

THEORY OF COST

MEANING OF COST- Cost may be defined as the monetary value of all sacrifices made to achieve an objective i.e. to produce goods and services. Cost are very important in business decision making. Cost of production provides the floor to pricing. It helps manager to take correct decision, such as what price to quote, whether to place particular order for inputs or not whether to abandon or add a product to the existing product line and so on.

Ordinarily, cost refer to the money expenses incurred by a firm in the production process. Cost also included imputed value of the entrepreneur's own resources and services, as well as salary of the owner-manager.

DETERMEAINTS OF COST-

Factors determining the cost are:

(a) Size of plant: There is an inverse relationship between size of plant and cost. As size of plant increases, cost falls and vice versa.

(b) Level of Output: There is a direct relationship between output level and cost. More the level of output, more is the cost (i. e., total cost) and vice Versa.

(c) Price of Inputs: There is a direct relationship between price of inputs and cost. As the price of inputs rises, cost rises and vice versa.

(d) State of technology: More modern and upgraded the technology implies lesser cost and vice versa.

(e) Management and administrative efficiency: Efficiency and cost are inversely related. More the efficiency in management and administration better will be the product and less will be the cost. Cost will increase in case of inefficiencies in management and administration.

COST CONCEPT-

The concept of cost is central to business decision making. To make effective business decisions, the business manager needs to be aware of a number of cost concepts and their respective uses.

Actual cost- Actual cost means the actual expenditure incurred on producing goods and services. Value of raw material, wages, rent, salaries paid and interest of borrowed capital etc. are some of the example of actual cost. Actual cost is also known as absolute cost or out lay cost or money cost.

Opportunity Cost- The opportunity cost is measured in terms of the forgone benefits from the next best alternative use of a given resource. For example the inputs which are used to manufacture a car may also be used in the productions of military equipment. Main points of opportunity cost are:

1. The opportunity cost of any commodity is only the next best alternative forgone.
2. The next best alternative commodity that could be produced with the same value of the factors, which are more or less the same.

3. It helps in determining relative prices of factor inputs at different places.
4. It helps in determining the remuneration to services.
5. It helps the manager to decide what he should produce in the factory.

Explicit cost- An explicit cost is a cost that is directly incurred by the firm, company or organization during the production. The explicit cost is kept on record by the accountant of the firm. Salaries, wages, rent, raw material are few example of the explicit cost. The explicit cost is also known as out-pocket cost. This cost is handy in calculating both accounting and economic profit.

Implicit cost- The implicit cost is directly opposite to it, as it is the cost that is not directly incurred by the firm or company. In implicit cost outflow of cash doesn't take place. It is not in the record and is hard to be traced back. The interest on owner's capital or the salary of the owner are the prominent example of the implicit cost. The implicit cost is also known as imputed cost. Through implicit cost, only the economic profit is calculated.

Incremental cost- Incremental costs are the added costs of a change in the level of production or the nature of activity. It may be adding a new product or changing distribution channel, or adding new machinery, etc. It appears to be similar to marginal cost, but it is not managerial cost. Marginal cost refers to the cost on added unit of output.

Sunk Cost- Sunk costs are costs which cannot be altered in any way. Sunk costs are costs which have already been incurred. For example, cost incurred in constructing a factory. When the factory building is constructed cost have already been incurred. The building has to be used for which originally envisaged. It can not be altered when operation are increased or decreased. Investment of machinery is an example of sunk cost.

Shutdown cost- Shutdown cost are those cost which would be incurred in the event of suspension of plant operations and which could be saved if operation

were continued. For example cost of sheltering the plant equipment and construction of sheds for protecting the exposed property, or fixed cost and maintenance cost etc.

Abandonment cost- Abandonment cost are those cost which are incurred for the complete removal of the fixed asset from use. These may occur due to obsolescence or due to improvisation of the firm. Abandonment costs thus involve problem of disposal of the asset.

Book cost – Book cost are those business cost which don't involve any cash payment is made but a provision is made in the books of accounts in order to include them in the profit and loss account and take tax advantages.

Out of pocket cost- Out of pocket cost are those costs or expenses which are current payments to the outsiders of the firm. All the explicit costs fall into the category of out of pocket costs.

Past cost- Past costs are actual costs incurred in the past. These costs are mentioned in the financial accounts. , since the past costs have already been incurred, and there is no scope for managerial decision. If the management finds out that the past costs are excessive, it cannot do anything to rectify it now.

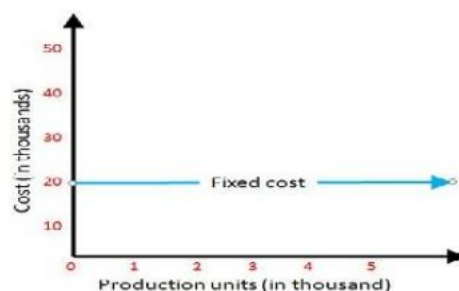
Future cost- Future costs are those costs which are to be incurred in the near future. This is only a forecast. Future costs matter for managerial decisions because, the management can evaluate the desirability of that expenditure. In the case of future costs, if the management considers them very high , it can either reduce them or postpone the use of them.

Direct cost-Direct costs are related to a specific process or product. They are also called traceable costs as we can directly trace them to a particular activity, product or process. They can vary with changes in the activity or product. Examples of direct costs include manufacturing costs relating to production, customer acquisition costs pertaining to sales, etc.

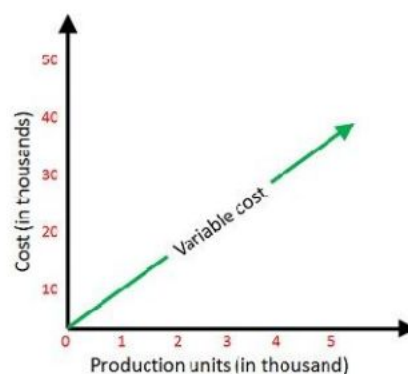
Indirect costs- Indirect costs, or untraceable costs, are those which do not directly relate to a specific activity or component of the business. For example, an

increase in charges of electricity or taxes payable on income. Although we cannot trace indirect costs, they are important because they affect overall profitability.

Fixed Cost- Fixed cost are the amount spent by the firm on fixed inputs in the short run. Fixed cost are thus, those costs which remain constant, irrespective of the level of output. These costs remain unchanged even if the output of the firm is nil. Fixed costs therefore, are known as Supplementary costs or Overhead costs.



Variable Costs- Variable costs are those cost that change directly as the volume of output changes. As the production increases variable cost also increases, and as the product decreases variable costs also decreases, and when the production stops variable cost is zero.



Semi Variable Cost- This type of cost lies in between fixed and variable cost. It is neither perfectly variable nor perfectly fixed in relation to changes in output. This type of costs include a portion of fixed cost and a portion of variable cost, this is known as semi variable cost. For example- electricity bill generally include both a fixed charge (meter rent) and a variable charge(charge based on units consumed) and the total payment made is semi variable cost.

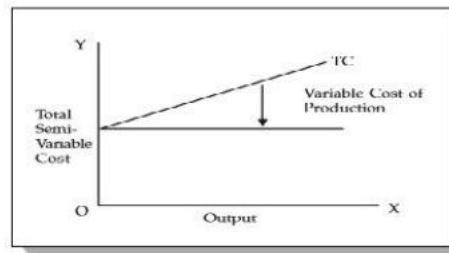
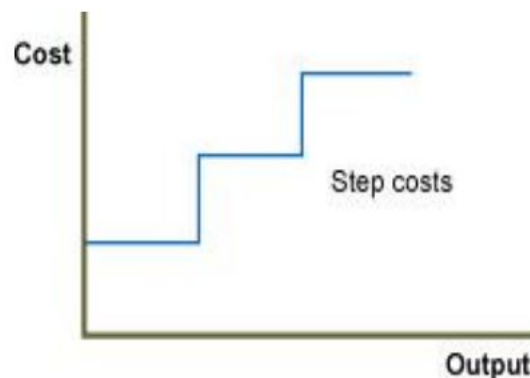


Fig. 3 : Semi Variable Cost

Stair Step Cost- Certain expenses increase in a stair step manner, i.e. remaining constant over a range of output but rising suddenly to a new higher level as output passes beyond. The given level. For example- up to a point the attendants salary may remain fixed as output increases but beyond that point further increase in output may require an additional attendant leading to a sudden jump in supervision expenses.



Total cost- Total cost is the total expenditure incurred in the production of goods and services.

$$TC = TFC + TVC$$

Average cost- Average cost is not actual cost, It is obtained by dividing the total cost by the total output.

$$AC = \text{Total Cost} / \text{Units Produced}$$

Marginal cost- The cost incurred on producing one additional unit of commodity is known as marginal cost. Thus it shown a change in total cost when one more or less unit is produced.

$$MC = TC_n - TC_{(n-1)}$$

Cost function-

The cost output relationship plays an important role in determining the optimum level of production.

$$TC = F(Q)$$

Where,

TC= Total cost

Q= Quantity produced

F= Function

The cost function can be classified as:

Short run cost- Short run is a period where the time is too short to expand the size of industry and the increased demand has to be met within the existing size of industry because there are certain factors which cannot be changed in short run. So short run costs are those which vary with output when fixed plant and capital equipments remain unchanged.

Long run costs- In the long run the size of an industry can be expanded to meet the increased demand for products such as in long run all the factors of production can be increased according to need. Hence long run costs are those which vary with output when all input factors including plants and equipment vary.

Cost output relationship in short run-

In the short-run a change in output is possible only by making changes in the variable inputs like raw materials, labour etc. Inputs like land and buildings, plant and machinery etc. are fixed in the short-run. It means that short-run is a period not sufficient enough to expand the quantity of fixed inputs. Thus Total Cost (TC) in the short-run is composed of two elements – Total Fixed Cost (TFC) and Total Variable Cost (TVC).

TFC remains the same throughout the period and is not influenced by the level of activity. The firm will continue to incur these costs even if the firm is temporarily shut down. Even though TFC remains the same fixed cost per unit varies with changes in the level of output.

On the other hand TVC increases with increase in the level of activity, and decreases with decrease in the level of activity. If the firm is shut down, there are no variable costs. Even though TVC is variable, variable cost per unit is constant.

So in the short-run an increase in TC implies an increase in TVC only. Thus:

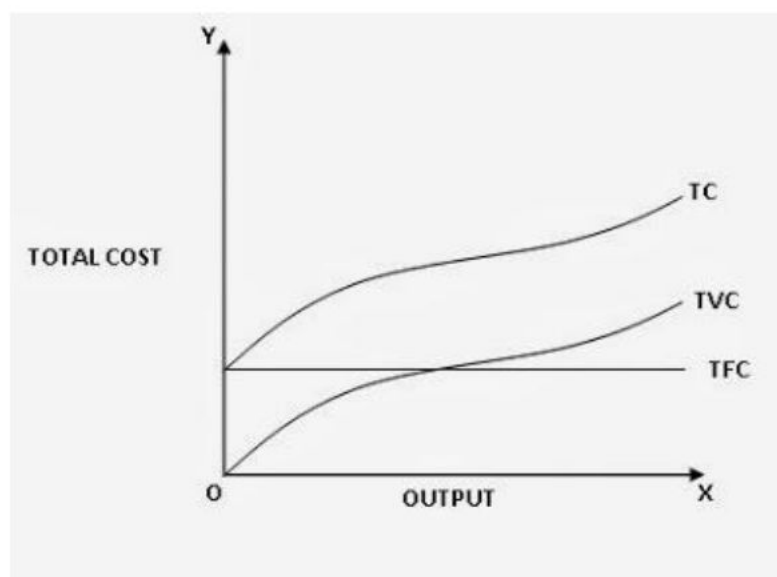
$$TC = TFC + TVC$$

$$TFC = TC - TVC$$

$$TVC = TC - TFC$$

$$TC = TFC \text{ when the output is zero.}$$

The graph below shows Short-run cost output relationship.



In the graph X-axis measures output and Y-axis measures cost. TFC is a straight line parallel to X-axis, because TFC does not change with increase in output.

TVC curve is upward rising from the origin because TVC is zero when there is no production and increases as production increases. The shape of TVC curve depends upon the productivity of

the variable factors. The TVC curve above assumes the Law of Variable Proportions, which operates in the short-run.

TC curve is also upward rising not from the origin but from the TFC line. This is because even if there is no production the TC is equal to TFC.

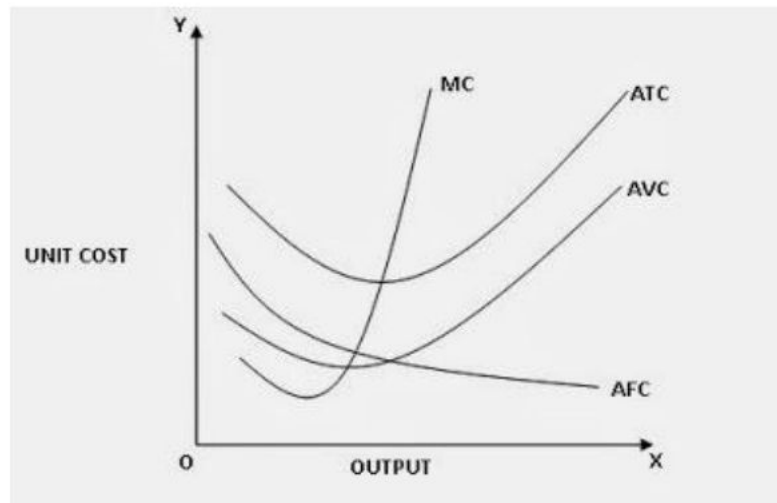
It should be noted that the vertical distance between the TVC curve and TC curve is constant throughout because the distance represents the amount of fixed cost which remains constant. Hence TC curve has the same pattern of behavior as TVC curve.

Short-run Average Cost and Marginal Cost

The concept of cost becomes more meaningful when they are expressed in terms of per unit cost. Cost per unit can be computed with reference to fixed cost, variable cost, total cost and marginal cost.

The following Table and diagram illustrates cost output relationship in the short-run, with reference to different concepts of cost.

Output	Total Fixed Cost (TFC)	Total Variable Cost (TVC)	Total Cost (TC)	Average Fixed Cost (AFC)	Average Variable Cost (AVC)	Average Total Cost (ATC)	Marginal Cost (MC)
1	2	3	$4 = 2 + 3$	$5 = 2 / 1$	$6 = 3 / 1$	$7 = 4 / 1$	8
0	240	0	240	—	—	—	—
1	240	120	360	240	120	360	120
2	240	200	440	120	100	220	80
3	240	270	510	80	90	170	70
4	240	320	560	60	80	140	50
5	240	420	660	48	84	132	100
6	240	552	792	40	92	132	132
7	240	720	960	34	103	137	168



Average Fixed Cost (AFC): Average fixed cost is obtained by dividing the TFC by the number of units produced. Thus:

$AFC = TFC / Q$ where, 'Q' refers
quantity of production.

Since TFC is constant for any level of activity, fixed cost per unit goes on diminishing as output goes on increasing. The AFC curve is downward sloping towards the right throughout its length, with a steep fall at the beginning.

Average Variable Cost (AVC): Average Variable Cost is obtained by dividing the TVC by the number of units produced. Therefore:

$$AVC = TVC / Q$$

Due to the operation of the Law of Variable Proportions AVC curve slopes downwards till it reaches a certain level of output and then begins to rise upwards.

Average Total Cost (ATC): Average Total Cost or simply Average Cost is obtained by dividing the TC by the number of units produced. Thus:

$$ATC = TC / Q$$

The ATC curve is very much influenced by the AFC and AVC curves. In the beginning both AFC curve and AVC curve decline and therefore ATC curve also declines. The AFC curve continues the trend throughout, though at a diminishing rate. AVC curve continues the trend till it reaches a certain level and thereafter it starts rising slowly. Since this rise initially is at a rate lower than the rate of decline in the AFC curve, the ATC curve continues to decline for some more time and reaches the lowest point, which obviously is further than the lowest point of the AVC curve. Thereafter the ATC curve starts rising because the rate of rise in the AVC curve is greater than the rate of decline in the AFC curve.

Marginal Cost (MC): Marginal Cost is the increase in TC as a result of an increase in output by one unit. In other words it is the cost of producing an additional unit of output.

$$MC = \Delta TC / \Delta Q \quad \text{Where, } \Delta TC = \text{Change in Total cost}$$

$$\Delta Q = \text{Change in quantity}$$

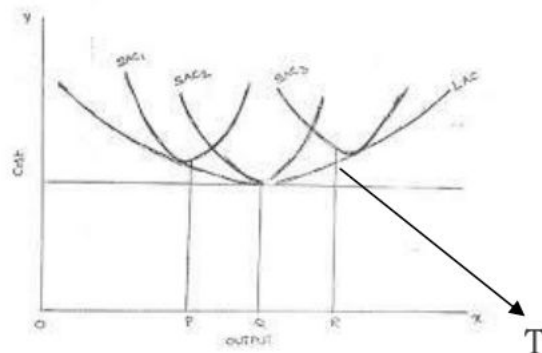
MC is based on the Law of Variable Proportions. A downward trend in MC curve shows decreasing marginal cost (i.e. increasing marginal productivity) of the variable input. Similarly an upward trend in MC curve shows increasing marginal cost (i.e. decreasing marginal productivity). MC curve intersects both AVC and ATC curves at their lowest points.

The relationship between AVC, AFC, ATC and MC can be summed up as follows.

1. *If both AFC and AVC fall ATC will also fall because $ATC = AFC + AVC$*
2. *When AFC falls and AVC rises (a) ATC will fall where the drop in AFC is more than the rise in AVC (b) ATC remains constant if the drop in AFC = the rise in AVC, and (c) ATC will rise where the drop in AFC is less than the rise in AVC.*
3. *ATC will fall when MC is less than ATC and ATC will rise when MC is more than ATC. The lowest ATC is equal to MC.*

Cost output relationship in the long run-

In order to study the cost output relationship in the long run it is necessary to know the meaning of long run. As known in the long run the size of an industry can be expanded to meet the increased demand for products as such in the long run all the factors of production can be varied according to the need. Hence long run costs are those which vary with output when all the input factors including plant and equipment vary.



As per the above figure suppose that at a given time the firms operate under plant SAC2 and produces output OQ. If the firm decides to produce output OR and continues with the current plant SAC2 its average cost will be uR. But if the firm decides to increase the size of the plant to plant SAC3 its average cost of producing OR output would then be TR. Since cost TR is less than the cost on old plant uR, therefore new plant SAC3 is preferable and should be adopted. Thus the long run cost of producing OR output will be TR which can be obtained by increasing the plant size.

Features of LAC curve

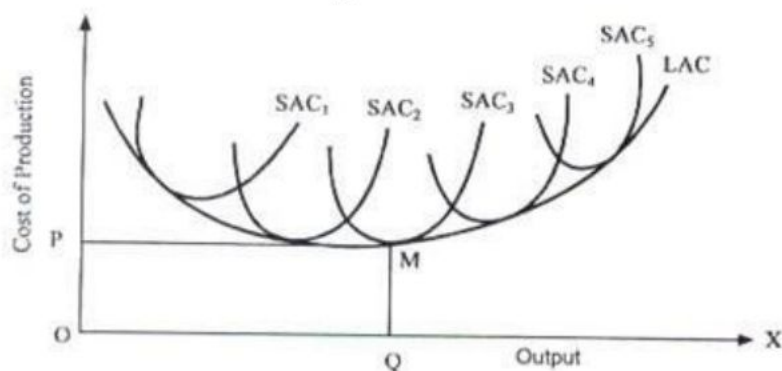


Fig II.12: Derivation of LAC Curve from SAC Curves

To draw long run average cost curve(LAC) we start with a number of short run average cost(SAC) curves, each such curve representing a particular size of plant including the optimum plant. One can now draw a LAC curve which is tangential to all SAC curves. In this connection following features are highlighted:

- 1- The LAC curve envelopes the SAC curves and is therefore called as envelope curve.
- 2- Each point of the LAC is a point of tangency with the corresponding SAC curve.
- 3- The points of tangency on the falling part of SAC curve for points lying to the left of minimum point of LAC.
- 4- The points of tangency occur on the rising part of the SAC curves for the points lying to the right of minimum point of LAC.
- 5- The optimum scale of plant is a term applied to the most efficient of all scales of plants available. This scale of plant is the one whose SAC curve forms the minimum point of LAC curve. It is SAC₃ in our case which is tangent to LAC curve at its minimum point at R.
- 6- Both LAC and SAC curves are U shaped but the difference between the two U shapes is that the U shape of the LAC curve is flatter or lesser pronounced from bottom. The main reason for this is that in the long run such economies are possible which cannot be had in the short run, likewise some of the diseconomies which are faced in short run may not be faced in the long run.

Features of long-run average cost curve : Long run average cost curve has following features :

- (1) **Envelope Curve :** Long run average cost curve encloses all short-run cost curves like a cover that is why it is also called an envelope curve. Hence LAC is the locus of all tendency points all SACs.
- (2) **Only Tangential to Various SAC Curves :** LAC curve only touches SAC curves and does not intersect them.
- (3) **Always below than SAC :** LAC is always lower than SAC, that is why it is never above SAC.
- (4) **U-Shaped :** LAC curve is U shaped or soccer shaped like SAC curves but is flatter. The longer would be duration, LAC curve would be less deep U shaped or more flat. Being more flat means change rate in LAC is less than SAC.
- (5) **Tangential to Minimum Point is not Necessary :** It is not necessary for LAC curve that it would touch SAC curves at their minimum points. LAC curve only touches one SAC curve at its lowest point. LAC curve touches falling part of SAC curves prior to minimum point and rising part of SAC curves after minimum point.
- (6) **Planning Curve :** LAC curves helps managers in planning and tells best possibilities of cost-output so it is also called planning curve.
- (7) **Various Forms :** LAC curve can have different form as per various laws of returns - law of increasing returns, law of constant returns and law of diminishing returns which have been shown in diagram 10.

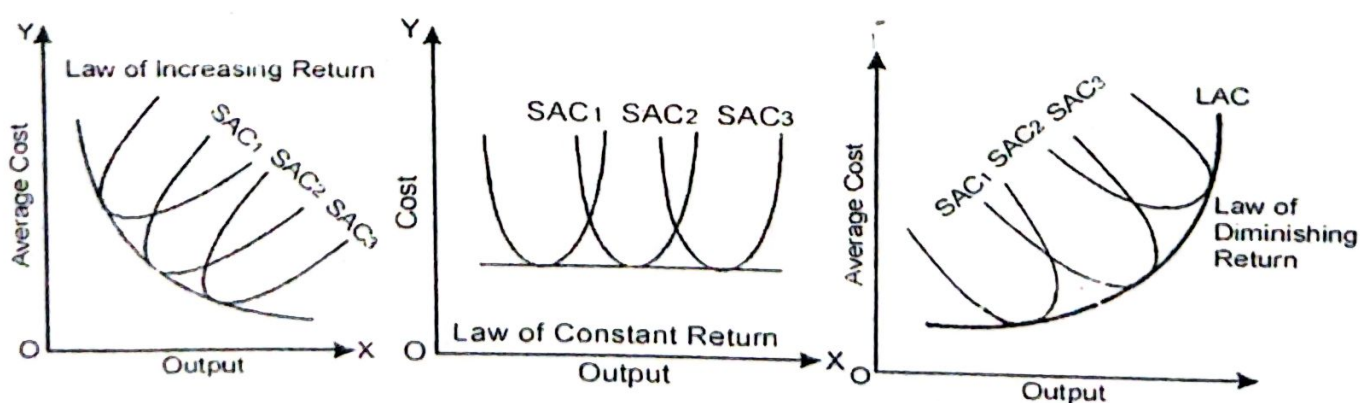


Diagram-10

Uses Of LAC Curve

Long run average cost curve is helpful in decision-making process of busi-

ness managers. It assists them in decisions like determination of best size of production, change in level of production and expansion of plant. Firm wants to produce according to demand at lowest cost. In such case, LAC curve is used for choosing best amongs different alternative plants. The best is chosen with the help of LAC curve, in case, where conditions of less or more production exist, inspite of optimum production level, which has been explained below :

(1) For output less than the Long-term Optimum Level : If firm want to produce less than optimum production level, it is profitable for it to get production through large plant. Its reason is that prior to optimum level law of increasing return will operate on firm and economics of large scale production would obtain. As a result, cost is less on large plant is comparison to small plant.

(2) For Outputs More than the Long-term Optimum level : If firm wants to produce more than optimum level it would be better to use small plants in place of big plants. Its reason is that after optimum size, law of diminishing returns apply on firm and cost in small plant is less than large plant. Hence, for more production than optimum size, it is more profitable to use small plant.

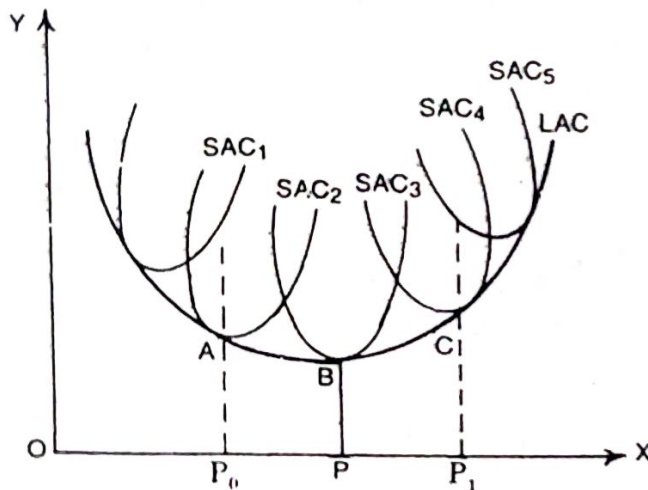


Diagram-11

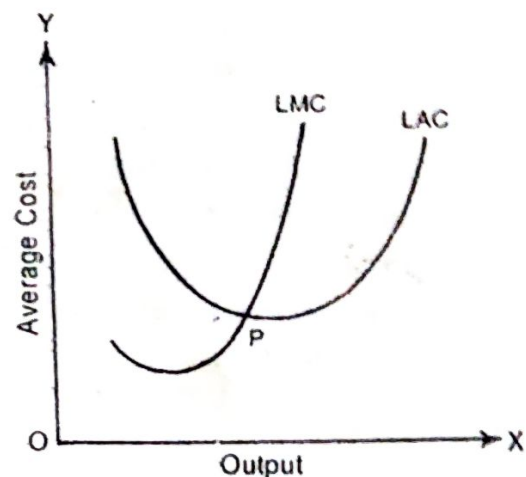


Diagram-12

Both these facts have been shown in diagram 11. Firm has five plants for production whose capacity is respectively increasing. Their short-run average cost has been shown as SAC curve and long-run average cost has been shown by LAC curve. If OP is to produce by using third plant, minimum cost is achieved. If less production OP_0 is to produce it is better to use plant of better capacity (second whose cost run SAC_2) rather than earlier. If more production OP_1 has to achieve it is better to use plant of less capacity (third whose cost is SAC_3) than fourth one.

LONG-RUN MARGINAL COST

In long-run, the rise in the total cost due to one additional unit of production is called long-run marginal cost (LMC). It is clear from diagram that

when LAC decreases the LMC is less than it. LMC is equal to LAC to minimum point P. After this when LAC rises LMC is more than it.

ESSAY TYPE QUESTIONS

1. Briefly describe the cost-output relationships in different time periods.
2. Explain the cost and output relation during short-run. Analyse the importance of short-run cost to the business management.
3. Describe relationship of long-term costs and production and state its importance in business decisions.
4. Describe the short-run average costs and output relationship with the help of suitable diagrams.
5. State the salient features of long-run average cost curve and discuss its usefulness in managerial decision-making.
6. Discuss the concept of total cost and explain with suitable diagram the nature of fixed and variable costs.
7. What is meant by Marginal and Average Cost of Production ? Elucidate the geometrical relationship between the two, in short-run.
8. Explain the cost-output relationship in the short-run.
9. What is meant by long-run Average Cost Curve ? What are its characteristics ? Discuss its managerial utility.
10. What is the relationship between the average cost and the marginal cost of a firm ? Prove that the marginal cost curve intersects the average cost curve at its lowest point.
11. What is meant by average fixed cost, average variable cost, average total cost and marginal cost. Explain their relationship with the help of suitable diagrams.

SHORT TYPE QUESTIONS

1. Explain the meaning of fixed and variable costs.
2. Distinguish between fixed and variable costs.
3. State briefly the meaning and computation method of marginal cost.
4. What is the relation between average and marginal cost ?
5. Outline the importance of short-run cost analysis.
6. How is long-run average cost curve drawn from various short-run average cost curves ? Give suitable diagram also.
7. State the uses of long-run average cost curve.

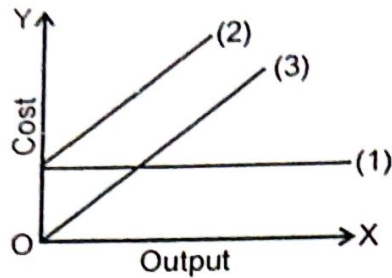
VERY SHORT TYPE QUESTIONS

1. What is called variable cost ?
2. State the shape of average fixed cost curve.
3. What is meant by average variable cost ?

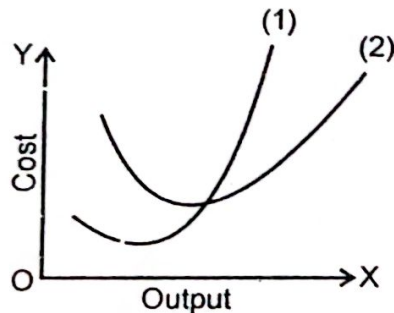
4. Write the types of long-run costs.
5. Write the meaning of marginal cost.

OBJECTIVE QUESTIONS

1. In the diagram, curves (1), (2), and (3) indicates respectively :



- (a) Variable, marginal and total costs
 - (b) Fixed, variable and total costs
 - (c) Fixed, total and variable costs
 - (d) Variable, total and fixed costs
2. The shape of average fixed cost curve to be like.....
 - (a) Rectangular hyperbola
 - (b) U
 - (c) O
 - (d) None of the above
 3. Which is not the attribute of long-run average cost curve ?
 - (a) Envelope Curve
 - (b) Only tangential to SAC
 - (c) U shaped
 - (d) Always more than SAC curves.
 4. In the diagram (1) and (2) are.....respectively.



- (a) Fixed and Variable costs
- (b) Average and total costs
- (c) Marginal and average costs
- (d) None of the above

Ans. 1. (c), 2. (a), 3. (d), 4. (c)

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