**Study Materials for Sem II CBCS Economics by Dr. Ramesh Chandra Das**

**Fundamentals of Economic Theory**

**Chapter 1-Basic Concepts on Economics**

**1.1 What is Economics?**

The subject economics originated from the scenarios of scarcity and abundance. It is difficult to define the subject matter of economics. We can provide here the most acceptable definition of economics. “It is the science which studies the human and social behaviour as a relationship between ends and scarce means that have their alternative uses also”.

 Adam Smith, who is considered the father of economics, defined Economics as “An enquiry into the Nature and causes of Wealth of Nations (1776)”.

 Marshall defines Economics “as a study of mankind in the ordinary business life. It examines that Part of individual and social action which is most closely associated with the attainment and with the use of material requisites of well being”.

 Robbin offers a definition of economics that it is the study of human behaviour as a relation ship between the ends and scarce means which have alternative uses. This definition is founded upon three basic issues, namely, i) the ends and wants are unlimited, ii) the means to attain those wants are limited and iii) these means are capable of alternative uses. The first issue is related to the concept of unconstrained optimisation ( of utility, production , profit, welfare etc), the second is related to constraint of purchasing power or income or resource levels and the third is related to the question of opportunity cost in the use of any factor or goods.

 But recent developments in the subject during the last five decades, especially after the Keynesian Revolution on the theory of income and employment determination have necessitated renewal of the earlier or classical definitions. Therefore, the modern definition follows as Economics is a social science that is concerned with the proper allocation and utilisation of resource for the attainment of stable growth of the economy as a whole that means the growth will be sustainable in the ground that it affects both the current and future generations in the same manner.

**1.1.1 Scope of Economics**

Economics is a social science. The subject deals with the analysis of economic problems of people in the society and the satisfaction or fulfillment of their wants. It is important to us to know the scope of economics. With the evolutionary changes of the society and its civilization, the subject matter scope of economics has expanded. Scope of economics covers the following:

1. As part of social science, economics deals with the economic activities of human being.
2. The availability of scarce resources and their use are important subject matter of economics. Adam Smith has termed economics as the “Science of Wealth”. Economics discusses how men can get the maximum satisfaction by using the scarce means to satisfy wants on the basis of priority.
3. People's wants are related to and consumption. Again, currency, banking system, public finance, trade etc is also parts of economic activities. Economics discusses the activities like production, exchange, consumption, distribution and social welfare.
4. Economics discusses the value judgment of human actions and behavior upon the others.

**1.2 Basic Economic Problems**

Most of the problems of economics arise out of the scarcity of resources to satisfy human as well as social wants. According to Prof. R.G. Lipsey (1983), there are seven general questions that may be faced in all types of economies, whether they are capitalists, socialists or the mixture of these two.

**Question No.1:** What commodities are to be produced and in what quantities?

 This question arises directly from the scarcity of resources. It concerns the allocation of scarce resources among the alternative uses. Selection of commodities within the domain of the available resources is related to the preference or utility derived from the consumption of the goods and profits or returns from the production of the goods. This alternatively implies that the combination of demand for and supply of the goods make sense in this respect. The study of how this system works is the major topic in the price theory.

**Question No 2:** By what methods are these commodities to be produced?

This question appears because the society has more than one technical possibilities by which goods and services can be produced. For example, any industrial good can be produced by the help of either labour using (i.e.capital using) or labour saving (i.e.capital using) technologies. Hence the question is related to the theory of production.

**Question No 3:** How can the societies output be divided among its members?

The question is related to the distribution of total national product among the individual and groups in the society. Such questions have been of great concerns to the economist long date back to Adam Smith and David Ricardo. These questions are the subject matters of the theory of distribution of output and income among different factors of the production systems.

**Question No 4:** How efficient is the society’s production and distribution?

These questions arise naturally from question number 1, 2 and 3. Efficiency or inefficiency is the part of positive economics, not of normative economics. Consumption or production is said to be efficient if it would be possible to consume or produce more of at least one commodity with simultaneously consuming or producing less of any other commodity by reallocating the fixed resources among different commodities. This efficient consumption or production structure is popularly known as Pareto optimal allocation of consumption or production. The question about efficiency thus belongs to the branch of welfare Economics.

**Question No 5:** Are the countries’ resources fully utilised?

It has been already noted that the existing resources of any country are not sufficient to produce all of those commodities which are urgently required for betterment of individualsor groups. Therefore, there can be no question of leaving idle any of the available resources. Yet one of the most disturbing features of free market economy is that such waste sometime or more often occurs. The appearance of such wastage is said to generate the problem of involuntary unemployment. A great advance made in the study of this phenomenon was the publication of general theory of employment, interest and money by J.M. Keynes (1936). Publication of this book made a revolution in the aggregate economic system by searching out several practical problem of attaining the classical concept of automatic full employment. Also the book addressed the causes of Great Depression of 1920’s and 1930’s and proposed policies to come out of the problem of unemployment and economic growth. This is so, related to the theory of unemployment and output.

**Question No 6:** Is the purchasing power of money constant?

The economies in the world have often experienced periods of prolonged and rapid changes in price levels. In recent decades the course of prices has almost always been upward for most of the countries. Inflation or sustained rise in general price levels reduces the purchasing power of money and savings. This means rise in nominal money or savings leads to fall in real money or saving when the effect of inflation is incorporated. The concept of inflation is closely related to the amount of money supplied in the economy as well rise in components of demand.

**Question No 7:** Is the economy’s capacity to produce growing from year to year or is it remaining static?

 The question is directly related to the dynamism of a state of economy that happens through changes in capacities in terms of technology, invention, intervention by the government, learning by doing etc. Why the capacity to produce grows rapidly in some economies is a critical problem which covered a large part of the development of economic theories since the time of Adam Smith. Problem of this type holds the topics in the theory of economic Growth.

 The answers of Question No 1 to Question No 4 are obtained from the study of Microeconomics and the study of Macroeconomics gives answers to question No 5 to Question No 7.

* 1. **Microeconomics and Macroeconomics**

The term ‘micro’ originates from the Greek word ‘Mikros’ which means small and the term ‘macro’ originates from the Greek word ‘Makros’ that means large. Microeconomics deals with the analysis of the behaviour of individual economic units such as the consumption behaviour of an individual consumer, the pricing of a particular commodity or a particular factor in a particular market, the importance of transaction cost or information cost for a particular system of exchange etc.

 On the other hand, Macroeconomics deals with the analysis of aggregate or the economy as a whole. It deals with the aggregate consumption behaviour of the citizens of a nation, role of aggregate investment upon aggregate output of an economy, how national output of an economy is determined, how does aggregate employment determine aggregate output, how does money supply affect national output and price levels, and more and more such dealings with respect to the aggregate.

 Microeconomics is also called price theory and macroeconomics is called theory of income. Price theory tries to explain the composition or allocation of total production while the income theory tries to explain the level of production and analyses why the level fluctuates.

 Microeconomics possesses a very important space in the study of economics; it covers both theoretical and empirical significance. It explains the functioning of a free enterprize economy, it also helps in formulating economic policies to promote efficiency in production and the welfare of the masses. Therefore, the role of microeconomics is both positive and normative.

 Microeconomic analysis suffers from certain limitations –it cannot provide idea of how an aggregate economy works as a whole. An individual sector may be well-functioning, but the aggregate may not be. Microeconomics assumes the presence of full employment situation persisting in the economy thus is a rare phenomenon in most of the capitalist world. Therefore, it is an unrealistic assumption,

 Study of Macroeconomics is very important to get proper idea about the functioning of a whole economy because microeconomics is not only inadequate but may lead to misleading policy effects. Although it can solve the limitations of the microanalysis, it also suffers from certain limitations. In macro study, individuals are ignored altogether. It is the individual well-being that is the main objective of economics. Increasing aggregate saving at the expense of individual welfare is not a sustainable policy.

**1.3.1 Conceptual notes on Microeconomic units**

There are several microeconomic units whose aggregated decisions leads to the macroeconomic units. The relevant microeconomic units and the related concepts are discussed briefly in the following part.

**Commodity:** A *commodity* in economics is a marketable item produced to satisfy unlimited wants of the individuals. Often the item is tangible in the sense that we touch them while going for use. Economic commodities comprise of goods and services. Goods are those which are tangible. For example, a piece of cake, a glass of coke, a roll of cloth, etc. Services, on the other hand, are intangible in the sense that we just get the benefit or utility from it without any direct contact like goods. For example, we withdraw money from the bank by the help of the bankers, we use metro railway while moving from one point to another, mothers prepare food for us in the domestic level, etc. These services are not social service as we have to pay for getting them or to provide any complimentary services for them. Social service is the type of service where no such usury charges are there. For example, blood donation, flood relief, rural hospital facilities, Kanyashri like projects in West Bengal, etc.

**Related and Unrelated Goods**: In real world we face rather buy and consume two or more goods which are related to each other. Again there are certain goods which are unrelated as well. Two goods, for sake of simplicity, are related when one influences the other either in rivalry manner or friendly manner. Two goods are rival or commonly substitutes (meaning one in place of the other) when consumption of one good leads to no consumption for the other. For example, two popular *substitute goods* are Tea and Coffee. If one consumes more tea, he will have to forego the consumption of coffee since both the goods almost equally satisfy the consumer, of course there are exceptions. Now a question arises: why consumption of coffee increases? The answer lies within the price of coffee being cheaper. That means, if price of coffee falls, people will demand more of coffee and will reduce the consumption of other related good, tea. On the other hand, if price of tea falls, consumption of coffee will fall. Some other substitute pair of goods is HP Computer and Dell Computer, two groups of anti biotic medicines, Government College and Private College, SMS facility and Call facility, etc. You can add items into the list. Now suppose there are two goods which are not rival, rather friend or *complementary*. That means one’s fall of consumption, due to price increase, will also lead to fall in consumption of the other. The goods are then called complementary. Examples are car and petrol, pen and ink, husband and wife, CPU and monitor, Economics and Mathematics subjects, etc. In the reverse side, there are lots of goods which are unrelated; ones consumption does not any way affect the consumption of the other. Examples are, Book and Shoe, Chalk and Stick, Butter and Wine, Hockey Stick and Raquet, etc.

**Consumer:** A *consumer* is a person or organization that uses economic services or commodities. The motive of the consumers is to maximize the utilities or minimize expenditure or the volume of money they spend on purchasing goods or services. For example, a hungry man wants to maximize the food intake to be fit and healthy. Fit and healthy are the terms which can be used as a proxy to utility. A student wants to maximize the use of books and other related materials to get maximum scores in exams. Maximum score is a proxy to utility. If a consumer consumes a number of goods and services then the total utility is obtained by the summation of all the utilities from the individual items of goods and services.

**Utility:** It is the satisfaction that one achieves from consuming a good/service, and is an abstract concept based on the individual in question. Stating otherwise, utility is a measure which captures the consumer’s scale of preference for a commodity. The variant of this concept is marginal utility. *Marginal utility* is the extra satisfaction/utility one gets from each additional unit of consumption. It is generally diminishing with the units of consumption of the good. The economists refer to this as the *law of diminishing marginal utility*. For example, a thirsty individual gets very high utility if he takes first glass of water, relatively less utility if he takes second glass; again less if he goes for the third glass and so on until his additional (marginal) utility becomes zero. But there is deviation from this concept if we replace the good or water by precious metal like Diamond. As units of diamond consumption or use increases, the total utility level as well as marginal utility increase. If second unit of diamond is used, both of the utilities increase and so on and so forth. That means, what is applicable for Water is not applicable for Diamond. The *law of diminishing marginal utility* does not work for diamond. This is popularly known as Water-Diamond Paradox in economics.

**Producer**: A *producer* is someone who creates and supplies goods or services usable by the consumers. Producers combine all the factors of production in the form of a specific technology to get optimum output or maximum output. There are four factors or inputs of production. They are, land, labor capital and organization. For example, an agricultural farmer uses 1 acre of land, 30 units of labours, 5 units of capital and one manager to get 30 quintals of the crop. So we can write the production function as 30 quintal = F(1 acre, 30, 5, 1). The combination of factors such as (1 acre, 30, 5, 1) is called Technology. The farmer can combine all the inputs in various ways. All such combinations are called technology and the only efficient or low cost combination is used for production purpose. Similarly, a factory owner or manufacturer can also produce its products which are called industrial products in the similar type of production function but with relatively less use of the primary inputs, land and labour, and relatively more use of capital and managerial powers like secondary inputs. The common aspect of both the farmer and factory owner is that their activities are bounded to the agricultural plot or factory boundary. Hence, they are called producers which are different to firms.

**Firm**: A *firm* is also a producer like before but he has the capacity to take them to the market and hence its role is to sell. This is why a firm is alternatively called seller or supplier. The firm has to use its mode of transport to carry the products, keeps information on the market price of the product (not just a commodity), the behavior of the buyers and other competing sellers, the decision to promote its sale by means of advertising, etc. Firm’s nature can vary from market to market. If there are very large number of sellers with very small capacity to sell with free entry and exit conditions and similar product then the firms are called purely competitive. If additionally the criteria of perfect knowledge and perfect mobility of the factors are considered then the firms are called perfectly competitive. This is an ideal market structure in the sense that both the consumers and producers stay better off. This is a polar extreme in market structure in the good end. On the other hand, if there is only one firm in the market with strictly prohibited entry conditions then the firm enjoys huge market power to control the entire market. Such type of market is called monopoly. This is worst form of the market since consumers are exploited here. Hence, this is a polar extreme in the bad end.

**Cost**: It is the payments made for purchase of the factors of production. We have already stated that there are four factors of production, land, labour, capital and organization. The payment for land is rent (charge of usury), for labour is wage, for capital is rate of interest and for organization is profit or normal profit. Suppose, the farmer pays Rs. 500 as rent for one acre plot of land, Rs. 200 for one unit of labour as wage rate, Rs. 500 for each unit of capital and he keeps Rs. 3000 as minimum part of surplus or normal profit for one organizer. Hence, to produce 30 quintals of crop, the farmer needs to bear 500 + 200×30 + 500 × 5 + 3000 × 1 = 500+6000+2500+3000 = Rs. 12000. Hence, cost of production of one quintal of the crop (it is called average cost or marginal cost) = 12000/30 = Rs. 400. Hence, the cost of production of one kilogram of the crop is 400/100 = Rs. 4. Rs. 4 of the per kilogram crop is the minimum price the consumers will have to pay to the farmer.

**Revenue**: It is the total volume of sale which is calculated as the price of the product (crop in our example) times the total unit of sale. Suppose in our example for the farmer, the total revenue for 30 quintal sale of the crop is 400 × 30 = Rs. 12000 or in per kilogram rate, it is 4 × 3000 = Rs. 12000. The sum of Rs. 12000 is alternatively the consumers’ expenditure on the crop as the revenue comes from the consumers/customers/buyers by selling the product.

**Profit**: It is defined as the difference between total revenue (TR) and total cost of production (TC) faced by the farmer or firm. That means,

*Profit (π) (it is the symbol popularly used in economics as profit) = TR – TC*

In our previous example, π = 12000 – 12000 = 0.

That means, the farmer does not gain anything more than the cost of production. The part of profit, i.e. Rs. 3000 is thus called *normal profit* since it is the minimum payment the organizer expects to run his total system of production. If there is anything more than the normal profit it is called *excess profit* or *super normal profit*. Hence, by the term, profit, we mean excess profit. In the example, excess profit is zero.

Now suppose, the farmer gets Rs. 5 per kilogram of crop in place of Rs. 4 (which may be due to over or excess demand for the crop which again may arise due to any festival season) then TR = 5× 3000 = Rs. 15000. Thus, π = 15000-12000 = Rs. 3000. This is called *super normal profit*.

Further suppose that there is bad weather and all the customers could not come to the farmer to buy the crop. This means, the farmer will have to push the sales to the existing customers at a low price to exhaust his stock. Suppose, the price per kilogram is now Rs. 3. Hence, TR = 3×3000 = Rs. 9000. Thus π = 9000 – 12000 = - Rs. 3000. This negative value of π means *loss*.

**Industry**: An *industry* is the collection of firms who produce homogeneous products in the sense that all the products are perfectly substitutable (or one product may be used in place of the other). The term industry and market are symmetrically used in economics. For example, we have perfectly competitive industry or monopoly industry or market. But in reality we do not find industries either of these two polar extremes. Instead, we find certain firms who produce not identical products rather their products are very closely substitutable like toilet soap industry, tooth paste industry, ball pen industry, etc. This particular type of industry is called monopolistically competitive industry/market since it is the combination of perfect competition and monopoly. Defining industry under this market structure is difficult. Hence, one way to define industry under this structure is to group the products which are nearly similar and the term industry and group are synonymously used in this market. On the other hand, if there are a few firms (large in size) with strategic natures or playing strategic games (it is named so because the firms here behave like players in a sport) among each other then it is called oligopoly industry. For example, the car manufacturers, soft drinks manufacturers, in the world are a few in numbers but always they frame strategies to capture the market share of the others.

**Market**: If we allow the buyers not to come to the sellers or allow the sellers not to approach the buyers then the transaction or exchange of the goods will not be there. In that case, the producer’s products will be rotten and the consumer’s money will be unused and they will be in hunger. *Market* is such a place or institution which allows the exchange of the products and money between the sellers and buyers. By the term ‘place’ we do not mean that it needs a large plot of land. There can be transactions even without any place. For example, an information and technology firm can sell out its products to other firms or countries in air-a form of online trading or transaction. In a market system, we see the exchanges of property rights of both the parties (parties means buyers and sellers). The buyers have their money as property and they give out them to the sellers in exchange of the products which are again their property. Market decides the price of the product and quantity of sale and purchase of the product by its own mechanism which is called *free market mechanism*. According to Adam Smith, there is the working of invisible hands when the market mechanism works. But if there are goods like school education, national highways, hospitals, etc. where everybody can get the service without depriving the other, can there be the easy process of market rule to work? The answer is No, since everybody will over use or under uses the free services of these goods. Hence, there is *market failure* to determine price and quantity.

**Private Good and Public Good**: In the real world we consume or use two types of goods. One is private and the other is public. A *private good* is such which is divisible in the sense that it can be available to any other person after deducting the units used by the first person. In this sense, private good has rivalry property meaning once it is available to anyone, may not be available for the other persons. For example, a piece of burger. Once you purchase and consume it, it will not be available to your friends.

Now suppose it is not the burger, rather a sea beach. Although there may be a fee or charge to enter into the beach, there is no end to get satisfaction from viewing it. Besides, the other persons in the beach also can get equal amount of satisfaction like you. No one is rival or opponent to the other. That means, you are not the rival to your friends or co visitors. Also it is true that the total volume of sea water and sea view is not divisible like the private good. Therefore, we can define a public good as which is non divisible and has non rivalry or non excludability property. Other examples are national highways, seminar room, environment, etc.

**Positive and Normative Economics**: Economists have to often deal with two approaches to economic ideas- positive and normative. A *positive economics* is a branch of economic analysis where the actual valuation is made. For example, what is the volume of demand, what is quantity of supply, what is the equilibrium consumption of goods, how much the government collects tax revenue in the head of GST or VAT, etc. No emotion, sentiments like value judgments are taken into account in positive economics. On the other hand, a normative economics deals with the issues like what should be the optimum consumption, which tax the government should impose, what should be the income distribution to maximize social welfare, etc. All the above questions raise the concept of value judgment for which exact valuation is difficult to obtain.

**Static and Dynamic Systems**: In common sense, *static* means the occurrence of an event at any particular point of time; no inter period linkages are considered. In economics, a *static system* means when the decision of any particular economic agent or the economy as a whole is taken without taking into the periodic or time movements of the concerned deciding variable/s. For example, a consumer buys a Pastry from a shop with his income and price of the pastry at that particular point of time. He does not think what would happen if he would have more money in his pocket, or what the price of the pastry was one hour before. We can write a static function as y = f(x), time is constant, say at 11 am of today. On the other hand, *dynamic system* means when decision of any economic agent is taken with the consideration of time factor. It is not at a particular point of time, rather it depends on the series of time. For example, an agricultural farmer is to put effort on different stages of production at different time points and finally he gets the crop in a particular day on a season. Here the different stages carry the time dimension but the crop harvesting time is the static. A dynamic function is like y = f(x, t), where ‘t’ is time period. From the above examples it is clear that dynamic system is a function of all static systems.

**Partial and General Analysis**: Economists often busy with the terms ‘partial’ and ‘general’. In *partial analysis* economists concentrate their discussion on a particular good, factor, market, etc. For example, the demand for a particular brand of Smart Phone by an individual consumer, supply of a particular brand of Smart Phone by an individual producer, the price determination of a particular brand of smart phone in that particular market, etc. The interlinkage among the demand, supply and pricing of that particular smart phone is not affected by the demand/supply/pricing of other smart phones. In short, in partial analysis, the interdependences among different sectors are not taken into account. On the other hand, in general analysis, economists take into account the interdependences among all sectors of the economy. For example, demand for Pulsar 180 does not only depend on the price of it; it also depends on the prices of other brands of the similar capacity bikes off different companies like Fazer of Yamaha, CB Trigger of Honda, Apache of TVS, CBZ Xtreme of Hero. Again, choosing Economics as the lead subject in the graduate level also allows the students to verify the pros and cons of taking other subjects. Hence, general analysis is the collection of all partial analysis.

**1.3.2 Market Mechanism**

We have already stated that the primary objective of microeconomics is to determine price of any good or any service. The following part concentrates on how such pricing process is done. Market is one of the pillars of price determination. Other two pillars are Consumers or demanders and firms or suppliers. The combination of all three institutions, I call them as institution since they have their own bases, norms and have influence upon the others. The system of collaboration or combination among them is such that there is free to buy and sale which is called free market mechanism.

**Demand:** It is the desire supported by the purchasing power. There should be desire or want in demand and to satisfy it the individual should have money. Money is called purchasing power. Demand function is defined as the relation between quantity of demand and price of the good when income and prices of the other goods are held constant. When price increases, the quantity of demand falls and as price falls, demand increases. This inverse or negative relation between demand and price is called *law of demand*. A simple linear mathematical function of a demand function for the good (say, Cake) can be written as q = 100 – 2P, where ‘q’ is quantity of demand for Cake and ‘P’ is price of the Cake per unit. Let us take some price units and derive the quantities of demand for the cake. In Box 1, we have shown this in first two columns.

Box-1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Price (P)(Rs.) | Demand (q)q = 100 – 2P | Change in demand | Supply (q)Q = 10 + 5P | Change insupply | If Demand increases by 50% | If Supply increases by 50% |
| 0 | 100 | - | 10 | - | 150 | 15 |
| 1 | 98 | 98-100 = -2 | 15 | 15-10 = 5 | 147 | 22.5 |
| 2 | 96 | -2 | 20 | 5 | 144 | 30 |
| 3 | 94 | -2 | 25 | 5 | 141 | 37.5 |
| 4 | 92 | -2 | 30 | 5 | 138 | 45 |
| ... | ... | ... | ... | ... | ... | ... |
| 50 | 0 | 0-2 = -2 | 260 | 260-255 = 5 | 0 | 390 |

**Supply**: It originates from the firm’s desire to supply the cake at different prices given the available production system. Supply function is defined as the relation between quantity of supply and price of the good when all other supply conditions are held constant. When price of the cake increases, the quantity of supply of it rises and as price falls, supply also falls. This direct or positive relation between supply and price is called *law of supply*. A simple linear mathematical function of a supply function can be written as q = 10 + 5P, where ‘q’ is quantity of supply of the cake and ‘P’ is price of the cake per unit. Let us take some price units and derive the quantities of supply (Box 1).

We have considered 51 price units for the cake ranging from 0 to Rs. 50 and derived the corresponding quantities of demand for the cake and supply of the cake. Column 1 and 2 together is called *demand schedule* and Column 1 and 4 together is called *supply schedule*. We have plotted the demand and supply schedules in Figure A. We see that the demand schedule is a downward line (D) and the supply schedule is an upward line (S). Distinguishing features among them are in *intercepts and slopes*. When price is zero, that means the good is a free item, the demanders want to take 100 units of the cake but the suppliers want to offer 10 units of the cake (both are the points on the horizontal or quantity axis). These two quantities i.e. 100 and 10 are the quantities of demand and supply which can be done by both the demanders and suppliers without thinking for the other goods to buy or sell. Hence, the intercepts of the demand and supply functions represent the *size of the market and size of the available free resource* by the demanders and suppliers respectively. Hence, the intercepts of any function has some meanings; not just a number. On the vertical (or price axis) axis, the intercepts are 50 for the demand function and (-) 2 for the supply function. The supply function starts from negative axis. Rs. 50 is a prohibitive price which bars the demanders to buy at that high price. At the same time, Rs. -2 is a bottom line price where the supplier does not want to sell; rather he wants to be a consumer in place of producer. Further we see that at price of Rs. 50, the demander wants to demand zero unit (point D) but the supplier wants to supply the maximum unit of 260 (point L which should be at 260 and hence shown by the extended dotted line) since it is desirable for the demander to buy zero at that high price and the supplier to sell more at that high price. The reverse happens at price zero where demander demands maximum demand of 100 units (point D׳) and the supplier supplies minimum of 10 units (point S).

Now see the changes of demand and supply of the cake when its price increases from 0 to 50. Column 3 and 5 respectively represent the changes in demand and supply with price changes. The columns give us the slopes of the two functions or the laws of demand and supply respectively. The slope for the demand curve is always negative (= -2 since -2/1 for the first change, -2/1 for the second change and so on…) and the slope of the supply curve is always positive (= +5 since +5/1 for the first change, +5/1 for the second change and so on…). As the price increases, demanders want to buy less and less and the suppliers want to sell more and more. Hence, there is a *conflict of interest* between the demanders and the suppliers. How to solve the conflict?



Figure-A

Market has the power to solve the conflict. That means it can determine the accepted price and quantity by both the demanders and suppliers. How? Just look at the shapes and movements of the two curves. Both are going in their own ways (free movements); only one point, E, is there where both of them intersect. That means out of all possibilities depending on their positions, there is only one possibility of mutual understanding between the demander and the supplier. Alternatively we can say that the free market mechanism (by invisible hands) makes solution to the conflict between the two parties. There are some adjustment processes around point E.

Suppose that the position of conflict lies above E corresponding to price P2, say. We see that demand function is left (point F) to the supply function (point G). That means supply (P2G) is greater than demand (P2F). This alternatively means, at that price, the suppliers want to sell more but the demanders want to buy less. Hence it is an excess supply situation; the seller has brought excess amount of the cake to the market. As a result of that price should be cut by the seller and then the demander will be willing to buy more and in the same process E will be reached where there is no excess supply. The adjustment process works in the downward direction indicated by the arrow.

Now suppose the conflict arises in below the point E corresponding to price P1, say. Here we see the opposite; at the price corresponding to P1, demander wants to buy more but the seller wants to sell less of the cake. That means low price discourages the seller but encourages the demander. There is excess demand for the good. The market mechanism will push up the price to the unit corresponding to E i.e P\* = Rs. 15.7. Again at E there is no excess demand and both the existing sellers and buyers are satisfied. The adjustment process works in the upward direction indicated by the arrow. Hence we say *E as market equilibrium* point where *demand is equal to supply*. The equilibrium price or the per unit price of the good at equilibrium is Rs. 15.7 in our example and the quantity of demand and supply is 68.6 units which satisfy both the two parties in the market exchange or transaction system. Algebraically, we can solve by equating the demand and supply functions. At E, demand = supply.

Or, 100 – 2P = 10 + 5P

Or, P = 15.7

Putting the value of P=15.7 into either of the demand or supply function we get q = 68.6.

Hence we say that the free market mechanism has the capacity to solve the conflict of interest. This is what the microeconomics deals with.

**Comparative static analysis**: In economics we have to often test for the effects of any policy. May be it comes from the consumers side like planning of purchasing a housing asset or to save more this year to consume more in the future, etc; from producers side like booking new printing machine for the coming seasons, contracting skilled laboureres for the new factory, etc; from government side like the policy to impose more income tax, providing more subsidy on LPG, etc. All such policies have some economic effects, besides other sectors’ effects like social sector, political sector, etc. We are here dealing with the economic sector only. So we have two situations; one is pre policy change situation and the other is post policy change situation. Alternatively, there is pre change equilibrium position (of price, quantity like variables) and post change equilibrium position. That means we have to make comparisons of these two situations. That is why it is named as comparative. Static means there is no effect of time. Hence we have to make comparisons of two situations at a particular point of time.

But the necessary requirement for going to comparative static analysis is that the initial equilibrium point (or pre change situation) should be stable. A *stable equilibrium* is such a point from which if there is any deviation then it will again be back to its initial position. Unless it is stable, any policy changes may have distorted results. For example, a drunker is walking in front of your bike like a movement of a pendulum; some times to the right and sometimes to the left but in an unsual (or random or irrational behaviour) manner. If you speed up your bike, you may face accident. On the other hand, if the person is a rational and in normal condition, then speeding up of your bike to catch the thief may be effective. Hence, an unstable equilibrium is like a drunker’s movement but a stable equilibrium is like a rational person’s movement.

In Figure A, point E is the stable equilibrium as the arrows show its bring back situation. We can allow policy changes here. The policy variable may be consumer’s income, good weather condition for the supplier, government’s tax policy for both the consumers and producers, etc. Every policy will have its role to shift out the equilibrium point. And the comparative static analysis takes into account the relative changes.

***1.3.2.1 What happens if the buyer is richer now and the supplier face good weather condition***?**-an example of comparative static analysis**

In the initial discussion about the market mechanism in the above paragraphs we had assumed (*it is the term widely used by the economists to develop theories since Economics is a social science and it is very difficult to study the behaviors of the human beings; taking assumption/s is a way to control these unknown behaviors*) that quantity of demand and quantity of supply of the cake are the functions of price of the cake and all other things affecting demand and supply are constant. These other things are say ‘income’ for the demander and ‘good weather’ for the supplier. Increase in income will definitely allow the buyer to buy more of the cake at the given price and improvement of weather condition will also allow the supplier of the cake to sell more at the given price. Hence, price of cake is not changing, rather other factors are changing. These other factors, income and weather condition, are called *parameters* whose role is to fix and shift the position of the demand and supply functions. Now a natural question is-what is the role of price change with the position of the demand and supply functions? The answer is: price changes make the movement along the functions; not off the functions. Price is a variable, not a parameter like income and weather condition. The readers will have to be careful in dealing with the roles of a variable and parameters with the position/s of the concerned function/s.

Let us explain the role of income change on the demand function. Suppose the demander gets additional 50% of income (may be due to a gift cheque from your uncle, reduction in income tax rates, etc) which he will spend fully upon buying additional units of cake (he does not want to save) since price of the cake is unchanged. That means at any price ranging from 0 to 50, there will be additional demands by 50% at all levels. Column 6 of Box 1 shows this. The series of additional demands at all prices makes the rightward shift of the demand function from DD׳ to D׳׳. It has been seen in Figure B. The new demand function is parallel to the old one, why? The changes in demands along the new demand function are always constant at (-) 3 (since 147-150, 144-147, etc.). But the slope of the original demand function (DD׳) was -2. The parallel slopes can be explained by the changes in intercept and slope parts together.



Figure-B

Let us explain the role of good weather on the supply function. Suppose the supplier faces better weather condition to prepare cake. At the same price, he will be able to produce more cake. Hence, the supply function will shift to the rightward from SS׳ to S׳׳. There will again be a parallel shifting. What happens to the market mechanism if both income increase and good weather conditions occur at a time? If we look at Figure B we see that the two shifted functions meet at a new point E׳׳. This is new market equilibrium. We also see that the magnitude of the effect of income increase (D׳D׳׳) is greater than the magnitude of the effect of good weather (S׳S׳׳). That means, extra demand is greater than extra supply of the cake. The result will be more price of the cake and more quantity of the cake sold and bought. The new price is P\*\* and quantity is q\*\*. *Hence, for the betterment of the country or economy, you should earn more and the weather or environmental conditions should be good*.

The readers can try out the reverse effects. Suppose you lost your money by pick pocketing or we pollute the environment, employees of government sectors take bribe, the making of popular social sector policies like mid day meals, subsidized food, fuel, etc.

We can apply this free market mechanism in determining the prices of any good, any service and any factors of production like land, labour, capital and organization. In the course of time we will enter into them in detail one by one. Do not hurry.

**1.3.3 Different economic systems**

The pricing of any good or factor that what we discussed above depends on the systems of economic operations. Different societies are organized through alternative economic systems and economic studies the different mechanism that a society can use to allocate its scarce resources. Different types of economic systems exist in different countries of the world. We will have a flash on them.

**Market Economy**: A market economy is one in which individual economic agents take the major decisions about production and consumption. All of them freely choose their best and the market system generates the best social output. No outside agencies have anything to interfere into the free market economic system. Usually in a perfectly competitive market structure (we will come to this point in the theory of market to get the details) follows this free market rule. It is the socially acceptable market structure since it uses the resources at their best capacity. In practice, we observe this type of market in the so called developed or industrialized countries like the United States of America, the leading European Countries of the Western Europe, etc.

**Socialistic or Command Economy**: A command is one in which the government makes all decisions about production and distribution. Soviet Union during most of this century, the government owns most of the means or factors of production like land and capital; it also owns and directs the operations of enterprise in most industries; it is the employer of most workers and tells them how to do their jobs. Besides, the government in a command economy decides how the output of the society is to be divided among different goods and services. In this economy, the government answers the major economic questions through its ownership of resources and its power to enforce decisions. Later periods, a major part of Latin America, like Venezuela, Bolivia, Brazil, Paraguay, Cuba, and the Asian Giant, China maintained a long decades of socialism.

**Mixed Economy**: In recent time no contemporary society falls completely into either market economy or command economy. Rather all exception of two or three societies is mixed economies with element of market and command. Here there is a coexistence of private and public sectors which carry out the entire production and distribution activities. India has been continuing with this structure of mixed economy. Besides there are a list of countries of the developed zones like USA, England and Canada, who are also following mixed economic structure in the recent times.

**Market Socialism or Socialistic Market Economy**: The socialistic nature of The Peoples Republic of China, could not maintain a huge growth to feed up its mass scale of population. The Chinese economy tried to follow the Stalinism and to control its entire resources by the state authority. But what followed that it could not grow at a significant rate despite its huge growth of population. Lured by the options opened by the developed nations in terms of getting into the phase of international exchanges of commodities and capitals the Chinese government tried to move into the market economic structure by opening up of its economy to the world people so that huge capital inflow can pull the economy into a high growth path. The new dimension, after that, that China followed and which is now continuing is the socialistic structure with the market clearing principle which is stylized in the name of ‘Market socialism’ or ‘Socialistic market Economy’ where socialism can and should be achieved without a massive state apparatus. In this doctrine it is believed that while capital can and should be owned cooperatively, with some cases by the state, the decisions about production and exchange should be left to the market forces. It is a variety of current anti-Marxist economic thought according to which the socialistic economy is a kind of commodity and money economy which operates in conformity with the laws of the market competition.

**Chapter 2- Analysis of Demand Functions**

**3.1 Determinants of Demand**

We have already mentioned that demand for a commodity is a multivariate function. The direct demand function usually follows the following functional relation

X = f(Px, Py, M, Taste, ……..)

where x is the quantity of demand for the good X,

 Px is the price of X per unit

 Py is the price of related good (Y) per unit

 M is the money income of the consumer

 T is the taste and preference.

Traditionally these are the principal determinant, of the market demand. When we address the demand function as x = f(Px) then Py, M, ……..are kept constant under the ceteris paribus assumption. The role of the ceteris paribus assumption is to shift the demand function. When price of x falls or rises there are the movements along the demand function. Under such a case the change in quantity demanded is termed as contraction or expansion of demand.

 Suppose income of the consumer or the aggregate rises under the assumption of no change in price of the own as well as other commodities. The price of the own commodity remains unchanged and so the portions of the demand function is same. If M rises then given Px and Py extra money makes extra purchasing power and so at P1 or P2 more & more new demands are created. In such a case the demand function shifts upward parallel. This is the case for a normal good. The reverse shifting will appear when there is decrease in money income. The upward shifting is called increase in demand and the downward shifting is called decrease in demand. Therefore, there is a distinction between expansion (and contraction) in demand and increase (or decrease) in demand. The former is the movement along the same demand function and the latter is the shift in demand function.

 The analysis can similarly be done by change in prices of the related products other than Px itself. Suppose X and Y are substitutes to each other than a rise in Py leads to fall in demand for Y (due to law of demand) and so demand for X rises at the initial price of x (dx/dPy > 0). As a result the Dx function will shift upward. Similarly as Py falls, Dx will shift leftward. The pattern of shifting gets reverse direction when goods are complement to each other. As Py falls, demand for Y rises and so demand for X also rises (dx/dPy <0). This means the demand function will shift rightward for a fall in Py and as Py rises, demand function shifts leftward.

**3.2 Change in quantity demanded versus change in demand**

The analysis of consumer’s behaviour has helped us to derive a demand function for a good that is negatively sloped, except for a few situations. Whatever is the slope and shape of the function, the position of a demand curve in the demand map depends on several factors, some of which are endogenous and some are exogenous. When we relate quantity of demand with the determinants of demand one by one then the factor that enters into the functional relation is called endogenous and the rest of the determining factors play the role of exogenous variable. The notable fact from this demand relation is that any independent variable in the demand function can be endogenous in one state and exogenous in another state.

Let us express a demand function for the good X containing three principal determinants, own price of the good (Px), money income of the consumer (M) and price of related good (Py). The form of the demand function is as

x = f(Px, M, Py)

Suppose the demand for the good depends only on its own price. The demand function is, then, simplified into

x = f(Px)

where M and Py are unchanged (this is the ceteris paribus restriction). The relation between x and Px are expressed in terms of the movements along the demand function (that is the endogenous relation) whereas, the relations between x and M and/or Py are in terms of the movements off the demand function(that is exogenous relation). The role of M and Py on the demand is like a shift parameter (that is the exogenous relation) that can move the function from its original position. This means, the existing one way relation between x and Px gets disturbed by means of changes in M or Py. The relation between quantity of demand with the changes in Px gives us the concept of ‘change in quantity demanded’ and the relation between demand with M or Py is called ‘change in demand’.

Figure 3.1 presents a negatively sloped demand function in (x, Px) plane, other things remaining same. There is an inverse relation between quantity of demand and price of the good i.e dx/dPx < 0. As price falls from P2 to P1 the quantity of demand rises from x1 to x2. This rise in quantity demanded is called ‘expansion in demand’. Conversely, as price rises from P1 to P2 demand for the good falls from x2 to x1. This movement along the function is called ‘contraction in demand’. So the expression dx/dPx < 0 works for both the expansion and contractions in demands.



 Figure-3.1

Now suppose that, given the price-quantity relation (P2, x1), the consumer faces an increment of his money income under the assumption that price of the related product has not changed. Effect of rise in money income will lead to shift in the demand function at the initial price P2. The direction of shifting will, of course, depend on the nature of the good (Figure 3.2).

If X is normal then a rise in M will shift the demand function up to D2 and demand for the good will rise to x2ʹ. The change in demand in this context is called the rise or increase in demand. Similarly, as M falls the demand function will shift down to D1 making a reduction of demand to x1ʹ. This change of demand is called fall or decrease in demand. If X is inferior then a rise in M leads to downward shifting of the demand function leading to fall in demand and as M falls the demand function shifts upward leading to rise in quantity of demand. We can express the effect of shifting in a functional relation like

x = f(M)|Px=constant

where dx/dM|Px=constant >0 for normal X and dx/dM|Px=constant <0 for inferior X.

Let us switch off the impact of income but open the analysis of what happens to the positions of the demand function when price of the related product changes with the price of the own good remaining same. In the same way like the change in M, the shifting of the demand function will depend on the nature of interdependence among the goods X and Y. There are two ways of interdependences; substitutes and complements. X and Y are substitutes if a rise in price of Y (say) leads to rise in demand for X (or, dx/dPy >0) and complements if a rise in price of Y leads to fall in demand for X as well (or, dx/dPy <0) with no change in income of the consumer. The shifting of the demand function of X for change in Py is presented in Figure 3.3.

When the goods are substitutes then as Py rises the demand function shits rightward to D2 making the demand rise up to x2ʹ and a fall in Py leads to shift the demand function leftward to D1 making a decrease in demand to x1ʹ. Conversely, when the interdependence is complementary then as Py rises the demand function shifts leftward to D1 where demand for X falls to x1ʹ and as Py falls, the demand function shifts to rightward to D2 making a demand rise to x2ʹ.



 Figure-3.2 Figure-3.3

If the goods are independent then any change in price of Y does not make any changes in the demand for X (dx/dPy = 0) and hence, the demand function is unaltered in its position. This means the demand function for X in this context is homogeneous of degree zero in price of Y.

**3.3 Elasticity of Demand**

We are now at the position to have the knowledge of derivation of demand function of a commodity from the behaviour of the consumer. It is now of the interest to have a knowledge regarding the measure of responsiveness of demand to its determining factors. We can experience such responsiveness by the measure of slope of the demand function. If the demand function of a commodity is expressed in terms of its own price, other things remaining same, then the demand function can be written as

X = f(Px)

This is the direct demand function where demand for the commodity is directly defined by its price. If the demand function is written in the inverse form then the mathematical form of the function is replaced by

Px = f(x)

The slope of the direct demand function is the ratio between the change in quantity demanded and change in price i.e dx/dPx. The sign of the slope under the normal good case is negative that means as price of the good rises then quantity of demand falls and vice-versa. Similarly, the slope of the inverse demand function is dPx/dx that is again negative in sign under normal case. It is standard measure of the slope in the literature as we know that slope is the ratio of the quantity of the variable measured along the vertical axis and the quantity of the variable measured along the horizontal axis. We measure price of the good along the vertical axis and quantity demanded along the horizontal axis and so slope is nothing but the expression dPx/dx.

Although the slope measure is a good notion of measuring responsiveness, it suffers from a serious problem. Slope of the demand function depends on the units of price and quantities. If we measure quantity of a food product in kilogram rather than in grams then the magnitude of the slope will be lower as unit of kilogram is quantitatively lower than the unit of grams. It is, therefore, required to specify units all the time to make the magnitude of slope free from such problem. It is hence required to consider a unit free measure of responsiveness for convenience. Economists have chosen a measure which is known as elasticity of demand.

Elasticity, in general, means the degree of responsiveness of the dependent variable with respect to change in the independent variables. Degree of responsiveness is presented by the proportional change of the dependent variable with respect to the proportional change in the independent variables. Hence, elasticity measure makes degree of responsiveness unit free.

 Suppose we have the usual direct demand function x = f(Px, Py, M) where the variables in the bracket have their usual meanings. Since there are three sets of independent variables we have three different forms of elasticity of demand- two sets of price elasticities and one income elasticity of demand. When the elasticity is measured in terms of Px then it is called own price elasticity and when it is in terms of Py then it is called cross-price elasticity of demand. When it is measured in terms of income then we have the income elasticity of demand. If the changes in price are very small we use point price elasticity as the measure of responsiveness. But if the price changes are not small then we use the concept of arc elasticity of demand as the relevant measure. Here we mainly concentrate on explaining the elasticities of demands with respect to a particular point, unless otherwise specified.

**3.3.1 Own-price elasticity of demand**

Applying the ceteris paribus assumption we get the own demand function as x = f(Px). Own price elasticity of demand is the degree of responsiveness of demand with respect to changes in the price of the own commodity. Point price elasticity of demand is the percentage change in the demand for a commodity when there is one percent change in price of that commodity corresponding to a particular point of the demand curve. So the expression of own price elasticity of demand is

epx = (percentage change in demand for x) / (percentage change in price of X)

 = [(dx/x) × 100] /[(dPx/Px) × 100]

 = (dx/dPx). (Px/x)

 = [1/(dPx / dx)] . Px/x

 = (1/Slope). Px/x

Here Px and x be the initial price and quantity demanded of the good respectively. dPx/dx is the slope of the demand curve which is invariably negative in general and so sign of epx is negative. However, it is very much problematic of comparing two negative values of elasticities because of negative sign. For example -2 is algebraically lower than -1, but in elasticity definition, the demand function with the elasticity -2 is relatively elastic than the demand function with elasticity -1. To get rid of the problem, often the absolute value of demand elasticity is considered. Therefore, we can rewrite the expression for own price elasticity of demand as

 | epx| = - (dx/dPx). (Px/x)

We further note that elasticity of demand is the inverse of the slope of the inverse demand curve. This means as the demand function becomes steeper and steeper the function becomes more and more in elastic and conversely, as the demand function becomes flatter and flatter the function becomes more and more elastic.

The magnitude of elasticity of demand varies across the nature of goods. If a good has an elasticity of demand lesser than unity in absolute value we can say that the demand for the good is inelastic and if it is greater than unity we can say it is elastic (Figure 3.4). The nature of good in the first case is necessary like food items and in the second case it is luxury good like car. If the magnitude of elasticity is equal to unity then the good is called unitary elastic (Figure 3.5).



 Figure-3.4 Figure-3.5

In the case of elastic demand the proportionate change in demand is greater than that of price change. The demand factor is highly responsive to the change in price i.e (dx/x) > (dPx/Px). Conversely, in the case of inelastic demand, the demand is less sensitive to the change in price i.e (dx/x) < (dPx/Px). In the diagram, D2 is the elastic demand whereas D1 is the inelastic demand. For a reduction of price from P2 to P1, the demand rises in both the demand functions but the magnitude of demand rise for the elastic demand is higher than that of the inelastic demand (x1x3 > x1x2). To define elastic or inelastic demand functions in an alternative way, we can say that for an elastic demand there is the existence of so many close substitutes whereas for the inelastic demand function number of availability of substitutes is too few. The availability of substitutability makes the quantity of demand to be highly responsive to price of the good.

In case of unitary elastic demand the percentage change of demand is exactly equal to the percentage change in price. If price rises by 10 per cent then quantity demanded falls exactly by 10 per cent and if price falls by 10 per cent then quantity demanded rises exactly by 10 per cent. Under such a situation the expenditure on the good made by the consumer remains unchanged for all price quantity combination. In other words, the rectangles formed under the demand curve for each price quantity combination are of equal area that is equal to the amount of fixed expenditure of the consumer. This distinguishing feature of the good makes the demand curve to be rectangular hyperbola.

There are two extreme values of own price elasticity of demand depending on the degree of availability of substitutes of the given product X. If | epx| is equal to zero then we face either of the two possibilities; either dx/x is equal to zero or dPx/Px is equal to infinity. To present it differently, we can say that if the consumer consumes a fixed quantity of the



 Figure-3.6 Figure-3.7

good no change in price of the good is capable of changing its demand from the fixed quantity. The good in this case is called perfectly inelastic good like salt, life saving medicine, etc. The availability of substitutes in this perfectly necessary nature of good is near zero. Hence, there is unchanged emand even if price of the good changes infinitely in either upward or downward directions. The demand curve, thus, looks like a vertical line (Figure 3.6). On the other hand, if there are infinite numbers of substitutes available in the market, any rise or fall in price of the good leads to infinite changes in demand for the good making the property of the good as less important. The magnitude of price elasticity of demand is infinite. The demand curve under such a case is horizontal (Figure 3.7). That particular type of demand curve is observed in the perfectly competitive market for a representative firm (we will discuss it in more detail in the chapter relating to competitive market). Therefore, the absolute values of own price elasticity of demand varies from zero to infinity (0≤ | epx| ≤∞).

**3.3.2 Examples of price elasticity**

**Example I:** Price elasticity of a linear demand curve

Suppose the linear demand curve be x = a – bp. The slope of the demand curve in direct form is dx/dp = -b. From the expression for the price elasticity of demand we have

 | epx| = - (-b. p/x) = b. p/(a-bp)

For a linear demand curve putting the possible values of prices along different points we can obtain different values of the price elasticity of demand.

If p = 0 then quantity of demand x = a, which is maximum availability at free of price. The value of | epx| at p = 0 is zero. This is the corresponding point on the demand curve that meets the quantity axis. Similarly, at price p = a/b, x = 0 and the value of | epx| is infinity. This is the point on the vertical axis where the demand curve meets. Further at price p = a/2b, quantity of demand is x = a/2 that is half of the total size of demand at zero price. The corresponding value of | epx| is unitary. This happens at the mid point of the demand curve. If at a/2b<p<a/b and 0<x<a/2 the value of | epx| is greater than unity. Similarly at 0<p<a/2b and a/2<x<a, the value of | epx| is less than unity. Therefore, what we observe that for a linear demand curve the value of price elasticity of demand varies from zero and infinity (Figure 3.8).



 Figure-3.8

**Example II:** Unitary price elasticity of demand

We observed in the first example that along a linear demand curve the own price elasticity of demand takes the values from zero to infinity. Only at the mid point of the demand curve it was equal to unitary. But a unitary price elasticity of demand function is the set of price quantity relations depicting always the elasticity equal to one along the demand function. This holds under a special case when the consumer expenditure or the revenue of the firm remains unchanged for all combination of price and quantities. The demand function looks like

 Px = E0/x

where E0 is the fixed amount of consumer’s expenditure or the firm’s revenue from the product. Let us derive the magnitude of price elasticity of demand for any point of the demand function that should entail the value -1 (or +1 in absolute terms). We have,

dx/dPx = - E0/Px2

Now epx = (dx/dPx).(Px/x) = - (E0/Px2).(Px2/ E0)

Or, epx = -1

The demand curve looks like a rectangular hyperbola (Figure 3.5).

**3.3.3 Constant price elasticity of demand**

In the above example we found that for a demand function like x **=** E0/Px the elasticity of demand is constant at unity. But unitary value of elasticity does not express all values of the constant elasticities. Therefore, we need a more general version of demand function that will represent the constant elasticities of demands. It is represented by the function

x = KPxe

where K is any positive arbitrary constant and e stands for the constant elasticity of demand. We can show this.

We can express the demand function in the logarithmic form so as to get the elasticity of demand by the first differentiation. The logarithmic form of the function is

logx = logK + elogPx

This is the log linear demand function.

Let us recall the elasticity expression as epx = (dx/dPx).(Px/x)

We can rewrite the expression as epx = (dx/x)/(dPx/Px) = dlogx/dlogPx

Hence, from the log linear demand function we obtain epx = dlogx/dlogPx = e.

This is the constant value of elasticity that can take any negative constant values.

**3.3.4 Derivation of point price elasticity diagrammatically from a linear demand function**

Suppose DD1 is the linear demand curve (Figure 3.9). We want to measure point price elasticity at point E. Initial price OP1 = Ex1 and initial quantity demand Ox1 = EP1

Change in price dPx = P2 – P1 = EG and

Change in quantity demanded dx = x2 – x1 = FG

Now price elasticity of demand at E is

 epx = (dx/dPx) .(Px/x) = (FG/EG).(Ex1/EP1)………………….(1)

From the diagram, we see that ΔEFG and ΔEx1D1 are similar so

 EG/Ex1 = GF/x1D1

 Or, GF/EG = x1D1/Ex1……………………..(2)

Substitute (2) into (1) we get

 epx = (x1D1/Ex1).(Ex1/EP1) = x1D1/EP1 …………….(3)



 Figure-3.9 Figure-3.10

Again ΔDP1E and ΔEx1D1 are similar, so

 EP1/x1D1 = ED/ED1

 Or, x1D1/EP1 = ED1/ED…………………(4)

Comparing (3) and (4) we get

 epx = ED1/ED

 = (lower segment of the demand curve from E)/(upper segment of the curve from E)

So the point price elasticity of demand is the ratio of the lower segment and upper segment of the demand curve around the concerned point of measuring elasticity. The concerned point E may lie anywhere along the demand curve. Let us take following observations depending on the position of E (Figure 3.10).

**Case I**: E is midpoint of the demand curve:

 If E is midpoint then length of lower segment is equal to the length of upper segment.

 Or, ED1 = ED

 So epx = ED1/ED = ED/ED = 1

Therefore, the midpoint of the linear demand curve is unitary elastic.

**Case II**: E is right to the midpoint:

 This implies lower part is less than upper part

This means ED1 < ED

 So epx = ED1/ED < 1

This is the inelastic zone of the linear demand curve.

**Case III**: E is left to the midpoint:

 This implies ED1 > ED

Hence, epx = ED1/ED > 1. This is elastic zone of the linear demand curve.

**Case IV**: E is at the upper corner point:

 This implies ED1 = ∞ and ED = 0

 So epx = ED1/ED = ∞

This implies that at the intersection point of the vertical axis the price elasticity of demand takes the infinite value.

Case V: E is at the lower corner point:

 This implies ED = ∞ and ED1 = 0

 So epx = ED1/ED = 0. Hence the elasticity at the horizontal intercept is zero.

So the values of own price elasticity of demand lies between 0 and -∞, or, 0 ≤ | epx| ≤ ∞.

**3.3.5 Arc elasticity of demand**

The above formula for measuring point price elasticity is applicable only when the price changes are very small. But if the price changes are significant then we can not use the formula, rather we apply the arc elasticity for a particular segment of the demand curve rather than measuring at a particular point. Suppose DD1 be a linear demand function (the same explanation may be given for a non linear demand function) upon which there are two points E and F (Figure 3.11 and Figure 3.12). By applying the point elasticity formula we can compute price elasticity of demand either at E or at F or at both. The result will obviously change from point E to point F. To have a unique value of elasticity out of these two points we make adjustments to the quantification of base prices and base quantities. Since both the points depicts different combinations of pric and quantities so we take the averages of their values and consider these average values as the initial price and quantity demanded. Therefore, arc elasticity of demand is defined as the percentage change in quantity demanded due to percentage change in the price of the commodity with the initial price as average price and initial quantity as average quantity demanded. On the other hand, arc elasticity measures the demand elasticity for a particular segment (EF) of the demand curve instead of at a particular point (like E or F).

So the expression of arc elasticity of demand is

 ec = dx/dPx. [(P1 + P2)/2] / [(x1 + x2)/2]

 = (dx/dPx). (P1 + P2) /(x1 + x2)



 Figure-3.11 Figure-3.12

The arc elasticity is the measure of average elasticity that is the elasticity at the mid point of the segment of the linear demand curve (or, midpoint of the line drwan joining points E and F for a non linear demand function).

Example: Suppose prices and quantities corresponding to the points E and F are given by

E F

P1 = 15 P2 = 10

X1 = 20 x2 = 30

Prove that point elasticity is different for E and F and there is unique value of arc elasticity of demand.

With respect to point E, Px = 15 and x = 20. Change in demand for change in price is dx/dPx = (x2-x1)/(P2-P1) = (30-20)/(10-15) = -10/5 = -2. So point price elasticity at E is

epx = -2.15/20 = -1.5

Similarly with respect to point F, Px = 10 and x = 30. dx/dPx = (x1-x2)/(P1-P2) = (20-30)/(15-10) = -10/5 = -2. The point price elasticity at F is epx = -2.10/30 = - 0.67. Therefore, the values of elasticities are different at point E and F.

Now compute the magnitude of arc elasticity of demand. Here initial price is Px = (15+10)/2 = 12.5 and initial quantity is x = (20+30)/2 = 25. Therefore, ec = -2.(12.5/25) = -1. This is a unique value.

**3.4 Slope vis-à-vis elasticity**

We have earlier pointed out that slope and elasticities are the two types of measures of responsiveness of demand due to price change, although the latter is a better measure compared to the former. Further, the elasticity of demand varies inversely with the slope of the demand function in general, but we can find situations that even with same slope the elasticity may be different and with different slope elasticity may be the same.Let us prove these two statements in the following discussions.

 Let AB and CD be two demand functions with equal slopes (they are parallel in position) (Figure 3.13). Let us set a price P1 for both the functions. E and F are two points respectively on two demand curves AB and CD. Since, the elasticity of demand at a particular point is the ratio between the length of the lower segment and upper segment of the demand curve around the concerned point so elasticity of the demand curve AB at point E = EB/EA = OP1/AP1. Similarly, elasticity of the demand curve CD at point F = FD/CF = OP1/CP1. Comparing the values of price elasticity at two points of the different demand functions we see that OP1/CP1<OP1/AP1. This shows that the elasticity of the demand curve AB is greater than the elasticity of the demand curve CD; although the slopes of the demand curves are identical. The difference in the magnitudes of elasticity of the demand curves will not change for all price quantity combinations along these two demand curves.

Let us take the reverse case. The two demand curves with different slopes are with identical magnitudes of elasticity.[[1]](#footnote-1)

Suppose AB and AC are two demand curves starting from the same point A on the price axis have different slopes (Figure 3.14). AB is with higher slope compared to AC. E and F are two points on two demand curves AB and AC respectively. The magnitude of elasticity of demand at point E = EB/AE = OP1/AP1. In the same way, elasticity at point F on AC demand curve is FC/AF = OP1/AP1. Hence we can say that the two demand curves with different slopes have same elasticity of demand.

Let us consider another illustration where the demand curves have different intercepts along both the price and quantity axes. The slopes are, therefore, automatically different. A function cutting the other from above has greater slope than the other cutting from below. We can show that under this case the demand curves will have different magnitudes of elasticity. The steeper demand curve will follow lower elasticity and the flatter one will follow higher elasticity.

Recalling our price elasticity expression

epx = (dx/dPx).(Px/x)

= (1/dPx/dx).(Px/x)

= (1/slope).(Px/x)



 Figure-3.13 Figure-3.14 Figure-3.15

The relation shows that there is an inverse relation between elasticity and price and hence they are comparable. Let us consider two demand curves AB and CD (Figure 3.15). AB is steeper than CD and they intersect at point E. The price quantity ratio at the intersection point is same (=P1/x1). The difference in the slopes, thus, makes differences in the elasticities. The elasticity at point E for AB demand curve is EB/AE = OP1/AP1. Again elasticity at E for CD demand curve is ED/CE = OP1/CP1. Since OP1/CP1>OP1/AP1 (since AP1>CP1), so elasticity for the steeper demand curve AB is smaller than the elasticity of the flatter demand curve CD.

**3.5 Income elasticity of demand**

Just like demand for a good is determined by the price of the good, demand for a good is also determined by money income of the consumer. Under the ceteris paribus assumption, the demand function of the consumer is stated like

 x = f(M)

where M stands for the money income of the consumer that is also a proxy of purchasing power of money. The working of the functional rule is reverse to the working of the demand price relation for a normal good. This means for a normal good as price falls (or rises) quantity of demand rises (or falls) but as income rises (or falls) demand for the normal good rises (or falls). In algebraic expression we can state that dx/dPx<0 or dx/dM>0. But for an inferior good (that are not Giffen) the direction of demand price relation works in the similar way as with the demand income relation (dx/dPx<0 or dx/dM<0). The demand curve derived with respect to different values of M is called the income demand curve or the Engel curve.

The expression dx/dM measures the degree of responsiveness of demand due to one unit change in the level of income. Like the slope of price curve the measure of responsiveness in terms of dx/dM also suffers from the unit of measurement problem. Therefore, the true measure of responsiveness is further taken in terms of elasticity. The measure of elasticity describing demand income relation is called income elasticity of demand. Income elasticity of demand is expressed by the ratio of proportionate change of demand to proportionate change in income. Therefore, we can write

 emx = [(dx/x)\*100]/[(dM/M)\*100]

 = (dx/dM).(M/x)

The sign of emx depends on the sign of dx/dM which further depends on the nature of the good to the consumer, provided the initial level of income and quantity of demand are positive. If X is normal then quantity of demand changes at the same direction with the change in income (i.e dx/dM>0). This means the sign of income elasticity of demand is positive (emx>0). If X is inferior then demand changes inversely with the changes in income levels (i.e dx/dM<0). So, the sign of income elasticity of demand is negative (emx<0). If the good is normal luxury or superior then demand changes at a higher rate than the change in income then the magnitude of income elasticity of demand is greater than unity (emx>1). On the other hand if the good is absolutely necessary then the demand is irresponsive to the changes in levels of income so the magnitude of income elasticity of demand is zero (emx=0).

As a general rule of thumb, however, the magnitude of income elasticity of demand hovers around a central value of 1. We can show this from the equation of the budget function. Suppose, at two income situations M1 and M2, the respective bundles (x1, y1) and (x2, y2) are purchased at the fixed prices of the goods X and Y. The two budget constraints are

Px.x1 + Py.y1 = M1………………….(1)

Px.x2 + Py.y2 = M2………………….(2)

Subtracting equation (1) from equation (2) we get

 Px (x2-x1) + Py (y2-y1) = (M2-M1)

Or, Px.dx + Py.dy = dM

Or, Px.dx/dM + Py.dy/dM = 1

Doing necessary adjustments we get the relation

 (Px.x/M).(dx/dM).(M/x) + (Py.y/M).(dx/dM).(M/y) = 1

 Or, αx.emx + αy.emy =1

where αx represents the share of income spends on X and αy represents the share of income spends on Y. Under a two commodity world αx + αy =1. The above expression states that the weighted average of income elasticities will be equal to unity, where the weights are the share of expenditures on two goods. This is the *Engel’s Aggregation condition*. This gives us the clue to our answer. An inferior good with negative income elasticity will be counterbalanced by another normal good with a significant high magnitude of elasticity. Similarly, a luxury good will is associated by a normal good with a low magnitude of income elasticity. This proves that the income elasticity of demand tend to cluster around a unitary magnitude. One more important conclusion can be derived from the result that two goods in a two good world can not be inferior simultaneously.

**3.6 Cross-price Elasticity of Demand**

In the real world there are certain goods which are interrelated. The degree of their interdependence can be given in terms of cross-price elasticity of demand. Suppose there are two goods X and Y. The demand function of X is x = f(Py) under the assumption of income and own price constant. Py is the per unit price of Y that determines the quantity of demand for X. By the similar ceteris paribus restrictions we can alter the direction of interdependence like y = f(Px).

Cross price elasticity of demand for X on Y can be defined as the ratio of percentage change of demand for X and the percentage change in price of Y. This means

exy = [(dx/x)\*100]/[(dPy/Py)\*100]

 or, exy = (dx/dPy).(Py/x)

The sign of exy depends on the sign of dx/dPy which further depends on the nature of interdependence among the goods. There are mainly two ways of interdependence-substitutes and complements.

If the goods are substitutes to each other than a rise price of Y leads to fall in demand for it but raises demand for X. This also suggests that X is substituted for Y for a price rise. If Py falls then Y is cheaper and X is dearer, so, Y is substituted for X. This means the sign of dx/dPy is positive and hence the sign of exy is positive. Most popular example of substitutes is tea and coffee.

On the other hand if there is complementary relation between the goods then a rise in Py leads to fall in quantity of demand for Y as well as X. The sign of dx/dPy is negative and hence the sign of exy is negative. The example of complementary goods is car-petrol, pen-refill, tea-sugar etc. If the value of exy rises in positive direction then the degree of substitutability rises and as the value of exy rises in negative direction then the degree of complementarity rises.

If the goods are not related at all then the rise or fall in price of Y does not lead to any sort of change in the demand for X. In other words the magnitude of cross elasticity of demand is zero. The example may be shoe and butter, bread and umbrella etc.

Suppose a demand function be x = M/2Py

For any initial price demand combination we get dx/dPy = -M/2Py2. The value of cross elasticity becomes

 exy = -(M/2Py2).(2Py2/M) = -1<0

Let us take another example. The demand function be x = Py.M. The value and sign of cross elasticity of demand is exy = M. Py/Py.M = +1>0. The goods in the first example are complements and in the second case are substitutes.

**3.7 Relation between own price, cross price and income elasticity of demand**

Suppose an ordinary demand function be x = f(Px, Py, M). If all the independent variables are changed by a fixed proportion ‘k’ then the demand function does not change. This is to say alternatively that the demand function is homogeneous of degree zero. We can write the changed function as

x = k0 f(Px, Py, M)

where the power of k represents the zero degree of homogeneity. Applying Euler’ theorem, we get

Px.(dx/dPx) + Py.(dx/dPy) + M.(dx/dM) = 0.x

Dividing both sides by x we get

(Px/x). (dx/dPx) + (Py/x).(dx/dPy) +(M/x).(dx/dM) = 0

 Or, epx + exy + emx = 0

where the first term stands for own price elasticity of demand, the second term cross price elasticity and the third income elasticity of demand. The above expression presents the relation between three elasticities of demand which shows that their sum is zero. Rewriting the relation we have

epx + exy = **-** emx

This further show that the sum of price elasticities is the negative of income elasticity of demand for the good X The above relation can be used to find the nature of the goods. To do it we take some observations.

1). X is normal. This means emx>0. Since own price elasticity is always negative so sign of exy can be negative. This means, if all the prices and money income change equi-proportionately then, for normal X, both the goods will be complement to each other. On the other hand if magnitude of negative epx is larger than positive exy then the above relation still satisfies and in that case the goods are substitute rather complementary to each other.

2). X is inferior. This refers to emx<0. To satisfy the above equality, exy should be positive and will be greater than the magnitude of epx. This implies the goods are substitutes to each other.

3). X is absolute necessary. The sign of exy should be positive and the goods will be substitutes.

**3.8 Derivation of Income Elasticity of Demand from EC**

Income elasticity of demand (emx) for good X is the percentage change in the demand for X when there is one per cent change in money income i.e.

emx = [(dx/x).100]/[(dM/M).100] = (dx/dM).(M/x)

If X is necessary good then emx<1. If it is luxury or superior then emx>1 and when it is unitary income elastic then emx =1. For a normal good X, the EC will be positively sloped. Let us consider some of the following observations-

**Case I:** EC has a positive intercept from the horizontal axis

Let us measure income along the horizontal axis and quantity of consumption of good X along the vertical axis. We want to measure income elasticity at point C. We draw a perpendicular CD on the horizontal axis. Now OD = M (initial amount of money), CD = x (the original purchase) and dx/dM is the slope of EC = CD/AD.



 Figure-3.16 Figure-3.17

So the income elasticity of demand at point C is emx = (dx/dM).(M/x) = (CD/AD).(OD/CD) = OD/AD. From the diagram (Figure 3.16), it is observed that OD>AD. Or, OD/AD>1, so emx>1. In the first case, emx is greater than unity and such EC represents the feature of a luxury good.

**Case II:** EC has a positive intercept in the vertical axis

Here also emx = OD/AD. From Figure 3.17 OD<AD or, OD/AD<1. So emx is less than unity. Engel curve in this case represents the one of the features of a necessary good.



 Figure-3.18 Figure-3.19

**Case III:** EC passes through the origin

In this case the emx at point C is emx = OA/AD. But in the diagram, OD = AD and so OD/AD =1. So emx = 1. This implies when EC is a straight line passing through the origin then income elasticity of demand will be unitary elastic (Figure 3.18).

**Case IV:** EC is negatively sloped

We draw a negatively sloped EC that starts from the original income M = OA and original demand is x = CD. After change in income to dM = AD (which is negative in sign) demand changes to dx = CD. Therefore, emx = OA/AD < 0 since AD is negative. Hence, the EC with downward shape illustrates the nature of the inferior good (Figure 3.19).

**3.9 Market Demand**

The demand function of a particular consumer for a particular good obtained from either the cardinal or ordinal utility theories does not help in determining the market price of the commodity. The individual demand is just a representative of the aggregate demand and can not influence the decision marking power of the aggregate. Therefore we need the concept of aggregate or market demand for a particular good generated for the demands of all the individual consumers.

**Derivation of Market Demand**

In positive economics the market demand for a particular commodity is the horizontal summation of the demand of all the individual consumers for a particular price. In other words, the summation of quantity demands of the individual consumers forms the shape of the market demand curve. Suppose there are two consumers, consumer A and consumer B, who demand the commodity X on the basis of the optimisation of their own objectives. DA and DB are the two linear demand curves (assuming X is not a Giffen good to either consumer) varying in slope and elasticity. In Figure 3.20, Panel I and Panel II represent the individual demand curves and Panel III represents the market demand curve (DA + DB). At P1 price, consumer A demands xA1 units and B xB1 units of the good. The horizontal summation i.e. ∑xi = xA1 + xB1 = x1 is the market demand for the good at price P1. Now suppose price rises to P2. Consumer A demands less of the good x2A and consumer B also consume less unit x2B and so the market demand falls heavily to x2 = ∑xi = x2A + x2B. Doing the same analysis for all possible prices, we find the market demand curve (D).



 Panel I Panel II Panel III

Figure-3.20

The aggregate demand curve is still negatively sloped like the individual demand curves but it is more elastic and flatter than the individual demand curves. Market demand fell drastically due to drastic falling in demand by consumer B, as it is highly elastic than A.

It is very rare that a market demand function will not be negatively sloped. Upward sloping demand function is observed for a Giffen good. But a good may be Giffen to a particular consumer but it is very unlikely that it will be observed by all the consumers in the market at a time. And even if it is, it is unlikely to hold for each consumer at the same range of prices. And, hence, the negatively sloped market demand curve, which is the horizontal sum of individual demand curves, is very much likely to observe.

**3.9.1 Market demand- problem of aggregation**

In deriving the market demand curves in the previous section we assumed that all the individual demand curves are representative and independent that any one’s purchase plan does not influence the purchase plans of the others. Hence, the aggregation of individual demand curves to arrive at a market demand curve did not raise any question of invalidity. But there are certain instances in practice that the behaviour of an individual consumer affects the behaviour of the others. For example, either one envies the other or one follows the other (this is termed as keeping up with the Joneses). In other way to say that the different demand functions are not independent and so there is the problem of aggregation. We highlight some of the instances in the following discussions.

**3.9.1.1 Bandwagon effect**

Bandwagon effect comes to operate when the individual consumer treats himself as a part and parcel of the society in the sense that if individuals in the group purchase a good then he will follow them and as a result aggregate demand in the market will rise. The demand curve, after incorporating the bandwagon effect, becomes elastic than the demand curve under zero bandwagon effect. Figure 3.21 illustrates the bandwagon effect.



 Figure-3.21 Figure-3.22

Suppose D1 be the ordinary market demand curve and total demand is x1 at price P2. After fall in price from P2 to P1 the quantity of demand rises to x2 with no bandwagon effect. But if the effect is present the other consumers in the group will follow and they will enter the market. As a result there will be greater rise in the quantity of demand to x3. The aggregate demand curve is, therefore, flatter or elastic (D2) than the demand curve under absence of the effect.

**3.9.1.2 Snob effect**

A snob effect arises if the consumer wants to differentiate himself from the other members of the group or society. One such behaviour is like the fact that he prefers the good which the mass do not, rather cannot, afford to prefer. For example, a fall in price of the good attracts the mass of the consumers in terms of high quantity of demand but the concerned individual with snob appeal dislikes to demand more like the mass. Rather he goes for reduction of quantity of demand for the good. At the same time if price of the good rises, most of the consumers will cut down their demand but the consumer with snob appeal raises consumption of the good and makes himself identifiable in the society. Therefore, for a price fall demand will be less and for a price rise demand will be more than the mass. So the demand curve under snob effect will be less elastic (D2) than the commons’ demand curve (D1) (Figure 3.22).

**3.9.1.3 Veblen effect**

A Veblen effect (named after Thorstein Veblen) said to exist when the individual judges quality by price. This means a good with high price is supposed to be with high quality and similarly a good with low price is with low quality. The demand curve under the Veblen effect will be steeper as because a fall in price leads to a fall in quantity of demand than under the ordinary demand (D1) case (Figure 3.23).



Figure-3.23

The market demand curve will be steeper and steeper (D2) as the magnitude of the effect becomes stronger and stronger. The aggregate demand curve may even be upward sloping (D3) if most of the people in the society behaves in the similar price-quality reactions. How far these interdependencies explains the divergences between the true and ordinary demand curves will depend on at what extent the effect works and how many consumers gets affected by this effect.

In reality it is not rationale to suppose that majority of the consumers follow the above three effects. It is better to consider them as the exceptional cases.

**Multiple Choice Questions and Answers**

1. In a linear demand function, the absolute values of own price elasticity changes with increase in unit of demand in the following manner
2. Decreases with demand
3. Increases with demand
4. No changes with demand
5. None of the above
6. Increase in price of a good will necessarily lead to increase in expenditure of the good with other things remaining same then the nature of the good is
7. Luxury or elastic
8. Absolutely necessary
9. Necessary or inelastic
10. All of the above
11. If the demand function for a good is negatively sloped then the good may be
12. Normal
13. Giffen
14. Inferior
15. Both Normal and Inferior
16. If two demand functions are parallel that is with identical slopes then the own price elasticity for these two demand functions will be
17. Equal
18. Different
19. More for the upper function
20. Less for the upper function
21. When arc elasticity of demand is calculated then the initial price-quantity combination is taken as
22. Price-quantity combination of either of the points
23. Summation of both prices and quantities
24. Average of the prices and quantities at the two points
25. None of the above
26. Suppose in a two good system, income of the consumer and price of the other good remaining same, the effect of change in price of the good in concern will lead to
27. Shifting out of the demand function
28. Shifting in of the demand function
29. Movement towards down along the demand function
30. Movement along the demand function at any direction
31. Suppose in a two good system, price of the own good and price of the other good remaining same, the effect of change in income of the consumer will lead to
32. Shifting out of the demand function
33. Shifting of the demand function in either upward or downward direction
34. Movement towards down along the demand function
35. Movement along the demand function at any direction
36. If the Engel Curve for a good is negatively sloped in a two good world, then the Engel Curve of the other good should be
37. Negatively sloped
38. Positively sloped
39. Positively sloped and sufficiently elastic
40. Cannot be judged
41. The comparison among ordinary demand and compensated demand functions can be given as
42. All three are different in slopes and Hicksian function is steeper than Slutsky and Ordinary
43. All three are different in slopes
44. Ordinary is steeper than either of the compensated demand functions
45. None of the above
46. Consumer’s surplus from a good can be derived from the demand function as
47. The area below the demand function
48. The area above the demand function
49. The area below the demand function but above the market price
50. None of the above
51. If the demand function of a good of any nature is homogeneous of degree zero in prices and income, then the sum of absolute values of the own and cross price elasticities will be equal to
52. Less than the absolute value of income elasticity of demand
53. More than the absolute value of income elasticity of demand
54. Equal to the absolute value of income elasticity of demand
55. None of the above
56. If the income elasticity of demand is unitary then the income demand curve will be a line
57. Through the consumption axis
58. Through the origin
59. Through the income axis
60. All of the above
61. If the sign of the cross price elasticity of demand is positive then we can say that
62. Both the goods are complements to each other
63. Both are unrelated
64. Both are substitutes to each other
65. None of the above
66. If the aggregate demand function is upward sloping it implies that
67. The bandwagon effect is present
68. The Snob effect is present
69. The Veblen effect is present
70. Both ‘b’ and ‘c’ are true
71. If two goods are substitutes to each other, then a fall in price of one leads to shift of the demand function of the other in
72. Upward direction
73. Downward direction
74. No change in position of the demand function
75. None of the above

**Answers**

1(a), 2(c), 3(d), 4(b), 5(c), 6(d), 7(b), 8(c), 9(a), 10(c), 11(c), 12(b), 13(c), 14(d), 15(b)

**Descriptive Questions**

1. Define a demand function. Construct a demand schedule of your own choice and derive the slope and elasticity at different price-quantity combination.
2. What do you mean by ‘change in quantity demanded’ and ‘change in demand’? Explain how the factors captured under the ceteris paribus restriction make changes in the demand schedule. Can you differentiate in this context between two goods with different natures? Explain.
3. How can you measure the ‘degree of responsiveness’ of price change on the quantity of demand? Explain with proper argument. Draw the demand function whose mathematical form is x = 50/p where the notations are of usual meanings. Derive price elasticity of demand from this demand function.
4. What do you mean by the demand function to be homogeneous of degree zero in prices and income? Interpret such demand function to establish possible relation between two goods.
5. Derive the mathematical relation among expenditure, price and elasticity of demand for a good. Show in diagram that an increase in price of a good does not necessarily lead to increase in consumer’s expenditure on that good.
6. Differentiate point price elasticity from arc elasticity of demand. Derive the point elasticity of demand at a particular point on a non linear demand function.
7. What is Engel’s Law? Draw income elasticity of demand from a linear demand function at a particular point. Prove that the sum of weighted income elasticities of demand for two goods will always be unitary. Can you infer anything from the relation about the desired natures of two goods simultaneously? Explain.
8. The equation of the demand function is q = ApδMβ (where P = price, M = income, A = constant). Calculate a) price elasticity and b) income elasticity of demand.
9. Prove that if a demand curve is a rectangular hyperbola, the price elasticity of demand at all points being equal to – 1. Hints: (take p.q = C, where C is any constant).
10. Assume that the demand curve takes the following form: q = 50 – 2p.

a) Calculate the price elasticity of demand at p = 15 and p = 25 and justify that elasticity cannot be inferred by slope alone.

b) “The flatter the demand curve the greater the price elasticity of demand.” Do you agree?

c) Change the demand curve to q = 100 – 2p. Calculate elasticity at p = 15. Is it the same as in (a) (since the slope is unchanged).

1. Consider the demand curve q = 40 – 2p.

 a) Find the quantities demanded at p = 0, 1, 2, 3, 4, 5 and plot the demand curve.

1. Two functions starting from the same intercept points will have identical elasticity and two functions starting from the same intercept on the quantity axis will also have identical elasticity at each quantity. [↑](#footnote-ref-1)