ADITYA ENGINEERING COLLEGE (A)

Managerial Economics and Financial Analysis

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Course Outcomes

At the end of the Course, Student will be able to:

CO 1 :Explain the Managerial Economic concepts for decision making and forward planning

CO 2 : Illustrate the law of demand and its exceptions by using different forecasting methods.

CO 3 : Identify the cost behavior for managerial decision making and Break Even Point (BEP) of an enterprise

Course Outcomes

CO 4 : Classify the different types of business organizations along with basic knowledge on business cycle.

CO 5 : Make use of the process & principles of accounting for the preparation of final accounts

CO 6 : Utilize various techniques on investment project proposals with the help of capital budgeting techniques for decision making

Course Objectives

COB3 : To impart the knowledge on production theories, its factors and cost analysis.

Course Contents

- UNIT I : **Introduction to Managerial Economics and demand Analysis**
- UNIT II : **Production and Cost Analyses**
- UNIT III: **Introduction to Markets, Pricing Policies & Types of Business Organization and Business Cycles**
- UNIT IV: **Introduction to Accounting & Financing Analysis**
- UNIT V : **Capital and Capital Budgeting**

Text Books

- Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011.
- Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011.
- Prof. J.V. Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

LEARNING OUTCOME

At the end of the This lecture , Student will be able to:

LO 1 : Identify the cost behavior for managerial decision making and Break Even Point (BEP) of an enterprise.

CONTENTS

1.Concept of Production function.

2.Cobb-Douglas Production function

3.Law of Variable proportions

4.Isoquants and Isocosts

5.choice of least cost factor combination

6.Concepts of Returns to scale and Economies of scale

7.Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs

8.Cost –Volume-Profit analysis-Determination of Breakeven Point (simple problems)

9.Managerial significance and limitations of Breakeven point.

The Production Function

Michael R Baye defines production functions as "that function which defines maximum amount of output that can be produced with a given set of inputs".

- The Production functions is more concerned with physical aspects of production. It is the concerned of the engineer rather than that of the manager to know how much can be the production with a given set of inputs.
- Production function is an engineering relation that expresses that maximum amount of output that can be produced with a given set of inputs.

INPUT OUTPUT RELATIONSHIP OR PRODUCTION FUNCTION

The inputs for any product or service are land, labour, capital, Organization and technology.

In other words the production here is the function of these five variable in puts. Mathematically this is expressed as

$$Q = f(L_1, L_2, C, O, T)$$

Q = quantity of production

F explains the function that is the type of relation between inputs and outputs

Assumptions of Production function

1.The production function is related to a particular period of time.

2. There is no change in technology.

3. The producer is using the best techniques available.

4. The factors of production are divisible.

5. Production function can be fitted to a short run or to long run

- LAW OF PRODUCTION:
- Production analysis in economic theory considers two types of input-output relationships.
- 1. When quantities of certain inputs, are fixed and others are variable and
- 2. When all inputs are variable.

Production function with one variable input and law of returns

The law of returns states that when at least one factor of production is fixed are factor input is fixed and when all other factors are varied that total output in in the initial stages will increase at an increasing rate and ofter reaching certain level of output the total output will increase at declining rate.

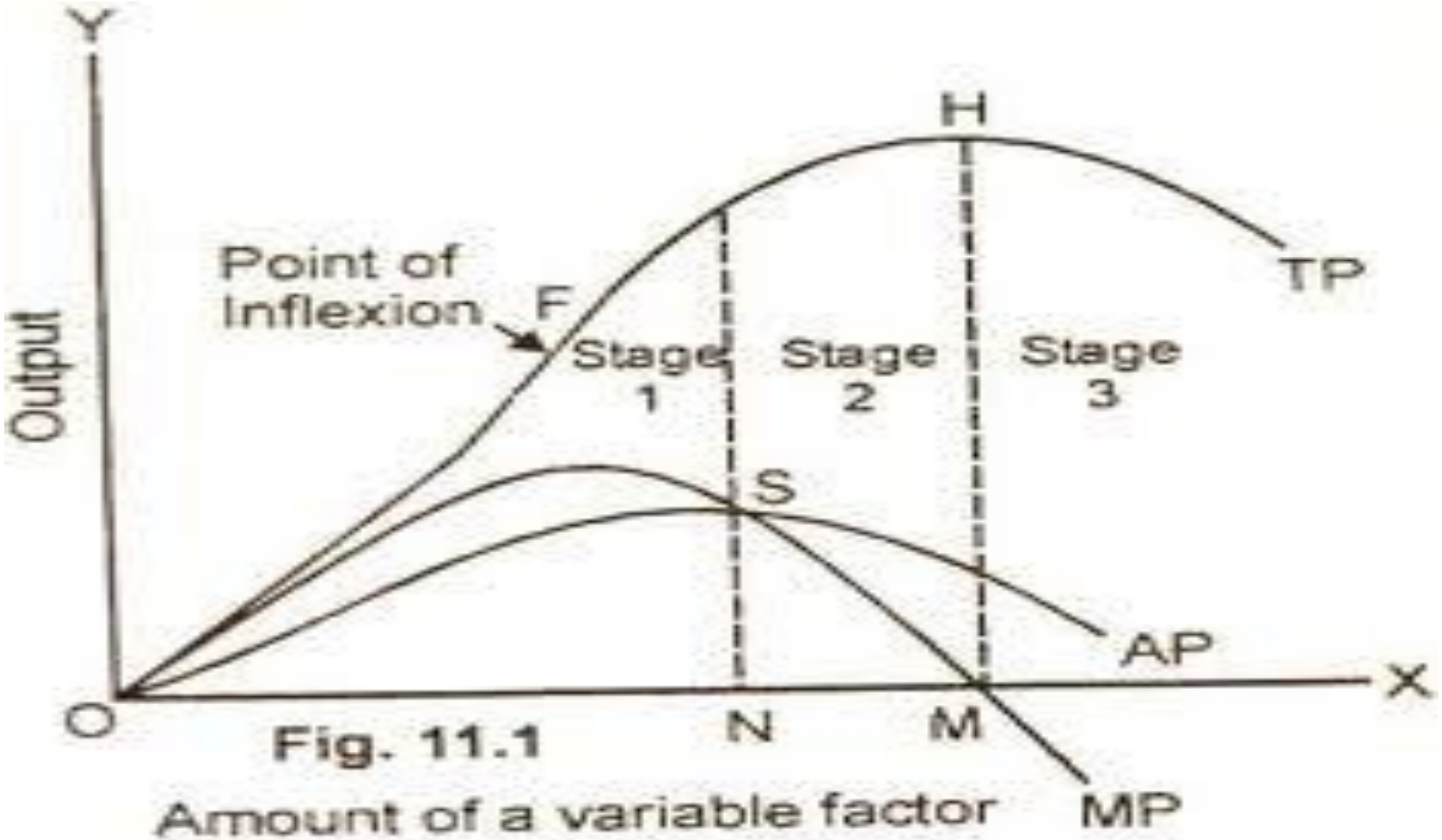

Y
Output
H
Point of
Inflexion
F
TP
Stage
1
Stage
2
Stage
3
S
AP
X
O
N
M
MP
Amount of a variable factor

Fig. 11.1

Units of labour	Total product (TP)	Marginal product (MP)	Average product (AP)	Stages
0	0	0	0	Stage 1
1	10	10	10	
2	22	12	11	
3	33	11	11	Stage 2
4	40	7	10	
5	45	5	9	
6	48	3	8	
7	48	0	6.85	Stage 3
8	45	-3	5.62	

- Assumptions of the Law: The law is based upon the following assumptions:
- i) The state of technology remains constant. If there is any improvement in technology, the average and marginal output will not decrease but increase.
- ii) Only one factor of input is made variable and other factors are kept constant. This law does not apply to those cases where the factors must be used in rigidly fixed proportions.
- iii) All units of the variable factors are homogenous.

- ISOQUANTS:
- The term Isoquants is derived from the words „iso‟ and „quant‟ – „Iso‟ means equal and „quant‟ implies quantity. Isoquant therefore, means equal quantity.
- Isoquants are the curves, which represent the different combinations of inputs producing a particular quantity of output. Any combination on the Isoquant represents the same level of output.

- For a given output level firm's production become,
- Q= f (L, K) Where
- Q, is the units of output is a function of the quantity of two inputs L and k. Thus an Iso quant shows all possible combinations of two inputs, which are capable of producing equal or a given level of output. Since each combination yields same output, the producer becomes indifferent towards these combinations.

- Assumptions:
- 1. There are only two factors of production, viz. labour and capital.
- 2. The two factors can substitute each other up to certain limit
- 3. The shape of the Iso quant depends upon the extent of substitutability of the two inputs.
- 4. The technology is given over a period.

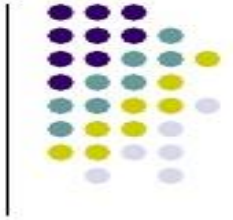
Isoquants

An Isoquant may be explained with the help of an arithmetical example.

Combinations	Labour (units)	Capital (Units)	Output (quintals)
A	1	10	50
B	2	7	50
C	3	4	50
D	4	4	50
E	5	1	50

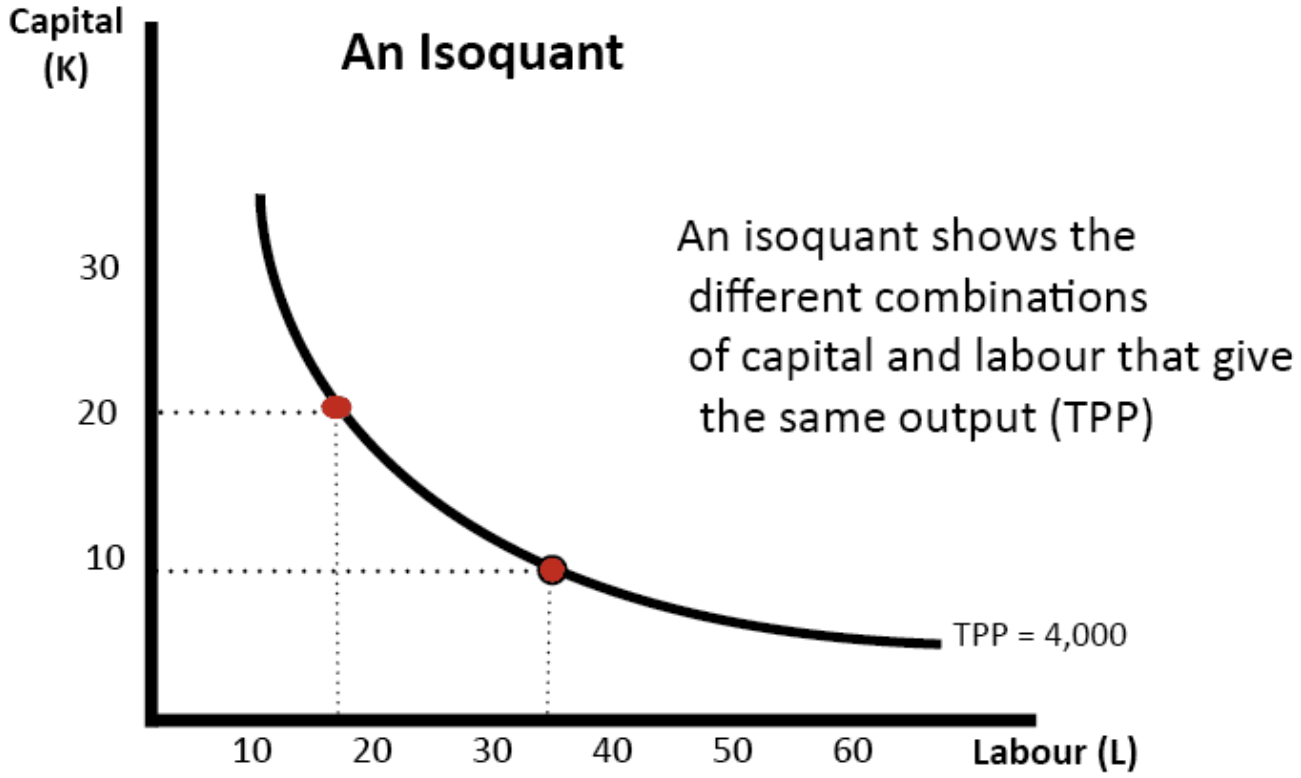
- Labour is on the X-axis and capital is on the Y-axis. IQ is the ISO-Product curve which shows all the alternative combinations A, B, C, D, E which can produce 50 quintals of a product. An isoquant (equal quantity) is a curve that shows the combinations of certain inputs such as Labor (L) and Capital (K) that will produce a certain output Q. Mathematically, the data that an isoquant projects is expressed by the equation
- $Q = f(K,L)$

Characteristics or Properties of Isoquants



- Isoquants are negatively sloped.
- A higher represents a larger output.
- No two isoquants intersect or touch each other.
- Isoquants are convex to the origin.

ISO QUANTS


Capital
(K)
An Isoquant
30
20
10
An isoquant shows the
different combinations
of capital and labour that give
the same output (TPP)
TPP = 4,000
10
20
30
40
50
60
Labour (L)

Marginal Rate of technical Substitution

MRTS is defined as the units of one input factor that can be substituted for a single unit of the other input factor.

- The MRTS tells us how much of one input a firm can sacrifice while still maintaining a certain output level.
- MRTS (L for K)= -dK/dL = MPL/MPK
  For Example: When going from point B to A in Figure 9.1, the Slope = (8 units of Capital)/(-6 units of Labor). The MRTS (L for K) = -(8/-6) = 4/3 between points B and A, which means that 4 units of Capital can substitute for 3 units of labor.

Iso cost

- Example: A company producing widgets encounters the following costs- cost of capital is $25000, labor cost is $15000, and the total cost the firm is willing to pay is $150,000.

ISOCOSTS: An isocost line (equal-cost line) is a Total Cost of production line that recognizes all combinations of two resources that a firm can use, given the Total Cost (TC). Moving up or down the line shows the rate at which one input could be substituted for another in the input market. For the case of Labor and Capital, the total cost of production would take on the form: TC = (WL) + (RK) TC= Total Cost, W= Wage, L= Labor, R= Cost of Capital, K= Capital

- Least Cost Combination of Inputs

A given level of output can be produced using many different combinations of two variable inputs. In choosing between the two resources, the saving in the resource replaced must be greater than the cost of resource added. The principle of least cost combination states that if two input factors are considered for a given output then the least cost combination will have inverse price ratio which is equal to their marginal rate of substitution.

- Producer‟s Equilibrium:
- The tem producer‟s equilibrium is the counter part of consumer‟s equilibrium. Just as the consumer is in equilibrium when be secures maximum satisfaction, in the same manner, the producer is in equilibrium when he secures maximum output, with the least cost combination of factors of production. The optimum position of the producer can be found with the help of iso-product curve. The Isoproduct curve or equal product curve or production indifference curve shows different combinations of two factors of production, which yield the same output. This is illustrated as follows. Let us suppose. The producer can produces the given output of paddy say 100 quintals by employing any one of the following alternative combinations of the two factors labour and capital computation of least cost combination of two inputs.

Labour	Capital	Out put	Labour cost	Cost of capital	Total cost
10	45	100	30	180	210
20	25	100	60	112	172
30	16	100	90	64	154
40	12	100	120	48	168
50	8	100	150	32	182

COBB-DOUGLAS PRODUCTION FUNCTION

Cobb and Douglas put forth a production function relating output in American Manufacturing Industries from 1899 to 1922 to labour and Capital inputs. They used the following formula:

$$P = bL^{a} C^{1-a}$$

The Exponents a and 1-a are the elasticities of production. These measure the percentage response of output to the percentage changes in labour and capital respectively.

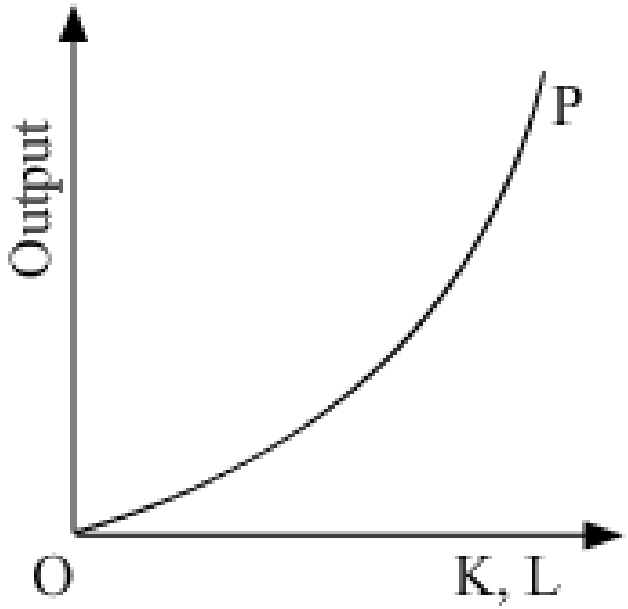
$$P = 1.01L^{0.75}C^{0.25}$$

- Law of Returns of Scale:

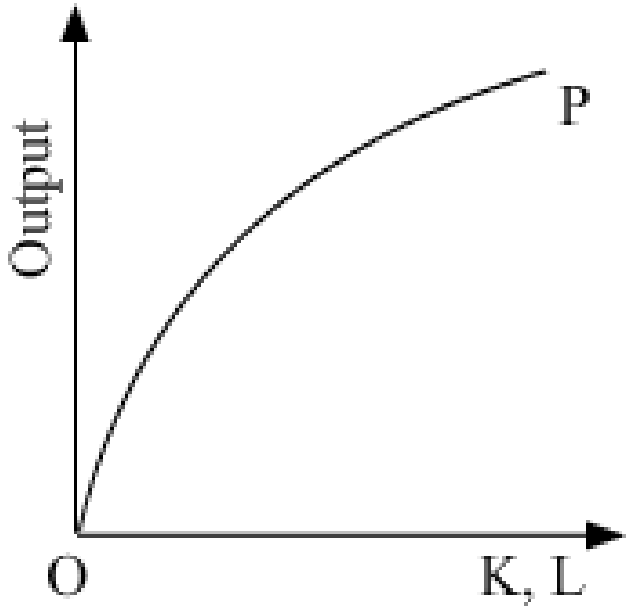
- The law of returns to scale explains the behavior of the total output in response to change in the scale of the firm, i.e., in response to a simultaneous and proportional increase in all the inputs. More precisely, the Law of returns to scale explains how a simultaneous and proportionate increase in all the inputs affects the total output at its various levels.

- Types of returns to scale.

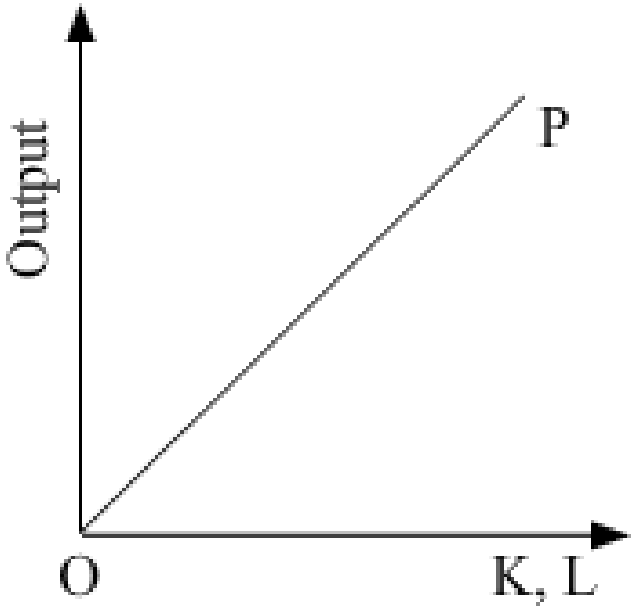
- Increasing returns to scale
- Constant returns to scale
- Decreasing returns scale



(a) Increasing Returns to Scale



(b) Decreasing Returns to Scale



(c) Constant Returns to Scale

- Increasing returns to scale:

- If increase in the output is greater than proportional increase in the inputs, it means increasing returns to scale.

- Constant returns to scale:

If increase in the total output is proportional to the increase in input, it means constant returns to scale.

- Decreasing returns to scale:

- If increase in the output is less than proportional increase in the inputs, it means diminishing returns to scale.

Economies of scale:

Production may be carried on a small scale or o a large scale by a firm. When a firm expands its size of production by increasing all the factors, it secures certain advantages known as economies of production. Marshall has classified these economies of large-scale production into

1. Internal economies and
2. External economies.

- Internal economies:

are those, which are opened to a single factory or a single firm independently of the action of other firms. They result from an increase in the scale of output of a firm and cannot be achieved unless output increases. Hence internal economies depend solely upon the size of the firm and are different for different firms.

- External economies:

are those benefits, which are shared in by a number of firms or industries when the scale of production in an industry or groups of industries increases. Hence external economies benefit all firms within the industry as the size of the industry expands.

- Causes of internal economies:

  Internal economies are generally caused by two factors

- 1. Indivisibilities
- 2. Specialization.

- INTERNAL ECONOMIES: Internal economies may be of the following types.
- Technical Economies: Technical economies arise to a firm from the use of better machines and superior techniques of production. As a result, production increases and per unit cost of production falls. A large firm, which employs costly and superior plant and equipment, enjoys a technical superiority over a small firm. Another technical economy lies in the mechanical advantage of using large machines. The cost of operating large machines is less than that of operating mall machine. More over a larger firm is able to reduce it‟s per unit cost of production by linking the various processes of production. Technical economies may also be associated when the large firm is able to utilize all its waste materials for the development of by-products industry. Scope for specialization is also available in a large firm. This increases the productive capacity of the firm and reduces the unit cost of production.

- Managerial Economies:

These economies arise due to better and more elaborate management, which only the large size firms can afford. There may be a separate head for manufacturing, assembling, packing, marketing, general administration etc. Each department is under the charge of an expert. Hence the appointment of experts, division of administration into several departments, functional specialization and scientific co-ordination of various works make the management of the firm most efficient.

- Marketing Economies:

The large firm reaps marketing or commercial economies in buying its requirements and in selling its final products. The large firm generally has a separate marketing department. It can buy and sell on behalf of the firm, when the market trends are more favorable. In the matter of buying they could enjoy advantages like preferential treatment, transport concessions, cheap credit, prompt delivery and fine relation with dealers. Similarly it sells its products more effectively for a higher margin of profit

- Financial Economies:

The large firm is able to secure the necessary finances either for block capital purposes or for working capital needs more easily and cheaply. It can barrow from the public, banks and other financial institutions at relatively cheaper rates. It is in this way that a large firm reaps financial economies

- Risk bearing Economies:

The large firm produces many commodities and serves wider areas. It is, therefore, able to absorb any shock for its existence. For example, during business depression, the prices fall for every firm. There is also a possibility for market fluctuations in a particular product of the firm. Under such circumstances the risk-bearing economies or survival economies help the bigger firm to survive business crisis.

- Economies of Research:

A large firm possesses larger resources and can establish it‟s own research laboratory and employ trained research workers. The firm may even invent new production techniques for increasing its output and reducing cost

- Economies of welfare:

A large firm can provide better working conditions in-and out-side the factory. Facilities like subsidized canteens, crèches for the infants, recreation room, cheap houses, educational and medical facilities tend to increase the productive efficiency of the workers, which helps in raising production and reducing costs.

- EXTERNAL ECONOMIES:

Business firm enjoys a number of external economies, which are discussed below:

- Economies of Concentration:

When an industry is concentrated in a particular area, all the member firms reap some common economies like skilled labour, improved means of transport and communications, banking and financial services, supply of power and benefits from subsidiaries. All these facilities tend to lower the unit cost of production of all the firms in the industry.

- Economies of Information:

The industry can set up an information centre which may publish a journal and pass on information regarding the availability of raw materials, modern machines, export potentialities and provide other information needed by the firms. It will benefit all firms and reduction in their costs

- Economies of Welfare:

An industry is in a better position to provide welfare facilities to the workers. It may get land at concessional rates and procure special facilities from the local bodies for setting up housing colonies for the workers. It may also establish public health care units, educational institutions both general and technical so that a continuous supply of skilled labour is available to the industry. This will help the efficiency of the workers.

- Economies of Disintegration:

The firms in an industry may also reap the economies of specialization. When an industry expands, it becomes possible to spilt up some of the processes which are taken over by specialist firms. For example, in the cotton textile industry, some firms may specialize in manufacturing thread, others in printing, still others in dyeing, some in long cloth, some in dhotis, some in shirting etc. As a result the efficiency of the firms specializing in different fields increases and the unit cost of production falls. Thus internal economies depend upon the size of the firm and external economies depend upon the size of the industry.

- Cost Analysis:

Profit is the ultimate aim of any business and the long-run prosperity of a firm depends upon its ability to earn sustained profits. Profits are the difference between selling price and cost of production.

- COST CONCEPTS:

A managerial economist must have a clear understanding of the different cost concepts for clear business thinking and proper application. The several alternative bases of classifying cost and the relevance of each for different kinds of problems are to be studied. The various relevant concepts of cost are

- 1. Opportunity costs and outlay costs:

- Out lay cost also known as actual costs obsolete costs are those expends which are actually incurred by the firm.

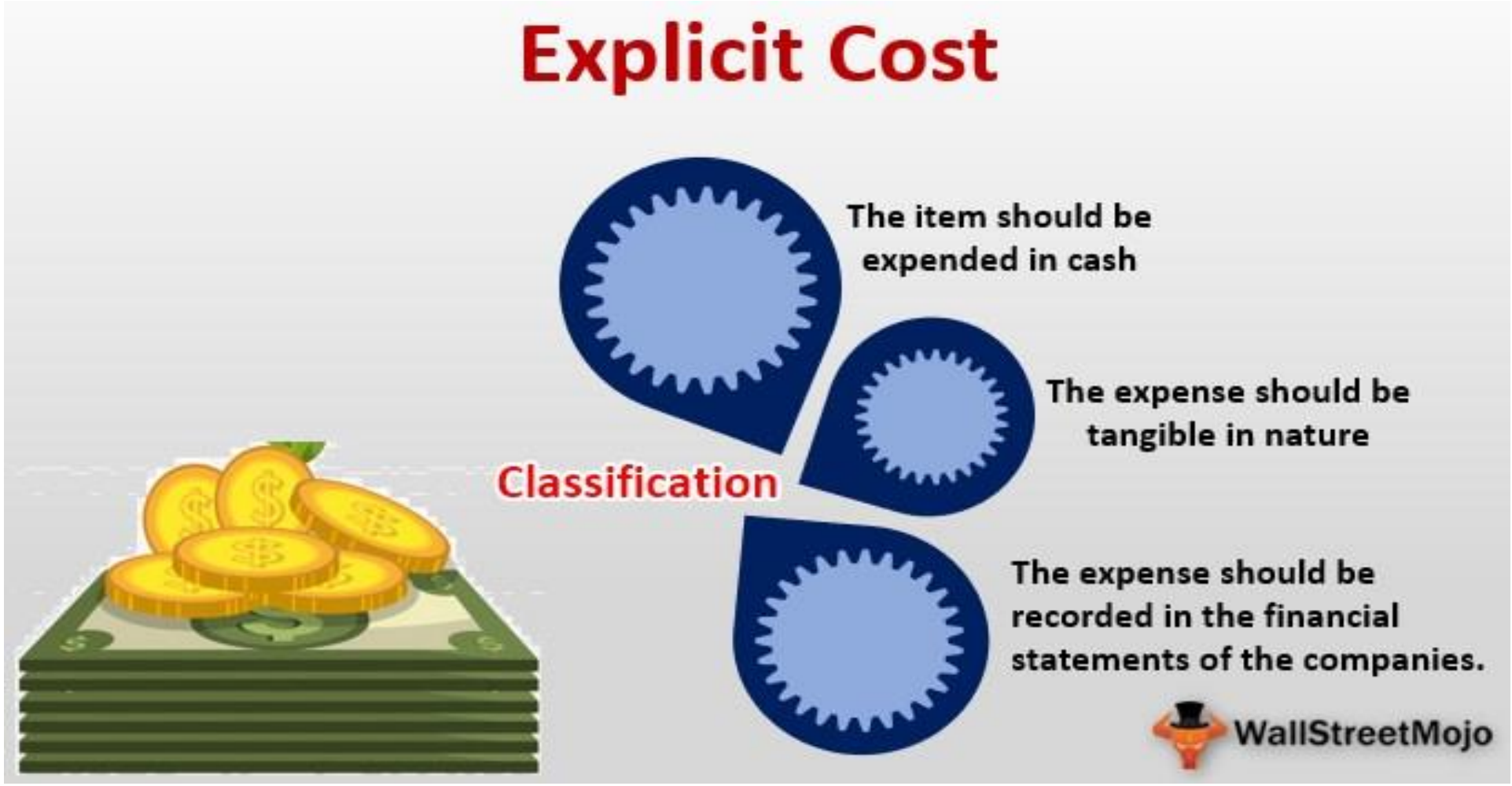
Ex: these are the payments made for labour, material, plant, building, machinery traveling, transporting etc., These are all those expense item appearing in the books of account, hence based on accounting cost concept.

- opportunity cost:

  opportunity cost implies the earnings foregone on the next best alternative, has the present option is undertaken. This cost is often measured by assessing the alternative, which has to be scarified if the particular line is followed. The opportunity cost concept is made use for long-run decisions. This concept is very important in capital expenditure budgeting. This concept is very important in capital expenditure budgeting. The concept is also useful for taking short-run decisions opportunity cost is the cost concept to use when the supply of inputs is strictly limited and when there is an alternative. If there is no alternative, Opportunity cost is zero. The opportunity cost of any action is therefore measured by the value of the most favorable alternative course, which had to be foregoing if that action is taken.

- 2. Explicit and implicit costs:

- Explicit costs are those expenses that involve cash payments. These are the actual or business costs that appear in the books of accounts. These costs include payment of wages and salaries, payment for raw-materials, interest on borrowed capital funds, rent on hired land, Taxes paid etc.


Explicit Cost
Classification
The item should be expended in cash
The expense should be tangible in nature
The expense should be recorded in the financial statements of the companies.
WallStreetMojo

- Implicit costs are the costs of the factor units that are owned by the employer himself. These costs are not actually incurred but would have been incurred in the absence of employment of self – owned factors. The two normal implicit costs are depreciation, interest on capital etc. A decision maker must consider implicit costs too to find out appropriate profitability of alternatives

Particulars	Explicit Cost	Implicit Cost
Meaning	Explicit costs occur when the company pays for the usage of its factors of production.	Implicit costs occur when the company uses resources belonging to the owner such as capital and inventory.
Alternatively known as	Explicit cost is also referred to as out-of-pocket costs	Implicit cost is referred to as imputed or opportunity cost.
Determining Costs	Explicit cost can be determined easily.	Implicit cost does not have track and cannot be determined precisely
Calculation of Profit	Explicit cost assists in calculating both, accounting profit as well as economic profit	Implicit costs help in calculating only economic profit.
Cash	Explicit cost requires an outflow of cash from the entity	Implicit costs do not require an outflow of cash.

- 3. Historical and Replacement costs:

- Historical cost is the original cost of an asset. Historical cost valuation shows the cost of an asset as the original price paid for the asset acquired in the past. Historical valuation is the basis for financial accounts.

- A replacement cost

is the price that would have to be paid currently to replace the same asset. During periods of substantial change in the price level, historical valuation gives a poor projection of the future cost intended for managerial decision. A replacement cost is a relevant cost concept when financial statements have to be adjusted for inflation.

Replacement Cost

Example

Initially, the cost of each machine is $1,000

After 10 years (Replacement Cost)

The cost of new machines with the exact same capacity is $1500

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- 4.Short – run and long – run costs:

- Short-run is a period during which the physical capacity of the firm remains fixed. Any increase in output during this period is possible only by using the existing physical capacity more extensively. So short run cost is that which varies with output when the plant and capital equipment in constant.

- Long run costs are those, which vary with output when all inputs are variable including plant and capital equipment. Long-run cost analysis helps to take investment decisions.

- 5. Out-of pocket and books costs:

- Out-of pocket costs also known as explicit costs are those costs that involve current cash payment.

- Book costs also called implicit costs do not require current cash payments. Depreciation, unpaid interest, salary of the owner is examples of book costs. But the book costs are taken into account in determining the level dividend payable during a period. Both book costs and out-of-pocket costs are considered for all decisions. Book cost is the cost of self-owned factors of production.

- 6. Fixed cost and Variable cost:

- Fixed cost is that cost which remains constant for a certain level to output. It is not affected by the changes in the volume of production. But fixed cost per unit decrease, when the production is increased. Fixed cost includes salaries, Rent, Administrative expenses depreciations etc.

- Variable is that which varies directly with the variation is output. An increase in total output results in an increase in total variable costs and decrease in total output results in a proportionate decline in the total variables costs. The variable cost per unit will be constant. Ex: Raw materials, labour, direct expenses, etc.

- 7.Past and Future costs:

- Past costs also called historical costs are the actual cost incurred and recorded in the book of account these costs are useful only for valuation and not for decision making.

- Future costs are costs that are expected to be incurred in the futures. They are not actual costs. They are the costs forecasted or estimated with rational methods. Future cost estimate is useful for decision making because decision are meant for future.

- 8.Traceable and common costs:

- Traceable costs otherwise called direct cost, is one, which can be identified with a products process or product. Raw material, labour involved in production is examples of traceable cost.

- Common costs are the ones that common are attributed to a particular process or product. They are incurred collectively for different processes or different types of products. It cannot be directly identified with any particular process or type of product.

- 9.Avoidable and unavoidable costs:

- Avoidable costs are the costs, which can be reduced if the business activities of a concern are curtailed. For example, if some workers can be retrenched with a drop in a product – line, or volume or production the wages of the retrenched workers are escapable costs.

- The unavoidable costs are otherwise called sunk costs. There will not be any reduction in this cost even if reduction in business activity is made. For example cost of the ideal machine capacity is unavoidable cost.

- 10.Controllable and uncontrollable costs:
- Controllable costs are ones, which can be regulated by the executive who is in charge of it. The concept of controllability of cost varies with levels of management. Direct expenses like material, labour etc. are controllable costs. Some costs are not directly identifiable with a process of product. They are appointed to various processes or products in some proportion. This cost varies with the variation in the basis of allocation and is independent of the actions of the executive of that department. These apportioned costs are called uncontrollable costs.

- 11.Incremental and sunk costs:

- Incremental cost also known as different cost is the additional cost due to a change in the level or nature of business activity. The change may be caused by adding a new product, adding new machinery, replacing a machine by a better one etc.

- Sunk costs are those which are not altered by any change – They are the costs incurred in the past. This cost is the result of past decision, and cannot be changed by future decisions. Investments in fixed assets are examples of sunk costs

- 12.Total, average and marginal costs:
- Total cost is the total cash payment made for the input needed for production. It may be explicit or implicit. It is the sum total of the fixed and variable costs. Average cost is the cost per unit of output. If is obtained by dividing the total cost (TC) by the total quantity produced (Q)

Marginal cost is the additional cost incurred to produce and additional unit of output or it is the cost of the marginal unit produced.

- 13.Accounting and Economics costs:

- Accounting costs are the costs recorded for the purpose of preparing the balance sheet and profit and loss statements to meet the legal, financial and tax purpose of the company. The accounting concept is a historical concept and records what has happened in the past.

- Economic cost considers future costs, which help future planning, and choice, while the accountant describes what has happened, the economics aims at projecting what will happen.

COST-OUTPUT RELATIONSHIP

The cost-output relationship plays an important role in determining the optimum level of production. The relation between cost and its determinants is technically described as the cost function.

C= f (S, O, P, T ….)

Where;

C= Cost (Unit or total cost)

S= Size of plant/scale of production

O= Output level

P= Prices of inputs

T= Technology

- Cost-Output Relation during Short Run or Short Run Cost Curves:

- Time element plays an important role in price determination of a firm. During short period two types of factors are employed. One is fixed factor while others are variable factors of production. Fixed factor of production remains constant while with the increase in production, we can change variable inputs only because time is short in which all the factors cannot be varied.

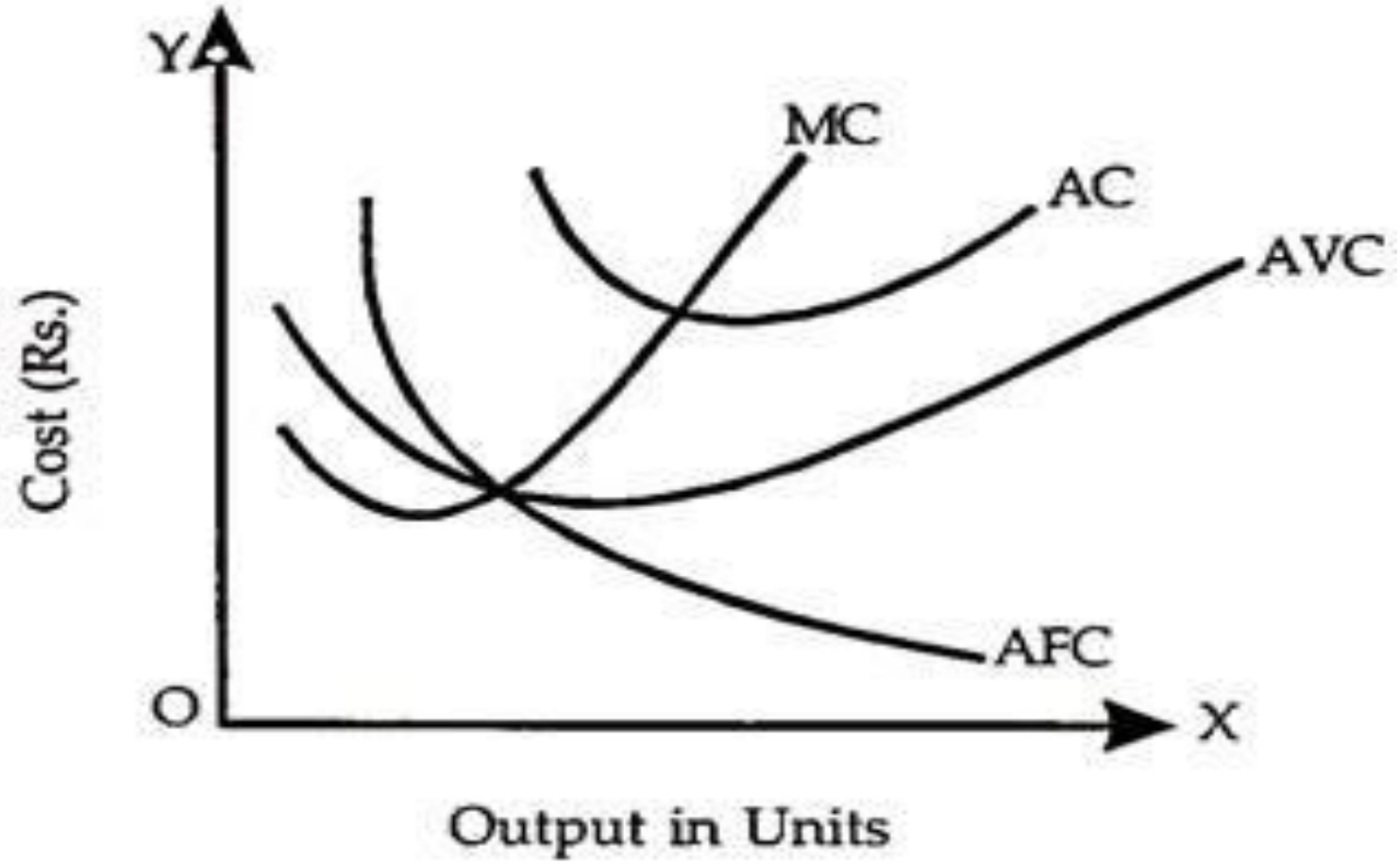
- Raw material, semi-finished material, unskilled labour, energy, etc., are variable inputs which can be changed during short run. Machines, capital, infrastructure, salaries of managers and technical experts are included in fixed inputs. During short period an individual firm can change variable factors of production according to requirements of production while fixed factors of production cannot be changed.

Table 2

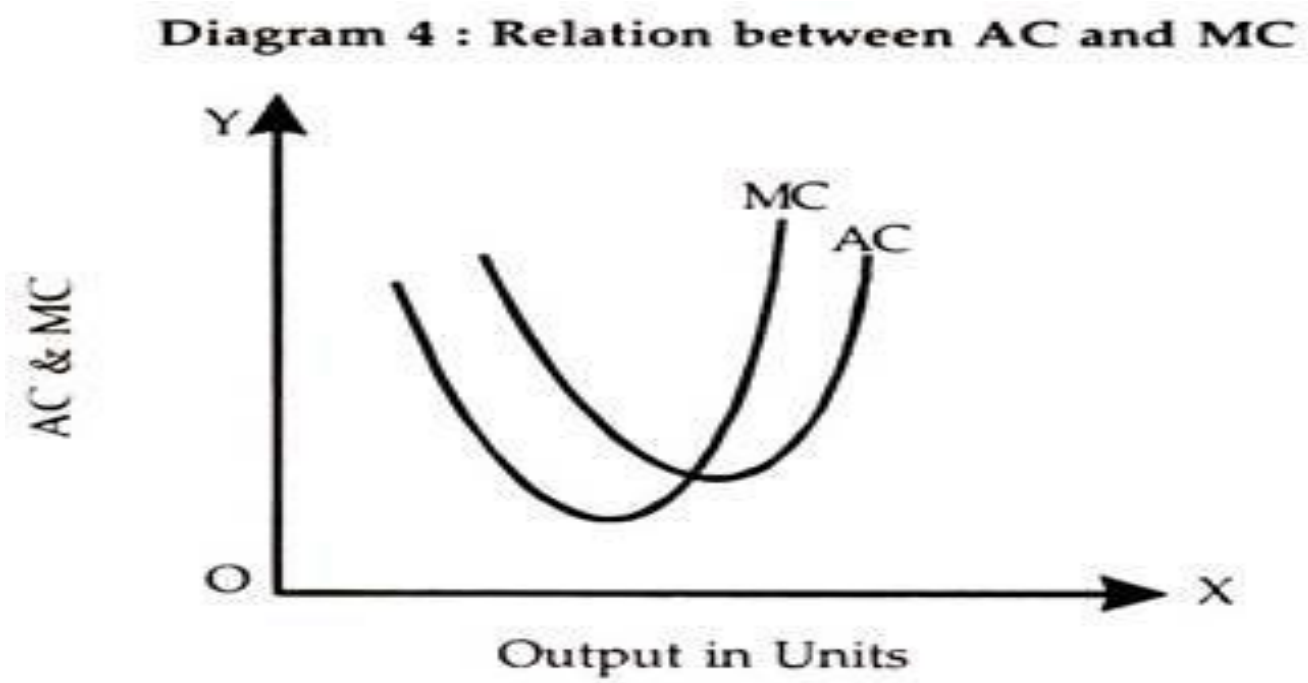
Short Run Output Relation (Rs.)

Output (Units)	Total Costs			Average costs			
	TFC	TVC	TC (TFC+ TVC)	AFC	AVC	AC (AFC+ (AVC)	MC
1	2	3	4	5	6	7	8
0	100	0	100	0	0	0	-
1	100	30	130	100	30	130	30
2	100	60	160	50	30	80	30
3	100	80	180	33.3	26.7	60	20
4	100	90	190	25	22.5	47.5	10
5	100	100	200	20	20.0	40.0	10
6	100	120	220	16.66	20.0	36.66	20
7	100	150	250	14.3	21.4	35.7	30
8	100	190	290	12.5	23.75	36.25	40
9	100	240	340	11.1	26.67	37.7	50
10	100	320	420	10.0	32.0	42.0	80

Diagram 3 : Cost–Output Relation



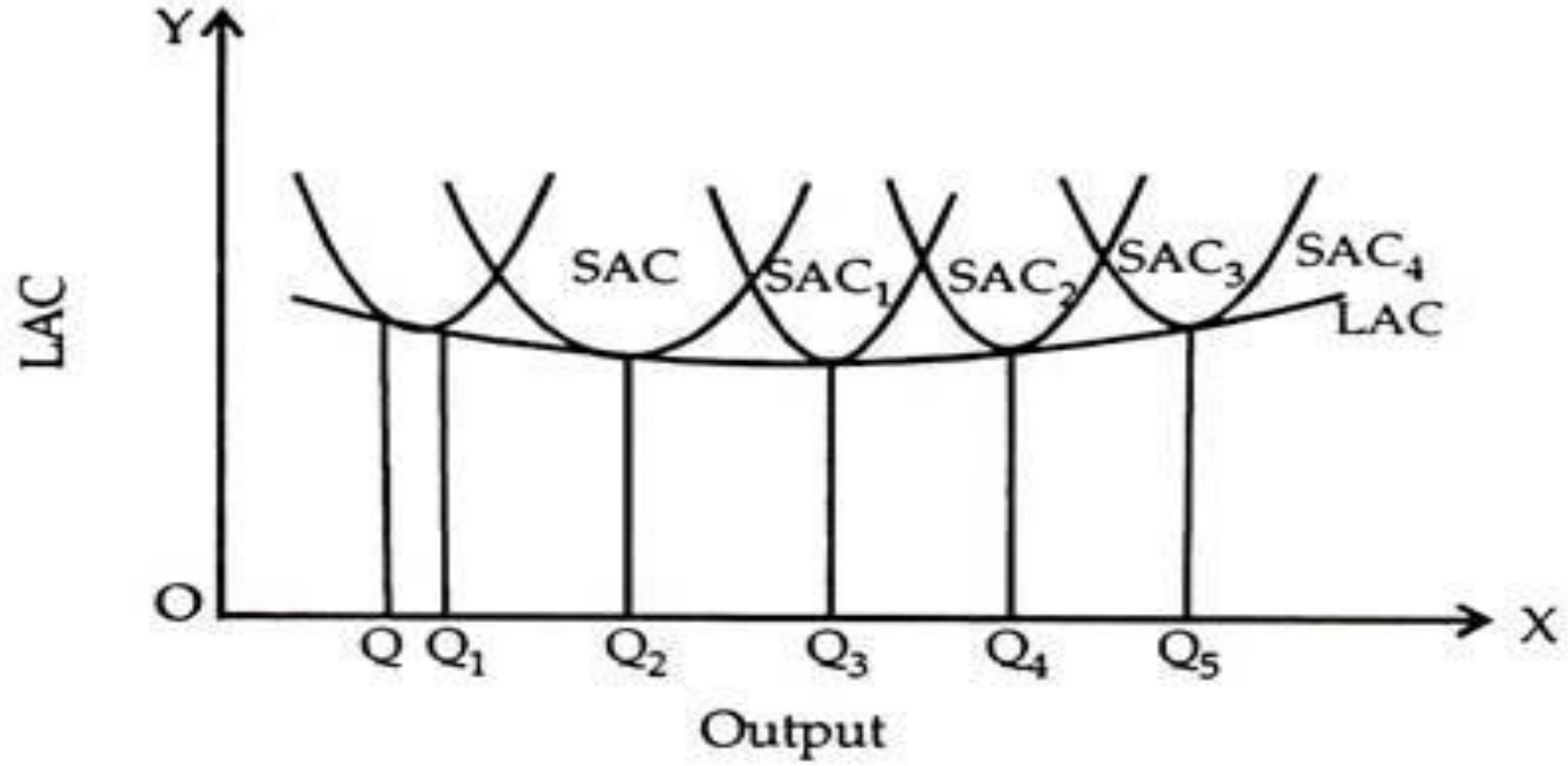
The relation between AC and MC can be seen from the following diagram during short period:



- Long Run Average Cost (LAC):

- In the long run, all the factors of production are variable and the firm has a variety of choices to select the size of the plants and the factors of production to be employed. Various short run average cost curves represent the various sizes of the plants available to a firm. We can get the long run average cost curve with the help of all the short run average cost curves. The long run average cost curve envelopes all the short run average cost curves in it. It is also called an ‘Envelope Curve’ or ‘Planning Curve’.

Diagram 5 : Long Run Average Cost Curve (LAC Curve)



- OPTIMUM SIZE OF THE FIRM:

- When a firm expands its size to the lowest point of the long-run average cost (LAC), it sets up a plant which, given the state of technology, has the lowest unit cost of production when operated at its full capacity. As has been explained above that long-run average cost of a firm is influenced by the various economies and diseconomies of scale. These economies and diseconomies are determined by various technical, managerial, financial and marketing factors.

- The optimum size is achieved when all the internal economies of scale such as division of labour, use of specialised machinery, managerial advantage of large scale production etc. are being fully enjoyed by the firm and the internal diseconomies of scale have not yet started accruing to it.

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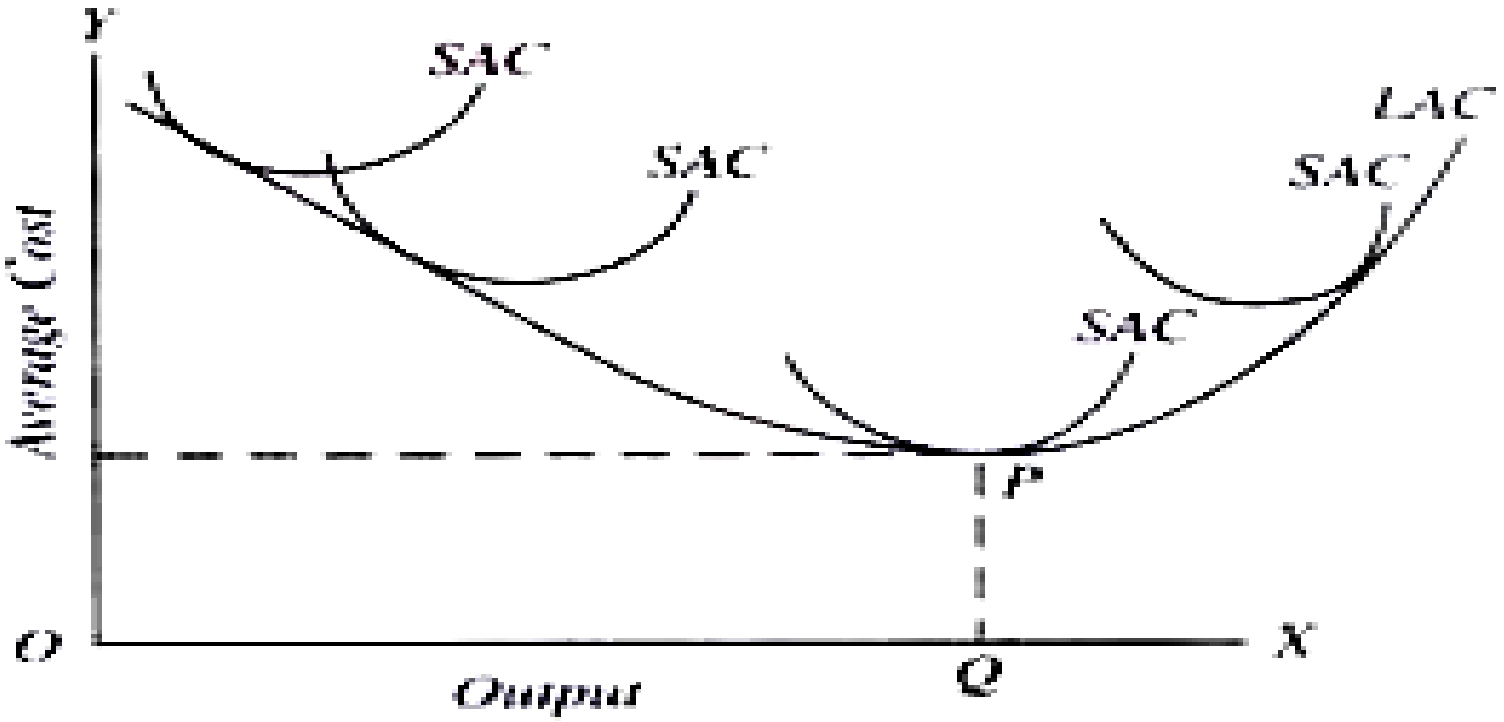


Fig. 19.11. *Large Optimum Size*

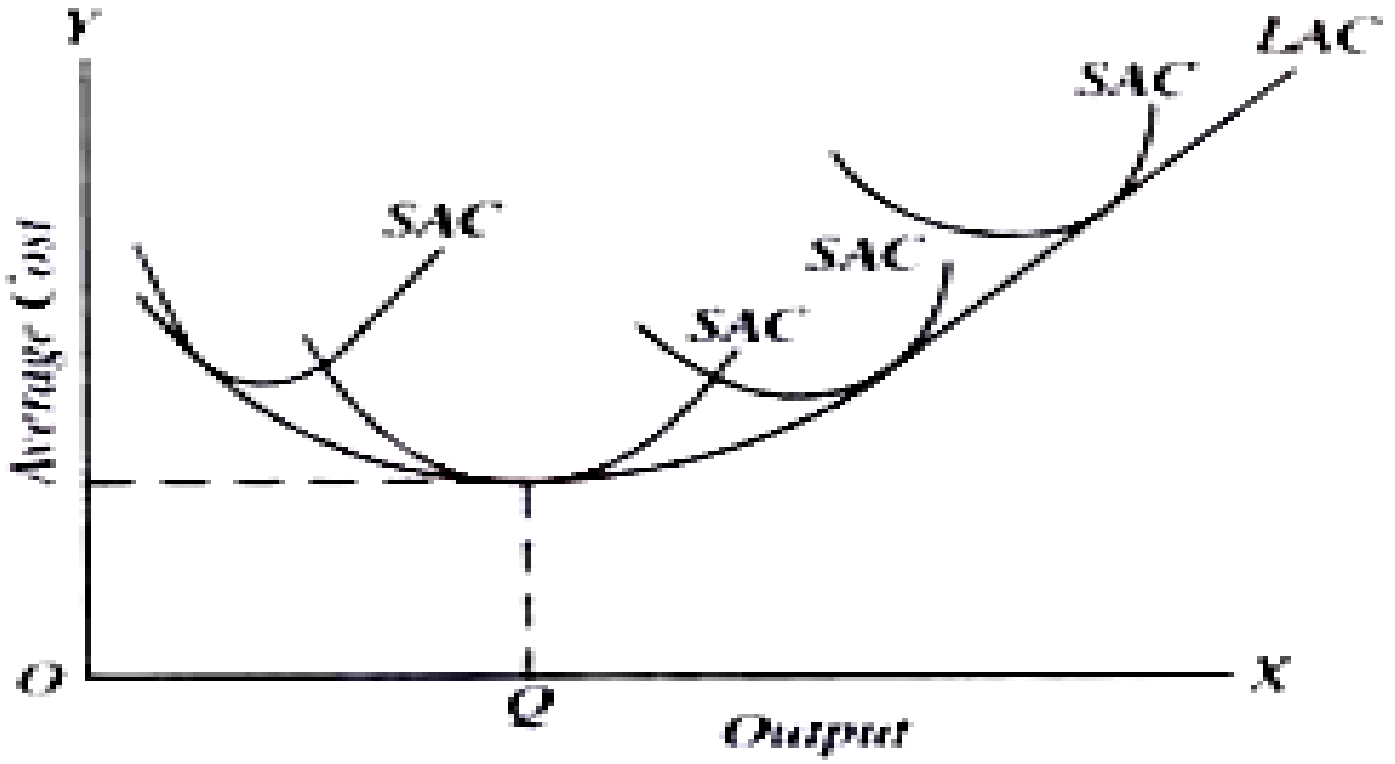


Fig. 19.10. *Small Optimum size*

COST-OUTPUT RELATIONSHIP

The cost-output relationship plays an important role in determining the optimum level of production. The relation between cost and its determinants is technically described as the cost function.

$$C = f(S, O, P, T \ldots.)$$

Where;

C= Cost (Unit or total cost)

S= Size of plant/scale of production

O= Output level

P= Prices of inputs

T= Technology

- Cost-Output Relation during Short Run or Short Run Cost Curves:

- Time element plays an important role in price determination of a firm. During short period two types of factors are employed. One is fixed factor while others are variable factors of production. Fixed factor of production remains constant while with the increase in production, we can change variable inputs only because time is short in which all the factors cannot be varied.

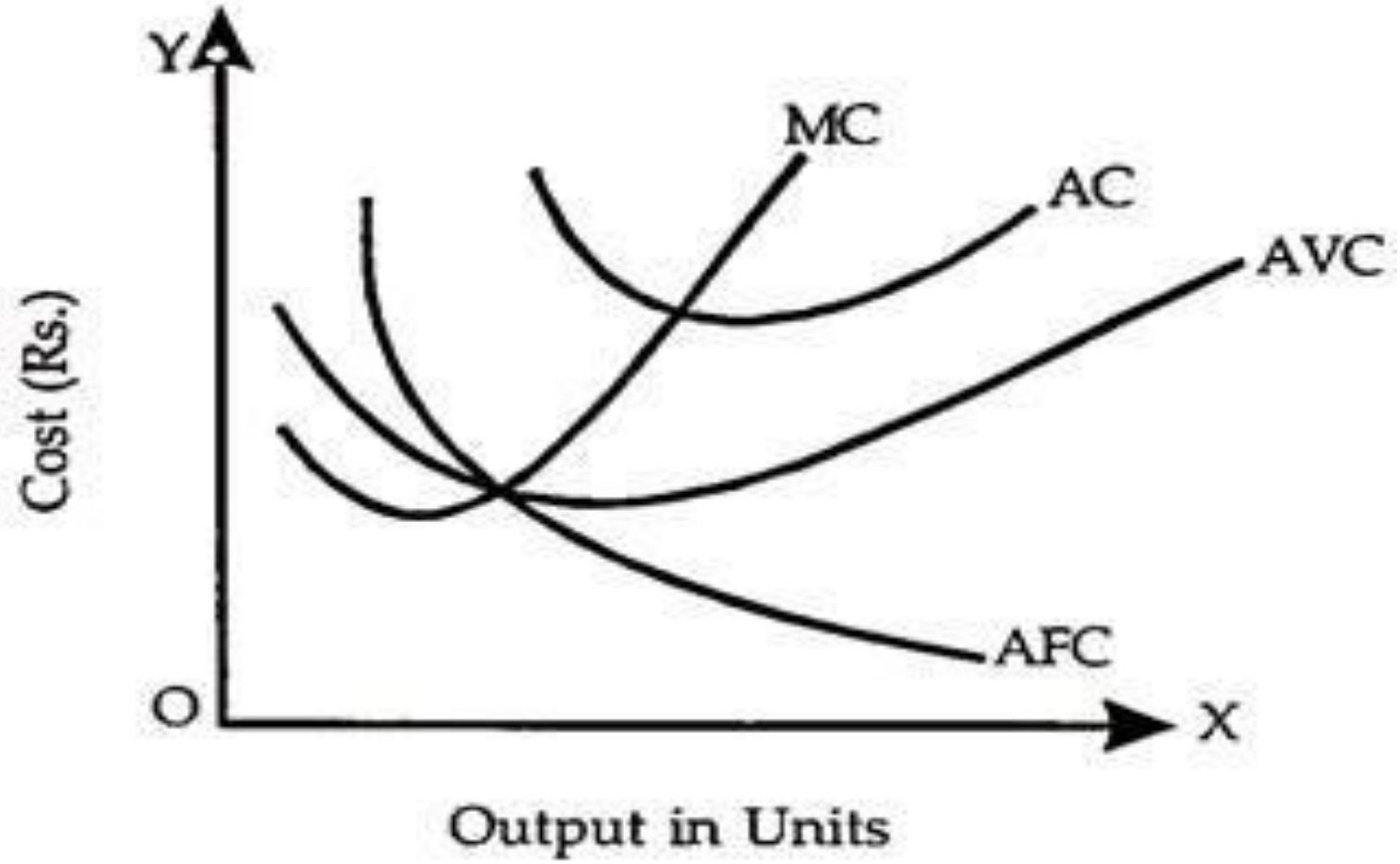
- Raw material, semi-finished material, unskilled labour, energy, etc., are variable inputs which can be changed during short run. Machines, capital, infrastructure, salaries of managers and technical experts are included in fixed inputs. During short period an individual firm can change variable factors of production according to requirements of production while fixed factors of production cannot be changed.

Table 2

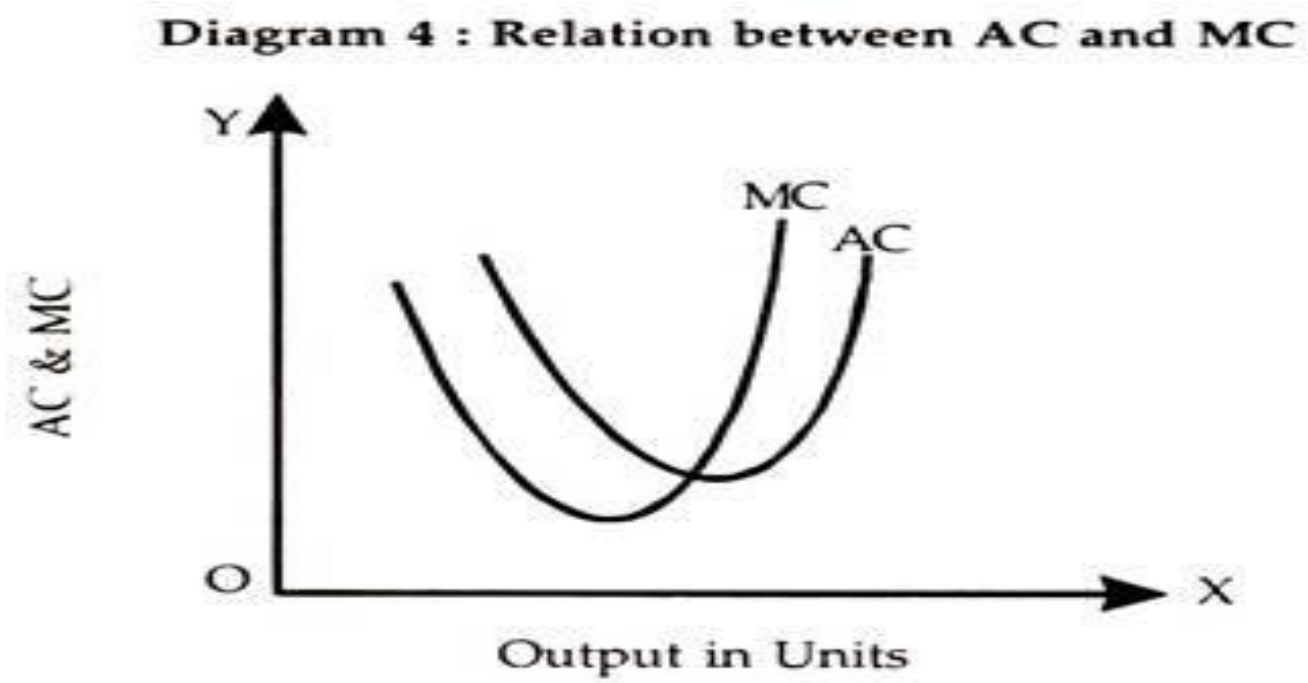
Short Run Output Relation (Rs.)

Output (Units)	Total Costs			Average costs			
	TFC	TVC	TC (TFC+ TVC)	AFC	AVC	AC (AFC+ (AVC)	MC
1	2	3	4	5	6	7	8
0	100	0	100	0	0	0	-
1	100	30	130	100	30	130	30
2	100	60	160	50	30	80	30
3	100	80	180	33.3	26.7	60	20
4	100	90	190	25	22.5	47.5	10
5	100	100	200	20	20.0	40.0	10
6	100	120	220	16.66	20.0	36.66	20
7	100	150	250	14.3	21.4	35.7	30
8	100	190	290	12.5	23.75	36.25	40
9	100	240	340	11.1	26.67	37.7	50
10	100	320	420	10.0	32.0	42.0	80

Diagram 3 : Cost–Output Relation



The relation between AC and MC can be seen from the following diagram during short period:



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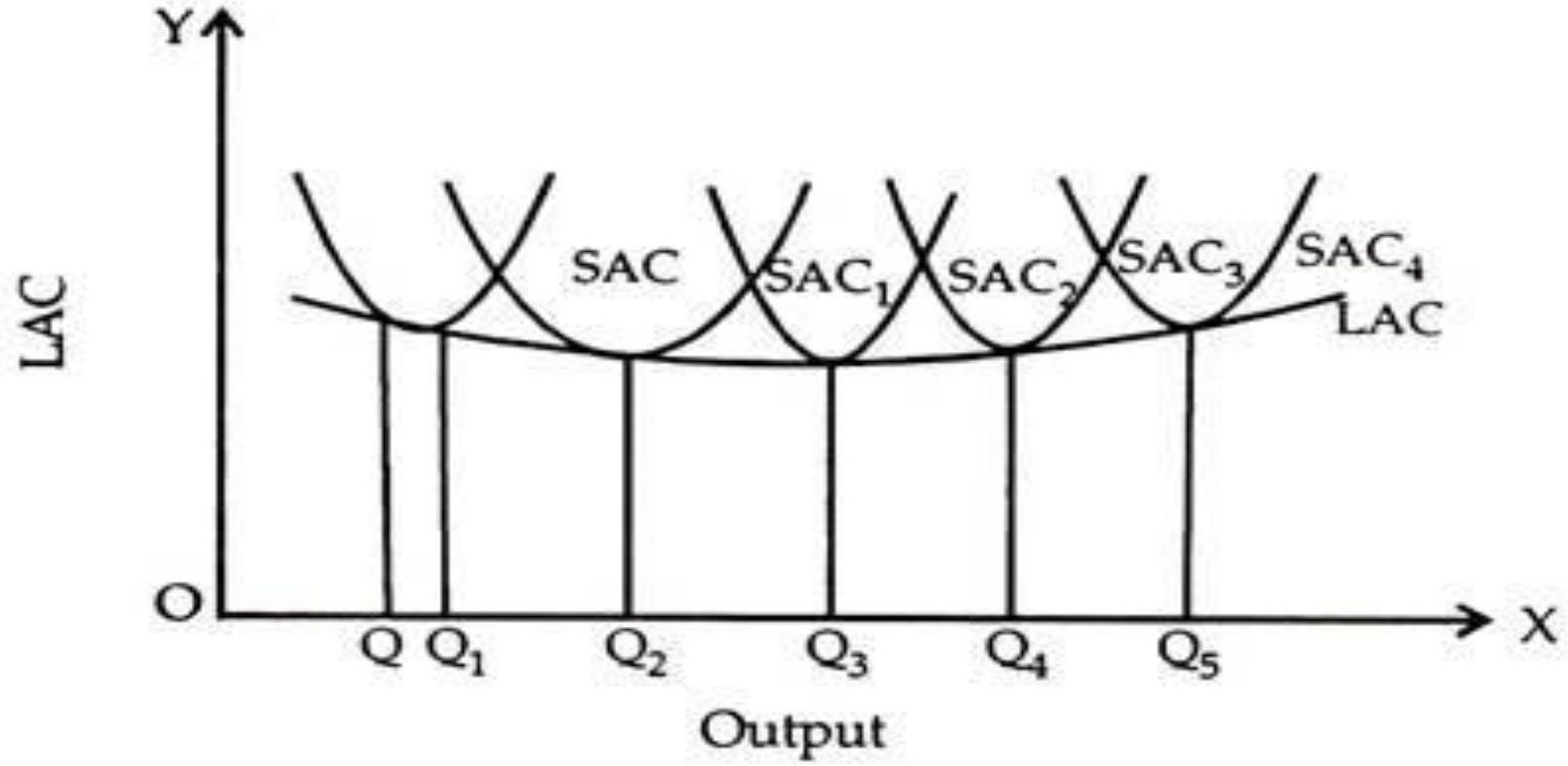

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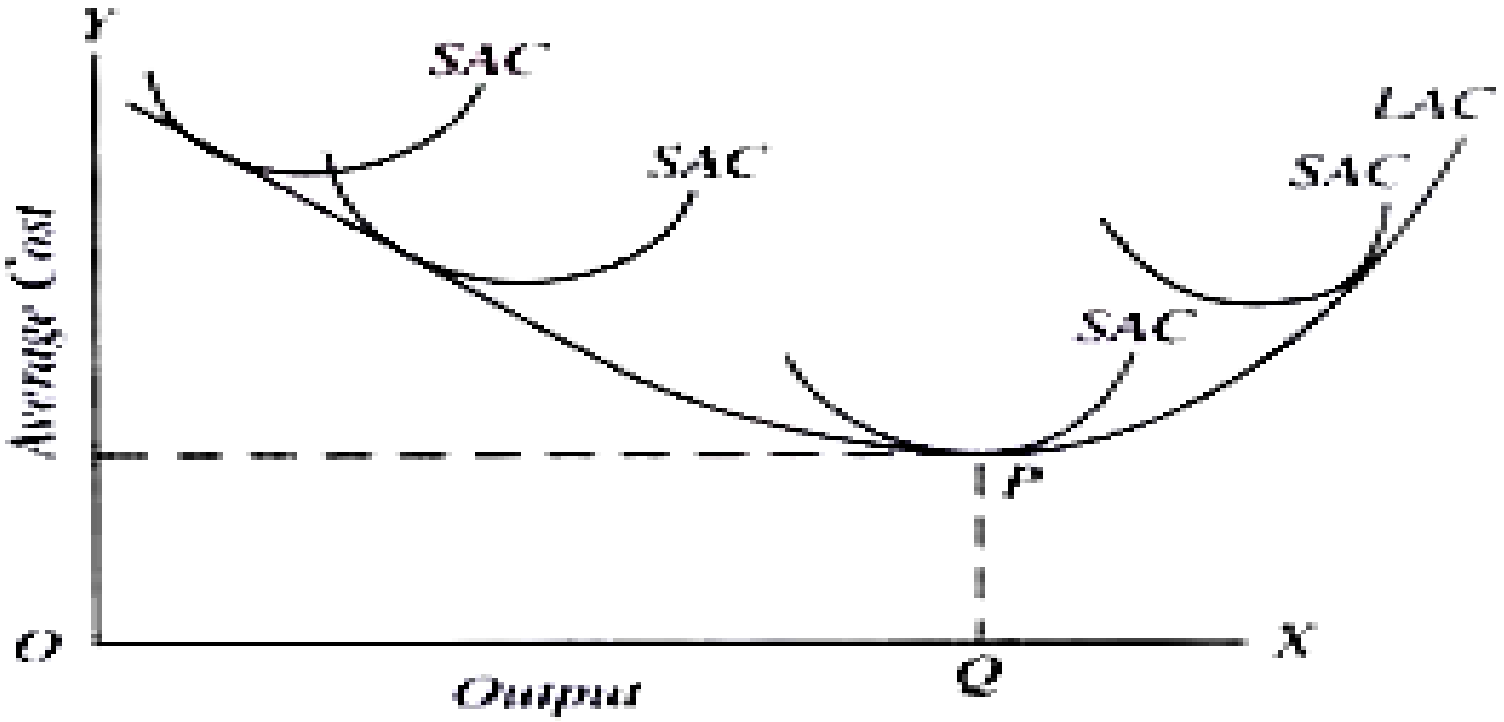

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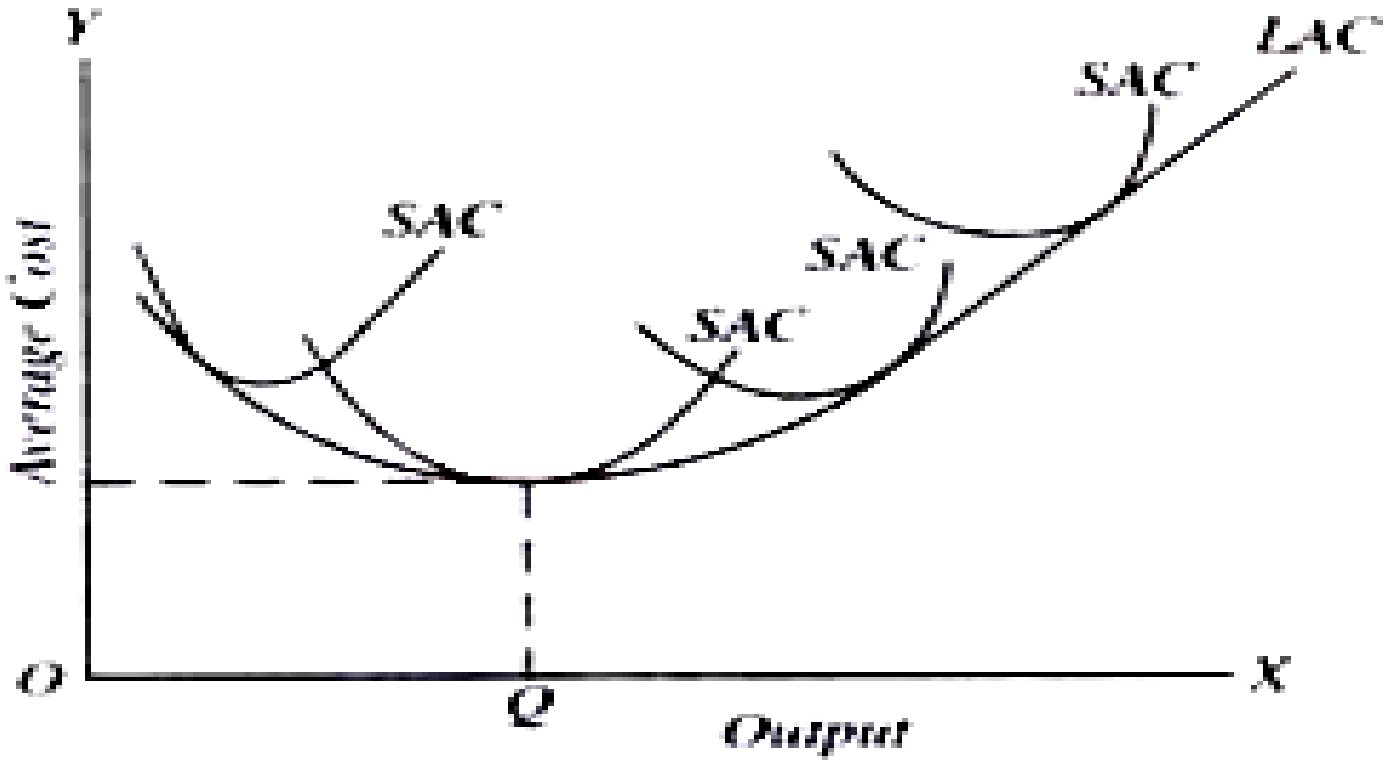

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Thank you