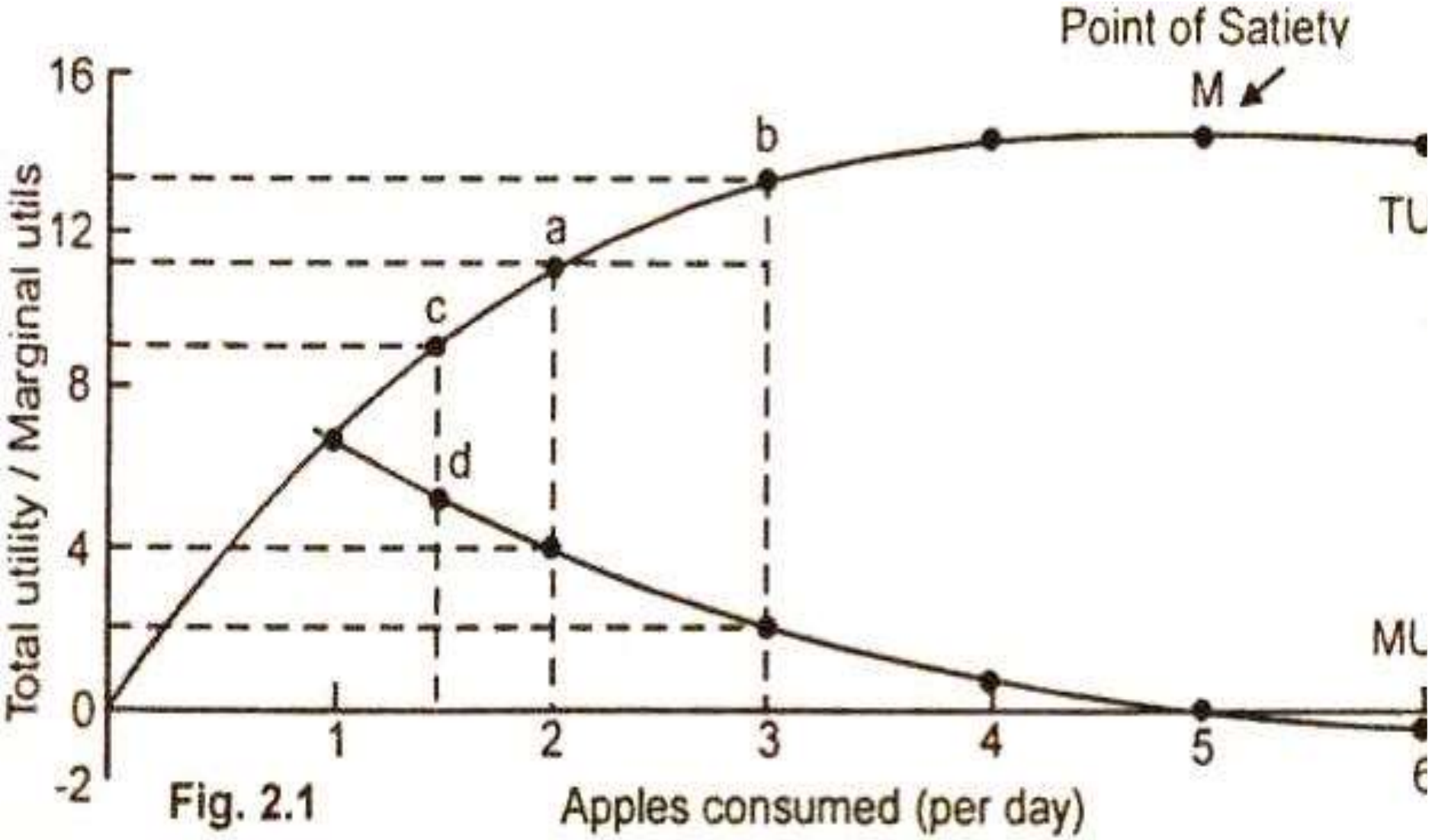

Fig. 2.1

- (i) The total utility curves starts at the origin as zero consumption of apples yield zero utility.
- (ii) The TU curve reaches at its maximum or a peak of M when MU is zero.
- (iii) The MU curve falls through the graph. A special point occurs when the consumer consumes fifth apple. He gains no marginal utility from it. After this point, marginal utility becomes negative.

Law of Diminishing Marginal Utility:

- Definition and Statement of the Law:
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- The *law of diminishing marginal utility* describes a familiar and fundamental tendency of human behavior. The law of diminishing marginal utility *states that*:
- "As a consumer consumes more and more units of a specific commodity, the utility from the successive units goes on diminishing".
- Mr. H. Gossen, a German economist, was first to explain this law in 1854. Alfred Marshal later on restated this law in the following words:
- "The additional benefit which a person derives from an increase of his stock of a thing diminishes with every increase in the stock that already has".

Assumptions of Law of Diminishing Marginal Utility:

- The law of diminishing marginal utility is true under certain assumptions. These assumptions are as under:
- (i) Rationality: In the cardinal utility analysis, it is assumed that the consumer is rational. He aims at maximization of utility subject to availability of his income.
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- (ii) Constant marginal utility of money: It is assumed in the theory that the marginal utility of money based for purchasing goods remains constant. If the marginal utility of money changes with the increase or decrease in income, it then cannot yield correct measurement of the marginal utility of the good.
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- (iii) Diminishing marginal utility: Another important assumption of utility analysis is that the utility gained from the successive units of a commodity diminishes in a given time period.
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- (iv) Utility is additive: It is assumed that the utilities of different commodities are independent. The total utility of each commodity is additive.
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- (v) Consumption to be continuous: It is assumed in this law that the consumption of a commodity should be continuous. If there is interval between the consumption of the same units of the commodity, the law may not hold good. For instance, if you take one glass of water in the morning and the 2nd at noon, the marginal utility of the 2nd glass of water may increase.

- (vi) Suitable quantity: It is also assumed that the commodity consumed is taken in suitable and reasonable units. If the units are too small, then the marginal utility instead of falling may increase up to a few units.
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- (vii) Character of the consumer does not change: The law holds true if there is no change in the character of the consumer. For example, if a consumer develops a taste for wine, the additional units of wine may increase the marginal utility to a drunkard.
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- (viii) No change to fashion, customs and tastes: If there is a sudden change in fashion or customs or taste of a consumer, it can than make the law inoperative.
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- (ix) No change in the price of the commodity: There should be any change in the price of that commodity as more units are consumed.

- Explanation and Example of Law of Diminishing Marginal Utility:
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- This law can be explained by taking a very simple example. Suppose a man is very thirsty.
- He goes to the market and buys one glass of water. The glass of water gives him immense pleasure or we say the first glass of water has great utility for him.
- If he takes second glass of water after that, the utility will be less than that of the first one. It is because the edge of his thirst has been blunted to a great extent. If he drinks third glass of water, the utility of the third glass will be less than that of second and so on.

- The utility goes on diminishing with the consumption of every successive glass of water till it drops down to zero.
- This is the point of satiety. It is the position of consumer's equilibrium or maximum satisfaction.
- If the consumer is forced further to take a glass of water, it leads to disutility causing total utility to decline. The marginal utility will become negative.
- A rational consumer will stop taking water at the point at which marginal utility becomes negative even if the good is free. In short, the more we have of a thing, ceteris paribus, the less we want still more of that, or to be more precise.

- “In given span of time, the more of a specific product a consumer obtains, the less anxious he is to get more units of that product” or we can say that as more units of a good are consumed, additional units will provide less additional satisfaction than previous units.
- The following table and graph will make the law of diminishing marginal utility more clear.

Schedule of Law of Diminishing Marginal Utility:

Units	Total Utility	Marginal Utility
1st glass	20	20
2nd glass	32	12
3rd glass	40	8
4th glass	42	2
5th glass	42	0
6th glass	39	-3

- From the above table, it is clear that in a given span of time, the first glass of water to a thirsty man gives 20 units of utility.
- When he takes second glass of water, the marginal utility goes on down to 12 units;
- When he consumes fifth glass of water, the marginal utility drops down to zero and if the consumption of water is forced further from this point, the utility changes into disutility (-3).
- Here it may be noted that the utility of then successive units consumed diminishes not because they are not of inferior in quality than that of others.
- We assume that all the units of a commodity consumed are exactly alike. The utility of the successive units falls simply because they happen to be consumed afterwards.

Curve/Diagram of Law of Diminishing Marginal Utility:

The law of diminishing marginal utility can also be represented by a diagram.

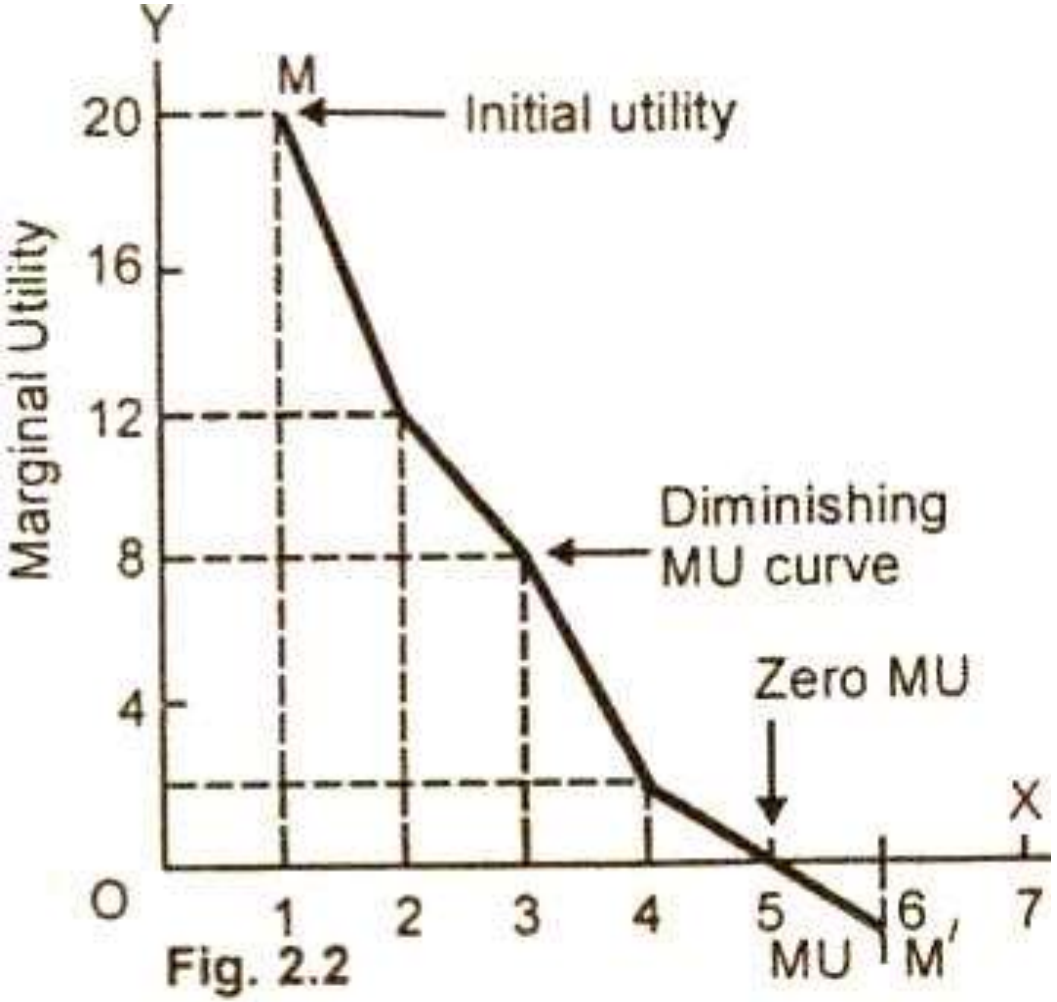

Fig. 2.2

- In the figure (2.2), along OX we measure units of a commodity consumed and along OY is shown the marginal utility derived from them. The marginal utility of the first glass of water is called initial utility. It is equal to 20 units.
- The MU of the 5th glass of water is zero. It is called satiety point. The MU of the 6th glass of water is negative (-3).
- The MU curve here lies below the OX axis. The utility curve $MM^{/}$ falls left from left down to the right showing that the marginal utility of the success units of glasses of water is falling.

Limitations/Exceptions of Law of Diminishing Marginal Utility:

- There are some exceptions or limitations to the law of diminishing utility.
- (i) Case of intoxicants: Consumption of liquor defies the low for a short period. The more a person drinks, the more likes it. However, this is truer only initially. A stage comes when a drunkard too starts taking less and less liquor and eventually stops it.
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- (ii) Rare collection: If there are only two diamonds in the world, the possession of 2nd diamond will push up the marginal utility.

- (iii) Application to money: The law equally holds good for money. It is true that more money the man has, the greedier he is to get additional units of it. However, the truth is that the marginal utility of money declines with richness but never falls to zero.
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- Summing up, we can say that the law of diminishing marginal utility, like other laws of Economics, is simply a statement of tendency. It holds good provided other factors remain constant.

Practical Importance of Law of Diminishing Marginal Utility:

- The law of diminishing marginal utility has great practical importance in economics. The law of demand, the theory of consumer's surplus, and the equilibrium in the distribution of expenditure are derived from the law of diminishing marginal utility.

(i) Basis of the law of demand: The law of diminishing marginal utility and the law of demand are very closely related to each other.

- In fact they law of diminishing marginal utility, the more we have of a thing, and the less we want additional increment of it. In other words, we can say that as a person gets more and more of a particular commodity, the marginal utility of the successive units begins to diminish.
- So every consumer while buying a particular commodity compares the marginal utility of the commodity and the price of the commodity which he has to pay.

- If the marginal utility of the commodity is higher than that of price, he purchases that commodity.
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- As he buys more and more, the marginal utility of the successive units begins to diminish.

- Then he pays fewer amounts for the successive units. He tries to equate at every step the marginal utility and the price of the commodity, he must lower its price so that the consumers are induced to buy large quantities and this is what is explained in the law of demand.

- From this, we conclude that the law of demand and the law of diminishing are very closely inter-related.

- (ii) Consumer's surplus concept: The theory of consumer's surplus is also based on the law of diminishing marginal utility.

- A consumer while purchasing the commodity compares the utility of the commodity with that of the price which he has to pay.

- In most of the cases, he is willing to pay more than what he actually pays. The excess of the price which he would be willing to pay rather than to go without the thing over that which he actually does pay is the economic measure of this surplus satisfaction. It is in fact difference between the total utility and the actually money spent.
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- (iii) Importance to the consumer: A consumer in order to get the maximum satisfaction from his relatively scarce resources distributes his income on commodities and services in such a way that the marginal utility from all the uses are the same. Here again the concept of marginal utility helps the consumer in arranging his scale of preference for the commodities and services.

- iv) Importance to finance minister: Sometimes it is pointed out that the law of diminishing marginal utility does not apply on money.
- As a person to collect money the desires to accumulate more money increases. This view is superficial. It is true that wealth is acquired for the procurement of goods and services and man is always anxious in getting more and more of money.

- But what about the utility of money to him? Is it not a fact that as a person gets more and more wealth, its utility progressively decreases, though it does not reach to zero?

- For example, a person who earns Tk 90,000 per month attaches less importance to Tk 10. But a man who gets Tk 1000 per month, the value of Tk 10 to him is very high.
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- A finance minister knowing this fact that the utility of money to a rich man is high and to poor man low bases the system of taxation in such a way that the rich persons are taxed at a progressive rate.

- The system of modern taxation is therefore, based on the law of diminishing marginal utility.
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Law of Equi-Marginal Utility:

- Other Names of this Law: Law of Substitution OR Law of Maximum Satisfaction OR Law of Indifference OR Proportion Rule OR Gossen's Second Law.
- In the cardinal utility analysis, the principle of equal marginal utility occupies an important place.
- Definition and Statement of Law of Equi-Marginal Utility:
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- The *law of equi-marginal utility* is simply an extension of law of diminishing marginal utility to two or more than two commodities. The law of equilibrium utility is known, by various names. It is named as the Law of Substitution, the Law of Maximum Satisfaction, the Law of Indifference, the Proportionate Rule and the Gossen's Second Law.

- In cardinal utility analysis, this law is stated by Lipsey in the following words:
- “The household maximizing the utility will so allocate the expenditure between commodities that the utility of the last penny spent on each item is equal”.
- As we know, every consumer has unlimited wants. However, the income this disposal at any time is limited.

- The consumer is, therefore, faced with a choice among many commodities that he can and would like to pay. He, therefore, consciously or unconsciously compress the satisfaction which he obtains from the purchase of the commodity and the price which he pays for it. If he thinks the utility of the commodity is greater or at-least equal to the loss of utility of money price, he buys that commodity.

- As he buys more and more of that commodity, the utility of the successive units begins to diminish. He stops further purchase of the commodity at a point where the marginal utility of the commodity and its price are just equal. If he pushes the purchase further from his point of equilibrium, then the marginal utility of the commodity will be less than that of price and the household will be loser. A consumer will be in equilibrium with a single commodity symbolically:

- $MU^x = P^x$

- A prudent consumer in order to get the maximum satisfaction from his limited means compares not only the utility of a particular commodity and the price but also the utility of the other commodities which he can buy with his scarce resources.

- If he finds that a particular expenditure in one use is yielding less utility than that of other, he will tie to transfer a unit of expenditure from the commodity yielding less marginal utility.

- The consumer will reach his equilibrium position when it will not be possible for him to increase the

- total utility by uses. The position of equilibrium will be reached when the marginal utility of each good is in proportion to its price and the ratio of the prices of all goods is equal to the ratio of their marginal utilities.
- The consumer will maximize total utility from his income when the utility from the last Tk spent on each good is the same. Algebraically, this is:
- $MU_a = P_a = MU_b = P_b = MU_c = P_c = MU_n = P_n$
- Here: (a), (b), (c)…. (n) are various goods consumed.

Assumptions of Law of Equi-Marginal Utility:

- The main assumptions of the law of equi-marginal utility are as under.
- (i) Independent utilities. The marginal utilities of different commodities are independent of each other and diminish with more and more purchases.
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- (ii) Constant marginal utility of money. The marginal utility of money remains constant to the consumer as he spends more and more of it on the purchase of goods.
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- (iii) Utility is cardinally measurable.
-
- (iv) Every consumer is rational in the purchase of goods.

Example and Explanation of Law of Equi-Marginal Utility:

- The doctrine of equi-marginal utility can be explained by taking an example. Suppose a person has $5 with him whom he wishes to spend on two commodities, tea and cigarettes. The marginal utility derived from both these commodities is as under:

Schedule:

Units of Money	MU of Tea	MU of Cigarettes
1	10	12
2	8	10
3	6	8
4	4	6
5	2	3
$5	Total Utility = 30	Total Utility = 39

- A rational consumer would like to get maximum satisfaction from $5.00. He can spend money in three ways:
- (i) $5 may be spent on tea only.
- (ii) $5 may be utilized for the purchase of cigarettes only.
- (iii) Some rupees may be spent on the purchase of tea and some on the purchase of cigarettes.
- If the prudent consumer spends $5 on the purchase of tea, he gets 30 utility. If he spends $5 on the purchase of cigarettes, the total utility derived is 39 which are higher than tea. In order to make the best of the limited resources, he adjusts his expenditure

- (i) By spending $4 on tea and $1 on cigarettes, he gets 40 utility (10+8+6+4+12 = 40).
- (ii) By spending $3 on tea and $2 on cigarettes, he derives 46 utility (10+8+6+12+10 = 46).
- (iii) By spending $2 on tea and $3 on cigarettes, he gets 48 utility (10+8+12+10+8 = 48).
- (iv) By spending $1 on tea and $4 on cigarettes, he gets 46 utility (10+12+10+8+6 = 46).
- The sensible consumer will spend $2 on tea and $3 on cigarettes and will get maximum satisfaction. When he spends $2 on tea and $3 on cigarette, the marginal utilities derived from both these commodities is equal to 8. When the marginal utilities of the two commodities are equalizes, the total utility is then maximum, i.e., 48 as is clear from the schedule given above.

Curve/Diagram of Law of Equi-Marginal Utility:

The law of equi-marginal utility can be explained with the help of diagrams.

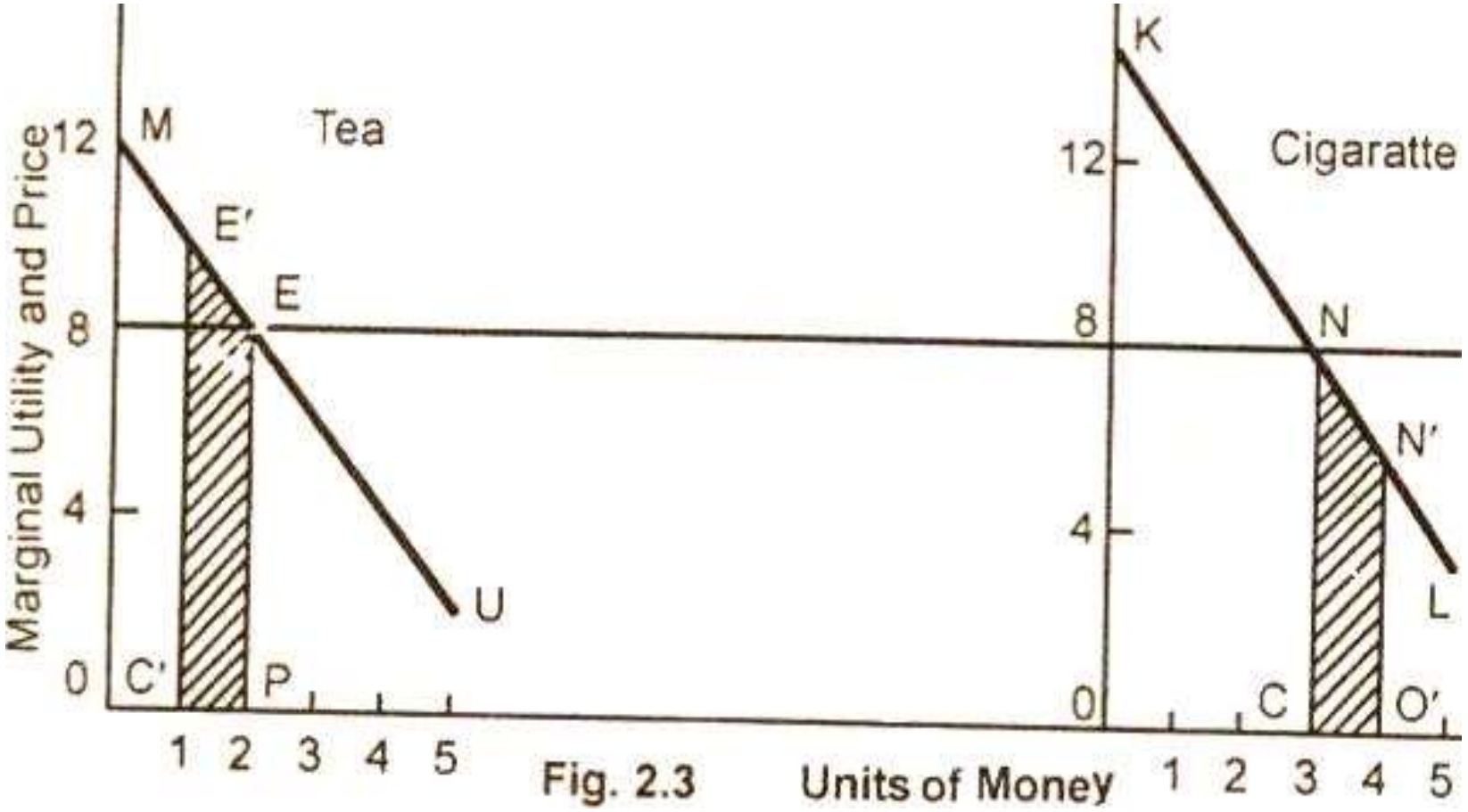

Fig. 2.3

- In the figure 2.3 MU is the marginal utility curve for tea and KL of cigarettes. When a consumer spends OP amount ($2) on tea and OC ($3) on cigarettes, the marginal utility derived from the consumption of both the items (Tea and Cigarettes) is equal to 8 units (EP = NC). The consumer gets the maximum utility when he spends $2 on tea and $3 on cigarettes and by no other alternation in the expenditure.

- We now assume that the consumer spends $1 on tea ($OC^{/}$ amount) and $4 ($OQ^{/}$) on cigarettes. If $CQ^{/}$ more amounts are spent cigarettes, the added utility is equal to the area $CQ^{/}N^{/}N$. On the other hand, the expenditure on tea falls from OP amount ($2) to $OC^{/}$ amount ($1). There is a loss of utility equal to the area $C^{/}PEE$. The loss is utility (tea) is greater than that the loss in utility (tea) is maximum satisfaction except the combination of expenditure of $2 on tea and $3 on cigarettes.

- This law is known as the *Law of maximum Satisfaction* because a consumer tries to get the maximum satisfaction from his limited resources by so planning his expenditure that the marginal utility of a rupee spent in one use is the same as the marginal utility of a rupee spent on another use.
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- It is known as the *Law of Substitution* because consumer continuous substituting one good for another till he gets the maximum satisfaction.
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- It is called the *Law of Indifference* because the maximum satisfaction has been achieved by equating the marginal utility in all the uses. The consumer than becomes indifferent to readjust his expenditure unless some change fakes place in his income or the prices of the commodities, etc.
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Limitations/Exceptions of Law of Equi-Marginal Utility:

- (i) Effect on fashions and customs: The law of equi-marginal utility may become inoperative if people forced by fashions and customs spend money on the purchase of those commodities which they clearly knows yield less utility but they cannot transfer the unit of money from the less advantageous uses to the more advantageous uses because they are forced by the customs of the country.
- (ii) Ignorance or carelessness: Sometimes people due to their ignorance of price or carelessness to weigh the utility of the purchased commodity do not obtain the maximum advantage by equating the marginal utility in all the uses.

- (iii) Indivisible units: If the unit of expenditure is not divisible, then again the law may become inoperative.

- (iv) Freedom of choice: If there is no perfect freedom between various alternatives, the operation of law may be impeded.

Importance of Law of Equi-Marginal Utility:

- The law of equi-marginal utility is of great practical importance. The application of the principle of substitution extends over almost every field of economic enquiry.

- Every consumer consciously trying to get the maximum satisfaction from his limited resources acts upon this principle of substitution. Same is the case with the producer. In the field of exchange and in theory of distribution too, this law plays a vital role. In short, despite its limitation, the law of maximum satisfaction is meaningful general statement of how consumers behave.

- In addition to its application to consumption, it applies equally to the theory of production and theory of distribution. In the theory of production, it is applied on the substitution of various factors of production to the point where marginal return from all the factors are equal. The government can also use this analysis for evaluation of its different economic prices.

- The equal marginal rule also guides an individual in the spending of his saving on different types of assets. The law of equal marginal utility also guides an individual in the allocation of his time between work and leisure. In short, despite limitations the law of substitution is applied to all problems of allocation of scarce resources.

Derivation of the Demand Curve in Terms of Utility Analysis:

- Dr. Alfred Marshal was of the view that the law of demand and so the demand curve can be derived with the help of utility analysis.
- He explained the derivation of law of demand:
- (i) In the case of a single commodity and (ii) in the case of two or more than two commodities. In the utility analysis of demand, the following assumptions are made:

- Assumptions:
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- (i) Utility is cardinally measurable.
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- (ii) Utilities of different commodities are independent.
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- (iii) The marginal utility of money to the consumer remains constant.
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- (Iv) Utility gained from the successive units of a commodity diminishes.

(1) Derivation of Demand Curve in the Case of a Single Commodity (Law of Diminishing Marginal Utility):

- Dr. Alfred Marshall derived the demand curve with the aid of law of diminishing marginal utility. The law of diminishing marginal utility states that as the consumer purchases more and more units of a commodity, he gets less and less utility from the successive units of the expenditure. At the same time, as the consumer purchases more and more units of one commodity, then lesser and lesser amount of money is left with him to buy other goods and services.

- A rational consumer, before, while purchasing a commodity compares the price of the commodity which he has to pay with the utility of a commodity he receives from it. So long as the marginal utility of a commodity is higher than its price ($MU_x > P_x$), the consumer would demand more and more units of it till its marginal utility is equal to its price $MU_x = P_x$ or the equilibrium condition is established.
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- To put it differently, as the consumer consumes more and more units of a commodity, its marginal utility goes on diminishing. So it is only at a diminishing price at which the consumer would like to demand more and more units of a commodity.

Diagram/Curve:

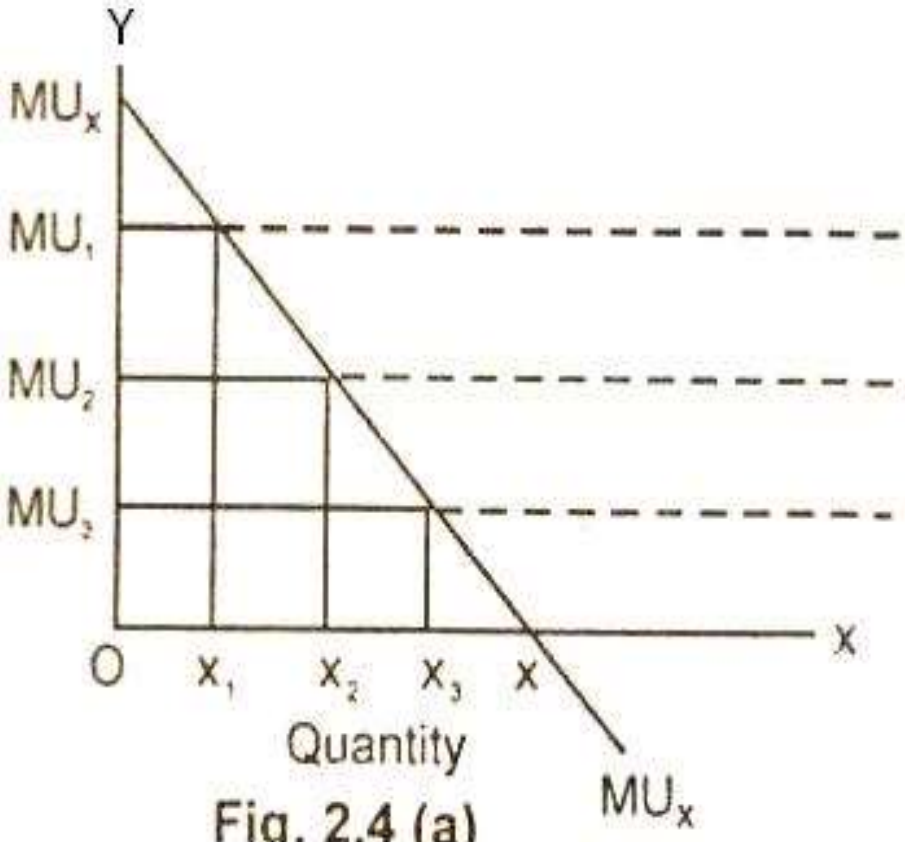

Fig. 2.4 (a)

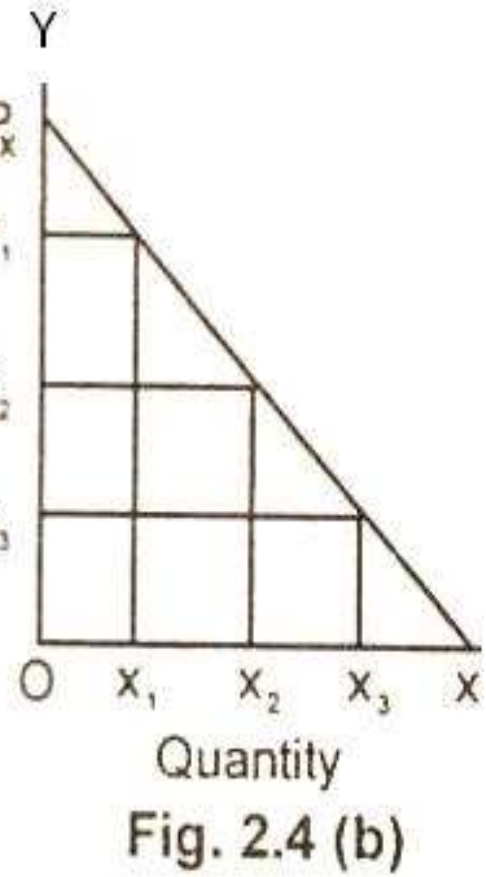

Fig. 2.4 (b)

- In fig. 2.4 (a) the MU_x is negatively slopped. It shows that as the consumer acquires larger quantities of good x, its marginal utility diminishes. Consequently at diminishing price, the quantity demanded of the good x increases as is shown in fig. 2.4 (b).
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- At X^1, quantity the marginal utility of a good is MU^1. This is equal to P^1 by definition. The consumer here demands OX^1 quantity of the commodity at P^1 price. In the same way X^2 quantity of the good is equal to P^2. Here at P^2 price, the consumer will buy OX^2 quantity of commodity. At X^3 quantity the marginal utility is MU^3, which is equal to P^3. At P^3, the consumer will buy OX^3 quantity and so on.

- We conclude from above, that as the purchase of the units of commodity X are increased, its marginal utility diminishes. So at diminishing price, the quantity demanded of good X increases as is evident from fig. 2.4 (b). The rational supports the notion of down slopping demand curve that when price falls, other things remaining the same, the quantity demanded of a good increases and vice versa. (The negative section of the MU curve does not form part of the demand curve, since negative quantities do not make sense in economics).

(2) Derivation of the Demand Curve in the Case of Two or More than Two Commodities (Law of Equi-Marginal Utility):

- The law of diminishing marginal utility can also be applied in case of two or more than two goods. When a consumer has to spend a certain given income on a number of goods, he attains maximum satisfaction when the marginal utilities of the goods are proportional to their prices as stated below.
- $MU^x / P^x = MU^y / P^y = \ldots\ldots\ldots MU^n / P^n$

- Derivation of Demand Curve:
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- In the fig. 2.5 (a), (b) and (c) given the money income, the price of X commodity (P_x) and the price of Y commodity (P_y) and constant marginal utility of money (MU_m), the demand curve derived is illustrated. The consumer allocates his money income between X and Y commodities to get OQ^1 units of good X and OY unit of good Y commodities because the combination correspondence to:

- $MU_x / P_x = MU_y / P_y = MU_m$
- At the OM level (constant).

Diagram/Curve:

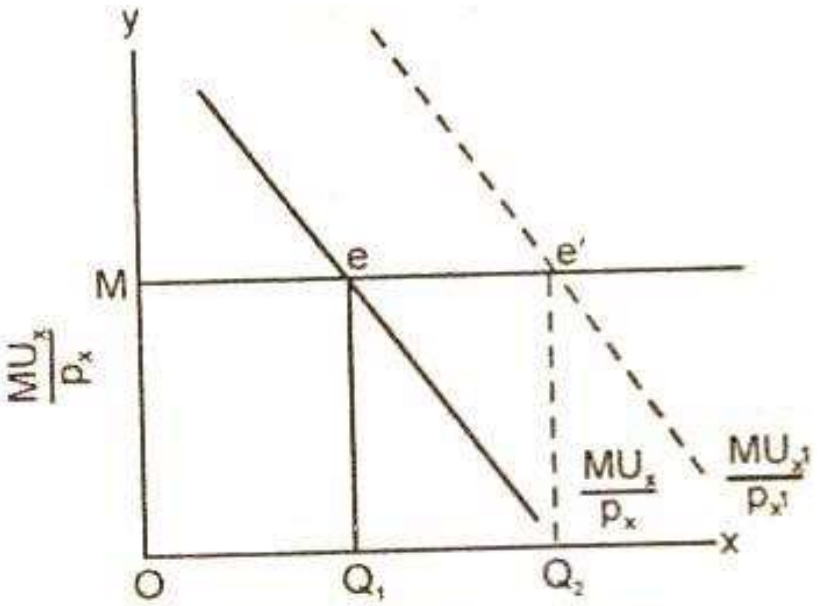

Fig. 2.5 (a) (Units of X Commodity)

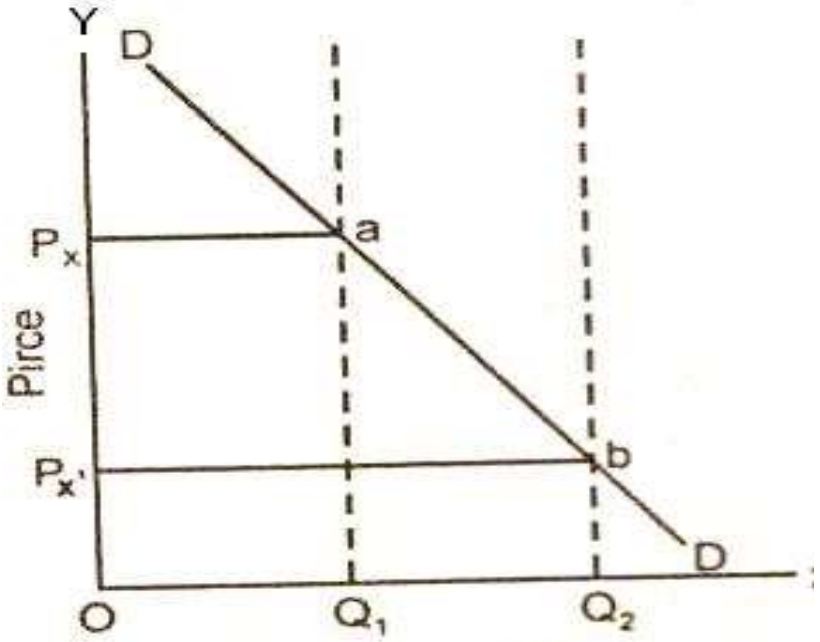

Fig. 2.5 (c) Quantity Demanded

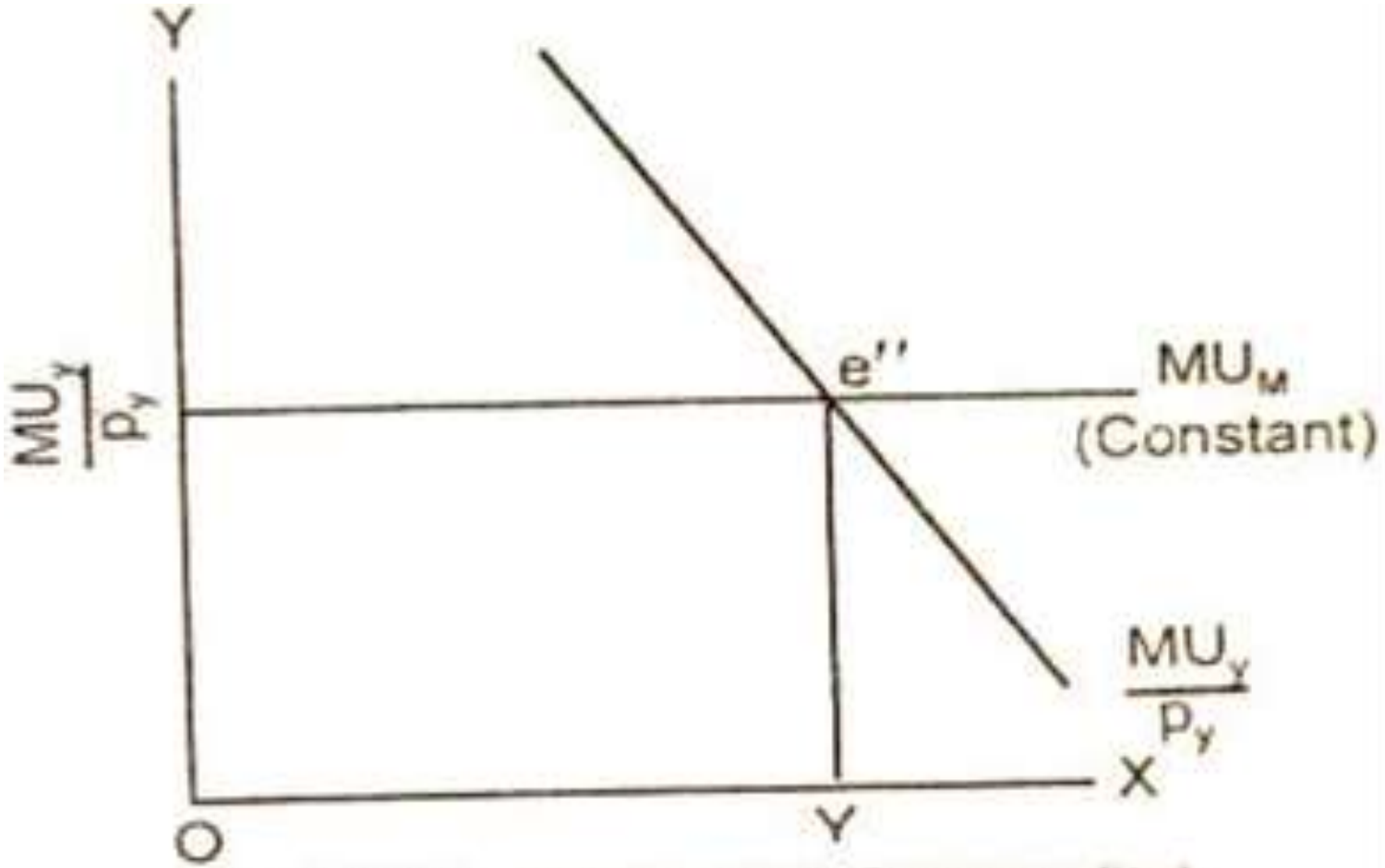
Y
e''
MU_M
(Constant)
$\frac{MU_y}{P_y}$
$\frac{MU_y}{P_y}$
X
O
Y
(Units of Y Commodity)

Fig. 2.5 (b)

- Let us assume that money income and price of Y commodity remain constant but the price of X commodity decreases. As a result of this money expenditure on commodity X rises resulting MU_x / P_x curve to shift towards right. The consumer now allocates his income to OQ_2 quantity of X commodity and O_y quantity of Y commodity because the combinations correspondence to

- $MU_x / P_x = MU_y / P_y = MU_m$

- (constant) at OM level.

- Thus in response to decrease in the price from Px to Px^1, the quantity demanded of a good X increases from OQ_1 to OQ_2. The DD is a negatively sloped demand curve.