IRC 1 (COMMERCE)

BUSINESS ECONOMICS MODAL TEST PAPER

FULL MARKS: 75

TIME: 3 HRS

Answer the questions as per instructions given.

The figures in the right-hand margin indicate marks

Candidates are required to give answer in their own words as far as practicable.

GROUP -A

(Short answer type questions)

Q1. Answer all the following questions in a few words or maximum in one sentence.

(5x1=5)

a) Which curve shows optimum quantity of a good purchased various levels of income
Ans. Engel curve.

b) Define elasticity of demand.

Ans. The price elasticity of demand is the response of the quantity demanded to change in the price of a commodity-

c) What is the shape of AVC (Average Variable Cost) curve?

Ans. U shaped.

d) Define Marginal Rate of technical substitution.

Ans. The marginal rate of technical substitution (MRTS) is the measure with which one input factor is reduced while the next factor is increased without changing the output

e)What can be said about the degree of elasticity of demand when there is infinite change in quantity demanded without any change in price.

Ans. Perfectly elastic demand.

Q2. Define Law of diminishing marginal utility. (5)

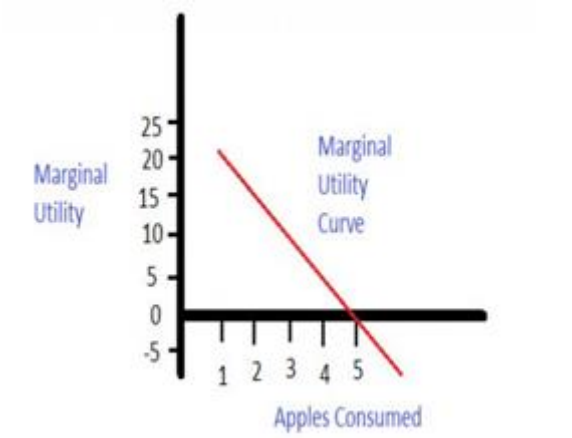
The law of diminishing marginal utility states that the amount of satisfaction provided by the consumption of every additional unit of good decreases as we increase that good's consumption. Marginal utility is the change in the utility derived from consuming another unit of a good.

Schedule for Law of Diminishing Marginal Utility:

Unit of Consumption	Marginal Utility	Total Utility
1	20	20
2	15	35
3	10	45
4	05	50
5	00	50
6	-05	45

In the above table, the total utility obtained from the first apple is 20 utils, which keep on increasing until we reach our saturation point at 5th apple. On the other hand, marginal utility keeps on diminishing with every additional apple consumed. When we consumed the 6th apple, we have gone over the limit. Hence, the marginal utility is negative and the total utility falls.

With the help of the schedule, we have made the following diagram:



Saturation Point: The point where the desire to consume the same product anymore becomes zero.

Q3. What do you mean by consumer surplus. (5)

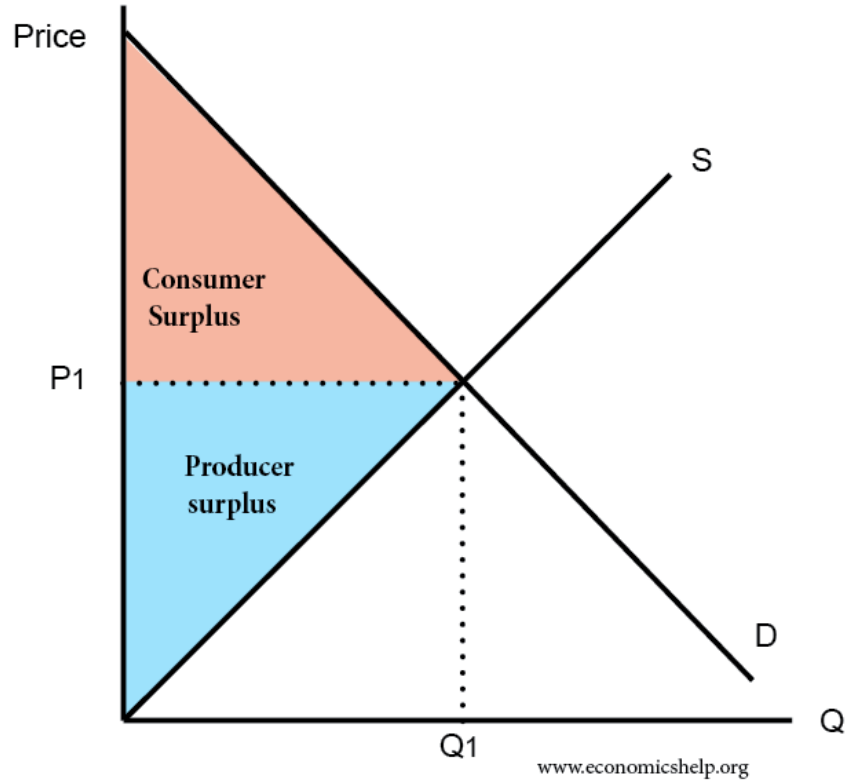
Alfred Marshall, British Economist defines consumer's surplus as follows: "Excess of the price that a consumer would be willing to pay rather than go without a commodity over that which he actually pays."

Hence, Consumer's Surplus = The price a consumer is ready to pay – The price he actually pays

Consumer Surplus is the difference between the price that consumers pay and the price that they are willing to pay. On a supply and demand curve, it is the area between the equilibrium price and the demand curve

For example, if you would pay 76p for a cup of tea, but can buy it for 50p – your consumer surplus is 26

Diagram of Consumer Surplus



GROUP-B

(Long/Descriptive answer type questions)

Answer any four of the following questions.

Q4. Define Business Economics. Explain its nature and scope. **(15)**

Business Economics is the integration of economic theory with business practice for the purpose of facilitating decision making and forward planning by management. Business Economics, also referred to as Managerial Economics, generally refers to the integration of economic theory with business practice.

Definition of economics by different economists have a different point of view, but the essence is the same. The following are some popular definition of business economics. *Managerial economics is concerned with the application of economic concepts and economics to the problems of formulating rational decision making.*

Mansfield

Managerial economics is concerned with the application of economic principles and methodologies to the decision-making process within the firm or organization. It seeks to establish rules and principles to facilitate the attainment of the desired economic goals of management.

Douglas

Nature of Business Economics

Business Economics is a Science: Science is a systematized body of knowledge which establishes cause and effect relationships. Business Economics integrates the tools of decision sciences such as Mathematics, Statistics and Econometrics with Economic Theory to arrive at appropriate strategies for achieving the goals of the business enterprises. It follows scientific methods and empirically tests the validity of the results.

Based on Micro Economics: Business Economics is based largely on Microeconomics. A business manager is usually concerned about achievement of the predetermined objectives of his organisation so as to ensure the long-term survival and profitable functioning of the organization. Since Business Economics is concerned more with the decision making problems of individual establishments, it relies heavily on the techniques of Microeconomics.

Incorporates elements of Macro Analysis: A business unit does not operate in a vacuum. It is affected by the external environment of the economy in which it operates such as, the general price level, income and employment levels in the economy and government policies with respect to taxation, interest rates, exchange rates, industries, prices, distribution, wages and regulation of monopolies. All these are components of Macroeconomics. A business manager must be acquainted with these and other macroeconomic variables, present as well as future, which may influence his business environment.

Business Economics is an art: it involves practical application of rules and principles for the attainment of set objectives.

Use of Theory of Markets and Private Enterprises: Business Economics largely uses the theory of markets and private enterprise. It uses the theory of the firm and resource allocation in the backdrop of a private enterprise economy.

Pragmatic in Approach: Microeconomics is abstract and purely theoretical and analyses economic phenomena under unrealistic assumptions. In contrast, Business Economics is pragmatic in its approach as it tackles practical problems which the firms face in the real world.

Interdisciplinary in nature: Business Economics is interdisciplinary in nature as it incorporates tools from other disciplines such as Mathematics, Operations Research, Management Theory, Accounting, marketing, Finance, Statistics and Econometrics.

Normative in Nature: Economic theory has developed along two lines – positive and normative. A positive or pure science analyses cause and effect relationship between variables in an objective and scientific manner, but it does not involve any value judgement. As against this, a normative science involves value judgement. It is prescriptive in nature and suggests 'what should be' a particular course of action under given circumstances. Welfare considerations are embedded in normative science.

Business Economics is generally normative or prescriptive in nature. It suggests the application of economic principles with regard to policy formulation, decision-making and future planning. However, if the firms are to establish valid decision rules, they must thoroughly understand their environment.

Scope of Business Economics

The scope of Business Economics may be discussed under the following two heads:-

1. Microeconomics applied to operational or internal Issues

Demand Analysis and Forecasting: *Demand Analysis* pertains to the behaviour of consumers in the market. It studies the nature of consumer preferences and the effect of changes in the determinants of demand such as, price of the commodity, consumers' income, prices of related commodities, consumer tastes and preferences etc.

Demand Forecasting is the technique of predicting future demand for goods and services on the basis of the past behaviour of factors which affect demand. Accurate forecasting is essential for a firm to enable it to produce the required quantities at the right time and to arrange, well in advance, for the various factors of production viz., raw materials, labor, machines, equipment, buildings etc. Business Economics provides the manager with the scientific tools which assist him in forecasting demand.

Production and Cost Analysis: Production theory explains the relationship between inputs and output. A business economist has to decide on the optimum size of output, given the objectives of the firm. He has also to ensure that the firm is not incurring undue costs. Production analysis enables the firm to decide on the choice of appropriate technology and selection of least - cost input-mix to achieve technically efficient way of producing output, given the inputs. Cost analysis enables the firm to recognize the behavior of costs when

variables such as output, time period and size of plant change. The firm will be able to identify ways to maximize profits by producing the desired level of output at the minimum possible cost.

Inventory Management: Inventory management theories pertain to rules that firms can use to minimize the costs associated with maintaining inventory in the form of 'work-in-process,' 'raw materials', and 'finished goods'. Inventory policies affect the profitability of the firm. Business economists use methods such as ABC analysis, simple simulation exercises and mathematical models to help the firm maintain optimum stock of inventories.

Market Structure and Pricing Policies: Analysis of the structure of the market provides information about the nature and extent of competition which the firms have to face. This helps in determining the degree of market power (ability to determine prices) which the firm commands and the strategies to be followed in market management under the given competitive conditions such as, product design and marketing. Price theory explains how prices are determined under different kinds of market conditions and assists the firm in framing suitable price policies.

Resource Allocation: Business Economics, with the help of advanced tools such as linear programming, enables the firm to arrive at the best course of action for optimum utilization of available resources.

Theory of Capital and Investment Decisions: For maximizing its profits, the firm has to carefully evaluate its investment decisions and carry out a sensible policy of capital allocation. Theories related to capital and investment provide scientific criteria for choice of investment projects and in assessment of the efficiency of capital. Business Economics supports decision making on allocation of scarce capital among competing uses of funds.

Profit Analysis: Profits are, most often, uncertain due to changing prices and market conditions. Profit theory guides the firm in the measurement and management of profit under conditions of uncertainty. Profit analysis is also immensely useful in future profit planning.

Risk and Uncertainty Analysis: Business firms generally operate under conditions of risk and uncertainty. Analysis of risks and uncertainties helps the business firm in arriving efficient decisions and in formulating plans on the basis of past data, current information and future prediction.

2. Macroeconomics applied to environmental or external issues

Environmental factors have significant influence upon the functioning and performance of business. The major macro economic factors are related to:-

- the type of economic system
- stage of business cycle
- the general trends in national income, employment, prices, saving and investment.
- government's economic policies like industrial policy, competition policy, monetary and fiscal policy, price policy, foreign trade policy and globalization policies
- working of financial sector and capital market
- socio-economic organisations like trade unions, producer and consumer unions and cooperatives.
- social and political environment.

Q5. Define indifference curve and state its properties. (15)

An indifference curve (IC) is a graphical representation of different combinations or consumption bundles of two goods or commodities, providing equal levels of satisfaction and utility for the consumer. In other words, a consumer is considered indifferent between any two bundles indicated by a point on the curve, provided these combinations give the same utility.

Here is an example to understand the indifference curve better. Peter has 1 unit of food and 12 units of clothing. Now, we ask Peter how many units of clothing is he willing to give up in exchange for an additional unit of food so that his level of satisfaction remains unchanged.

Peter agrees to give up 6 units of clothing for an additional unit of food. Hence, we have two combinations of food and clothing giving equal satisfaction to Peter as follows:

1. 1 unit of food and 12 units of clothing
2. 2 units of food and 6 units of clothing

By asking him similar questions, we get various combinations as follows:

Combination	Food	Clothing
A	1	12
B	2	6

C	3	4
D	4	3

Graphical Representation:

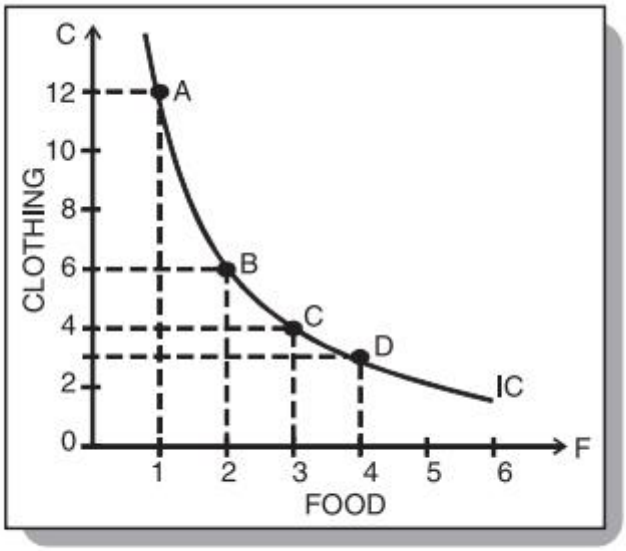


Fig. 1 : A Consumer's Indifference Curve

Properties of an Indifference Curve or IC

Here are the properties of an indifference curve:

1.An IC slopes downwards to the right

This slope signifies that when the quantity of one commodity in combination is increased, the amount of the other commodity reduces. This is essential for the level of satisfaction to remain the same on an indifference curve.

2.An IC is always convex to the origin

From our discussion above, we understand that as Peter substitutes clothing for food, he is willing to part with less and less clothing. This is the diminishing marginal rate of substitution. The rate gives a convex shape to the indifference curve. However, there are two extreme scenarios:

1. Two commodities are perfect substitutes for each other – In this case, the indifference curve is a straight line, where MRS is constant.

2. Two goods are perfect complementary goods – An example of such goods would be gasoline and water in a car. In such cases, the IC will be L-shaped and convex to the origin.

3.Indifference curves never intersect each other

Two ICs will never intersect each other. Also, they need not be parallel to each other either. Look at the following diagram:

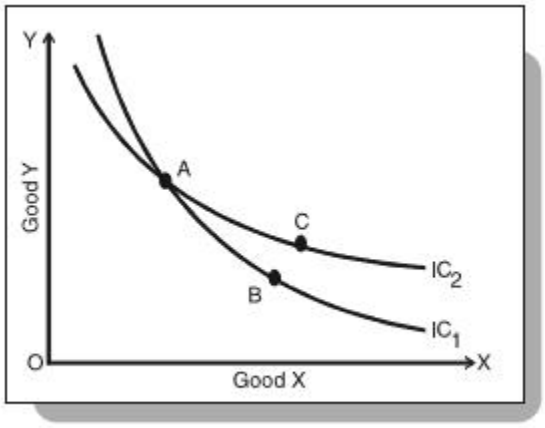


Fig. 3 : Intersecting Indifference Curves

Fig 3 shows two ICs intersecting each other at point A. Since points A and B lie on IC1, they give the same satisfaction level to an individual. Similarly, points A and C give the same satisfaction level, as they lie on IC2. Therefore, we can imply that B and C offer the same level of satisfaction, which is logically absurd. Hence, no two ICs can touch or intersect each other.

4.A higher IC indicates a higher level of satisfaction as compared to a lower IC

A higher IC means that a consumer prefers more goods than not.

5.An IC does not touch the axis

This is not possible because of our assumption that a consumer considers different combinations of two commodities and wants both of them. If the curve touches either of the axes, then it means that he is satisfied with only one commodity and does not want the other, which is contrary to our assumption

Q6.a) State Law of Variable Proportions and its assumptions. (12)

Law of Variable Proportions or Returns to a Factor

This law exhibits the short-run production functions in which one factor varies while the others are fixed.

Also, when you obtain extra output on applying an extra unit of the input, then this output is either equal to or less than the output that you obtain from the previous unit.

The Law of Variable Proportions concerns itself with the way the output changes when you increase the number of units of a variable factor. Hence, it refers to the effect of the changing factor-ratio on the output.

In other words, the law exhibits the relationship between the units of a variable factor and the amount of output in the short-term. This is assuming that all other factors are constant. This relationship is also called returns to a variable factor.

The law states that keeping other factors constant, when you increase the variable factor, then the total product initially increases at an increases rate, then increases at a diminishing rate, and eventually starts declining.

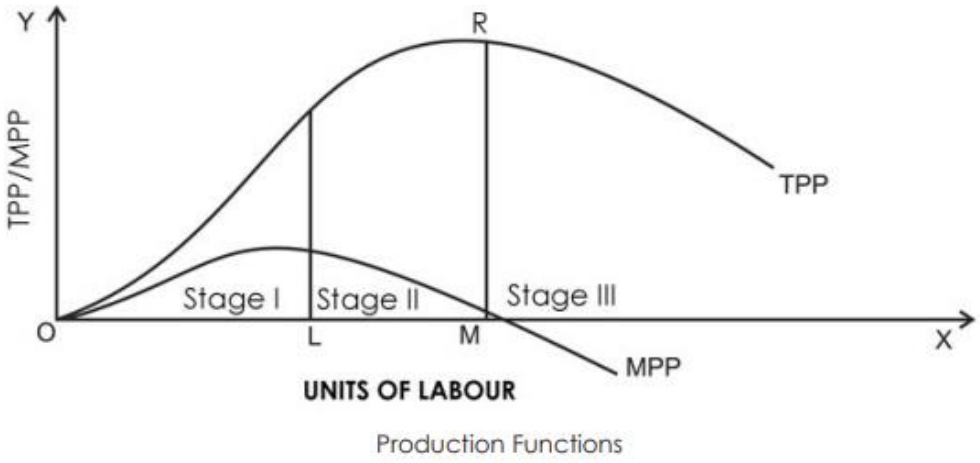
Law of Variable Proportions Explained

Let's understand this law with the help of another example:

Fixed Factor : Land (Acres)	Variable Factor: Land (Units)	TPP (Total Physical Product) (Quantity)	MPP (Marginal Physical Product) (Quantity)	
1	0	0	-	
1	1	2	2	Stage I
1	2	6	4	
1	3	12	6	
1	4	16	4	Stage II
1	5	18	2	
1	6	18	0	
1	7	14	-4	Stage III
1	8	8	-6	

In this example, the land is the fixed factor and labour is the variable factor. The table shows the different amounts of output when you apply different units of labour to one acre of land which needs fixing.

The following diagram explains the law of variable proportions. In order to make a simple presentation, we draw a Total Physical Product (TPP) curve and a Marginal Physical Product (MPP) curve as smooth curves against the variable input (labour).



Production Functions

Three Stages of the Law

The law has three stages as explained below:

1. Stage I – The TPP increases at an increasing rate and the MPP increases too. The MPP increases with an increase in the units of the variable factor. Therefore, it is also called the stage of increasing returns. In this example, the Stage I of the law runs up to three units of labour (between the points O and L).
2. Stage II – The TPP continues to increase but at a diminishing rate. However, the increase is positive. Further, the MPP decreases with an increase in the number of units of the variable factor. Hence, it is called the stage of diminishing returns. In this example, Stage II runs between four to six units of labour (between the points L and M). This stage reaches a point where TPP is maximum (18 in the above example) and MPP becomes zero (point R).
3. Stage III – Now, the TPP starts declining, MPP decreases and becomes negative. Therefore, it is called the stage of negative returns. In this example, Stage III runs between seven to eight units of labour (from the point M onwards).

b) At which stage a producer should operate and produce and why? (3)

Stage I

A producer does not operate in Stage I. In this stage, the marginal product increases with an increase in the variable factor.

Therefore, the producer can employ more units of the variable to efficiently utilize the fixed factors. Hence, the producer would prefer to not stop in Stage I but will try to expand further.

Stage III

Producers do not like to operate in Stage III either. In this stage, there is a decline in total product and the marginal product becomes negative.

In order to increase the output, producers reduce the amount of variable factor. However, in Stage III, he incurs higher costs and also gets lesser revenue thereby getting reduced profits.

Stage II

Any rational producer avoids the first as well as third stages of production. Therefore, producers prefer Stage II – the stage of diminishing returns. This stage is the most relevant stage of operation for a producer according to the law of variable proportions where both the marginal product and average product of the variable factor are diminishing.

Q7. State the kinds of elasticity of demand and explain the ways to calculate it. (15)

Types of Elasticity of Demand

Based on the variable that affects the demand, the elasticity of demand is of the following types. One point to note is that unless otherwise mentioned, whenever the elasticity of demand is mentioned, it implies price elasticity.

Price Elasticity

The price elasticity of demand is the response of the quantity demanded to change in the price of a commodity. It is assumed that the consumer's income, tastes, and prices of all other goods are steady. It is measured as a percentage change in the quantity demanded divided by the percentage change in price. Therefore,

$$Ep = \text{Change in Quantity} \times 100/\text{Original Quantity})/(\text{Change in Price} \times 100/\text{Original Price})$$

$$= (\text{Change in Quantity}/\text{Original Quantity}) \times (\text{Original Price}/\text{Change in Price})$$

Income Elasticity

The income elasticity of demand is the degree of responsiveness of the quantity demanded to a change in the consumer's income. Symbolically,

$$EI = \text{Percentage change in quantity demanded}/\text{Percentage change in income}$$

Cross Elasticity

The cross elasticity of demand of a commodity X for another commodity Y, is the change in demand of commodity X due to a change in the price of commodity Y. Symbolically,

$$Ec = (\Delta q/\Delta py) \times (py/qx)$$

Where,

Ec is the cross elasticity,

Δqx is the original demand of commodity X,

Δqx is the change in demand of X,

Δpy is the original price of commodity Y, and

Δpy is the change in price of Y.

The following points highlight the top four methods used for measuring elasticity of demand. The methods are:- 1. The Percentage Method 2. The Point Method 3. Total Outlay Method.

1. The Percentage Method:

The price elasticity of demand is measured by its coefficient (E_p). This coefficient (E_p) measures the percentage change in the quantity of a commodity demanded resulting from a given percentage change in its price.

Thus

$$E_p = \frac{\%\ change\ in\ q}{\%\ change\ in\ p} = \frac{\Delta q / q}{\Delta p / p} = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

Where q refers to quantity demanded, p to price and Δ to change. If $E_P > 1$, demand is elastic. If $E_P < 1$, demand is inelastic, and $E_p = 1$, demand is unitary elastic

2. The Point Method:

Prof. Marshall devised a geometrical method for measuring elasticity at a point on the demand curve. Let RS be a straight line demand curve in Figure. 2.

With the help of the point method, it is easy to point out elasticity at any point along a demand curve. Suppose that the straight line demand curve DC in Figure. 3 is 6 centimeters. Five points L, M, N, P and Q are taken on this demand curve. The elasticity of demand at each point can be known with the help of the above method. Let point N be in the middle of the demand curve. So elasticity of demand at point.

$$N = \frac{CN\ (Lower\ Segment)}{ND\ (Upper\ Segment)} = \frac{3}{3} = 1\ (Unity)$$

Elasticity of demand at point

$$M = \frac{CM}{MD} = \frac{5}{1} = 5\ or > 1.$$

(Greater than Unity)

Elasticity of demand at point

$$L = \frac{CL}{LD} = \frac{6}{0} = \infty\ (infinity).$$

Elasticity of demand at Point

$$P = \frac{CP}{PD} = \frac{1}{5} = (Less\ than\ Unity).$$

Elasticity of demand at point

$$Q = \frac{CQ}{QD} = \frac{0}{6} = 0\ (Zero)$$

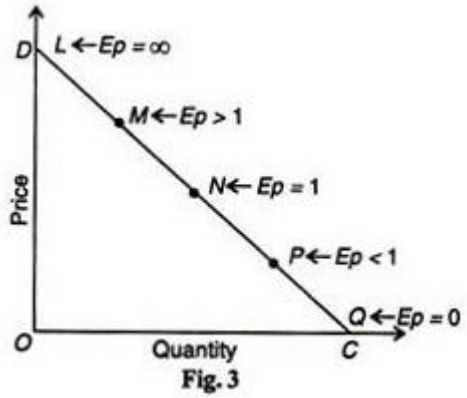


Fig. 3

We arrive at the conclusion that at the mid-point on the demand curve, the elasticity of demand is unity. Moving up the demand curve from the mid-point, elasticity becomes greater. When the demand curve touches the Y- axis, elasticity is infinity. Ipso facto, any point below the mid-point towards the A'-axis will show elastic demand. Elasticity becomes zero when the demand curve touches the X -axis.

The Total Outlay Method:

Marshall evolved the total outlay, or total revenue or total expenditure method as a measure of elasticity. By comparing the total expenditure of a purchaser both before and after the change in price, it can be known whether his demand for a good is elastic, unity or less elastic.

Total outlay is price multiplied by the quantity of a good purchased: Total Outlay = Price x Quantity Demanded. This is explained with the help of the demand schedule in Table.3.

Table. 3 : Total Outlay Method

Price Rs. per Kg.	*Quantity in Kgs.*	*TE in Rs*	*Ep*
(1)	(2)	(1×2)=3	(4)
9	2	18	
8	3	24	> 1
7	4	28	
6	5	30	
5	6	30	= 1
4	7.5	30	
3	8	24	
2	9	18	< 1
1	10	10	

(i) Elastic Demand:

Demand is elastic, when with the fall in price the total expenditure increases and with the rise in price the total expenditure decreases. Table.3 shows that when the price falls from Rs. 9 to Rs. 8, the total expenditure increases from Rs. 18 to Rs. 24 and when price rises from Rs. 7 to Rs. 8, the total expenditure falls from Rs. 28 to Rs. 24. Demand is elastic(Ep > 1) in this case.

(ii) Unitary Elastic Demand:

When with the fall or rise in price, the total expenditure remains unchanged, the elasticity of demand is unity. This is shown in the table when with the fall in price from Rs. 6 to Rs. 5 or with the rise in price from Rs. 4 to Rs. 5, the total expenditure remains unchanged at Rs. 30, i.e., Ep = 1.

(iii) Less Elastic Demand:

Demand is less elastic if with the fall in price, the total expenditure falls and with the rise in price the total expenditure rises. In Table 3 when the price falls from Rs. 3 to Rs. 2, total expenditure falls from Rs. 24 to Rs 18, and when the price rises from Re. 1 to Rs. 2. the total expenditure also rises from Rs. 10 to Rs. 18. This is the case of inelastic or less elastic demand, Ep < 1.

Q8. a) Explain the concept of Revealed Preference Theory and also state the major and assumptions of this theory. (10)

The Concept of Revealed Preference:

Prof. Samuelson has invented an alternative approach to the theory of consumer behaviour which, in principle, does not require the consumer to supply any information about himself.

If his tastes do not change, this theory, known as the Revealed Preference Theory (RPT), permits us to find out all we need to know just by observing his market behaviour, by seeing

what he buys at different prices, assuming that his acquisitions and buying experiences do not change his preference patterns or his purchase desires.

Samuelson's RPT is based on a rather simple idea. A consumer will decide to buy some particular combination of items either because he likes it more than the other combinations that are available to him or because it happens to be cheap. Let us suppose, we observe that of two collections of goods offered for sale, the consumer chooses to buy A, but not B.

We are then not in a position to conclude that he prefers A to B, for it is also possible that he buys A, because A is the cheaper collection, and he actually would have been happier if he got B. But price information may be able to remove this uncertainty.

If their price tags tell us that A is not cheaper than B (or, B is no-more expensive than A), then there is only one plausible explanation of the consumer's choice—he bought A because he liked it better.

More generally, if a consumer buys some collection of goods, A, rather than any of the alternative collections B, C and D and if it turns out that none of the latter collections is more expensive than A, then we say that A has been revealed preferred to the combinations B, C and D or that B, C and D have been revealed inferior to A.

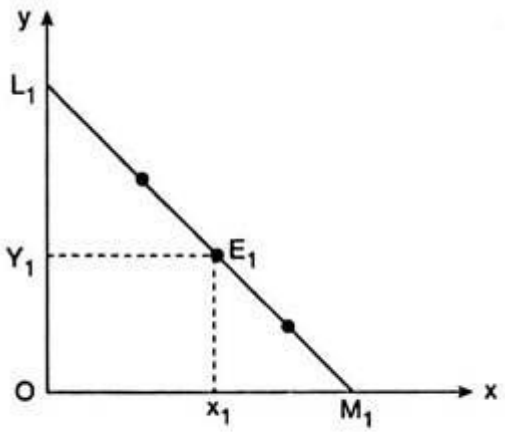


Fig. 6.104 Revealed preference

Therefore, if the consumer buys the combination E_1 (x_1, y_1)of the goods X and Y and does not buy the combination E_2(x_2, y_2) at the prices (p^1_x, p^1_y,) of the goods, then we would be able to say that he prefers combination E_1 to combination E_2, if we obtain

$$p^1_x x_1 + p^1_y y_1 \geq p^1_x x_2 + p^1_y y_2 \qquad (6.137)$$

The complete set of combinations of the goods X and Y to which a particular combination is revealed preferred can be found with the aid of the consumer's price line. Let us suppose that

the consumer's budget line is L_1M_1 in Fig. 6.104 and he is observed to purchase the combination E_1 (x_1, y_1) that lies on this line.

Now, since the costs of all the combinations that lie on the budget line are the same as that of E_1 and since the costs of all the combinations that lie below and to the left of the budget line are lower than that of E_1 we may say that E_1 is revealed preferred to all the combinations lying on or below the consumer's budget line.
Again, since the costs of the combinations that lie above and to the right of the budget line are higher than that of E_1 we cannot say that the consumer prefers E_1 to these combinations when he is observed to buy E_1, because here E_1 is the cheaper combination.
We have to note here the difference between "preference" and "revealed preference". Combination A is "preferred" to B implies that the consumer ranks A ahead of B.
But A is "revealed preferred to B" means A is chosen when B is affordable (no-more-expensive). In our model of consumer behaviour, we generally assume that people are choosing the best combination they can afford that the choices they make are preferred to the choices that they could have made. That is, if (x_1 y_1) is directly revealed preferred to (x_2, y_2), then (x_1, y_1) is, in fact, preferred to (x_2, y_2).
The revealed preference theory is based on the following assumptions:

1. Rationality:
The consumer is assumed to behave rationally in the sense that he prefers bundle of goods that contains more quantities of the commodities. This assumption of rationality underlies all logical explanations of consumer's behaviour.

2. Consistency:
The revealed preference theory sets upon this basic assumption, which has been called as consistency postulate. It can thus be stated, "no two observations of choice behaviour are made which provide conflicting evidence to the individual's preference"

In other words, if an individual chooses combination (or bundle) 'A' in one situation (given by his budget constraint) in which bundle 'B' was also available to him, he will not choose combination 'B' in any other situation (given by his new budget constraint) in which combination 'A' is also available.

3. Transitivity:
The assumption of transitivity is an application of the logical theory of ordering. Suppose, in a particular situation, three bundles Z_1, Z_2 and Z_3 of two commodities are available to a consumer. If he prefers bundle Z_1 to bundle Z_2 and bundle Z_2 to bundle Z_3, then he must

prefer bundle Z_1 to bundle Z_3. Symbolically, if 'A' > 'B' and 'B' > 'C', then 'A' > 'C'. Thus, the ordering has always to be unit directional and never circular.

b) What do you mean by 'Budget line'? (5)

Budget line definition

The budget line, also known as the budget constraint, exhibits all the combinations of two commodities that a customer can manage to afford at the provided market prices and within the particular earning degree.

The budget line is a graphical delineation of all possible combinations of the two commodities that can be bought with provided income and cost so that the price of each of these combinations is equivalent to the monetary earnings of the customer.

It is important to keep in mind that the slope of the budget line is equivalent to the ratio of the cost of two commodities. The slope of the budget constraint possesses distinctive importance.

Equation of a Budget Line

To understand the concept of a budget line in a detailed manner, it is important to understand the mentioned equation. The equation of the budget line equation can be represented as follows:

$M = Px \times Qx + Py \times Qy$

Where,

Px is the cost of product X.

Qx is the quantity of product X.

Py is the cost of product Y.

Qy is the quantity of product Y.

M is the consumer's income.

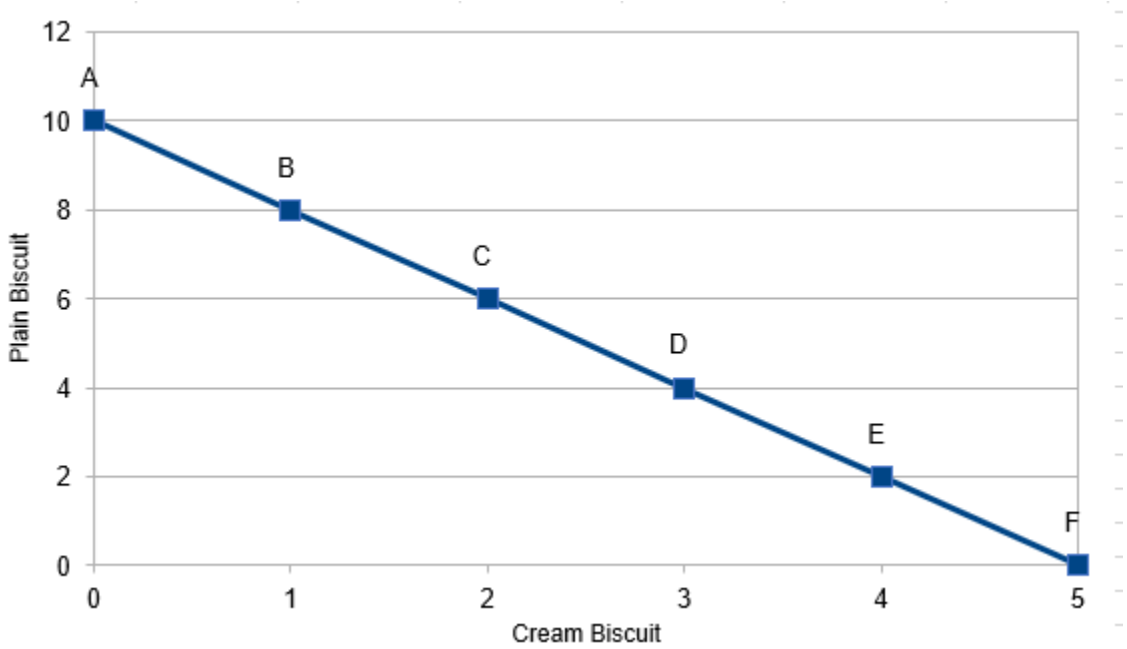
Example of a Budget Line

Radha has ₹50 to buy a biscuit. She has a few options to allocate her income so that she receives maximum utility from a limited salary.

	Budget schedule		
Combination	Cream biscuit (@ ₹10 per packet)	Plain biscuit (@ ₹5 per packet)	Budget allocation
A	0	10	$10 \times 0 + 5 \times 10 = 50$

B	1	8	10 × 1 + 5 × 8 = 50
C	2	6	10 × 2 + 5 × 6 = 50
D	3	4	10 × 3 + 5 × 4 = 50
E	4	2	10 × 4 + 5 × 2 = 50
F	5	0	10 × 5 + 5 × 0 = 50

To get an appropriate budget line, the budget schedule given can be outlined on a graph.



The budget set indicates that the combinations of the two commodities are placed within the affordability margin of a consumer.

Q9. a) Show the derivation of Short-run cost curves. (8)

Following are the cost concepts that are taken into consideration in the short run:

i. Total Fixed Costs (TFC):

Refer to the costs that remain fixed in the short period. These costs do not change with the change in the level of output. For example, rents, interest, and salaries. In the words of Ferguson, "Total fixed cost is the sum of the 'short run explicit fixed costs and implicit costs incurred by the entrepreneur." Fixed costs have implication even when the production of an organization is zero. These costs are also called supplementary costs, indirect costs, overhead costs, historical costs, and unavoidable costs.

TFC remains constant with respect to change in the level of output. Therefore, the slope of TFC curve is a horizontal straight line.

Figure-3 depicts the TFC curve:

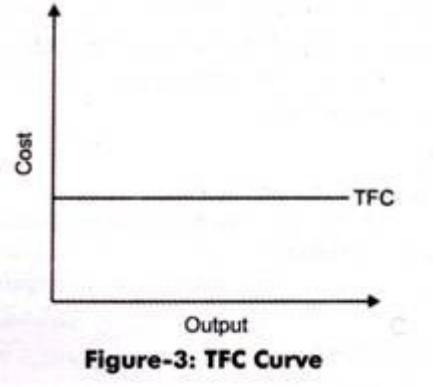


Figure-3: TFC Curve

As shown in Figure-3, TFC curve is horizontal to x- axis. From Figure-3, it can be seen that TFC remains the same at all the levels with respect to change in the level of output.

ii. Total Variable Costs (TVC):
Refer to costs that change with the change in the level of production. For example, costs incurred on purchasing raw material, hiring labor, and using electricity. According to Ferguson, "total variable cost is the sum of amounts spent for each of the variable inputs used" If the output is zero, then the variable cost is also zero. These costs are also called prime costs, direct costs, and avoidable costs.

Figure-4 shows the TVC curve:

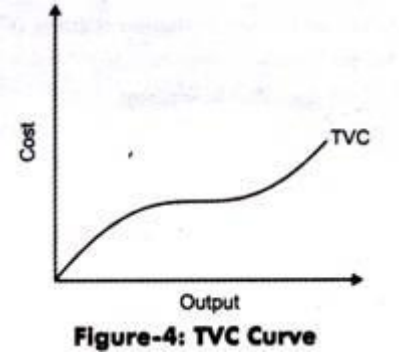


Figure-4: TVC Curve

In Figure-4, it can be seen that TVC curve changes with the change in the level of output.

iii. Total Cost (TC):
Involves the sum of TFC and TVC.

It can be calculated as follows:
Total Cost = TFC + TVC

TC also changes with the changes in the level of output as there is a change in TVC.

Figure-5 shows the total cost curve derived from sum of TVC and TFC:

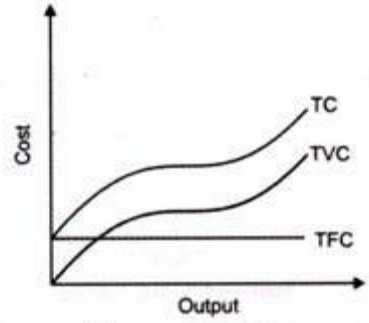


Figure-5: TC Curve

It should be noted that both TVC and TC increase initially at decreasing rate and then they increase at increasing rate Here, decreasing rate implies that the rate at which cost increases with respect to output is less, whereas increasing rate implies the rate at which cost increases with respect to output is more.

iv. Average Fixed Costs (AFC):
Refers to the per unit fixed costs of production. In other words, AFC implies fixed cost of production divided by the quantity of output produced.

It is calculated as:
AFC = TFC/Output

TFC is constant as production increases, thus AFC falls.

Figure-6 shows the AFC curve:

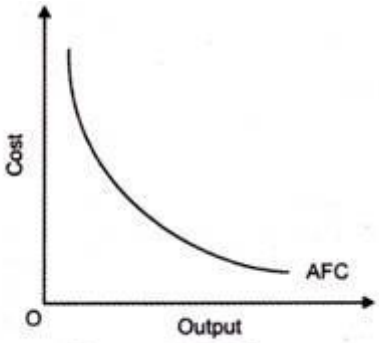


Figure-6: AFC Curve

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In Figure-6 AFC curve is shown as a declining curve, which never touches the horizontal axis. This is because fixed cost can never be zero. The curve is also called rectangular hyperbola, which represents that total fixed costs remain same at all the levels.

v. Average Variable Costs (AVC):
Refer to the per unit variable cost of production. It implies organization's variable costs divided by the quantity of output produced.

It is calculated as:
AVC = TVC/ Output

Initially, AVC decreases as output increases. After a certain point of time, AVC increases with respect to increase in output.

Thus, it is a U- shaped curve, as shown in Figure-7:

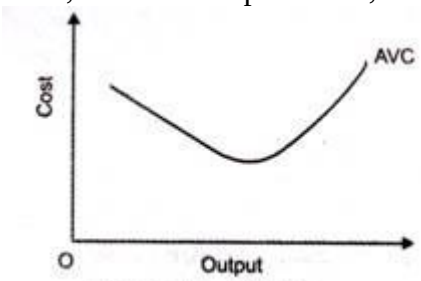

Figure -7: AVC Curve

vi. Average Cost (AC):
Refer to the total costs of production per unit of output.

AC is calculated as:
AC = TC/ Output

AC is also equal to the sum total of AFC and AVC. AC curve is also U-shaped curve as average cost initially decreases when output increases and then increases when output increases

AC is also equal to the sum total of AFC and AVC. AC curve is also U-shaped curve as average cost initially decreases when output increases and then increases when output increases.

Figure-8 shows the AC curve:

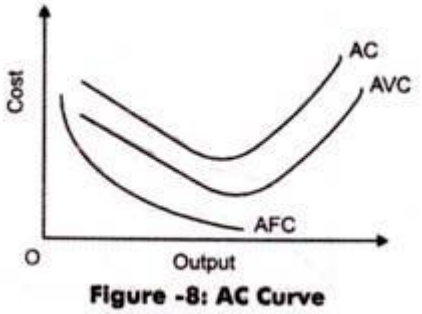

Figure -8: AC Curve

vii. Marginal Cost:
Refer to the addition to the total cost for producing an additional unit of the product.

Marginal cost is calculated as:
$MC = TC_n = TC_{n-1}$
n= Number of units produced

It is also calculated as:
$MC = \Delta TC/\Delta Output$

MC curve is also a U-shaped curve as marginal cost initially decreases as output increases and afterwards, rises as output increases. This is because TC increases at decreasing rate and then increases at increasing rate.

Figure- 9 shows the MC curve:

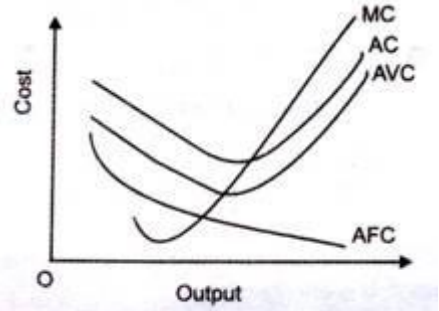

Figure-9: MC Curve

Let us learn the aforementioned cost concepts numerically with the help of Table-1:

Table-1: Calculation of Short-run Costs

Units of Output	TFC =30	TVC	TC= TFC + TVC	AFC= TFC/Output	AVC= TVC/Output	AC= AFC+ AVC	MC
0	30	0	30	-	-	-	-
1	30	10	40	30	10	40	10
2	30	18	48	15	9	24	8
3	30	24	54	10	8	18	6
4	30	32	62	7.5	8	15.5	8
5	30	50	80	6	10	16	18
6	30	72	102	5	12	17	22

b) Why long run average cost curve is U- shaped? Explain. (7)

It is generally believed by economists that the long-run average cost curve is normally U shaped, that is, the long-run average cost curve first declines as output is increased and then beyond a certain point it rises.

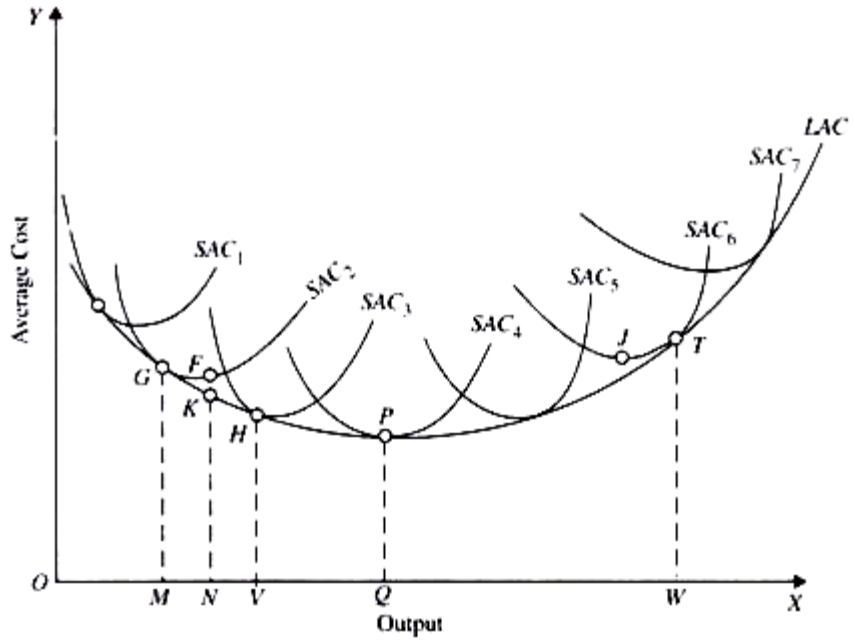

Fig. 19.7. *Deriving Long-Run Average Cost Curve from Short-Run Average Cost Curves*

We saw above that the U-shape of the short-run average cost curve is explained with the law of variable proportions. But the shape of the long-run average cost curve depends upon the returns to scale. Since in the long run all inputs including the capital equipment can be altered, the relevant concept governing the shape of this long-run average cost curve is that of returns to scale

Returns to scale increase with the initial increases in output and after remaining constant for a while, the returns to scale decrease. It is because of the increasing returns to scale in the beginning that the long-run average cost of production falls as output is increased and, likewise, it is because of the decreasing returns to scale that the long-run average cost of production rises beyond a certain point.

Why does LAC fall in the beginning: Economies of Scale?

But the question is why we first get increasing returns to scale due to which long-run average cost falls and why after a certain point we get decreasing returns to scale due to which long-run average cost rises. In other words, what are the reasons that the firm first enjoys internal economies of scale and then beyond a certain point it has to suffer internal diseconomies of scale? Three main reasons have been given for the economies of scale which accrue to the firm and due to which cost per unit falls in the beginning.

First, as the firm increases its scale of operations, it becomes possible to use more specialized and efficient form of all factors, especially capital equipment and machinery. For producing higher levels of output, there is generally available a more efficient machinery which when employed to produce a large output yields a lower cost per unit of output.

Secondly, when the scale of operations is increased and the amount of labour and other factors becomes larger, introduction of a great degree of division of labour or specialisation becomes possible and as a result the long-run cost per unit declines.

Thus, whereas the short-run decreases in cost (the downward sloping segment of the short-run average cost curve) occur due to the fact that the ratio of the variable input comes nearer to the optimum proportion, decreases in the long-run average cost (downward segment of the long-run average cost curve) take place due to the use of more efficient forms of machinery and other factors and to the introduction of a greater degree of division of labour in the productive process.

Indivisibility of Factors:
Some economists explain economies of scale as arising from the imperfect divisibility of factors. In other words, they think that the economies of scale occur and therefore the long-run average cost falls because of the ‘indivisibility’ of factors.

Why does LAC Rise Eventually: Diseconomies of Scale:

So much for the downward sloping segment of the long-run average cost curve. As noted above, beyond a certain point the long-run average cost curve rises which means that the long-run average cost increases as output exceeds beyond a certain point. In other words, beyond a certain point a firm experiences net diseconomies of scale.

There is also divergence of views about the proper explanation for this upward sloping of the long-run average cost curve. The first view as held by Chamberlin and his followers is that when the firm has reached a size large enough to allow the utilisation of almost all the

possibilities of division of labour and the employment of more efficient machinery, further increases in the size of the plant will entail higher long-run unit cost because of the difficulties of management. When the scale of operations exceeds a certain limit, the management may not be as efficient as when the scale of operations is relatively small.

After a certain sufficiently large size these inefficiencies of management more than offset the economies of scale and thereby bring about an increase in the long-run average cost and make the LAC curve upward-sloping after a point.

It should be noted that this view regards the entrepreneurial or managerial functions to be divisible and variable and explains the diseconomies of scale or the rising part of the long-run average cost curve as arising from the mounting difficulties of management (i.e. of supervision and coordination) beyond a certain sufficiently large-scale of operations.

The second view considers the entrepreneur to be a fixed indivisible factor. In this view, though all other factors can be increased, the entrepreneur cannot be. The entrepreneur and his functions of decision-making and ultimate control are indivisible and cannot be increased.

Therefore, when a point is reached where the abilities of the fixed and indivisible entrepreneur are best utilised, further increases in the scale of operations by increasing other inputs cause the cost per unit of output to rise.

In other words, there is a certain optimum proportion between an entrepreneur and other inputs and when that optimum proportion is reached, further increases in the other inputs to the fixed entrepreneur means the proportion between the inputs is moved away from the optimum and, therefore, these results in the rise in the long-run average cost.

Thus, in this view, increases in the long-run average cost are explained by the law of variable proportions. Economists who hold this view think that the decreasing returns to scale or rising long-run average cost is actually a special case of variable proportions with entrepreneur as the fixed factor.