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SUBJECT- PRINCIPLES OF ECONOMICS

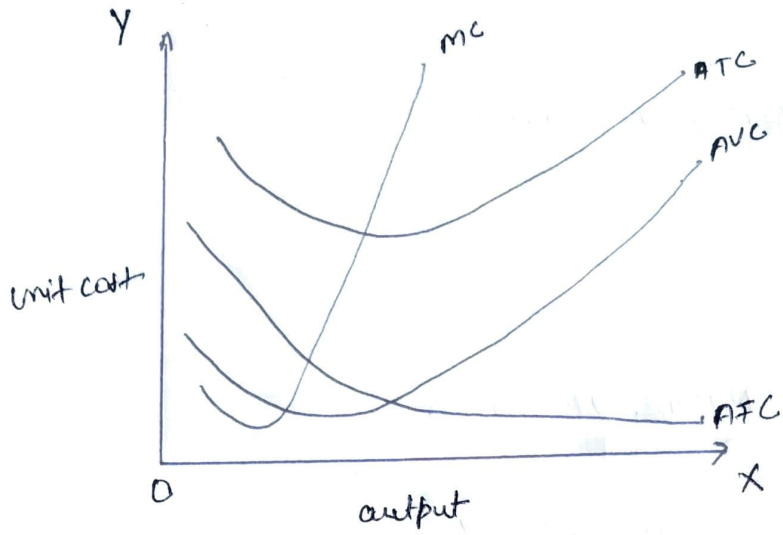
PRODUCTION: NATURE OF COSTS-2

* 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 slopping 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): It 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.

$$MC = \Delta TC / \Delta Q$$ where, ΔTC = Change in Total cost
ΔQ = 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 b/w AVC, AFC, ATC and MC can be summed up as follows.

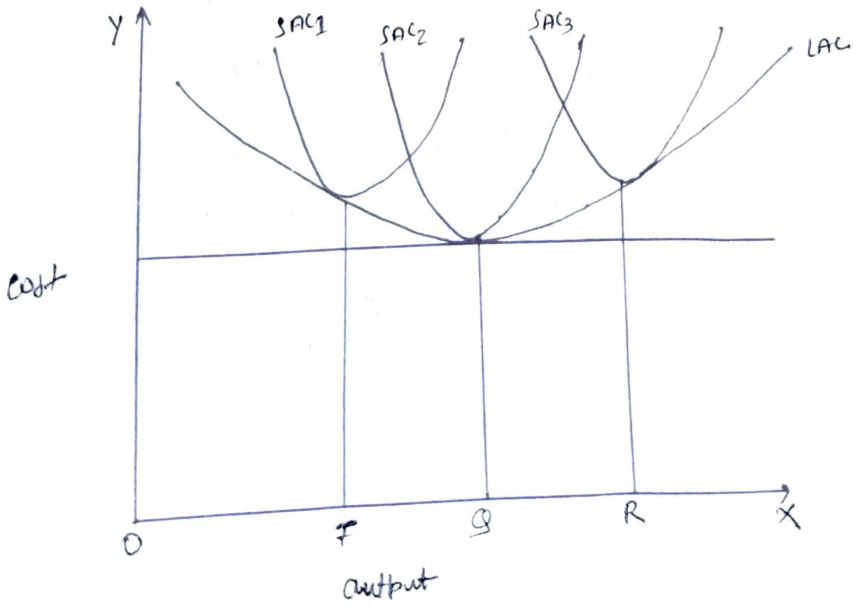
1. If both AFC and AVC fall ATC will also fall because ATC = AFC + AVC.

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.

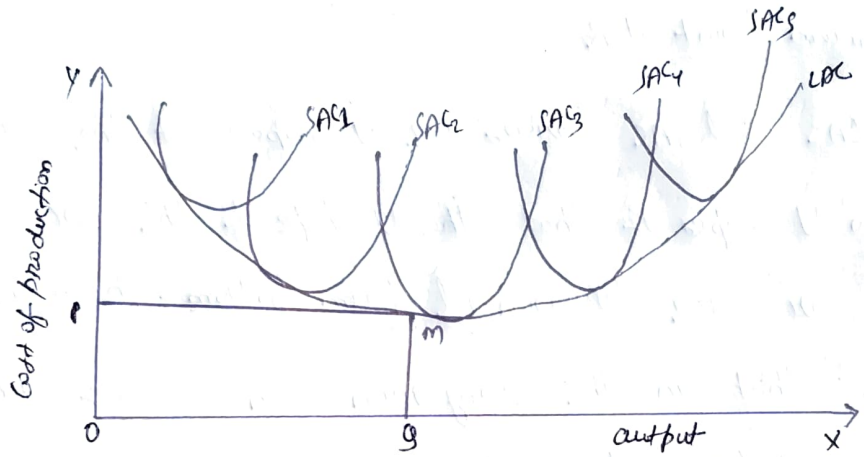
3. ATC will fall when MC is less than ATC and ATC will rise when MC is more than ATC. The lowest ATC is equal to MC.

* 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 firm operate under plant SAC_2 and produces output OQ. If the firm decides to produce output OR and continues with the current plant SAC_2 its average cost will be UR. But if the firm decides to increase the size of the plant to plant SAC_3 its average cost of producing OR output will be TR which can be obtained by increasing the plant size.



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 a 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 SAC_3 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 b/w 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.