Unit 2 **Microeconomics**

2.1 Market and Revenue curve

2.1.1 concept of market : perfect competition and imperfect competition and its types .

(oligopoly, monopoly and monopolistic competition)

Concept of market

Market refers to interaction between buyers and sellers. There is no need of a special place for the existence of a market. Market activities may also be performed by the means of different communication media (such as post offices, telephones, telex, fax, internet and even E-mails). To perform these market activities, there must be commodity, price, buyers and sellers.

Classification of Market

Market may be classified into different parts on the basis of area, volume, time, govt. regulation (legality), competition etc. Among them, the classification of market on the basis of competition is most important one. If the market is classified on the basis on the basis of competition, it is called market structure. under this market structure there the market of perfect competition and imperfect competition (Monopoly, Duopoly, Oligopoly, Monopolistic competition etc.)

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The popular basis of classifying market structure rest on two crucial elements:

1. The number of firm producing a product, and

2. The nature of product produced by the firm. i.e, whether it is homogeneous or heterogeneous (differentiated).

The classification of market forms can be presented in table below.

Classification of Market form

Form of market structure	Number of firms	Nature of product	Entry, Exit condition	Demand curve facing by firms
1. perfect competition	Many Large no. Of firms	homogeneous	Free	Horizontal, perfectly elastic
2.Imperfect competition i-Monopolistic competition	,, ,,	Differentiated	,,	Downward sloping, relatively elastic
ii- pure Oligopoly (without product differentiation)	Few (more than 2 but not many	Homogeneous	Restricted	Downward sloping, relatively less elastic
iii- Differentiated Oligopoly	,,	Differentiated with close substitute	,,	,,
iv- Duopoly	Two	,, ,,	,, & Blocked	,,
Monopoly	One	Unique	,,	,,

Oligopoly

It is a form of market organization in which there are few sellers

(or firms) producing either homogeneous or differentiated product and large number of buyers. Firms have market power and there is high degree of rivalry among firms unless they make a collusive agreement. In America, steel, automobile, coal industries, In Nepal, The Airlines (domestic flight) and telephone service providing companies are the example of oligopoly business.

Characteristics (Features)

1. Small number of firms (sellers): -

The number of seller is few in this market. Each firm controls a large share of the market. So, it is able to make a noticeable effect on the market activities by changing his output.

2. Nature of the Product: -

Firms may produce homogeneous or heterogeneous product. The market at which firms are producing homogeneous product like gas, mineral water, cement, etc. is known as homogeneous (pure) oligopoly.

The market at which firms are producing heterogeneous products like noodles, biscuits, TV services is known as (differentiated) heterogeneous oligopoly.

3. Interdependence of Decision Making: -

The price – output decisions of the firms are interdependent. The change in price by any one firm will be re-acted by other firms. This knowledge is important in price – output decision.

4. Indeterminate Price: -

In this market price is indeterminate because reactions are difficult to guess. The firms may cooperate or fight till to death. Thus, the demand curve is also indeterminate.

5. Barriers to Entry: -

In an oligopolistic industry different types of barriers are arising by which entry of new firms may be blocked. They are:

a. Huge investment requirement. **b.** Economies of scale

c. Strong consumer's loyalty to the established firm's product based on quality and service.

d. Resistance by the established firms by price cutting.

e. patent right, **and.** **f.** Merger and take – over.

6. Imperfect Knowledge about Market: -

There is a market imperfection i.e, imperfect knowledge about market to both buyers and sellers.

Monopolistic Competition

Pure competition and pure monopoly are the two extreme cases which are rarely exist in the real life. So, there is need to bridge the gap between these two-extreme conditions of the market structure. In 1933, Edward H. Chamberlin presented a theory of monopolistic competition. This model explains a realistic approach of the actual market structure faced by most of the firms.

Monopolistic competition refers to the market structure in which there are many firms producing closely related but not identical product and there is no restriction on entry and exit of firms.

Characteristics (Features)

1. No. of Firms: -

There are large number of firms producing closely related goods but not identical. Each firm acts independently but produces small part of the total output.

2. Product Differentiation: -

Different firms produce variety of goods which can be used for the same purpose because they are slightly differentiated but close substitutes. Due to product differentiation, each firm has some degree of monopoly power.

Product differentiation is made by using superior quality of raw materials, providing supplementary services like facility of credit, home delivery, free repairing, free gift, lottery, warranty, etc.

3. Group: -

The concept of industry is replaced by the concept of group. Under monopolistic competition, the collection of firms producing closely substitutable products is called group.

4. Entry and exit of the firm:-

There is free entry and exit of firms in the group. So, there is no barriers to entry as in the monopoly.

5. Advertisement cost: -

Being a same quality product, there arises keen competition between different firms. So, they expense a lot of money for advertisement through different communication media to prove their products superior than others.

6. Cost and demand curve: -

Within the group, it is assumed that the cost and demand conditions of the firms are identical. It is often called the heroic assumption made by Chamberlin. He makes this assumption to show the equilibrium of the firm and the group on the same diagram.

7. The goal of the firm is profit maximization: -

2.1.2 Revenue Curves

The amount of receipt obtained by a firm from the sale of certain quantities of a commodity during a specific period of time at various prices is known as revenue.

Revenue function shows the functional relationship between output and revenue . i.e, R = f(Q)

Concept of Revenue

The concept of revenue can be explained by dividing into three parts: total revenue, average revenue and marginal revenue.

1. Total Revenue (TR)

The total amount earned by a firm by selling certain quantity of product at certain prices is called total revenue. It can be calculated in two ways:

i. By multiplying the total quantity sales with unit price.

i.e. TR = P x Q

ii. By adding the marginal revenues.

i.e. TR = ∑MR (MR_1 + MR_2 _ _ _ _ _ + MR_n)

E.g. If a firm sells 1000 units of a commodity at a price of Rs. 50 each, then its total revenue will be:

TR = PxQ or 50 x 1000 = 50,000

2. Average Revenue (AR)

The average revenue is the price per unit of output sold. It is calculated by dividing the TR by the total quantity sold.

i.e. AR = TR/Q.

Since, the total revenue consists of price multiplied by quantity. Then,

AR= $\frac{TR}{Q}$ **or AR=PxQ/Q . Therefore AR= P**

From above example TR= 50000 and Q= 1000 units

Then AR=50000/1000=50

Now the question is, whether AR is different from price or these two mean the same thing?

If a seller sales various unit of product at the same price then AR would be the same as price. But if he sales different units at different prices, then the AR would not be equal to price.

3. Marginal revenue

Marginal revenue is the additional revenue generated by selling an additional unit of output. In other word marginal revenue is the change in total revenue resulting from a unit change in the output.

i.e. MR= TR_{n+1}-TR_n

Similarly, marginal revenue is also calculated by dividing the change in total revenue by the change in output sold.

i.e. MR = ΔTR/ΔQ

E.g. if TR of first unit is Rs.50 and second unit is Rs.70. Then,

$MR_2 = TR_2 – TR_1$

Or 70 – 50 = 20

MR = $\frac{\Delta TR}{\Delta Q}$ or. $\frac{70-50}{2-1} = 20$

2.1.3 Derivation of TR, AR and MR Curves

The AR and MR curves can be derived from TR curve. But the process is different in perfect competition and imperfect competition. Because price remains constant under perfect competition on the other hand price must be reduces to sell more quantities under imperfect competition.

Derivation of Revenue Curves Under Perfect Competition

The demand curve of a firm under perfect competition is perfectly elastic. Price is beyond the control of a firm. So, AR remains constant. If different units are sold at same price, MR=P. Because the addition made by the sale of an additional unit is equal to price. It is presented in a table below.

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Qty.sold	Price	TR	AR	MR
1	20	20	20	20
2	20	40	20	20
3	20	60	20	20
4	20	80	20	20
5	20	100	20	20

In table price remains constant at Rs. 20 when more units are sold. Hence AR is also constant at Rs. 20. The TR goes on increasing as more and more units are sold. But increasing rate is constant. i.e. it increases by Rs. 20. So, the MR also remains constant at Rs. 20 (40-20=20).

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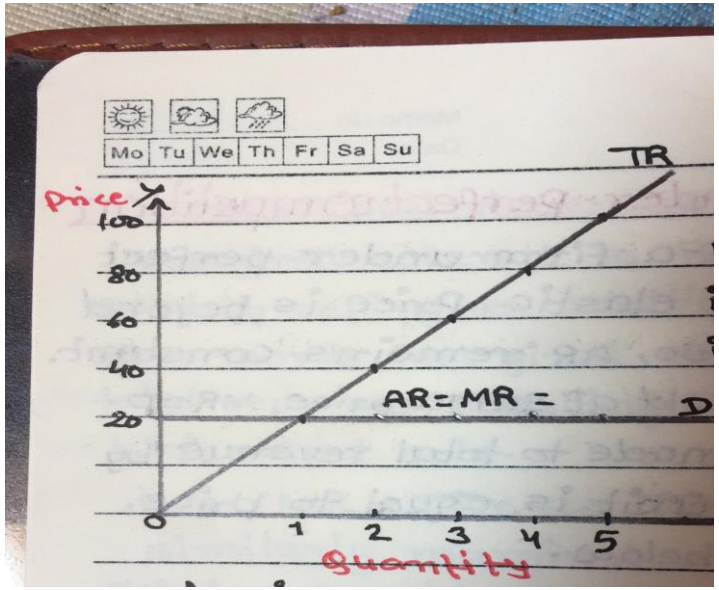
Since MR under perfect competition remains constant and is equal to AR, TR curve under this situation will be a straight line from the origin as shown in figure below.



In figure, TR curve starts from the point of origin showing TR is zero when quantity sold is nil. Rising upward curve shows that TR increases with increase in quantity sold. It is straight line because price is constant.

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AR curve is horizontal straight-line parallel to ox axis which shows that price remains constant at OP even if quantity sold increases. Since MR curve coincides with AR curve, MR and AR are equal.

Derivation of Revenue Curves Under Imperfect Competition

Monopoly is an extreme form of imperfect competition. Monopoly is a market structure in which there is a single seller producing a unique product which has no close substitute and entry of the other firms is blocked. Thus, under imperfect competition the firm has comparatively larger grip in the market share. So, it fixes price and can alter them. But if it wishes to sell more, it lowers price because the (demand curve) AR curve facing by a monopoly firm slopes downward. When AR curve slopes downward, MR curve also slopes downward but it lies below the AR curve. As long as TR is increasing, MR will be positive but it also becomes negative when TR declines. The TR curve goes on increasing, reaches its maximum and declines thereafter.

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Qty. sold	Price/AR	TR	MR
0	11	0	-
1	10	10	10
2	9	18	8
3	8	24	6
4	7	28	4
5	6	30	2
6	5	30	0
7	4	28	-2

Table shows that price decreases when more units are sold. Due to this both AR and MR decline. But the MR declines more rapidly than AR. The MR is zero when 6^{th} units are sold and becomes negative thereafter. TR is maximum when MR is zero and starts declining when MR becomes negative.

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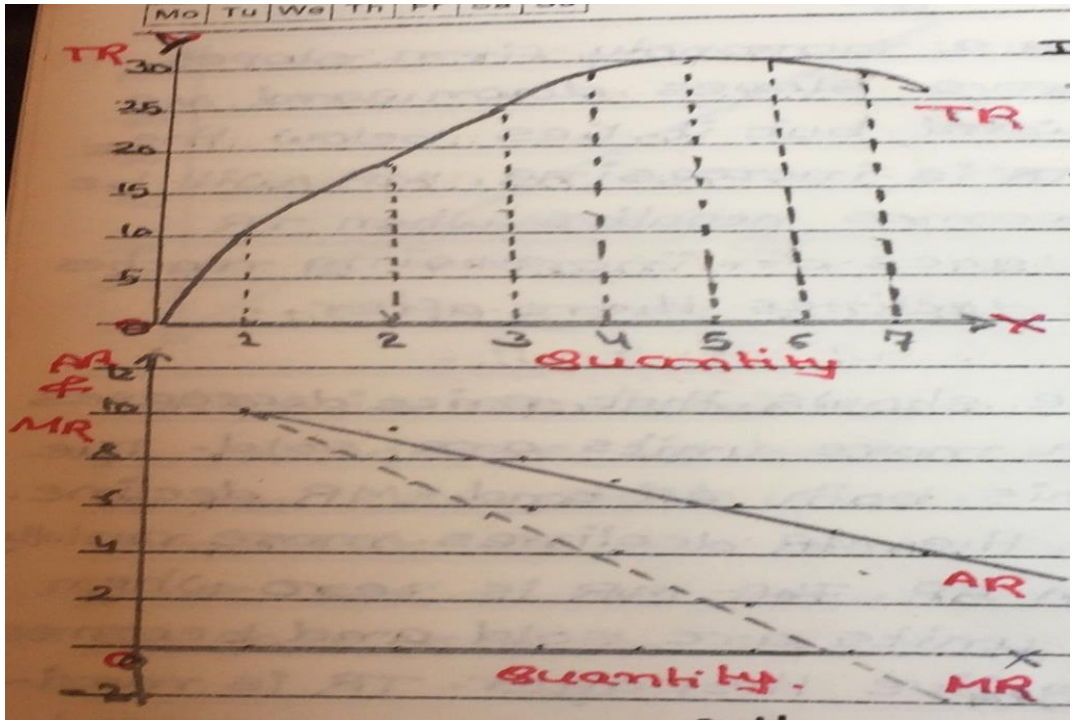
From above table we can draw the TR, AR and curve as follows:



In figure, TR is the total revenue curve which slopes upward in the beginning, reaches its maximum point and finally slopes downwards.

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In next figure, AR is the average revenue curve. It is downward sloping. Because in imperfect competition more quantity of the product could be sold by reducing its price. Hence MR curve lies below the AR curve. This means that MR falls more rapidly than AR. It will become zero when TR is maximum. When MR is positive, TR continue to rise but when MR becomes negative, TR starts to decline.

2.1.4 simple numerical examples

2.2 Cost Curves

Meaning of Cost & Cost Function

Cost refers to the factor price that must be paid for the use of various factors inputs. Cost takes a central position in business because the manager takes a production decision by comparing cost and benefit. Cost function is a derived function. It is derived from production function.

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The mathematical expression of the relationship between output and cost is called cost function and the diagrammatic representation is called cost curves.

Algebraically the cost function is written as:

$$C = f(Q) \text{ and, } f^{I} > 0$$

Generally, cost is the increasing function of output.

Main determinants of cost function are:

1. **Production function**
2. **Prices of factor inputs**
3. **Size of Production plant**
4. **State of technology, and**
5. **Managerial and administrative efficiency.**

2.2.1 Various Concepts of Cost:

- **1. Actual (Money) Cost and Opportunity Cost:-**
- **Actual cost are those which are actually incurred by the firm in payment for labor, raw materials, plant, building, machinery equipment, travelling and transport, advertisement, light, power, fuel, etc. The total money expenses, recorded in the book of account for practical purposes are known as the actual cost.**
- **The opportunity cost may be defined as the expected returns from the second best use of the resources fore-gone due to the scarcity of resources. It is also called the alternative cost. These costs are not recorded in a book of account, but they are useful for the purpose of decision making.**

2. Explicit Cost and Implicit Cost: -

- **The immediate and direct cash payment made by a firm for the use of various factors of production not owned by him are known as explicit cost. E.g- the payment made for wages and salaries, rent, raw materials, license fees, insurance premium, depreciation charge, interest on borrowed capital are the example of explicit cost. These cost involve direct cash payment and are recorded in normal accounting practices.**
- **On the other hand, implicit cost are certain other costs which do not take the form of cash payment nor appear in accounting system. It is defined as the earning expected from the second best alternative use of resources. For example, an entrepreneur could receive rent on his building and salary by working for some other firm. If he starts his own business on his building, he foregoes his salary and rent. These losses are the explicit cost of his own business.**

2.2.2 Concept of short-run cost:

Cost – output Relationship in Short – run

In the short run some of the factor inputs are fixed while other can be changed with the change in the level of output. Accordingly, in the short run, cost of the firm are also divided into fixed and variable cost. Together they make up the total cost of the firm.

1. Total Fixed Cost (TFC):-

Total fixed costs are associated with the fixed factors of production that cannot be altered within a short notice. This type of cost has to be incurred by the firm irrespective of the level of output. i.e. Fixed costs occur even if the firm is shut-down temporarily in the short-run.

TFC includes: interest on capital, insurance premium, property taxes, maintenance cost, administrative expenses , etc. which do not vary with the level of output. It is also called overhead cost.

2. Total Variable Cost (TVC)

Total variable cost are associated with the variable factors of production which can be altered in the short run with the variation in the variable factors of production. It is also called prime cost or direct cost.

It includes: expenses on raw materials, running expenses of fixed capital, the cost of direct labor, expenses on transport services, etc. They do not occur if firm is shut-down temporarily.

Differences between fixed cost and variable cost

Fixed Cost	Variable Cost
1. All types of costs incurred on fixed inputs. 2. Do not vary with the change in level of output. 3. They are always greater than zero. 4. A firm continue production even at the loss of fixed cost. 5. They are unavoidable.	1. All types of costs incurred on variable inputs. 2. They vary with the change in level of output. 3. When output is zero or production is closed, they will be zero. 4. A firm continue production only if there is loss of variable cost. 5. They are avoidable.

3. Total Cost (TC) :-

Short run total cost is aggregate of TFC and TVC

i.e. TC = TFC+TVC. The total cost is defined as the total actual cost that must be incurred to produce a certain amount of output. Therefore, the total cost directly varies with output.

It can be expressed as: TC = f(Q)

The curves representing different costs are called cost curves. It can be shown in terms of following table and figure as well.

Short-run costs of a firm

Output (Q)	TFC	TVC	TC
0	10	0	10
1	10	5	15
2	10	8	18
3	10	10	20
4	10	15	25
5	10	25	35
6	10	36	46

In the table the TFC is always constant and TVC rises first, then slowed down and again starts to rise. So happens with TC and it shifts parallel to TVC.

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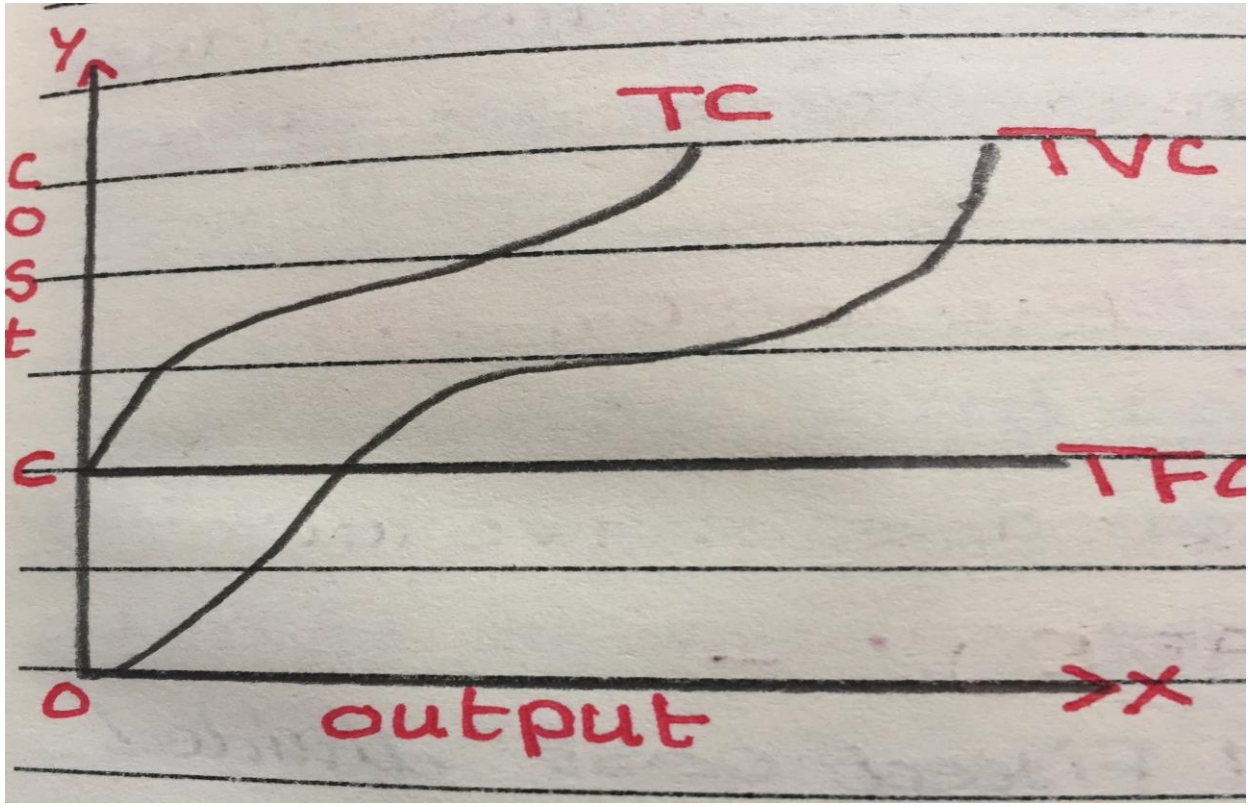

In figure, the TFC curve is horizontal straight-line parallel to ox-axis which shows that the fixed cost is fixed whatever be the level of output. The TFC curve starts from the point of C on oy-axis indicating that this much cost will have to be incurred even if the output is zero.

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The TVC curve starts from the point of origin indicating that no variable inputs will be employed when output is zero. It is upward sloping. This means that variable cost increases with increase in output.

The TC curve is the sum of TFC and TVC. So, the TC curve is also upward sloping having a same shape with TVC and the vertical distance between two is due to TFC which is always same because TFC is constant.

Derivation of short-run Average & Marginal Cost Curves

The derivation of short-run average and marginal cost curve can be explained by the help of following figure

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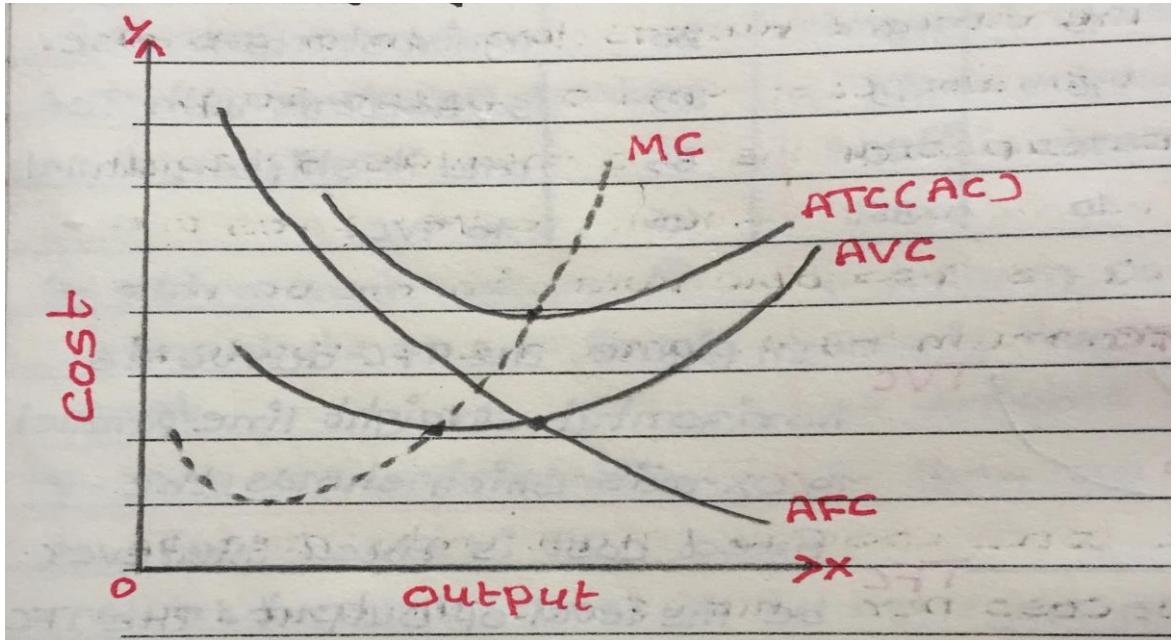


Average Fixed Cost (AFC)

AFC is defined as the total fixed cost divided by the quantity of output. In other words, it is the fixed cost per unit of output.

i.e. AFC = $\frac{TFC}{Q}$

Since TFC is a constant amount and output (Q) is a variable, the equation for AFC is that of a rectangular hyperbola. It is because as the output increases, the ratio of fixed cost to output decreases.

Average Variable Cost (AVC)

AVC is the variable cost per unit of output and could be obtained by dividing TVC by quantity of output. i.e. AVC=$\frac{TVC}{Q}$.

It exhibits a 'U' shape range showing that in the beginning as the producer goes on increasing the variable factor, its per unit variable cost goes on decreasing. After a normal capacity the AVC increases rapidly. The AVC curve in above figure represents average variable cost. It slopes downward in the beginning, reaches the minimum point and rises upward thereafter.

Average Total Cost (ATC)

The average total cost is in fact only average cost (AC). It is the cost per unit of output. It is obtained by dividing total cost by quantity of output. i.e. ATC(AC) = $\frac{TC}{Q}$

Average total cost can be split up into average fixed cost (AFC) and average variable cost (AVC)

Or ATC = AFC + AVC

In figure. ATC is the average total cost. In the beginning both AFC and AVC fall. So, ATC falls rapidly. But even after AVC starts rising upward, AFC continue to fall, due to support of AFC. ATC falls continuously. If production is further increased, AVC increases rapidly. Hence ATC also rises after a point. In this way ATC first falls, reaches its minimum point and rises there after showing almost 'U' shape range.

Marginal Cost (MC)

The MC is defined as the addition to the total cost caused by producing additional unit of output. In other words, it is the extra cost of producing one more unit of output.

Thus, MC=$\frac{\Delta TC}{\Delta Q}$

The MC is also obtained by subtracting the total cost of n^{th} unit of output from the total cost of $n+1^{th}$ unit of output..

i.e. MC= $TC_{n+1} - TC_n$ or $(TC_n - TC_{n-1})$

as shown in figure, the MC first falls, reaches its minimum point and increases there after showing 'U' shape range.

Reasons for the ‘U’ shape of SR-AC Curve

The short-run AC curve is always ‘U’ shaped due to following reasons:

1. Nature of AFC :-

The total fixed cost is a constant amount. The firm will have to be incurred this cost even if the output is zero. So, AFC continuously falls as the output rises. So, AFC continuously falls as the output rises. On account of this the average cost falls when output rises.

2. Nature of AVC :-

The AVC varies with quantity of output. In the beginning, the AVC declines when the output rises. But beyond normal capacity, it increases sharply. It is because more outputs can be produced only by increasing variable inputs which creates the problem of overcrowding and frequent break down of machine. Consequently, AVC curve rises upwards.

3. Economies of Scale:-

A.Marshall has divided economies of scale into two parts- internal and external.

The internal economies arise due to the expansion of the firm itself. Some internal economies that arise from inside the firm are:

Technical economies (division of labor, specialization of machinery).

Marketing economies (marketing cost does not vary with increase in sales up to certain limit i.e. economies on sales, transport and advertisement, etc.).

Managerial economies (single manager can supervise large production up to a certain limit.

External economies arise due to the expansion of industry as a whole from outside.

4. Indivisibilities:-

Some factors are indivisible in nature. The machine and manager cannot be cut into half to reduce output. So, when the output is increased, these factors are efficiently used.

Due to indivisibility, the AC first falls as the output is increased. But after normal capacity the average cost increases. Because if factors are used too much, there arises many problems and AC curve rises upward.

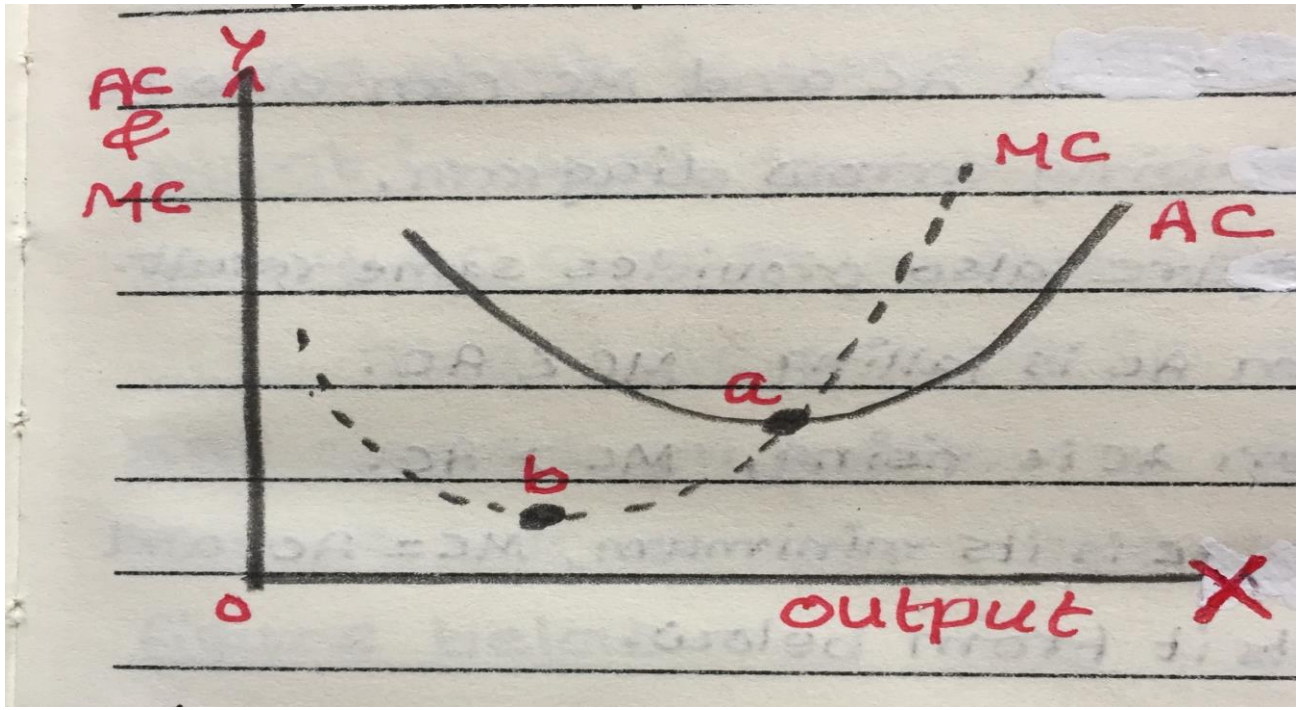
5. Law of variable proportion: -

If more variable factors are used with given fixed factor, initially the marginal product increases. But after a point it starts declining. Likewise, first the cost falls as the output is increased and after a point cost also increases with increase in output.

Relationship between AC and MC curve

The relationship between average and marginal cost curves hold special significance in economic analysis. On the basis of this relationship a firm decides the level of output.

The relationship between AC and MC can be explain with the help of following figure.



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From figure it is clear that so long as MC is below AC, average cost is declining. Which shows that so long as the new unit of output cost is less than the average cost, their production will pull the average cost down. Here MC pulls AC down.

When MC is above AC, average cost is rising. This indicates that if the new units of output cost is more than the average, their production will pull the average cost up.

When MC is equal to AC, average cost neither falling nor rising. MC cuts the AC curve at its lowest point.

In summary,

a) Both AC and MC are derived from same source (TC) and level of output (Q) with the difference that MC needs change in TC and Q.

b) Both are U shaped due to the law of variable proportions.

c) When AC falls, MC also falls but rapidly. Thus, to the left of minimum point of AC, AC is greater than MC.

d) When AC increases, MC also increases but rapidly. Thus, to the right of minimum point of AC, AC is less than MC.

e) MC always cuts AC at its minimum point. At minimum point of AC, AC = MC.

Long-Run Costs: Cost-output relationship in Long Run

Long run is period of time in which the firm can alter its plant size and scale of operation to meet changed demand condition. Its cost function can be adjusted by changing machine, building, management, etc. So, all costs become variable in the long run.

Since there are no fixed factors and fixed costs in the long run, we need to examine only long run average and marginal cost curves.

Derivation of LAC Curves

In the short run, the firm is tied up with a given plant. But in long run film can change plant size. Large plant is used to produce more and small plant is used to produce less. So, there may be many AC curves in the LR. The firm produces at lowest average cost in LR than in the short run.

The LAC curve is derived with the help of SAC curves. In order to show the derivation of LAC curve, let us consider 3 SAC curves as shown in following figure.

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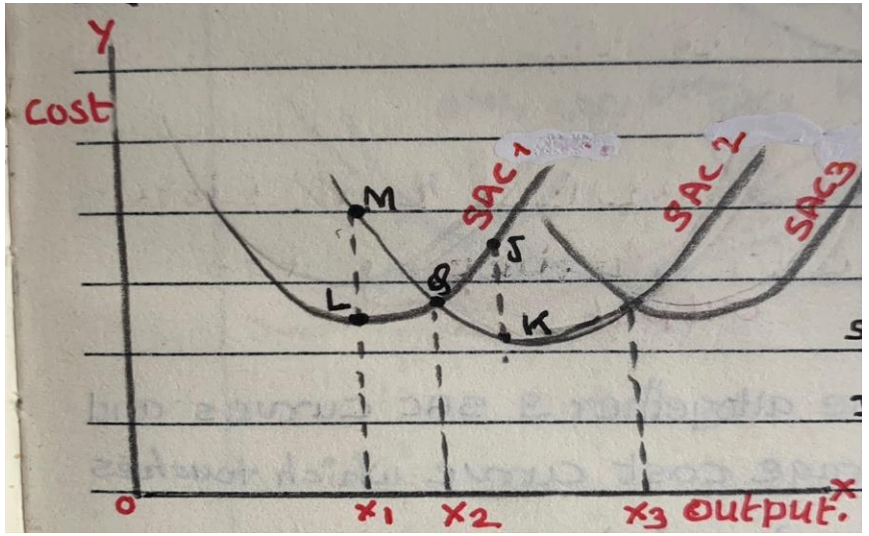

Suppose there are 3 plants, small, medium and large representing different production capacity denoted by SAC_1, SAC_2, SAC_3.

If a firm starts with small plant SAC1 and the demand for its product increases, it can produce up to $0x_1$ units at lower cost. After this the cost increases. If demand reaches $0x_2$, the firm can either continue his production with small plants or install medium plant (SAC_2). If demand exceeds OX_2, the firm installs medium plant. Because the output more than OX_2 can be produced at lower cost by medium plant than by small pant. Similarly, if demand exceeds $0x_3$, the firm installs large plant to produce required output at lower cost.

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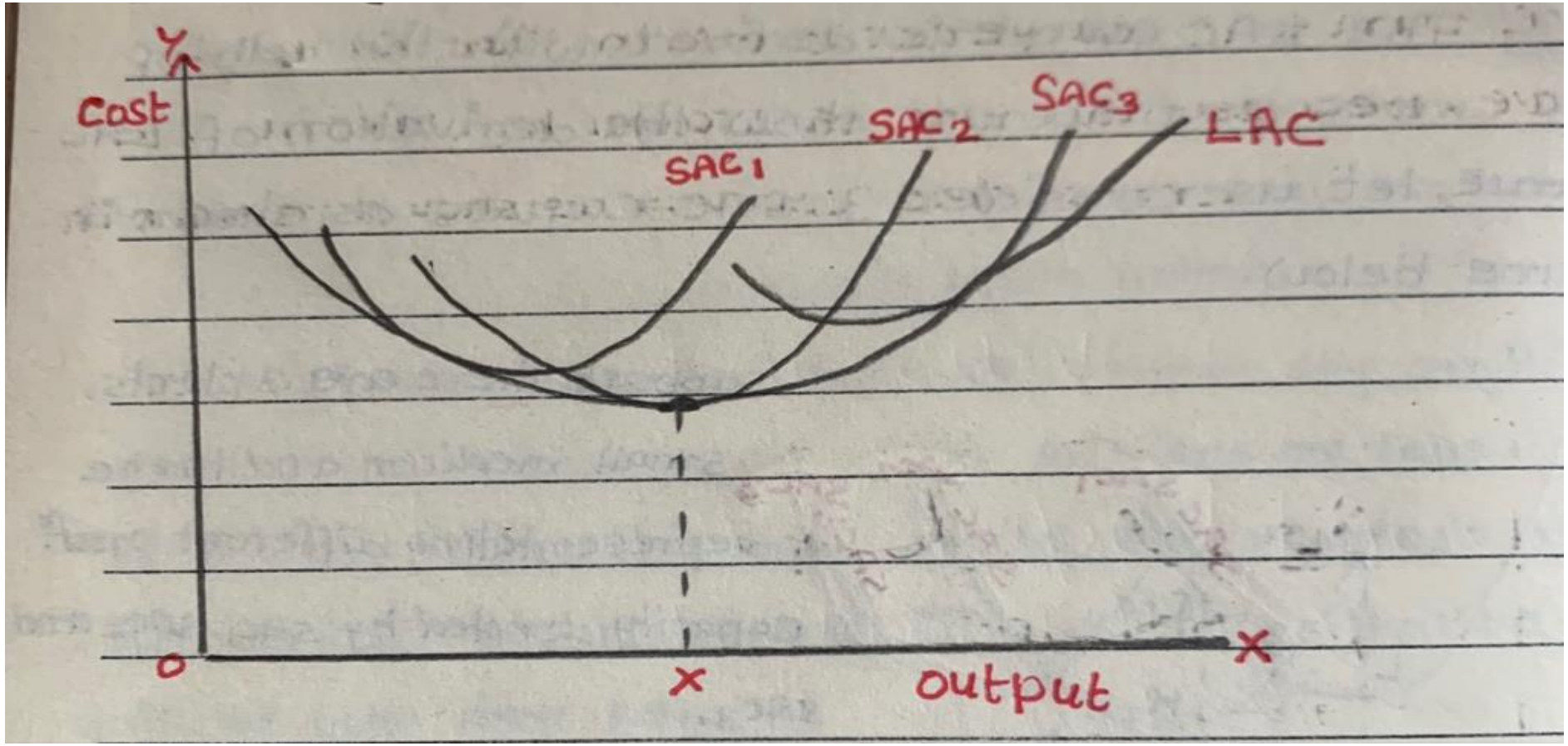
We could draw a number of SAC curves indicating separate capacity of plant that a firm would face in the long run. If we draw a tangent line joining all the SAC curves, we get a curve which is the long run average cost curve of the firm. It can be shown in figure below.



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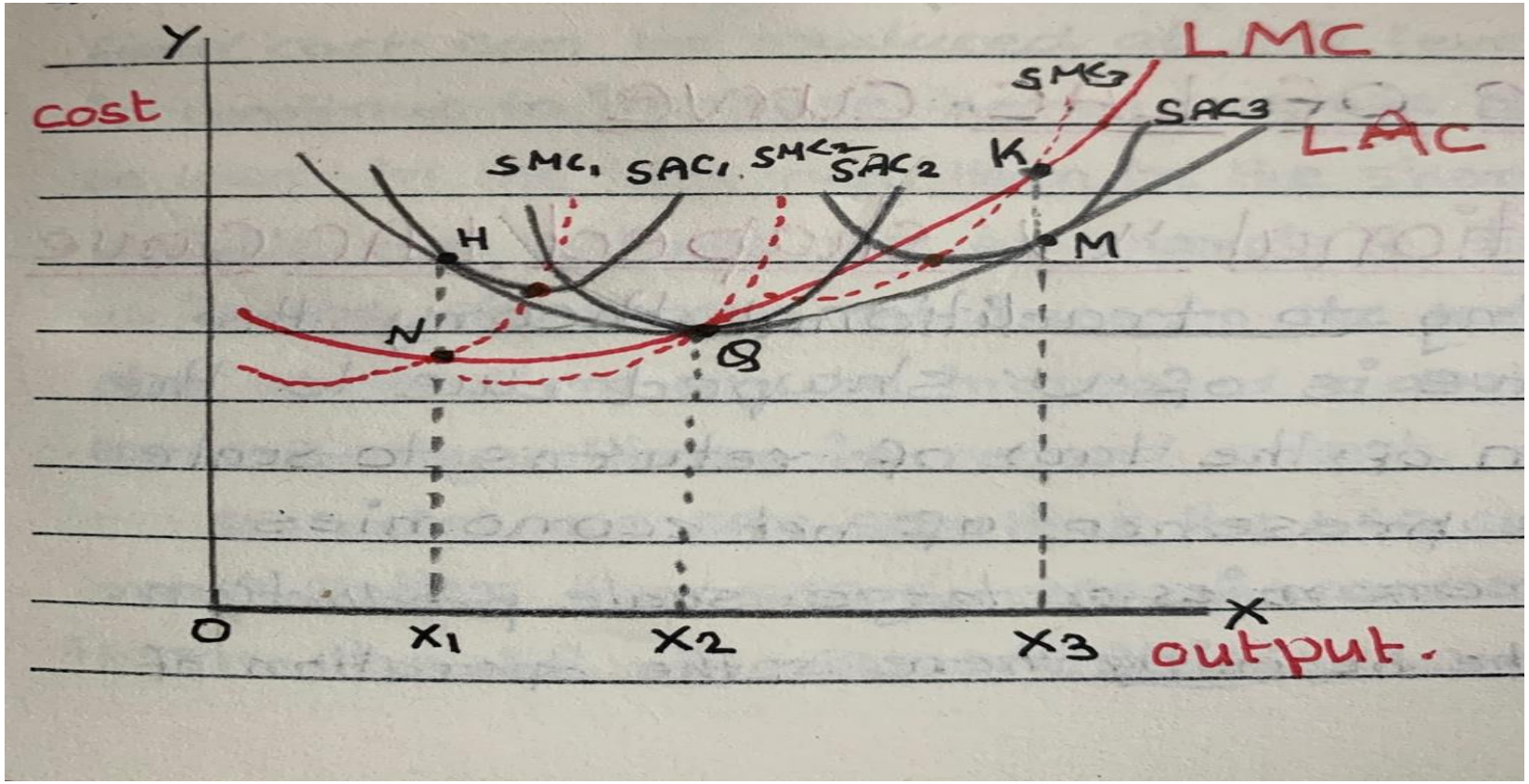
In above figure there are altogether 3 SAC curve and LAC is the long run average cost curves which touches all SAC curves at different points.

In the long run, the firm will produce at SAC_2 where average cost is minimum. Moreover, if LAC is of 'U' shape, it touches only one SAC curve at lowest point which is SAC_2 in figure.

The LAC curve is often called the envelope curve as it envelopes (covers) all the SAC curves. It is also called the planning curve, since it shows the cost-output ratio which helps the firm to make a plan. Tangent curve, Decision making curve, etc.

Derivation of LMC Curve

Like the derivation of LAC curve, the LMC curve is also derived with the help of SMC curves. But the shape of LMC curve is different from that of LAC curve. Because the LMC curve is drawn by joining the points of different SMC curves as shown in figure below.



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As shown in figure, if $0x_1$ output is to be produced in LR, it will be produced at point H. Because at that point LAC is tangent with SAC_1. Point "N" lies on SMC_1. So, in the long run marginal cost is equal to NX_1.

If output OX_2 is to be produced in LR, it will be produced at point "Q" which is the tangency point of SAC_2 and LAC. Point "Q" is also the point of SMC_2 and LMC corresponding to output OX_2.

Similarly, if output OX_3 is to be produced in the LR, it will be produced at point "M". Point "K" lies on SMC_3. So long run marginal cost of OX_3 output is KX_3.

Now if we draw a line by connecting points "N", "Q" and "K", we get a curve which is the long run marginal cost curve.

2.2.3 Simple Numerical examples

2.3 Theory of Price and output Determination

2.3.1 Meaning and Features of Perfect Competition

Perfect competition is a market characterized by large number of firms (sellers) producing homogeneous product and there is free entry and exit of firms.

A controversial statement for the perfect competition is presented as:

“ Perfect competition is a market structure under which there is complete absence of rivalry among existing firms. “ – A. Koutsoyiannis.

This statement is absolutely true in the sense that there is no any competition relating to product pricing. Because, the maximum output which an individual firm can produce is relatively very small to the total supply of the industry. So, a firm cannot affect the price by varying its output. With many firms and product homogeneity, no individual firm is in a position to influence the price of the product. Hence, firms are considered as a price taker. The demand curve facing by a firm will be a horizontal straight line which is just equal to AR and MR.

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According to Prof.Bilas – "Perfect competition is characterized by the presence of many firms; they sell identical product at the same price. That means the firms are considered as a price taker."

Prof. Ferguson – "Perfect competition describes a market in which there is complete absence of direct competition among different economic agents."

Conditions Necessary for Perfect Competition

Following conditions are to be fulfilled for a perfect competition. These conditions are also called features or characteristics of perfect competition.

1. Large number of buyers and sellers:

The numbers of buyers and sellers is so large that no individual buyer and seller can influence the market price and output quantity by his independent action. Every buyer and sells buys and sells significant quantity of the total output. Thus, individual firms are considered as a price taker.

2. Homogeneous Product:

Product homogeneity is another feature of perfect competition. Each firm within an industry produces identical product so that consumers have no preference of a particular firm's product.

3. Free entry and exit:

Every firm is free to join or leave the industry. If the industry is earning abnormal profit, new firms can enter to share that profit. If existing firms bear loss, they are free to leave the industry.

4. Perfect knowledge of market condition:

All buyers, sellers and factor owners have full knowledge about the market price at which transaction takes place in the market. So, no one individually can charge high price. Thus, in a perfectly competitive market no one is cheated.

5. Perfect mobility of factors:

All the resource owners are perfectly mobile between different firms. So, the resource owners like landlords, laborers and capitalists can employ their resources in the firms giving them the highest price for their services. This ensures that all the firms have identical cost condition.

6 . No Government Intervention:

The government does not interfere the process of production, demand and distribution of the firms by imposing higher tax or providing subsidies.

Beside these, it is also assumed that there is the absence of transportation cost. The objective of the firm is to maximize profit and that of consumer is to maximize utility.

Equilibrium price and output determination