Department of Economics, VBU
FYUGP (SEM – I)

MODEL QUESTION SET (ECONOMICS)
Major (MJ -I)
MJ -I – Micro Economics

Full Marks – 75 **Time – 3 Hrs**

Candidates will have to answer two very short answer type questions, two short answer type questions, and four long answer type questions.

Group –A **5 ×2 = 10**

1. Very Short Answer Types Questions:

a) What do you mean by Budget Constraint?

b) What is Water-Diamond Paradox?

c) What are the features of Imperfect Market?

d) Write of importance of selling cost?

e) What are the assumptions of Euler's theorem?

Group –B Short Answer type Questions **2 ×5 = 10**

2. What do you mean by uncertainty theory?
3. What are the conditions of pareto optimum?

Group –C **14+14+14+13 = 55**

LONG QUESTIONS (Answer any four question)

4. Critically examine the cardinal measurement of utility.
5. What is Returns to Scale? Explain economies of Scale.
6. What is price discrimination? How price is determined under it?
7. Explain the marginal productivity theory of distribution?
8. Present the economic cum mathematical properties of the Cobb-Douglas Production function.
9. What is welfare economics? Point out the problems involved in the measurement of welfare
10. Explain the Ricardian theory of rent**.**

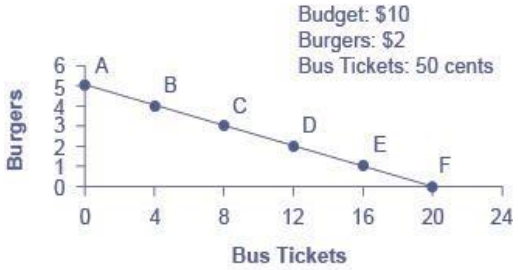
MODEL SET QUESTIONS & ANSWER
ECN-MJ

Group - A

Q. No. 1. Short Answer Types Questions

a) What do you mean by Budget Constraint?

Answer: The budget constraint is the boundary of the opportunity set—all possible combinations of consumption that someone can afford given the prices of goods and the individual's income. Opportunity cost measures cost in terms of what must be given up in exchange.



There are a lot of combinations of burgers and bus tickets that Alphonso could buy. So many, in fact, that it might be easier for us to describe the situation using a above graph.

b) What is Water-Diamond Paradox?

Answer: One of the most disconcerting problems to Adam Smith, the father of modern economics, was he could not resolve the issue of valuation in human preferences. He described this problem in *The Wealth of Nations* by comparing the high value of a diamond, which is unessential to human life, to the low value of water, without which humans would die. He determined "value in use" was irrationally separated from "value in exchange."1 Smith's diamond-water paradox went unsolved until later economists combined two theories: subjective valuation and marginal utility. Let's take a step back and see how economists arrived at that explanation.

c) What are the features of Imperfect Market?

Answer: The features of imperfect competition are:

- Large number of Sellers and Buyers: There are large numbers of sellers in the market.
- Product Differentiation: Another important characteristic is product differentiation.
- Selling Costs.
- Free Entry and exit of Firms.
- Price-makers.
- Blend of Competition and Monopoly

d) Write of importance of selling cost?

Answer: The purpose of selling costs is to influence the demand curve for the product of a firm or group. A producer incurs selling costs in order to push up his sales. Therefore, all selling costs tend to shift an individual seller's demand curve to the right.

Most important form of selling cost is advertisement. Advertisement is the easiest way to increase selling cost. All selling costs tend to shift an individual seller's demand curve to the right.

e) What are the assumptions of Euler's theorem?

i. **Answer:** Euler's Theorem and Production Function: It is based on some postulations. These are: implies invariable returns to scale.

ii. It assumes a linear standardized production of first degree which implies invariable returns to scale.

iii. It assumes that the factors are complementary, i.e. if a variable factor increases; it increases the marginal productivity of the fixed factor.

iv. It assumes that factors of production are perfectly divisible.

v. The relative shares of the factors are invariable and independent of the level of the product.

vi. There is a stationary, reckless economy where there are no profits.

vii. There is perfect competition.

viii. It is applicable only in the long run.

Group –B Short Answer type Questions

2. What do you mean by uncertainty theory?

Answer: Economic uncertainty, in a broad sense, is defined as the situation where future outlook for the economy is unpredictable. In case of rising uncertainty, agents in the economy are negatively affected because their expectations are blurred and they are not able to foresee the consequences of their decisions.

uncertainty, doubt, dubiety, skepticism, suspicion, mistrust mean lack of sureness about someone or something. uncertainty may range from a falling short of certainty to an almost complete lack of conviction or knowledge especially about an outcome or result.

That uncertainty affects their economic decisions: Households that are more uncertain are likely to reduce consumption, secure additional credit access and have lower exposure to equity market investments.

3. What are the conditions of pareto optimum?

Answer: According to the Pareto optimality criterion, a distribution of inputs among commodities and of commodities among consumers is Pareto optimal or pare to efficient if, no reorganization of production or consumption is possible by which some individuals are made better off (in their own judgment) without making someone else worse off.

1. Allocation of goods among consumers; Efficiency in Exchange

$$MRS^{A}_{xy} = MRS^{B}_{xy}$$

2. Optimal allocation of factors; Efficiency in production

$$MRS^{X}_{LK} = MRS^{Y}_{LK}$$

3. Optimal Composition of output; Efficiency in product Mix

$$MRT_{xy} = MRS^{A}_{xy} = MRS^{B}_{xy}$$

Group –C (LONG QUESTIONS)

Q.4. Critically examine the cardinal measurement of utility.

Answer:

Introduction:

The Cardinal utility theory Cardinal utility approach was originally given by Marshall. According to him, utility can be measured in utils , where utils is a scale like 1,2,3,… where one can measure his level of satisfaction or utility.(utils was originally derived by Walrus) Whereas, ordinal utility approach was given by Hicks where the utility cannot be measured in cardinal approach rather it could be measured in terms of ranks or orders. For instance, the highest satisfaction/utility level would be given the highest rank and the lesser satisfaction/utility could be given lesser rank in terms of measurement of utility and so on. Theory of consumer behaviour attempts to seek the consumption of goods which maximize consumer's utility. It also helps a consumer in his decision making about how to allocate his consumption expenditure on different goods so that his total utility could be maximized. But before moving ahead in the theory of consumer behaviour based on cardinal approach it is important to know the assumption of this approach.

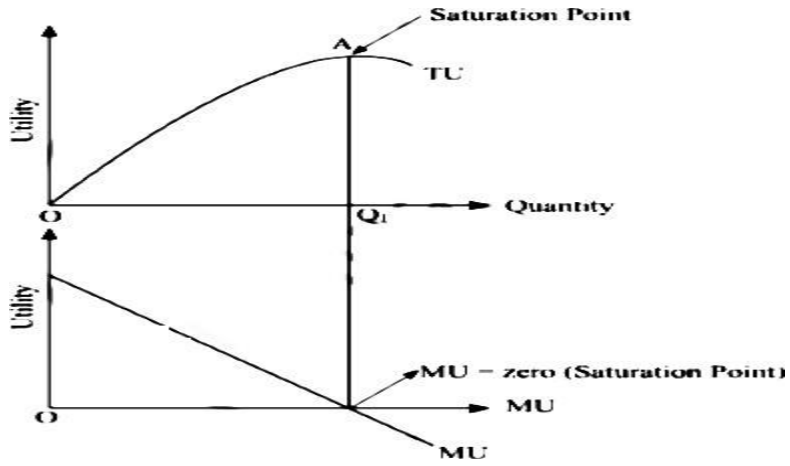
Assumptions

- Rationality: A consumer is always rational i.e. he always prefers more of goods and services to derive maximum utility. Thus he always buys the commodity which gives him maximum utility first and then he buys the least utility giving commodity at the end.
- Finite money income: The consumers have limited money income which they spend on the purchase of all the goods and services for their living. Thus they allocate this income as their consumption expenditure on all goods and services.
- Cardinal utility: The utility derived from the consumption of each good is measureable in terms of utils which is in turn equal to the money a consumer is willing to pay for it i.e. 1 util= utility of 1 unit of money.
- Constant marginal utility of money: The utility of each unit of money spent on buying the good remains the same i.e. one.
- Diminishing marginal utility: According to this, utility derived from the consumption of each successive unit of the good diminishes. As we consume more of a good the utility derived from each successive unit of it decreases (although the total utility from the consumption of the total quantity of good increases). This is also known as 'Gossen's first law'. Note that here each successive unit of the good is homogeneous in nature.
- Additive utility: According to this, the utility derived from the consumption of all goods and services is additive in nature. Therefore, the utility function of a basket 'n', comprising of various goods and services, is represented as follows: U = f(x1, x2, x3, ….. , xn) Here, x1, x2, x3, ….. , xn are the quantity of different goods and services consumed by the consumer with his limited money income. Now based on this, the total utility function of n items is additive and can be written as: TU = U1(x1)+ U2(x2) + U3(x3) + ……. + Un(x4).

Concept of total utility and marginal utility

Total utility refers to the sum of utility derived from the consumption of each unit of a good. Since as per the cardinal approach utility can be measured, hence Total utility can also be measured in utils and in monetary terms. Algebraically: TU = U1 + U2 + U3 + …… + Un = UN Marginal utility is defined as the utility derived from the last unit consumed. It is also defined as the utility derived from the consumption of each successive unit of the same good. More precisely, Marginal utility is the change in the total utility due to an additional unit consumed. Algebraically: MU = ΔTU/ΔQ Or, MU = TUn – TUn-1 Where, TUn is the total utility derived from the consumption of n units of a good and TUn-1 is the total utility derived from the n-1 unit of the same good. This can be explained with the help of the following table:

Q	**TU**	**MU**
0	0	-
1	40	40
2	70	30
3	90	20
4	100	10
5	100	0
6	90	-10



However, when the total utility reaches to its maximum i.e. at 100 then it started falling as the consumer increases his consumption; correspondingly the marginal utility becomes zero and then negative. Note that the point where the total utility reaches its maximum is the point where the marginal utility becomes zero and thereafter when the consumer increases his consumption of the goods again then total utility decreases and marginal utility goes negative. Thus we can conclude that there exists the following relationship between the total utility and marginal utility:

- Total utility increases initially at an increasing rate first and marginal utility also increases.
- Thereafter total utility increases at a diminishing rate and marginal utility diminishes.
- When total utility reaches to its maximum, marginal utility becomes zero
- When more of the units of the good is consumed even after achieving the highest level of total utility , then the total utility decreases and correspondingly marginal utility becomes negative.

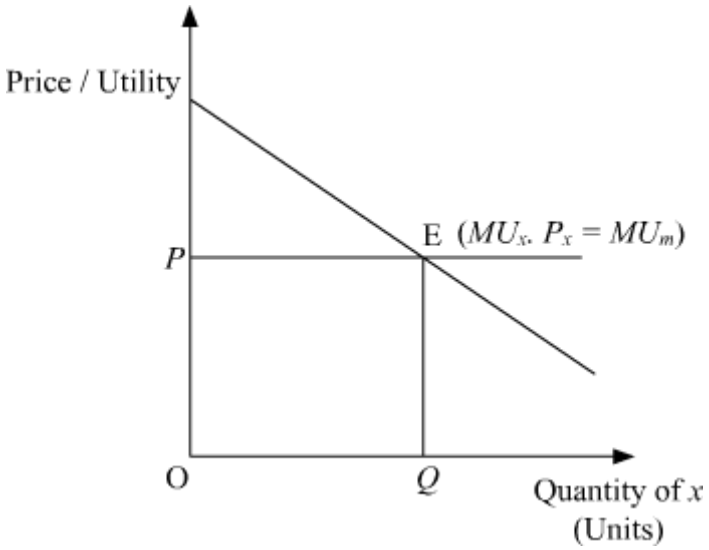
Consumer equilibrium under cardinal approach

After talking about the assumptions and the total utility and marginal utility concept, we can now evaluate the consumer equilibrium according to the cardinal approach. As a general rule, a consumer is always in equilibrium at a point where he maximizes his Total Utility. This can be explained with the help of following two cases.

Case I: Consumer equilibrium under single commodity case

Suppose that the consumer is having his money income and can consume only one commodity 'X'. In this case, he has only two choices; either spend his money income on the commodity or can retain his money income with himself where both of his money income and the commodity 'X' has a certain utility for him. If he retains all of his income and purchase no commodity then the Marginal Utility of money would be lower than the marginal utility of the commodity because MUm = 1(as per assumption).

Thus the consumer can increase his total utility by exchanging his money income with the consumption of the commodity (as the marginal utility of the commodity is greater) as far as MUx > MUm. Moreover, as it has been stated in the assumptions above that X has a diminishing marginal utility and money has a constant marginal utility, therefore, the utility maximizing consumer will exchange his money income for commodity X as long as MUx > MUm and will reach to his equilibrium level of consumption when MUx = MUm. However the prices of the commodities are generally greater than Rs.1, therefore, in this case the consumer equilibrium can be expressed as: MUx = Px(MUm), where MUm = 1. Hence, consumer equilibrium in case of single commodity occurs at a point where the consumer's MUx = Px. This can be represented graphically as follows:



Hence, the condition for the equilibrium is: MUx = Px If MUx > Px, the consumer can increase welfare by purchasing more of x commodities.

If MUx < Px, the consumer can increase his total satisfaction by cutting down his purchase of x commodities.

If MUx = Px, the consumer will be in equilibrium Case II: Consumer equilibrium under multiple commodity case.

In a real world, the consumer just does not spend on purchasing only one commodity. In order to make his living and fulfill his demand, a consumer always demands many commodities. We have earlier seen how he determines his equilibrium level of consumption when he just demands only one commodity.

Let's now check out how the equilibrium of a utility maximizing consumer determined when he purchases several commodities. As we know that different commodities are different so the utility derived by them would also be different. Some commodities would give the consumer the highest level of satisfaction or maximum utility where as some would give him second highest or even lesser utility. In such a condition the consumer keeps on switching his allocation of money income on different commodities as per their MU. He keeps on switching his consumption expenditure from one commodity to other till the MU of all the commodities becomes equals to each other. This is also known as the concept of equi marginal utility.

Let us now explain the law of equi marginal utility with the help of two commodities case. In such a situation, suppose the consumer consumes only two commodities 'X' and 'Y' by spending his finite money income. The prices of the commodity 'X' is given as "Px" and that of commodity 'Y' is given as "Py".

If we just apply the same concept which we have applied in CASE I above, then as per that MUx = Px (MUm) and MUy = Py (MUm).

Now,

MUx = Px (MUm) Or, MUx/ Px (MUm) = 1….....(1)

Similarly,

MUy = Py (MUm) Or, MUy/ Py (MUm) = 1….....(2)

Therefore, from equation (1) and (2),

we get: MUx/ Px (MUm) = MUy/ Py (MUm) = 1

Or, MUx/ MUy = Px (MUm)/ Py (MUm)

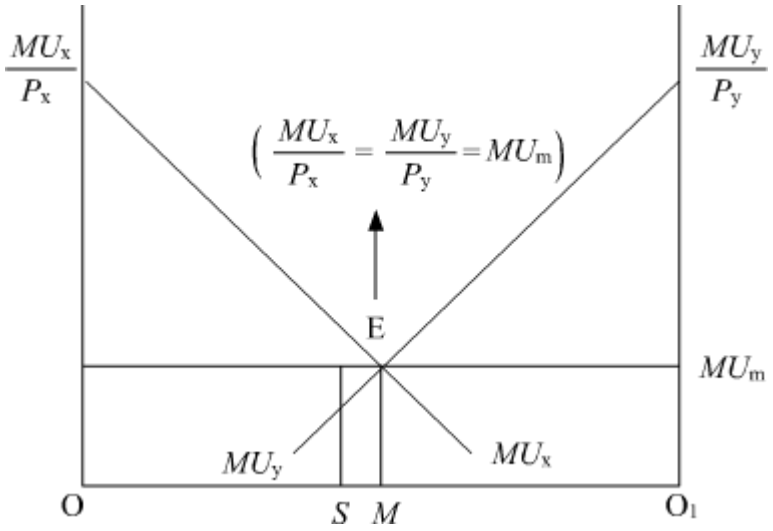
Or, MUx/ MUy = Px/ Py..... (3)

Or, MUx/ Px = MUy / Py.....(4)

Thus, according to the above discussion, a utility maximizing consumer is in equilibrium under two commodity case at the consumption level where his MUx/ MUy = Px/ Py or MUx/ Px = MUy / Py. Hence, accordingly, a consumer consuming multiple commodities (in his given money income) would maximize his utility at a point where, his MUx/ Px = MUy / Py = MUz / Pz = …… MUn / Pn. In other words, a utility maximizing consumer would be in equilibrium where the MU derived from each commodity is equal to each other i.e. where he equalizes the MU of each unit of his money expenditure on various goods and services.

Case II: Consumer equilibrium under Double commodity case

A consumer is in a state of equilibrium when he maximizes his satisfaction by spending his given income on different goods and services. Any deviation or change in the allocation of income under the given circumstance will lead to a fall in total satisfaction.



For the two-commodity case: Rupee worth of marginal utility of money should be the same across good X and good Y, and equal to the marginal utility of money. Marginal utility (MU) falls as consumption increases: The second condition needed to attain consumer's equilibrium is that MU of a commodity must fall as more of it is consumed.

Drawbacks of the cardinal approach

Although cardinal utility approach analyzes the consumer behaviour in a easy and simple way but still the economists have drawn some of the drawbacks of this approach. Following are some of those drawbacks of the cardinal utility theory which were pointed out by the economists: First, the assumption of cardinal utility approach that utility is measurable in utils and in monetary terms is very dissatisfying. Utility is a subjective concept which cannot be measured quantifiably. It can always be measured by giving preferences for each level of utility. Secondly, cardinal utility approach assumes that marginal utility of money remains constant and it also serves as a measure of utility. This assumption is also unrealistic because the marginal utility of money can also change, like all other goods; thus it cannot serve as a measure of utility derived from goods and services. Thirdly, the psychological law of diminishing MU has been established from introspection. This law is accepted as an axiom/ proverb without any practical confirmation. Fourthly, cardinal utility approach and derivation of demand curve on the basis of this approach are based on the ceteris paribus assumption which is unrealistic. It is for this reason that this theory ignores the substitution and income effects which might operate simultaneously. Finally, cardinal approach considers that the effect of price changes on demand curve is exclusively price effect. This assumption is also unrealistic because price effect may include income and substitution effects also.

Unrealistic Assumptions:

Marshall's utility analysis is based on some unrealistic assumptions. For instance, Marshall assumed that utility derived from a commodity can be measured in cardinal numbers. But, modern economists like J. R. Hicks and R. G. D. Allen had suggested that utility, being a psychological concept, can never be measured in cardinal numbers.

Actually, there is no measuring rod to measure utility derived from the consumption of a commodity. According to them, utility can be measured in ordinal numbers. This means that the consumer is capable of comparing different levels of utility.

A consumer can say that a particular commodity gives him a higher or lower level of satisfaction than another commodity. Of course, he cannot quantify the level of satisfaction. As the law of demand is based on Marshall's utility analysis, the explanation of the law of demand seems to be inaccurate.

MU of Money Can Never be Constant:

Marshall's assumption of constant marginal utility of money is another unrealistic assumption. And this is the most crucial assumption of the utility theory. According to Marshall, utility from a good can be measured in terms of money.

To measure utility (in cardinal numbers) in terms of money, marginal utility of money must remain invariant. But, like commodities, marginal utility of money also diminishes when stock of money rises. If it is so, measurement of utility in terms of money seems to be irrational.

No Formal Distinction between Income and Substitution Effect:

Because of the constancy in the marginal utility of money, Marshall could not distinguish between income effect and substitution effect of a price change. We know that a change in the price of a commodity results in two types of changes—one is the income effect and another is the substitution effect. Marshall considered only the substitution effect and ignored the income effect.

Because of constancy in the marginal utility of money, Marshall ignored the income effect. As Marshall considered only substitution effect, his demand curve is always negative sloping. In other words, Marshall could not explain Giffen Paradox for which the law of demand does not hold. Because of these criticisms, Marshallian utility analysis failed into disrepute. In the 1930s Hicks and Allen introduced an alternative theory known as ordinal utility theory or indifference theory which is an improvement over Marshall's cardinal utility theory.

Conclusion

This chapter not only outlines some important concepts like that of total utility and marginal utility but also explains how utility can be measured in terms of utils. We have seen that the change in price level changes the level of utility derived from commodities as a consumer is a ration consumer who gives first preference to the commodity which gives him highest level of utility and give last preference to the commodity which gives him least level of satisfaction. Moreover, the theory of consumer behaviour under cardinal approach has shown us the way in which consumer equilibrium could be attained algebraically and graphically both. At the end we have also derived the demand curve with the consumer equilibrium points and thus in this way the theory of consumer behaviour has helped in deriving the demand curve of a consumer in the most simple way. The way we take assumptions before drawing any model in a similar way each model is also associated with some drawbacks. The cardinal approach is also affected with some of the drawbacks which we have explained in detail above. Hence, these drawbacks give a chance to the economists for more research and development in this area.

Q. 5. What is Returns to Scale? Explain economies of Scale.
Answer:
Introduction:
Isoquant means equal quantity. Isoquant is therefore known as the production indifference curve or equal product curve. As the name itself suggests, an isoquant is the locus of all those combinations of inputs (labour and capital) which yield same output. Hence, all the points on an isoquant represent different combinations of labour and capital which can be used to produce the same quantity of output. Now the question is that how the different combinations of inputs can yield the same output. The answer to this question is that since there are different techniques of production available in the world, thus, the different techniques of production requires different combinations of inputs and thus it is possible to produce the same level of output using different combinations of inputs and techniques of production.
Isoquants vs. Indifference Curves: An isoquant is analogous to an indifference curve in more than one way. In it, two factors (capital and labour) replace two commodities of consumption. An isoquant shows equal level of product while an indifference curve shows equal level of satisfaction at all points. The properties of isoquants, as we shall study below, are exactly similar to those of indifference curves.

Properties of Isoquant
- Negative slope of isoquant: The negative slope of the isoquant implies substitution of one input for another so that output remains the same. It means that if one of the inputs is reduced, the other input has to be increased that the total output remains unaffected. Moreover an isoquant is always negative in the economic region, where the substitution between the inputs is technically efficient.
- Convexity: Isoquants are convex to origin because of diminishing marginal rate of technical substitution. Here marginal rate of technical substitution implies the rate at which on input is substituted for the other input at different levels without affecting the total output.

Symbolically, MRTS is always diminishing because of two reasons:
1. No factor is a perfect substitute for another and
2. Inputs are subject to diminishing marginal return. Hence, if we increase the employment of labour by one unit then it leads to a decrease in the capital and this decrease in the capital reduces with the employment of more and more labour by one more unit, keeping the output level same.

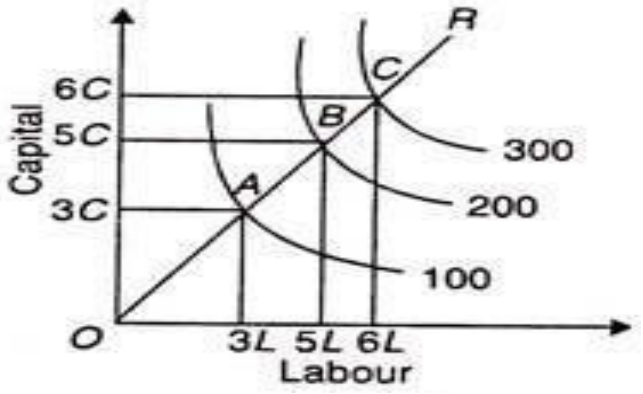
Thus, MRTS is diminishing in nature. Moreover, the isoquants never intersects with each other and are never tangent to each other. Else there will be two possibilities:
- The same combination of inputs can produce two different quantities of the same commodity and
- A given quantity of a commodity can be produced with a smaller as well as a larger input combination.

MRTS is the slope of an isoquant and depicts the rate at which one input is substituted for the other but it does not determine the degree of substitution between these inputs. Elasticity of technical substitution is the only measure which determines the substitutability of factors/inputs. Elasticity of technical substitution is defines as the percentage change in the capital labour ratio (K/L) divided by the percentage change in the MRTS.
The law of returns to scale
When both the inputs become variable and the change in both the inputs affect the change in the output and correspondingly the size of the firm changes, then it is known as the law of returns to scale. It is a long run phenomenon where the supply of both labour and capital is elastic. When both labour and capital are increased proportionately or simultaneously, then there are possibly three ways in which output can be increased.

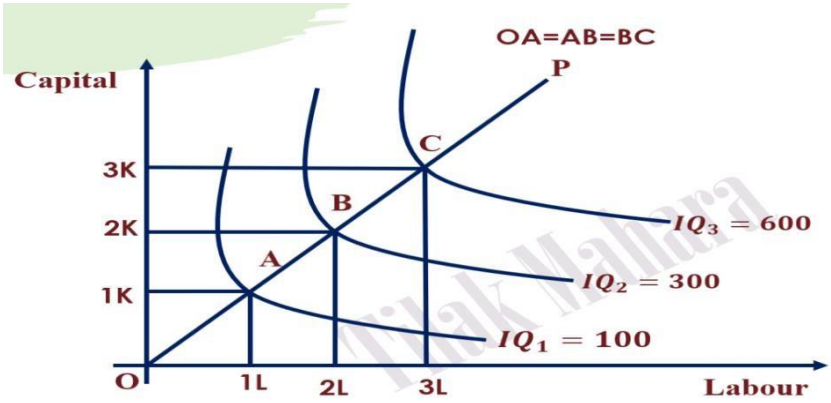
- Output may increase more than proportionately to an increase in inputs
- Output may increase proportionately to an increase in inputs
- Output may increase less than proportionately to an increase in inputs

Correspondingly, there are three types of returns to scale.

1. When Output increases more than proportionately to an increase in inputs then it is known as increasing returns to scale. For example, if labour and capital both increase by 50% and correspondingly the output increases by more than 50%, then it is known as the increasing returns to scale.

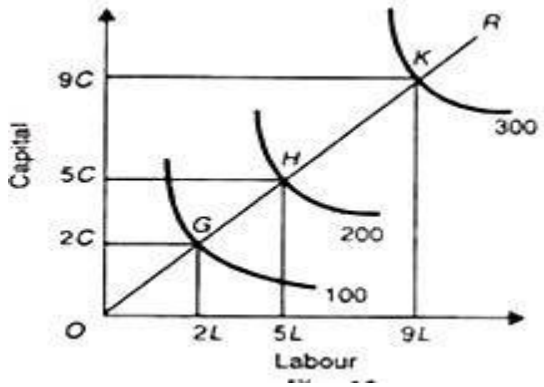


2. When Output increases proportionately to an increase in inputs then it is known as constant returns to scale. For example, if labour and capital both increase by 50% and correspondingly the output also increases by 50%, then it is known as constant returns to scale.

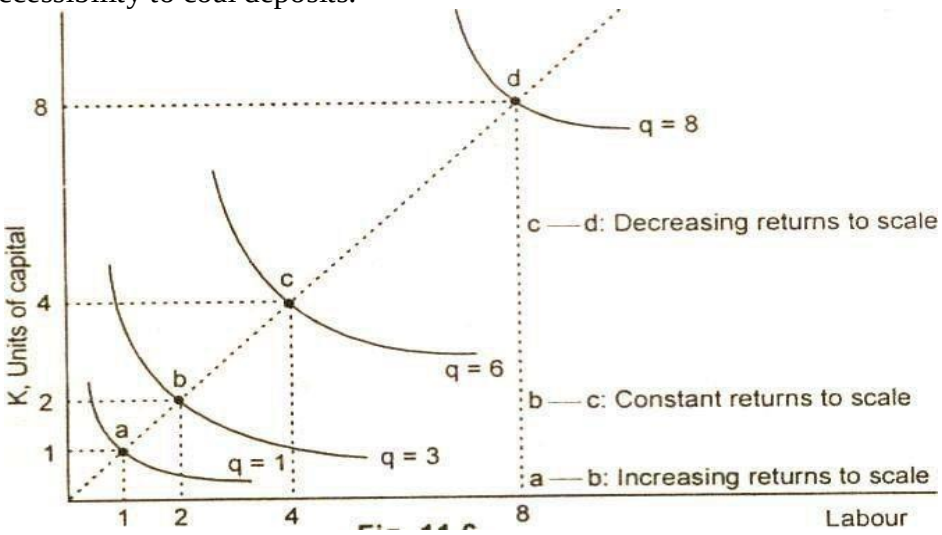


The constant returns to scale happen because there is a limit on economies of scale. When economies of scale disappear and diseconomies are yet to begin, the returns to scale become constant. The diseconomies arise mainly because of decreasing efficiency of management and scarcity of certain inputs. Moreover, constant returns of scale appear when the factors of production are perfectly homogeneous, like the Cobb- Douglas production function.

3. When Output increases less than proportionately to an increase in inputs then it is known as decreasing returns to scale. For example, if labour and capital both increase by 50% and correspondingly the output increases by 30%, then it is known as decreasing returns to scale.



Decreasing returns to scale happens because of diseconomies of scale. Mainly, when there are managerial diseconomies, and the size of the firm expands, managerial efficiency decreases causing decrease in the rate of increase in output. Moreover when the natural resources exhaust in nature then also decreasing returns of scale appears. For instance, if the coal mines are doubled then it may be possible that the coal production would not be doubles rather it just increases by less than double, because of the limitedness of the coal deposits or difficult accessibility to coal deposits.



If all inputs are increased in the same proportion, keeping factor proportions unchanged, then

- ✓ The percentage increase in output due to one percent increase in L & K brings MORE THAN one percent change in output- it is called IRS.
- ✓ Old Production Function, Q = f(K, L) and New Production Function, 4Q = f(2K, 2L).
- ✓ Causes for Increasing Returns to Scale: Increasing Returns to Scale implicitly implies reduction in the cost of production. The reducing costs may be attributed to the economies of scale. The economies of scale refer to those benefits that accrue to a particular firm due to increase its size and expansion of its business overtime.
- ✓ The percentage increase in output due to one percent increase in L & K brings EXACTLY one percent change in output- it is called CRS.
- ✓ Old Production Function, Q = f(K, L) and New Production Function, 2Q = f(2K, 2L).

- ✓ The percentage increase in output due to one percent increase in L & K brings LESS THAN one percent change in output- it is called DRS.
- ✓ Old Production Function, Q = f(K, L) and New Production Function, 1.5Q = f(2K, 2L).
- ✓ Causes for Decreasing Returns to Scale: Decreasing Returns to Scale implies increasing cost of production. The increase in the cost of production is a result of diseconomies of scale. Such diseconomies exist when a firm grows and expands beyond its optimum (maximum) capacity. In other words, a firm faces diseconomies of scale whenever it engages in overproduction.

Production function and Returns to Scale

Suppose the production function is given by: Q= f (K, L) Now, let us assume a Cobb-Douglas production function which is homogeneous of degree one, which in turn means that, when all inputs are increased in the same proportion and this proportion can be factored out. For instance, if all inputs are increased in a proportion by 'h' and if output will also increase by 'h', then the production function is said to be of homogeneous of degree one. This is also known as linear homogeneous production function and it implies constant returns to scale. Such a function can be expressed as follows: hQ= f(hK, hL) hQ= hf(K, L) However, if all inputs are increased in the same proportion by 'h' but the output do not increase by that proportion then in such a case a production function may be written as: kQ= f(hK, hL) Where, 'k' denotes the k- times increase in output as a result of h- times increase in both the inputs.

Hence, 'k' may be greater than 'h', or equal to 'h' or less than 'h'. If

- k>h then it represents an increasing returns to scale
- k=h then it represents constant returns to scale
- k<h then it represents decreasing returns to scale

Economies of Scale

Prof. Stigler defines economies of scale as synonyms with returns to scale. He mentioned when the scale of production is increased up to a certain point, the producer gets economies of scale. This will be followed by diseconomies to scale. Alfred Marshall has classified economies to scale into two parts → Internal Economies & External Economies.

- ❖ Internal Economies:
  - ✓ Cairncross defined internal economies as those which are open to a single factory, or a single firm independently of the action of other firms. These result from an increase in the scale of output of a firm and cannot be achieved unless output increases.
  - ✓ Alfred Marshall has divided Internal Economies into two parts- Real & Pecuniary Economies.
  - ✓ Real economies are associated with reduction of physical quantity of inputs, raw materials, labour & capital etc.
  - ✓ Technical Economies: accrue to large firms which enjoy higher efficiency from capital goods or machinery.
  - ✓ Marketing Economies: Include advertisement economies, opening up of show rooms, appointment of sole distributors, R&D & special arrangements with the dealers. All these reduce cost of production.
  - ✓ Labour Economies: like new inventions, specialization, time saving production etc.

- ✓ Managerial Economies: Work is divided and subdivided into different departments and each department is headed by an expert who supervises the work at micro level. This leads to specialization.
- ✓ Transport and Storage Economies: Big firm can have its own means of transportation to carry finished as well as raw material from one place to another. These firms can store their products when prices are unfavourable in the market.
- ✓ Pecuniary Economies: Those which happens when the firms have to pay less for the factors used in the process of production and distribution. Big firms get raw material at the low price as they buy in bulk, similarly, they get concessions while borrowing (in terms of lower interest rates) and paying for advertisements.

❖ External Economies:

- ✓ Cairncross defined External economies as those benefits which are shared in by a number of firms or industries when the scale of production in any industry increases.
- ✓ Economies of concentration or localization: Like coal mines, IT hub of Bangalore. These economies happen when a particular area specializes in the production of particular products due to the availability of various inputs required for production. These reduce the average cost of production of all the firms located in the region.
- ✓ Economies of information: The big firms cooperate in research and development and carry joint R&D wings. Like the vaccine invention for COVID-19 has reduced the cost of vaccine due to shared cost of acquiring information and carrying out clinical researches and tests.
- ✓ Economies of disintegration: Many smaller firms together operate and provides specialization to the big industries at different levels of production. Like Maruti company has many smaller firms which specialize in the production of say plastic bodies, wind-shields, glasses, which reduces the cost of production.

Conclusion

It can be concluded that both the returns to a variable factor and returns to scale are compatible because returns to a variable factor prevails in the short run where the production can be increased by increasing the variable input only, and the capital is fixed in nature, on the other hand, returns to scale is a long run phenomenon as all the inputs becomes elastic and variable in long run and therefore production can be increased in the long run by increasing all the inputs. Moreover, depending upon the type of production function, both these laws can also exist simultaneously, but that is not a usual phenomenon.

Q. 6 . What is price discrimination? How price is determined under it?

Answer:

Introduction:

Monopoly is a market structure where there is a single seller and large number of buyers. Monopolist being a sole producer of the product there are no close substitutes available for the product it produces. The monopolistic competition contains elements of both perfect competition and monopoly. Like the perfect competition model, it includes a large number of sellers and there are no barriers to entry into and exit from the industry. Like the monopoly, each firm has the small degree of monopoly power as firms are producing differentiated products. (i.e. product of one firm is not identical to the product of another firm). These products are highly substitutable for one another but they are not perfect substitutes. The last market structure Oligopoly is an industry characterized by few dominant firms. Oligopoly is said to prevail when there are few firms in the market producing or selling a product. Oligopoly is also referred to as “competition among the few”. A special case of oligopoly is

duopoly where two firms are competing with each other. Under oligopoly each firm has enough market power to prevent itself from being a price taker but each firm is facing inter firm rivalry which is preventing it to consider the market demand curve as its own demand curve.

Bilateral monopoly is a market structure where the participants are two monopolies i.e. one on the demand side and one on the supply side. It arises when a monopolist (single seller) faces a monopsonist (single buyer). Here both buyers are sellers are in a bargaining position so it is very difficult to predict what the price and output will be. Here we are assuming that firms are organized in such a way that it acts like a monopsony and labor is organized in a labor union that acts like a monopolist.

Price discrimination is a selling strategy that charges customers different prices for the same product or service based on what the seller thinks they can get the customer to agree to. In pure price discrimination, the seller charges each customer the maximum price they will pay. In more common forms of price discrimination, the seller places customers in groups based on certain attributes and charges each group a different price.

Meaning and Characteristics of Monopoly

Monopoly means single seller of a product but it is really a very rare condition to have a monopoly in a market structure, especially in the private sector. Since a monopolized industry is a single firm industry therefore there is no distinction between a firm and an industry in a monopolistic market structure. Hence the demand curve of a monopolistic firm is same as the market demand curve.

- Single Seller of a product
- Barriers to entry and exit
- No close substitute of the product is available in the market
- Imperfect knowledge about the product and market between buyers and seller
- Price discrimination
- No supply curve of a monopolistic firm

Short run equilibrium of the monopoly

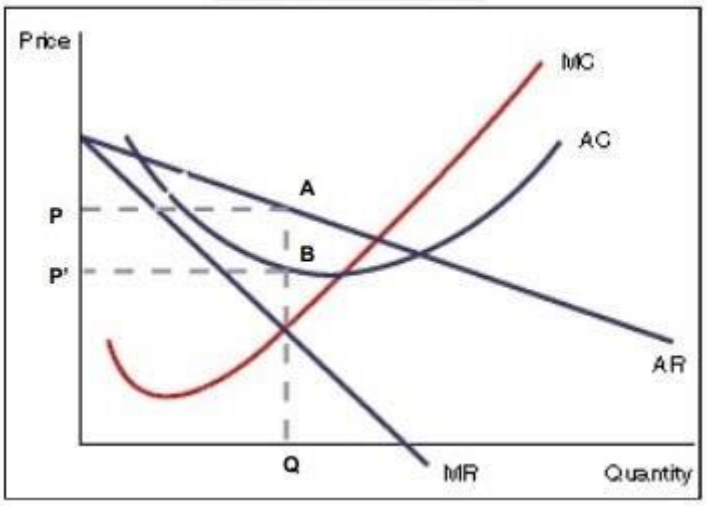
The equilibrium of a firm is attained at a point where the firm earns maximum profit. The short run equilibrium of a monopolistic firm can be studied through two approaches:

- TR – TC approach
- MR – MC approach

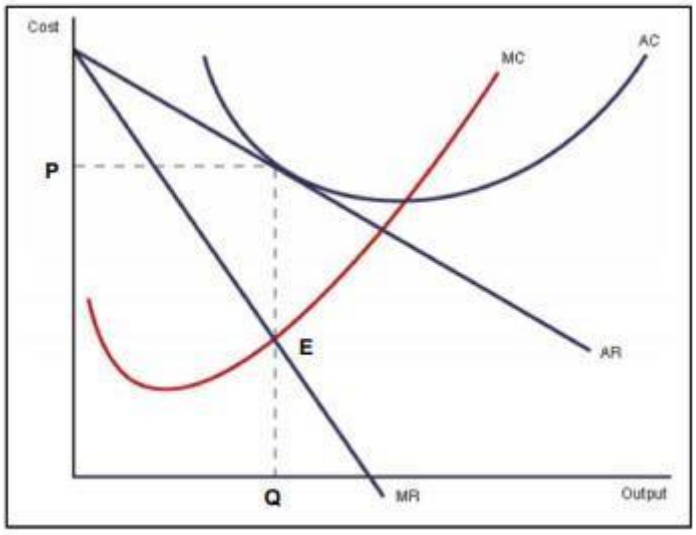
Let us do them one by one in detail: TR – TC Approach: According to the Total revenue (TR) and Total cost (TC) approach, a monopolistic firm is in equilibrium at the price and output where TR – TC = profit is maximum. For instance, in the following figure, the firm faces a cubic TC function $TC = F + bQ - cQ2 + dQ3$ (where F = fixed cost) and the demand function $Q = a - bP$. When we graph the TC function then we get a Total cost curve as follows, similarly from the demand curve we can get a revenue function by multiplying it with price and hence when we plot it then we get the following TR curve.

Actually it depends upon the cost which it bears for the production of its output and correspondingly the cost curve i.e. the curvature of the SAC determined whether the monopoly firm will earn a normal profit, positive profit or loss. Hence, given the level of output the three possibilities can be:

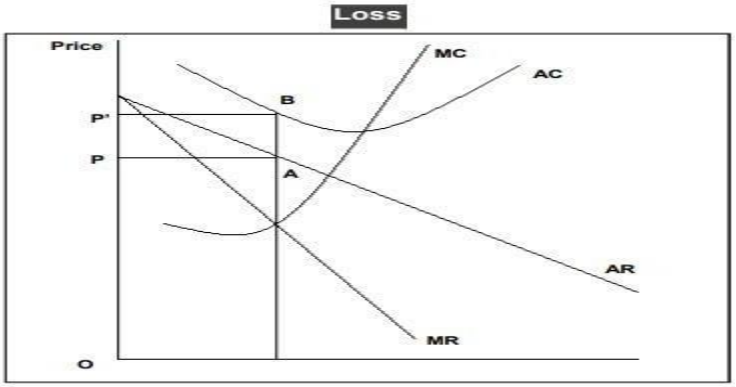
- If AR > AC, there is economic profit for the firms,



- If AR = AC, the firm earns only normal profit



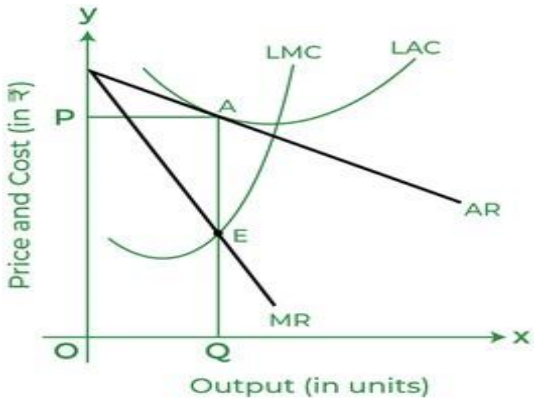
- If AR < AC, the firm makes losses.



Long run equilibrium of a monopoly firm

The long run equilibrium condition of a monopoly firm is quite different as compare to the other types of the market structure, as in monopoly there is no free entry or exit of the firms and hence has barriers to entry and exit like patent, economies of scale, legal protection etc.,

whereas in other competitive market, new firms can easily enter and exit in case of super normal profits or losses.



A monopolist always has option to close down in long run if he incurs losses in short run and can continue production in case of profits. If SAC> AR, then the monopolist makes loses in short run and will go out of business in long run if the market size is so small that no plant size can ensure pure profits in the long run. However, if AR> SAC, then it earns a short run profit given by Q1 output in the following diagram, then the monopolist will continue production and can even expand in order to maximize its profits.

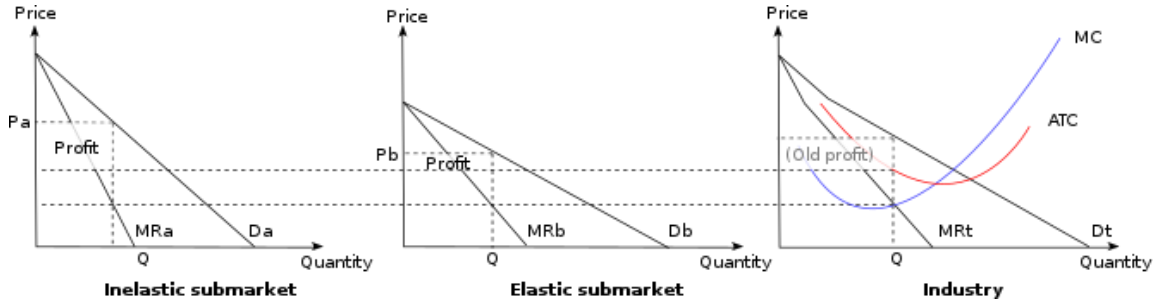
Multi plant monopoly

A monopoly produces homogeneous product and can expands its firm size by operating in more than one plant. This is a case of multi plant monopoly, where the monopolist can produce its output in more than one plant. For this we can assume that:

- A monopoly firm has two plants A and B
- The cost conditions of both the plants are different
- The firm is aware of its AR and MR

Price discrimination under monopoly

A monopolist always have the option to charge different prices of the same product form different consumers or group of consumers, as he is the sole producer of the product. This is known as price discrimination.



Consumers are discriminated in respect of price on the basis of their income or purchasing power, geographical location, age, sex, quantity they purchase, their association with the seller, frequency of purchases, purpose of the use of the commodity or service, and also on other grounds which the monopolist may find suitable. There exist three types of price discrimination exercised by a monopolist, which is given below:

First degree price discrimination: When the monopolist sells its output at different prices which different consumers are willing to pay then this kind of price discrimination is known as first degree price discrimination. In this type, the monopolist extracts the entire consumer surplus and hence charges that price which each individual consumer is willing to pay for that product because he knows the demand curve of each consumer, so he can charge the

maximum price which each consumer can pay for that product to buy. For instance, a doctor, who knows or can guess the paying capacity of his patients, can charge the highest possible fee from visibly the richest patient and the lowest fee from the poorest one.

Second degree price discrimination: When the monopolist divides the entire market or the consumers into different groups, sections or categories and then charges different prices from each section, then this type of price discrimination is known as second degree price discrimination. This type of price discrimination is also known as block pricing system, as the monopolist divides the entire market in blocks and hence charges different prices from each block.

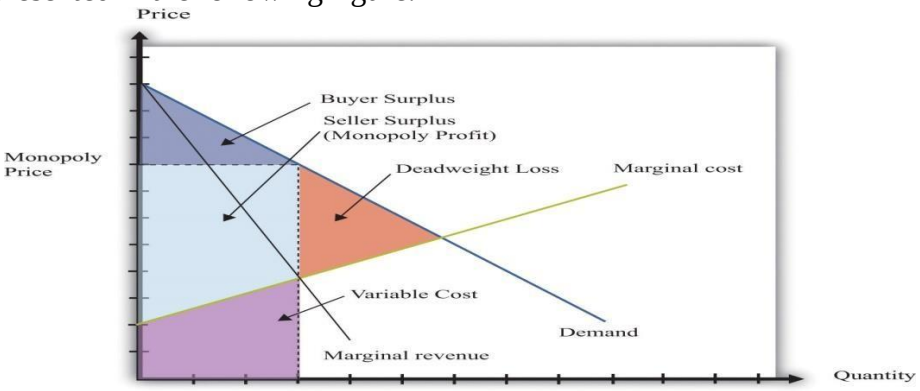
Third degree price discrimination: When a profit maximizing monopoly firm sets different prices in different markets having demand curves with different elasticities, it is using third-degree price discrimination. A monopolist is often faced with two or more markets, completely separated from each other—each having a demand curve with different elasticity. Therefore, a uniform price cannot be set for all the markets without losing the possible profits. The monopolist, therefore, allocates total output between the different markets and fixes different prices, so that profit is maximized in each market. Profit in each market would be maximum only when MR =MC in each market. The monopolist, therefore, allocates its total output between the markets in such proportions that in each market MR = MC.

MC = TQ = MRa = MRb

Thus, the equilibrium condition is satisfied in both the sub-markets and the monopoly firm adopting the third degree method of price discrimination maximizes its profits. The third degree method of price discrimination is most suitable where the total market is divided between the home and the foreign markets. However, it may be suitably practiced between any two or more markets separated from each other by any two or more of such factors as geographical distance, transport barriers, cost of transportation, legal restrictions on the inter-regional or inter-state transfer of commodities by individuals, etc.

The deadweight loss under monopoly

Monopoly not only causes loss of social welfare but also distortions in resource allocation. The suboptimal allocation of resources and loss of social welfare is known as deadweight loss, as represented in the following figure.



Suppose, there is a constant-cost industry which has LAC =LMC, given AR and MR curves, a perfectly competitive industry will produce at which LAC = LMC =AR at price.

Conclusion

A monopolistic firm may earn super normal profits, normal profits or losses in short run but will only earn supernormal profits in the long run, because due to one of its characteristics, it has barriers to entry and exit and hence if it earns losses in short run it goes out of business in the long run else continue production. A monopolistic firm may also have more than one plant where it can produce its output and can increase the output from the plant which has the lowest cost in the long run, in order to maximize its profits. A monopolist may also engage in

price discrimination by charging different prices form different consumers. We have seen that there are three types of price discrimination. At last we have explained the deadweight loss as the total loss of the society caused by a monopoly market structure.

Q. No. 7. Explain the marginal productivity theory of distribution?
Answer:
Introduction:
The marginal productivity theory, only tells us how many workers will an employer engage at a given wage-level in order to maximise his profit. It does not tell us how that wage-level is determined. We also say that the marginal productivity theory approaches the problem of the determination of the reward of a factor of production from the side of demand only. It ignores the supply side. Hence, the marginal productivity theory is not in adequate explanation of the determination of the factor prices.

The Marginal Productivity theory is an attempt by economists to evolve a general theory which will explain the determination of factor prices, such as wages, rent, interest and profits. It serves as a general theory of distribution in terms of which the rewards of all the factors could be explained. The marginal productivity theory states that the demand for a factor depends on its marginal revenue productivity (MRP). MRP is the addition made to the total revenue by employing one more unit of a variable factor, other factors remaining unchanged. As a general rule, the marginal revenue productivity of a factor diminishes with the increase in the units of that factor. When in the initial stages the units of a variable factor are employed, keeping the other factors constant, the total revenue product may increase more than proportionately for some time. But sooner or later, a time will come when the marginal revenue product will start diminishing and will tend to equal the price of the factor. This tendency of diminishing MRP follows from the Law of Variable Proportions. A firm operating under perfect competition has to pay the same price (reward) to a unit of the factor, which is being paid by the industry. In order to have maximum profits, it acts on the principle of substitution. Cheaper factors tend to displace expensive ones.

For example, if a firm finds it more profitable to substitute machines for costly labour, it will do so. The substitution of cheaper factors for the dearer will continue till the marginal revenue productivity of each factor is equal to its price. At this stage, the factors of production are employed in their most efficient combination or the least cost combination and the profits of the firm will be maximized. Moreover, substitution also takes place between different units of the same factor. There being perfect mobility in the factor market, units of a factor tend to move from one use where their marginal revenue productivity is low to another use where it is high, till it is equalized for all the units in different uses. In equilibrium, therefore, the price of a factor-service must equal its marginal revenue productivity.

If the marginal revenue product of a factor unit is more than its price (cost of employing it), it will be profitable for the firm to employ more units of this factor. As more units are employed, the marginal revenue product diminishes till it equalises the price. This is the point of maximum profits for the firm. But if more factor units are employed beyond this point, the marginal revenue product will fall below the price and the firm will sustain a loss. This follows from the application of the Law of Non-proportional Returns.

Assumptions of the Theory:

The marginal productivity theory of distribution is based on the following assumptions:

(i) It assumes that all units of a factor are homogeneous.
(ii) They can be substituted for each other.
(iii) There is perfect mobility of factors as between different places and employments.
(iv) There is perfect competition in the factor market.
(v) There is perfect competition in product market.
(vi) There is full employment of factors and resources.
(vii) The various units of the different factors are divisible.
(vii) One factor is variable and other factors are constant.
(ix) Techniques of production are given and constant.
(x) The entrepreneurs are motivated by profit maximization.
(xi) The theory is applicable in the long-run.
(xii) It is based on the Law of Variable Proportions.

Demand for a Factor:

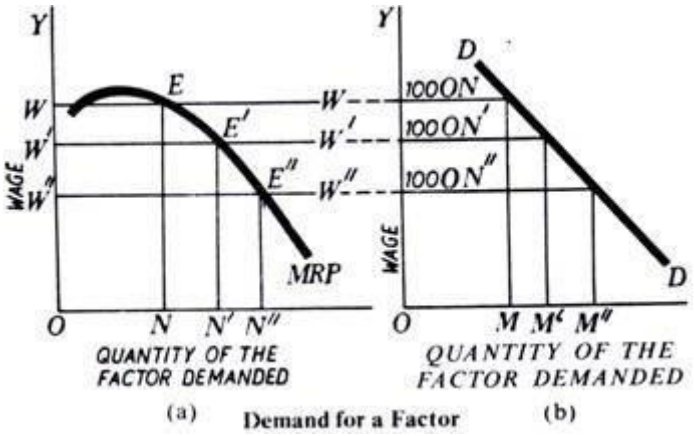
Let us first consider the demand side. In the first place, we should remember that the demand for a factor of production is not a direct demand if is an indirect or derived demand. It is

derived from the demand for the produce… that the factor produces. For instance, labour does not satisfy our wants directly. We want labour for the sake of the goods that it produces. It follows, therefore, that if the demand for goods increases, the demand for the factors which help to produce these goods will also increase. Also, if the demand for goods is elastic or inelastic, the demand for the factors too will be elastic or inelastic.

The demand for a factor of production will also depend on the quantity of the other factors required in the process. Generally speaking, the demand price for a given quantity of a factor of production will be higher, the greater the quantities of the co-operating productive services. If more of a factor of production is employed, the marginal productivity of the factor will fall, and the lower will be the demand price for the unit of a productive service. This is another rule connected with the demand for a factor of production.

The demand price of a factor of production also depends on the value of the finished product in the production of which the factor is used. The demand price will generally be greater; the more valuable is the finished product in which the factor is used. Also, the more productive the factor, he higher will be the demand price of a given quantity of the factor. These are a few points connected with the demand for a productive service. We know that the demand curve of the industry is the sum-total of the demand curves of the various firms in the industry. By a similar summing up, we can have the demand curve of all the industries using a particular productive service.

The demand of the employer for a factor depends on its marginal revenue productivity (in short, marginal productivity), and the quantity of the factor that a firm will employ will depend on the prevailing wage-level. That is more labour will be employed if wages are low and less if wages are high. Figure (a) illustrates the position of a firm regarding the employment of a factor, say, labour. When the wage is OW, the firm is in equilibrium at the point E and the demand for the factor is ON; similarly, at OW' wage, the demand is ON', and at OW" the demand is ON". MRP (marginal revenue productivity) curve is the demand curve for a factor of production by an individual firm.



Demand for a Factor

But for determining the price of a factor, it is not the demand of the individual firm for it that matters. What matters is the total demand, i.e., the sum-total of the demands of all firms in the industry. The total demand curve is derived by the lateral summation of the marginal revenue productivity curves of all the firms. This curve DD is shown in the Figure.

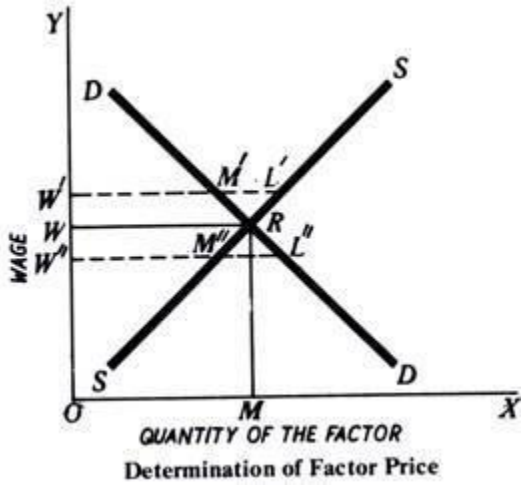
It can be seen that Y-axes in both curves are drawn to the same scale, but X-axes are drawn on different scales. We have supposed that there are 100 firms in the industry. At OW wage, the demand of the individual firm is ON, but the demand of the whole industry at the same wages is OM, which is equal to 100 ON (because the number of firms in the industry is 100). In the same manner, at OW' the demand of the firm is ON' but of the entire industry OM', which is equal to 100 ON', and at OW", the demand of the firm is ON" and that of the

industry OM", which is equal to 100 ON". It can be seen that the demand curve DD slopes downward to the right. The reason is that MRP curve, whose summation is represented by DD, also slopes down similarly to the right in the relevant portion. This means that according to the law of diminishing marginal productivity, the more a factor is employed the lower is the marginal productivity. This is all about the demand side.

Supply Side:

As for the supply side, the supply curve of a factor depends on the various conditions of its supply. Take the case of labour—a very important productive service. The supply of labour will depend on the size and composition of population, its occupational and geographical distribution, labour efficiency, cost of education and training, cost of movement, the expected income, relative preference for work and leisure, and so on. In this manner, by considering all the relevant factors, it is possible to construct the supply curve of a productive service. At the same time, we must note that the supply is a bit of complicated thing. We generally say that the supply of land is limited. But the fact is that, although for the whole community land is limited, for a particular firm or an industry, its supply is not limited. The supply can be increased if higher rent is offered.

In the case of commodities, we see that generally an increase in price brings forth larger supplies. This, however, does not necessarily hold good in the case of the factors of production. It may happen in some cases that, if wags go up, labour may be able to satisfy its needs by working for less time than before. They may prefer leisure to work. In this case, when the price of factor (or its remuneration) is increased, the supply is reduced. This peculiarity will be represented by a backward sloping curve after a stage. Also, the supply of labour does not merely depend on economic factors; many non-economic considerations also enter. All the same, we can say that, if the price of a factor increases, its supply will also generally increase, and vice versa. Hence, the supply curve of a factor rises from left to right upwards. This is shown in Figure.



Determination of Factor Price

Interaction of Demand and Supply:

Now we have worked our way to the demand curve and the supply curve of a factor of production. Both these curves are needed for the determination of the price of a productive service. That price will tend to prevail in the factor market at which the demand and supply are in equilibrium. This equilibrium is at the point of intersection of the demand and supply curves.

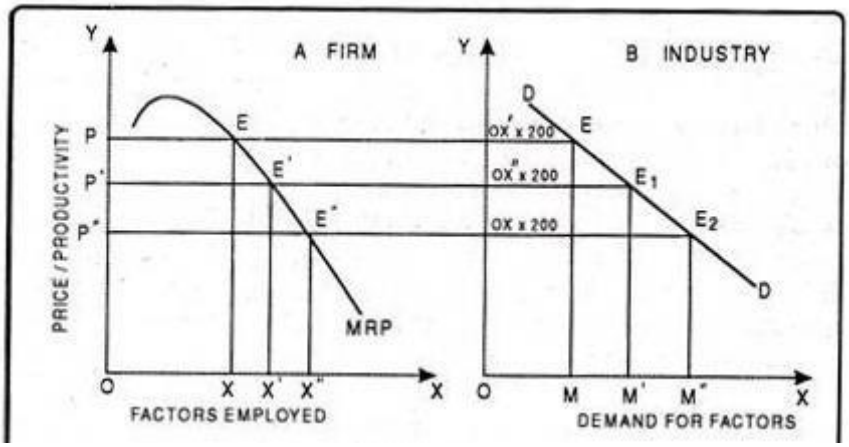
In Figure, they intersect at the point R, and the price of the factor will be OW. At OW' demand W'M' is less than the supply W'L'. In this case, competition among the sellers of the service will tend to bring down the price to OW. On the other hand, at OW" price, the demand W"L" is greater than the supply W"M"; hence price will tend to go up to OW at

which the demand and supply will be equal. This is how the price of a factor of production in the factor market is determined by the interaction of the forces of demand and supply relating to that factor of production. This is the correct and satisfactory theory of distribution.

Demand for Factors of Production:

The demand for factors of production is different from that of the demand for goods. The demand for goods is direct while the demand for factors of production is derived demand. The factors of production are demanded because they assist the process of production. Productivity of a factor refers to the contribution made by it in the process of production. If the demand for goods which the factor produces is more, its own demand will also be high and vice-versa. The elasticity of demand for industry with identical costs will be high. It means that the total demand of a factor unit at OP price level is OM i.e. OX' x 200. Further, at price level OP', the demand is OM' = (OX" X 200) and so on. Now, by taking all the possible combinations of factors price and the total demand for it we can draw the demand curve DD for the whole industry. In Figure, the factor price is determined by the quantity of the factor, possibility of substitutes, and elasticity of demand for final product. Thus, the demand for the factor is determined by its marginal revenue productivity.

The total demand for the factor in an industry, the demand for the factors by all the firms has to be added. It can be shown with the following figure:



Explanation of the Theory:

Given these assumptions, first we explain the determination of the price of a factor in an industry in terms of its demand and supply. In Figure, the demand curve D of industry intersects its supply curve S at point E which determines OP price and OQ quantity demanded and supplied. Thus all units of the factor (say, labour) in the industry are paid the same price (wage), OP. There being perfect competition, a firm will pay the same price (wage) to each unit of the factor (labour) as paid by the industry. Therefore, for the firm, the supply of this factor at that price will be perfectly elastic. It means that the supply curve of this factor at the given price OP is horizontal curve, shown as AFC = MFC in Panel (B) of the figure. AFC and MFC are the average and marginal factor costs of the firm at which it employs the factor units. The number of factor units, the firm will employ depends upon its demand for that factor. And the demand for the factor depends on its MRP. For equilibrium, it is essential that the price which the firm pays to the factor must equal its MRP. ARP and MFC, that is, Price of the Factor Unit = AFC = MFC = MRP = ARP. This is shown in Panel (B) where E is the equilibrium point for the firm when ARP = MRP = MFC = AFC and it pays OP price for OQ units of the factor. Suppose the factor-price rises to OP1. At this price, the firms will be incurring AB per unit loss, as the price Q1being paid to factor units is greater them Q1B, their ARP. This will induce some firms to leave the industry. As a result, the supply of factors will increase by ds, as in Panel (A), and the factor price will fall again to OP where equilibrium will be re-established at point E in both (A) and (B) Panels. On the

other hand, if the factor-price falls to OP2 firms will be earning DC per unit profit because the price Q2D being paid to factor units are less than Q2C, their ARP. Attracted by the profit, some firms will enter the industry. This will raise the factor-demand by s1d1 in the industry and the price will again increase to OP. These price changes are only possible in the short-run. In the long-run, equilibrium will stay on at point E, where OP = ARP = MRP = MFC = AFC.

Criticisms of the Marginal Productivity Theory:

The marginal productivity theory of distribution has been one of the most criticised theories in economics due to its unrealistic assumptions.

(1) Units of a Factor not Homogeneous: The assumption that all units of a factor are homogeneous is unrealistic. We know that efficiency of labour differs from worker to worker. Similarly, one piece of land differs from the other in fertility. It is, therefore, not correct to assume that the different factor-units of the same are homogeneous. In fact, heterogeneity and not homogeneity is the rule.

(2) Factors not perfectly Mobile: The theory assumes perfect mobility of factors as between different employments and places. But, in reality, factors are mostly immobile, particularly labour.

(3) No Perfect Competition: The theory is based on another unrealistic assumption of perfect competition which is to be found neither in the factor market nor in the product market. Perfect competition is not a reality but a myth. Rather imperfect competition or monopolistic competition is the rule.

(4) Factors not fully employed: The theory assumes the existence of full employment in the economy. This assumption of full employment makes the theory static. According to Keynes, under-employment rather than full employment is found in an economy.

(5) All Factors not Divisible: The assumption that factor-units are divisible and therefore can be increased by small quantities does not hold true. It is not possible to vary an individual, large or lumpy factor. For example how can the entrepreneur of a firm be increased or decreased by small units? Thus the equality between marginal productivity and price of a factor cannot be brought about by varying its quantities a little less or more.

(6) Production not the Result of One Factor: According to Taussig and Devonport production of a commodity cannot be attributed to any one factor- land, labour or capital. Rather, it is always the result of factors and their units working together. It is, therefore, not possible to calculate the marginal productivity of each factor unit separately.

(7) Profit not the Main Motive: The theory assumes that the entrepreneurs are motivated by maximization of profits. But as pointed out by Schumpeter, the entrepreneurial action is guided by the desire to found a commercial kingdom, the will to conquer, the joy of creating and getting things done. It is, therefore, not true to say that the entrepreneur is guided by the profit motive.

(8) Not Applicable in the Short-Run: The theory is applicable only in the long-run, when the reward of a factor tends to equal its marginal revenue product. But, in reality, we are concerned with short-run problems. As remarked by Keynes, “In the long-run we are all dead.” This assumption makes the factor pricing unrealistic.

(9) Nested of Technical Progress: According to Hicks, this theory fails to throw light on the determination of relative shares by neglecting the influence of technical change. Hicks has shown that a labour-saving innovation tends to raise the marginal product of capital relative to that of labour. The opposite may happen in the case of capital-saving innovation. Sometimes a technical change requires the use of cooperating factors in fixed proportions say two workers for one machine. Thus the marginal productivity theory fails to analyse the problems of technical Change.

(10) Supply of Factors not fixed: This Theory assumes the supply of factors to be perfectly inelastic. The supply of factors is fixed during the short period and not in the long-run. Therefore, the theory is self-contradictory, as it assumes the supply of factors to be fixed in the long-run to which it applies.
(11) Only Demand Theory: According to Samuelson, being a theory solely of the demand for factors, this theory cannot be applied to the factor market as a whole which requires a theory of both the demand for and supply of factors. Thus, it is a one-side theory.
(12) No Justification for Inequalities in Income: The marginal productivity theory is often used to justify the existing inequalities in the distribution of income. The theory states that the price of each factor equals its marginal revenue product which makes the reward inevitably what it is. Apparently, a person gets what he produces. The basic postulate rests on the proposition that an individual gets what is produced by the resources he possesses and that all persons have equal opportunities. But no two persons possess the same resources and have equal opportunities. Thus, the existing distribution of income cannot be justified on the basis of the principle of marginal productivity.
(13) Reward determines Productivity: According to this theory, the reward of a factor-unit is determined by its MRP. But according to Sydney Webb, when a worker is paid a higher reward (wage), his efficiency and productivity increase. Thus, reward is the cause and not the result of MRP.

Conclusion:

On account of its many weaknesses, Prof. Kaldor regards this theory as intellectual sterility. Despite the above failures and shortcomings, the Marginal productivity theory still offers us an apparatus which can be profitably used to explain factor-pricing under a variety of market situations.

Q. No. 8. Present the economic cum mathematical properties of the Cobb-Douglas Production function.

Answer:

Introduction:

In Economics, the Cobb Douglas production function is widely used to represent the relationship between inputs and output in an economy. The two most important neoclassical production functions are the Constant Elasticity of Substitution (CES) and the Cobb Douglas. The Cobb Douglas production function was created by Charles Cobb (Mathematician) and Paul Douglas (Economist) in 1927. But its functional form was proposed by Knut Wicksell (Economist) in the 19th Century. The Cobb Douglas production function lies between linear and fixed proportion production function with elasticity of substitution equal to one. It is very popular among economist because of its flexibility and ease of use.

Mathematical Form:

The mathematical form of the Cobb Douglas production function for a single output with two factors can be written as $Y = (K, L, A) = AK\ \alpha L\ 1-\alpha$

where Y: Output K: Capital input L: Labour input

A: Level of technology or total factor productivity (A>0)

α: Constant between 0 and 1 (0< α<1)

Constant Returns to Scale: The return to scale is a long run concept when all the factors of production are variable. In long run output can be increased by increasing all the factor of production. An increase in scale means that all factors are increased in the same proportion, output will increase but the increase may be at an increasing rate or at a constant rate or at a decreasing rate.

Three situations of Return to the Scale

The three situations of Return to the Scale are:-

(i) Increasing Returns to scale: Increasing return to scale occurs when output increases in a greater proportion than increase in inputs. If all factors are increased by 20% then output increases by say 30%. So by doubling the factors, output increases by more than double.

(ii) Constant Returns to scale: Constant Return to Scale occurs when output increases in the same proportion as increase in input. If all factors are increased by 20% then output also increases by 20%. So doubling of all factors causes a doubling of output then returns to scale are constant. The constant return to scale is also called linearly homogenous production function.

(iii) Decreasing Returns to scale Decreasing return to scale occurs when output increases in a lesser proportion than increase in inputs. If all the factors are increased by 20% then output increases by less than 20%.

The Cobb-Douglas production function exhibits constant returns to scale. Constant returns to scale occurs when output increases in the same proportion as increase in input. Under constant returns to scale the sum of two exponents for capital and labour is one i.e. α + (1-α) =1.

Isoquants are convex to the origin

The isoquants under Cobb Douglas production function are convex to the origin. This occurs because of diminishing marginal rate of technical substitution. Here the isoquant are:-

- Downward sloping.
- Convex to the origin: Diminishing MRTS.
- Higher the isoquant, higher the level of output.

➢ Cobb-Douglas Production Function

✓ The Cobb-Douglas production function is given by Charles Cobb and Paul Douglas in 1928.

$$q = f(K, L) = AK^{a}L^{b}$$

Where, A, a and b are all positive constants.

✓ Isoquants resulting from the functional form have convex shape

✓ Returns to Scale

- a + b = 1 implies Constant Returns to Scale (CRS)
- a + b > 1 implies Increasing Returns to Scale (IRS)
- a + b < 1 implies Decreasing Returns to Scale (DRS) case

✓ Allen's definition $\sigma = \frac{\frac{dq}{dL}(\frac{dq}{dK})}{(\frac{d^2q}{dL.dK})}$, $where, q = AK^{a}L^{1-a}$

$$\sigma = \frac{(1-a)\left(\frac{q}{L}\right) a \left(\frac{q}{K}\right)}{q^2 \left(\frac{(1-a)(a)}{L.K}\right)} = 1$$

✓ Elasticity of substitution is always equal to ONE.

➢ C-D Function is Linear in Logarithms

Ing-In A alnk bin L

$$\ln q = \ln A + a \ln K + b \ln L$$

Where, 'a' is the elasticity of output w.r.t. capital and 'b' is the elasticity of output w.r.t. labour

$$\eta_{q,} = \frac{dq}{dK}\frac{K}{q} = \frac{d\ ln\ q}{d \ln K} = a$$

$$\eta_{q,} = \frac{dq}{dL}\frac{L}{q} = \frac{d\ ln\ q}{d \ln L} = b$$

- If one of the factors is zero, then output is also zero.
- The function can be represented as log-linear model as

ln Q'= ln A'+ a ln K'+(1-a) ln L'

- AP and MP of factors are function of K-L ratio

$$AP\ of\ Labour = \frac{Q}{L} = \frac{AK^a L^{1-a}}{L} = AK^a L^{1-a-1} = A\frac{K^a}{L^a}$$

$$AP\ of\ Capital = \frac{Q}{K} = \frac{AK^a L^{1-a}}{K} = AK^{a-1} L^{1-a} = A\frac{L^{1-a}}{K^{1-a}}$$

$$MP\ of\ Labour = \frac{dQ}{dL} = (1-a)K^a L^{1-a-1} = A\ \frac{(1-a)K^a}{L^a}$$

$$MP\ of\ Capital = \frac{dQ}{dK} = AaK^{a-1} L^{1-a} = A\ \frac{aL^{1-a}}{K^{1-a}}$$

- 'a' and (1-a) represent output elasticities of labour and capital say, a is 0.33 and 1-a 0.66, then it implies that when K increases by 1%, output will increase by 0.33% holding labour constant and when L increases by 1%, output will increase by 0.66% holding capital constant. This implies C-D function indicates Diminishing Marginal Productivities for individual inputs but both the factors together indicate CRS.

Properties of Cobb Douglas Production Function

i. Constant Returns to Scale: The Cobb Douglas production function exhibits constant returns to scale. If the inputs capital and labor are increased by a positive constant, λ, then output also increases by the same proportion i.e. (λK, λL, A) = λ f(K, L, A) for all λ>0.

$Y = (K, L, A) = AK\ \alpha L\ 1-\alpha$

(λK, λL, A) = $(\lambda K)\ \alpha\ (\lambda L)\ 1-\alpha$

= $A\lambda\ \alpha K\ \alpha\lambda\ 1-\alpha L\ 1-\alpha$

= $\lambda AK\ \alpha L\ 1-\alpha = \lambda Y$

If the function exhibits decreasing returns to scale then $(\lambda K, \lambda L, A) < \lambda Y\ for\ any\ \lambda > 1$.

If the function exhibits increasing returns to scale then $(\lambda K, \lambda L, A) > \lambda Y\ for\ any\ \lambda > 1$.

ii. Positive and Diminishing Returns to Inputs: The Cobb Douglas production function is increasing in labor and capital i.e. positive marginal products.

(i) ∂Y ∂K > 0 and ∂Y ∂L > 0 $Y = (K, L, A) = AK\ \alpha L\ 1-\alpha\ MPK =$ ∂Y ∂K = $A\alpha K\alpha-1L\ 1-\alpha\ MPL =$ ∂Y ∂L = $(1-\alpha)\ \alpha L\ -\alpha$ Assuming A, L and K are all positive and $0 < \alpha < 1$, the marginal products are positive.

(ii) Diminishing Marginal Products with respect to each Input: ∂ 2 Y ∂K 2 < 0 and ∂ 2 Y ∂L 2 < 0 ∂ 2 Y ∂K 2 = $A(\alpha-1)K\ \alpha-2L\ 1-\alpha$

Here, any small increase in capital will lead to a decrease in the marginal product of capital. Any small increase in capital cause output to rise but at a diminishing rate. The same is true for labor.

iii. Inada Conditions

(i) The marginal product of capital (labor) approaches infinity as capital (labor) goes to zero. lim $K\to0$ ∂Y ∂K = lim $L\to0$ ∂Y ∂L = ∞

(ii) The marginal product of capital (labor) approaches zero as capital (labor) goes to infinity. lim $K\to\infty$ ∂Y ∂K = lim $L\to\infty$ ∂Y ∂L = 0

iv. The Cobb Douglas production function has elasticity of substitution equal to unity.

$$\sigma = \frac{(1-a)\ (\frac{q}{L})\ a\ (\frac{q}{K})}{q^2\ (\frac{(1-a)(a)}{L.K})} = 1$$

v. Constant Income Shares of Output: The exponent of capital (labor),α (1- α), represents the contribution of capital (labor) to output. This is the same as the portion of output distributed to capital (labor) i.e. capital (labor) income share. $Y = (K, L, A) = AK\ \alpha L\ 1-\alpha$
The real wage of labour (w) is calculated by partially differentiating Y w.r.t. L, which is nothing but marginal product of labor ( ). $w = MPL = \partial$Y ∂L = $(1 - \alpha)K\ \alpha L\ -\alpha = A(1 - \alpha)$ (L) $\alpha = (1 - \alpha)$ ($Y\ L$) Total wage bill=$w.\ L = MPL\ .\ L = (1 - \alpha)\ \alpha L\ 1-\alpha$
The labor share in real National Product is $Total\ Wage\ Bill\ Real\ National\ Product = Total\ Wage\ Bill\ Real\ National\ Product = wL\ Y = (1-\alpha)\ \alpha L\ 1-\alpha\ AK\alpha L\ 1-\alpha = 1 - \alpha$
In the same way, the capital income share remains constant at α.

Criticisms:

The function has been criticised for its lack of foundation. Cobb and Douglas were influenced by statistical evidence that appeared to show that labour and capital shares of total output were constant over time in developed countries; they explained this by statistical fitting least-squares regression of their production function. There is now doubt over whether constancy over time exists. The production function contains a principal assumption that may not always provide the most accurate representation of a country's productive capabilities and supply-side efficiencies. This assumption is a "constant share of labour in output", which may not be effective when applied to cases of countries whose labour markets are growing at significant rates. Another issue within the fundamental composition the Cobb Douglas production function is the presence of simultaneous equation bias. When competition is presumed the simultaneous equation bias has impact on all function types involving firm decisions – including the Cobb Douglas function. In some cases this simultaneous equation bias doesn't appear. However, it is apparent when least squares asymptotic approximations are used.

The Cobb–Douglas production function was not developed on the basis of any knowledge of engineering, technology, or management of the production process. This rationale may be true given the definition of the Capital term. Labour hours and Capital need a better definition. If capital is defined as a building, labour is already included in the development of that building. A building is composed of commodities, labour and risks and general conditions. It was instead developed because it had attractive mathematical characteristics, such as diminishing marginal returns to either factor of production and the property that the optimal expenditure shares on any given input of a firm operating a Cobb–Douglas technology are constant. Initially, there were no utility foundations for it. In the modern era, some economists try to build models up from individual agents acting, rather than imposing a functional form on an entire economy. The Cobb–Douglas production function, if properly defined, can be applied at a micro-economic level, up to a macro- economic level.

However, many modern authors have developed models which give micro economically based Cobb–Douglas production functions, including many New Keynesian models. It is nevertheless a mathematical mistake to assume that just because the Cobb–Douglas function applies at the microeconomic level, it also always applies at the macroeconomic level. Similarly, it is not necessarily the case that a macro Cobb–Douglas applies at the disaggregated level. An early micro foundation of the aggregate Cobb–Douglas technology based on linear activities is derived in Houthakker (1955). The Cobb–Douglas production function is inconsistent with modern empirical estimates of the elasticity of substitution between capital and labor, which suggest that capital and labour are gross complements.

Q. No. 9. What is welfare economics? Point out the problems involved in the measurement of welfare.

Answer:

Introduction:

Welfare economics is the study of how the allocation of resources and goods affects social welfare. This relates directly to the study of economic efficiency and income distribution, as well as how these two factors affect the overall well-being of people in the economy.

In practical terms, welfare economists seek to provide tools to guide public policy to achieve beneficial social and economic outcomes for all of society. However, welfare economics is a subjective study that depends heavily on chosen assumptions regarding how welfare can be defined, measured, and compared for individuals and society as a whole.

Social welfare systems assist individuals and families through health care, food stamps, unemployment compensation, housing assistance, and child care assistance. In the U.S., a caseworker is assigned to each individual or family applying for benefits to determine and confirm the applicant's needs.

The benefits available to an individual vary by state. Eligibility is determined based on factors surrounding the person's financial status and its relation to the minimum acceptable levels within a particular state. The factors involved can include the family unit's size, current income levels, or an assessed disability.

Social welfare systems may go by different names within each state, but they often serve similar functions. This can cause confusion when attempting to compare one state's program to another. Additionally, the requirements to qualify also vary, depending on the poverty line in a particular state. This allows for adjustments based on the cost of living that isn't based on one standard.

An individual who is on welfare is usually provided free or deeply discounted goods and services. The government requires that individuals or families seeking assistance must prove that their annual income falls below the federal poverty level (FPL). The FPL is an economic measure of income used to determine whether an individual or family qualifies for certain subsidies or aid.

Economists explain the concept of social welfare through social utility or social welfare function (SWF). A SWF is same kind of aggregation of individual utilities. It gives a way to rank different allocations that depends only on the individual preferences, and it is an increasing function of each individual's utility. A social welfare function is just some function of the individual utility functions: W U x u x u x (, , ,. , ( ) 2 ( ) n ( )) .

Some of the few functional forms that a SWF can take are;

(1) Classical utilitarian or Benthamite welfare function.

(2) Weighted – sum – of – utilities welfare function

(3) Rawlsian or minimax Social welfare function.

(4) Bergson – samuelson welfare function

It is now clear that the bliss point is uniquely associated with the maximum social welfare and is pareto-efficient. It should, however, be noted that pareto-efficiency is a necessary, but not sufficient condition, for social welfare maximization. That is, the marginal efficient conditions only give pare to efficiency requirements; but they alone do not guarantee a welfare maximum.

Welfare economics refers to the allocation of goods and resources for promoting social welfare. It deals with an economically efficient distribution of resources for the well being of the people. Welfare economists seek to guide the public policy such that the distribution is economically and socially beneficial for all sections of the society.

Meaning of Welfare Economics

Welfare economics is a branch of economics which deals with the study of the structure of the economy, the markets comprised therein, to achieve an efficient allocation of goods and resources in the society.
The aim of welfare economics is the overall well-being of society. Hence, welfare economics involves an evaluation of the economic policies, guiding the public policies for the greater good of society. The study of welfare economics uses the tools of cost-benefit analysis and social welfare functions.
The underlying assumptions of the study are measurability and comparability of social welfare across various sections of society and ethical and philosophical considerations about social well being.
It involves the application of utility theory in economics. Utility refers to the value perceived by the society of the goods and services offered to the society. In the utility theory, consumers will seek to maximise their utility in their actions as buyers with sellers through the laws of demand and supply.
There are various criteria to measure whether the welfare gains arising from a change to the economy would outweigh the losses if any. When analysed in terms of Pareto efficiency, resources cannot be allocated to make one individual better off without making one or more individual worse off. The underlying assumption for this cost-benefit analysis is that utility gains and losses can be measured in terms of money.

Pareto Efficiency
Pareto efficiency, or Pareto optimality, is an economic state where resources cannot be reallocated to make one individual better off without making at least one individual worse off. Pareto efficiency implies that resources are allocated in the most economically efficient manner, but does not imply equality or fairness. An economy is said to be in a Pareto optimum state when no economic changes can make one individual better off without making at least one other individual worse off.
Pareto efficiency, named after the Italian economist and political scientist Vilfredo Pareto (1848-1923), is a major pillar of welfare economics. Neoclassical economics, alongside the theoretical construct of perfect competition, is used as a benchmark to judge the efficiency of real markets—though neither perfectly efficient nor perfectly competitive markets occur outside of economic theory.

- Pareto efficiency is when an economy has its resources and goods allocated to the maximum level of efficiency, and no change can be made without making someone worse off.
- Pure Pareto efficiency exists only in theory, though the economy can move toward Pareto efficiency.
- Alternative criteria for economic efficiency based on Pareto efficiency are often used to make economic policy, as it is very difficult to make any change that will not make any one individual worse off.
- Pareto efficiency is measured along the production possibility frontier; when graphically depicted, combinations on the PFF representation efficient markets.
- Market failure occurs when inefficiency is not achieved either by leaving an individual worse off or by resources being unspent.

Understanding Pareto Efficiency
Hypothetically, if there were perfect competition and resources were used to maximum efficient capacity, then everyone would be at their highest standard of living, or Pareto efficiency. Economists Kenneth Arrow and Gerard Debreu demonstrated, theoretically, that

under the assumption of perfect competition and where all goods and services are tradeable in competitive markets with zero transaction costs, an economy will tend toward Pareto efficiency.

In any situation other than Pareto efficiency, some changes to the allocation of resources in an economy can be made, such that at least one individual gains and no individuals lose from the change. Only changes in allocation of resources that meet this condition are considered moves toward Pareto efficiency. Such a change is called a Pareto improvement.

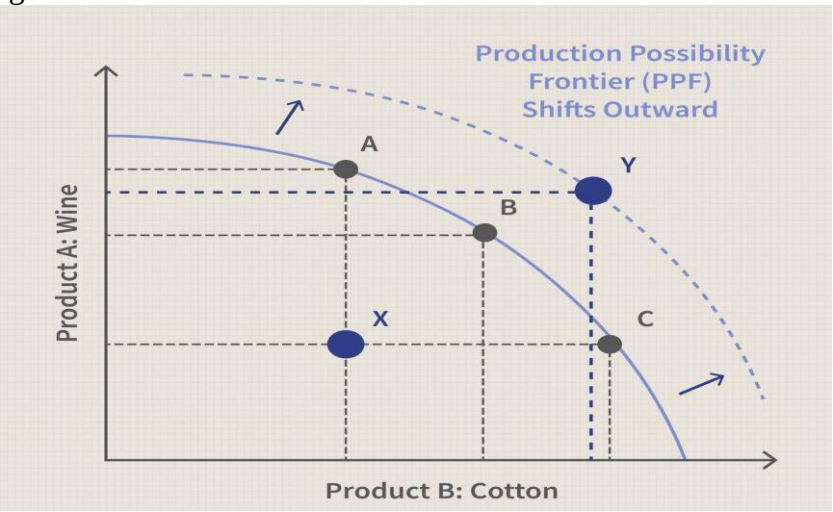
A Pareto improvement occurs when a change in allocation harms no one and helps at least one person, given an initial allocation of goods for a set of persons. The theory suggests that Pareto improvements will keep enhancing value to an economy until it achieves a Pareto equilibrium, where no more Pareto improvements can be made. Conversely, when an economy is at Pareto efficiency, any change to the allocation of resources will make at least one individual worse off. Pareto efficiency only deals in absolutes. An allocation of resources is either Pareto efficient or it isn't; there is no degree of efficiency when performing Pareto analysis.

Pareto Efficiency in Practice

In practice, it is almost impossible to take any social action, such as a change in economic policy, without making at least one person worse off, which is why other criteria of economic efficiency have found a wider use in economics. This includes:

- the **Buchanan unanimity criterion** under which a change is efficient if all members of society unanimously consent to it.
- the **Kaldor-Hicks efficiency** under which a change is efficient if the gains to the winners of any change in allocation outweigh the damage to the losers.
- the **Coase Theorem** which states that individuals can bargain over the gains and losses to reach an economically efficient outcome under competitive markets with no transaction cost.

These alternative criteria for economic efficiency all to some extent relax the strict requirements of pure Pareto efficiency in the pragmatic interest of real world policy and decision making.



Aside from applications in economics, the concept of Pareto improvements can be found in many scientific fields, where trade-offs are simulated and studied to determine the number and type of reallocation of resource variables necessary to achieve Pareto efficiency. In the business world, factory managers may run Pareto improvement trials, in which they

reallocate labor resources to try to boost the productivity of assembly workers without, for example, decreasing the productivity of the packing and shipping workers.

Pareto Efficiency and Market Failure

Market failure occurs when internal and external factors prevent an economy from reaching Pareto efficiency. It is aptly named because in these situations, the market has failed to allocates optimally or efficiently.

Consider an example of a free public good such as a public park. The provider of the park may not be able to exclude individuals who do not contribute tax dollars, donations, or volunteer hours to the park. Therefore, the public good creates an opportunity for individuals to "free ride".

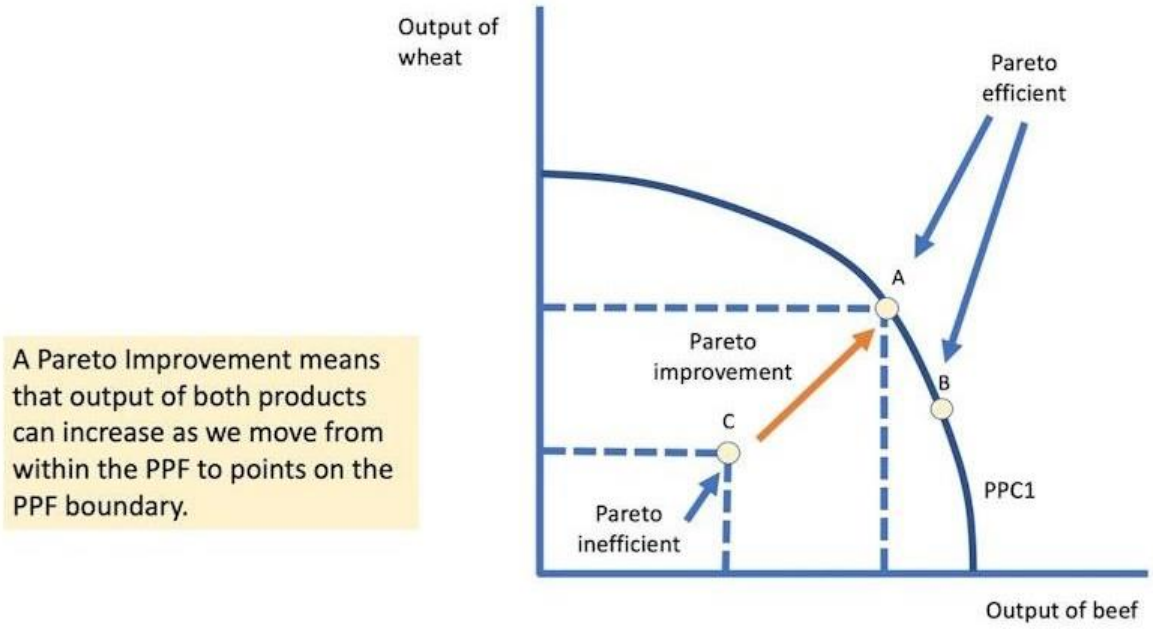
In addition, the consumption of the public good by one individual often does not compete or reduce the benefit consumed by another individual. Therefore, public goods are often market inefficient because an increase in one person's consumption often does not result in a decrease of value to other.

In another example, consider a monopoly where a single producer sets the market price. In this monopoly, the market price is often set higher than the marginal cost of the product. Because price and marginal cost are not the same, market efficient is not achieved and the optimal output is present. *If any resources are not utilized, Pareto efficiency has not been achieved as the market could have incurred additional units or benefit to some party.*

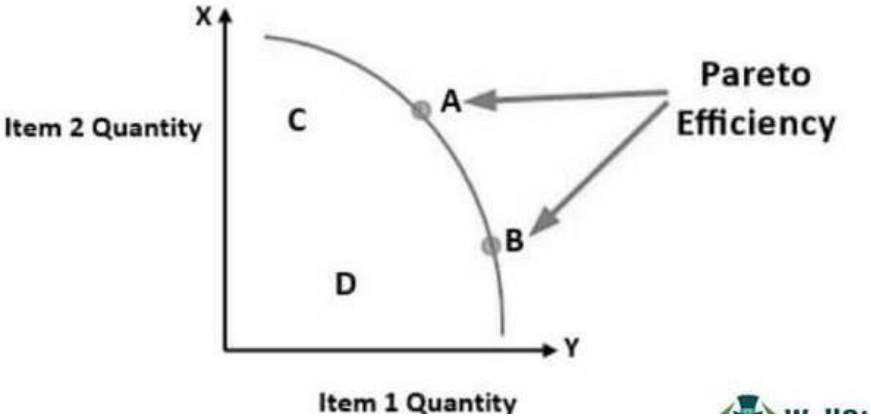
Pareto Efficiency and Production Possibility Frontier

Pareto efficiency can be graphically depicted to more easily demonstrate the production possibility frontier. The production possibility frontier is all of the possible combinations of resources that yield market efficiency. Combinations that do not reside on the production possibility frontier are inefficient because additional resources can be allocated.

The graph below demonstrates the visualization of the production possibility frontier in a fictional economy that can only produce beef and wheat.



The quantity of wine produced resides along the y-axis, and the quantity of cotton produced resides along the x-axis. The blue curve with a sold line represents the production possibility frontier where the maximum number of resources are being utilized. There are three different instances outlined in the graph above:



- **Point X:** Because X does not reside along the production possibility frontier, it is inefficient. The market has unspent resources it could be using to further produce either wine or cotton.
- **Points A, B, or C:** All three points reside on the production possibility frontier. All three combinations use the maximum amount of market resources; therefore, Pareto efficiency is achieved at any of the three points.
- **Point Y:** Because Y does not reside along the production possibility frontier, it is not efficient. This point exceeds the resources available in a market; the economy simply can't produce these quantities based on available resources. In order for Point Y to become Pareto efficient, the production possibility must shift outward by having expanded capabilities/resources

Measuring Welfare:

There are mainly two concepts for measuring welfare. The first relates to a Pareto improvement whereby social welfare increases when society as a whole is better off without making any individual worse off. This proposition also includes the case that when one or more persons are better off, some persons may be neither better off nor worse off. It is, thus, free from making interpersonal comparisons. Hicks, Kaldor and Scitovsky have explained social welfare in the Paretian sense in terms of 'the compensation principle'. In the second place, social welfare is increased, when the distribution of welfare is better in some sense. It makes some persons in society better off than others so that the distribution of welfare is more equitable. This is known as distributional improvement and relates to the Bergson social welfare function.

Dr. Graaf, however, refers to another concept which he calls the paternalist concept. A state or a paternalist authority maximises social welfare according to its own notion of welfare without any regard to the views of individuals in society. Economists do not make use of this concept to measure social welfare because it is related to a dictatorial regime and does not fit in a democratic set-up. Economic welfare, thus, implies social welfare which is concerned primarily with policy that leads either to a Pareto improvement or distributional improvement, or both.

Conclusion

Welfare economics seeks to achieve a state that will maximise the overall satisfaction for a society, maximising the producer and consumer surplus for the various markets comprised in the society. The literature on welfare economics has grown rapidly in recent years. The utilitarian's were the first to talk of welfare in terms of the formula, 'the greatest happiness of the greatest number'. Vilfredo Pareto considered the question of maximising social welfare on the basis of general optimum conditions.

Marshall and Pigou, the neo-classical economists, concentrated on particular sectors of the economic system in their postulates of welfare economics. It was Professor Robbins' ethical neutrality view about economics that led to the development of welfare economics as an important field of economic studies.
Kaldor, Hicks and Scitovsky have laid the foundations of the New Welfare Economics with the help of the 'compensation principle' avoiding all value judgements. On the other hand, Bargson, Samuelson and others have developed the concept of the Social Welfare Function without sacrificing value judgements. In the discussion that follows we shall refer to certain basic concepts of welfare economics and then pass on to Pareto's welfare conditions for an understanding of modern welfare economics.

Q. No. 10. Explain the Ricardian theory of rent.Answer:

Introduction:

David Ricardo, an English classical economist, first developed a theory in 1817 to explain the origin and nature of economic rent. Ricardo used the economic and rent to analyse a particular question. In the Napoleonic wars (18.05-1815) there were large rise in corn and land prices. Did the rise in land prices force up the price of corn, or did the high price of corn increase the demand for land and so push up land prices. Ricardo defined rent as, **"that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil."** In his theory, rent is nothing but the producer's surplus or differential gain, and it is found in land only.

Assumptions of the Theory:

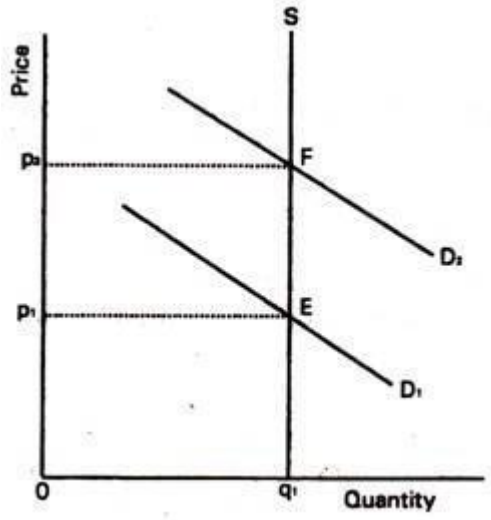
The Ricardian theory of rent is based on the following assumptions:
1. Rent of land arises due to the differences in the fertility or situation of the different plots of land. It arises owing to the original and indestructible powers of the soil.
2. Ricardo assumes the operation of the law of diminishing marginal returns in the case of cultivation of land. As the different plots of land differ in fertility, the produce from the inferior plots of land diminishes though the total cost of production in each plot of land is the same.
3. Ricardo looks at the supply of land from the standpoint of the society as a whole.
4. In the Ricardian theory it is assumed that land, being a gift of nature, has no supply price and no cost of production. So rent is not a part of cost, and being so it does not and cannot enter into cost and price. This means that from society's point of view the entire return from land is a surplus earning.

Reasons for Existence of Rent:

According to Ricardo rent arises for two main reasons:
(1) Scarcity of land as a factor and
(2) Differences in the fertility of the soil.

Scarcity Rent:

Ricardo assumed that land had only one use—to grow corn. This meant that its supply was fixed, as shown in Figure 13.1. Hence the price of land was totally determined by the demand for land. In other words, all the price of a factor of production in perfectly inelastic supply is economic rent—it has no transfer earnings.
Thus, it was the high price of corn which caused an increase in the demand for land and a rise in its price, rather than the price of land pushing up the price of corn. However, this analysis depends on the assumption that land has only one use. In the real world a particular piece of land can be put to many different uses. This means its supply for any one use is elastic, so that it has transfer earnings.



Differential Rent:

According to Ricardo, rent of land arises because the different plots of land have different degree of productive power; some lands are more fertile than others. So there are different grades of land. The difference between the produce of the superior lands and that of the inferior lands is rent—what is called differential rent. Let us illustrate the Ricardian concept of differential rent.

Differential Rent on account of differences in the fertility of soil:

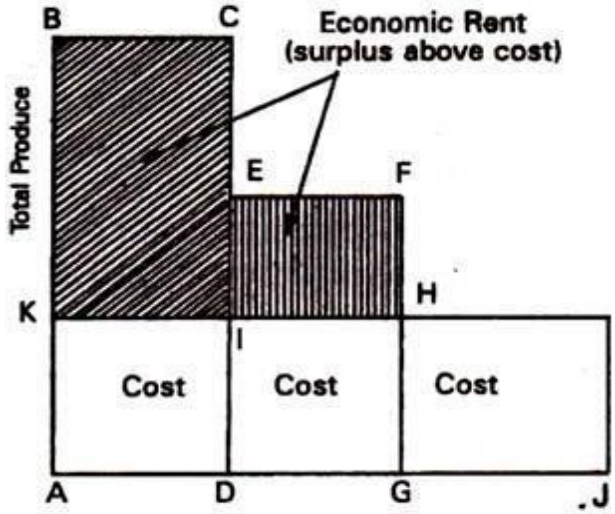
Ricardo assumes that the different grades of lands are cultivated gradually in descending order—the first grade land being cultivated at first, then the second grade, after that the third grade and so on. With the increase in population and with the consequent increase in the demand for agricultural produce, inferior grades of lands are cultivated, creating a surplus or rent for the superior grades. This is illustrated in Table.

Table: Calculation of Differential Rent

Grade of Land (the same size)	Total Produce and its Value	Cost of Production	Rent	Status of land
1st	40 kg×Rs. 5 = Rs. 200	Rs. 100	Rs. 100	Above-marginal Land
2nd	30 kg×Rs. 5 = Rs. 150	"	Rs. 50	"
3rd	20 kg×Rs. 5 = Rs. 100	"	Nil	Marginal (or No Rent) Land
4th	15 kg.×Rs. 5 = Rs. 75	"	Rs. –25	Below-marginal Land

Table shows the position of 3 different plots of land of equal size. The total cost is the same for each plot of land. Let us assume that the order of cultivation reaches the third stage when all the three plots of land of different grades are cultivated and the market price has come to the level of Rs. 5 per kg of wheat. The first grade land, being the most fertile, produces 40 kg, the second grade 70 kg and the third grade land, being less fertile, only 20 kg. So, the first grade land earns a surplus or rent of Rs. 100, the second grade a rent of Rs. 50 and the third one earns no surplus. The first two plots are called the intra-marginal and the third one is the marginal (or no-rent) land. This simple example shows how the differences in the fertility of the different plots of land create rent for the superior plots of lands. The concept of

differential rent arising due to differences in the fertility of different plots of land is illustrated in Figure.



Here, AD, DG and GJ are three separate plots of land of the same size, but of difference in fertility. The total produce of AD is ABCD, that of DG is DEFG and that of GJ is GHIJ. The first and second plots of land generate a surplus shows by the shaded area, which represents the rent of the first two plots of land. Since the third plot GJ has no surplus it is marginal land or no-rent land. Grade 4 (below-marginal) land will not be cultivated, because rent is negative (Rs. 25 in this example).

Rent and Price:

From the Ricardian theory we can show the relation between rent (of land) and price (of wheat). Since the market price of wheat is determined by costs of the marginal producer and since, for this marginal producer, rents are zero, Ricardo concluded that economic rent is not a determinant of market price. Rather, price of wheat is determined solely by the market demand for wheat and the availability of fertile land.

Deductions from the Theory:

If rent depends on price and on the superiority of rent-producing land over marginal land, we can deduce the following:

1. Improved methods of farming:

Improved methods of cultivation may lead to a fall in rent (demand remaining unchanged). It is because increased output on the superior grades of land will make the cultivation of inferior grades of land unnecessary.

2. Population growth:

Population growth is likely to lead to a rise in rent, since the increased demand for land will bring poor quality land into cultivation, thus lowering the output of marginal land. Thus, if the price of food increases, the rent of existing land will increase.

3. Improved transport facilities:

Improved transport facilities are likely to lead to a fall in rent. It is because the output of less fertile land of foreign countries may be able to compete more closely with the home produce. So there will be no need to cultivate inferior home areas. As a result the output of the marginal land rises and rent falls.

Thus, it is difficult to say whether or not rent increases with economic progress. However, rent is likely to fall with economic progress if population growth is unable to fully neutralise the effects of technological progress and improvement in transport facilities.

Criticisms of the Theory:

Ricardian theory has been criticised on the following grounds:

1. Ricardo considers land as fixed in supply. Of course, land is fixed in an absolute sense. But land has alternative uses. So the supply of land to a particular use is not fixed (inelastic). For example, the supply of wheat land is not absolutely fixed at any given time.
2. Ricardo's order of cultivation of lands is also not realistic. If the price of wheat falls the marginal land need not necessarily go out of cultivation first. Superior grades of land might cease to be cultivated if a fall in the price of its output causes such land being demanded for other purposes (e.g., for constructing houses).
3. The productivity of land does not depend entirely on fertility. It also depends on such factors as position, investment and effective use of capital.
4. Critics have pointed out that land does not possess any original and indestructible powers, as the fertility of land gradually diminishes, unless fertilisers are applied regularly.
5. Ricardo's assumption of no-rent land is unrealistic as, in reality; every plot of land earns some rent, although the amount may be small.
6. Ricardo restricted rent to land only, but modern economists have shown that rent arises in return to any factor of production, the supply of which is inelastic.
7. According to Ricardo, rent does not enter into price (cost) but from the point of view of an individual farm rent forms a part of cost and price.

Conclusion:

In spite of the various shortcomings of the Ricardian theory, it cannot be discarded—as Stonier and Hague remarked — "The concept of transfer earnings helps to bring the simple Ricardian theory of rent into closer relation with reality."