INDIAN SCHOOL MUSCAT

DEPARTMENT OF COMMERCE AND HUMANITIES

CLASS – XI – MICROECONOMICS

CONCEPTS OF COST

STUDY NOTES

Cost and Cost Function

Cost is a derived function. It is derived from production function which describes the most efficient method of producing a commodity. Cost of producing a commodity is the payment made to the factors of production which are used in the production of that commodity.

Types of Cost

1. Explicit Cost: Cost on factor and non-factor inputs hired or purchased from the market
2. Implicit Cost: Cost on self-owned or self-supplied factor inputs used by the used of production units.

Cost Function

A cost function shows the functional relationship between output and cost of production. It gives the least cost combinations of inputs corresponding to different levels of output.

Cost function is given as:

C = f (X), ceteris paribus where, C = Cost X = Output

TIME ELEMENT IN COST

The time factor is very important in the theory of cost. The time period is classified into two categories: (a) short-run and (b) long-run. Accordingly there are two types of costs:

Short-run Costs

The short-run costs are the costs over a period during which some factors in fixed supply, like plant, machinery, etc. It is sum total of fixed cost and variable cost incurred by the producer in producing the commodity. Production in the short-run can be increased only to the extent possible by using fixed factor to the full capacity and by increasing the units of variable factors.

Long-run Costs

The long-run costs are the costs over a period long enough to permit changes in all factors of production. In this period, firms can increase production using more of all factors. Supply of a commodity can be adjusted to changes in demand.

Total, Average and Marginal Costs

There are three costs in the short-run:

1. Total Cost
2. Average Cost
3. Marginal Cost

Total Cost (TC = TFC + TVC)

Total cost of production (TC) is divided into two parts: total fixed costs (TFC) and total variable costs (TVC), such that:

TC=TFC+TVC

Total Fixed Cost or Supplementary Cost

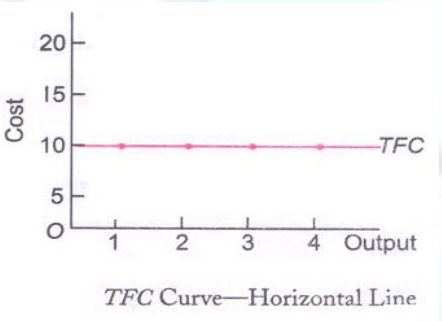
They are short-run costs. **Fixed costs are the sum total of expenditure incurred the producer on the purchase or hiring of fixed factors of production.**

Fixed costs are costs that do not change with a change in output. They are incurred irrespective of the amount of good produced. Examples of fixed costs are: Overhead expenses, wages/salaries, depreciation of machinery, and insurance amount.

Fixed costs are also known as overhead costs because they cover overhead expenses. The concept of TFC is explained with the help of a schedule given and diagram.

TFC Schedule

Output	TFC(₹)
0	10
1	10
2	10
3	10
4	10



TFC Curve—Horizontal Line

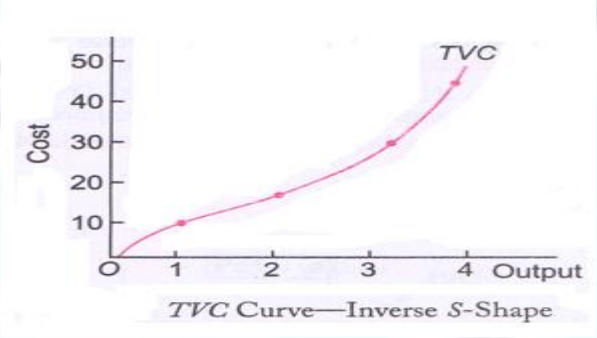
TFC remains constant at ₹10 whatever be the level of output. TFC curve is always a straight line parallel to the axis. Since fixed factors are purchased before production actually starts, fixed sts are incurred even when output in zero.

Total Variable Cost

Variable costs· are those costs which vary with the quantity of output produced. Examples of variable costs are (i) cost of direct labour, (it) running expenses like cost of raw materials, fuel, etc.

Variable costs are also called Prime cost. TVC schedule and it is graphically illustration is follows:

Output	TVC(₹)
0	0
1	10
2	18
3	30
4	45



TVC Curve—Inverse *S*-Shape

When no output is produced, TVC is zero. As output produced increases, TVC rises initially at a decreasing rate and then at increasing rate. TVC curve is an inverse S-shaped curve originates from the origin. The reason behind its shape is the law of variable proportion.

Distinction between Fixed Cost and Variable Cost

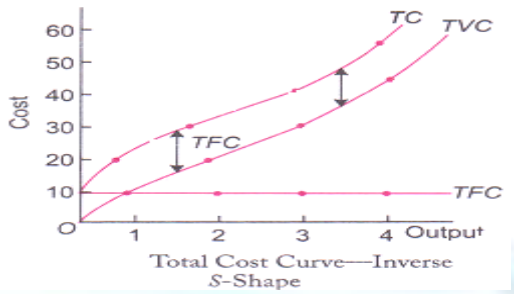
Fixed Cost (FC)	Variable Cost (VC)
FC are incurred on the fixed factors production like machines, buildings, insurance, etc.	VC are incurred on variable factors production like labour, raw material, transport, etc.
FC do not increase or decrease with a rise or fall in the level of output.	VC changes with changes in the level of output.
FC cannot be changed during short-run.	VC can be changed during short-run.
FC are never zero even when production	VC is zero when production is stopped.
Production at the loss of FC may continue	Production at the loss of VC will not continue.
Graphically, TFC curve is parallel to x – axis	Graphically, TVC curve is inverse 'S' shaped

Total Cost

Total Cost (TC) is defined as the aggregate of all costs of producing any given level of output. It is the total expenditure incurred by a firm for obtaining factors of production required for production of a commodity. TC is derived by the sum total of TFC and TVC.

TC= TFC+ TVC

Units	TFC(₹)	TVC(₹)	TC(₹)
0	10	0	10
1	10	10	20
2	10	18	28
3	10	30	40
4	10	45	55



TFC is a horizontal line and TVC is an inverse S-shaped starting from the origin. TC curve is an inverse S-shaped curve starting from the level of fixed cost (₹10). A change in TC is entirely due to change in TVC. TC curve is above TVC curve by the amount of TFC. The vertical distance between TVC and curves is the amount of TFC.

Average Cost (AC = AFC + AVC)

In the short-run, the average cost curves are more important than the total curves. The average cost is easily obtained as follows:

TC = TFC + TVC ... (1)

Dividing equation (1) by the level of output (X), we get

$$\frac{TC}{X}=\frac{TFC}{X}+\frac{TVC}{X}$$

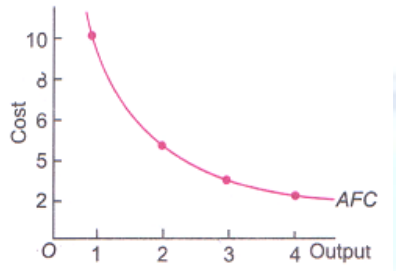
OR AC = AFC + AVC

Average Fixed Cost

AFC is defined as the fixed cost of producing per unit of the commodity. It is obtained by dividing TFC by the level of output.

$$AFC = \frac{TFC}{\text{No. of units produced}} = \frac{TFC}{X}$$

For instance, if TFC of producing 5 pencils is ₹50 then AFC will be ₹ 10. AFC schedule and curve are:



Units	TFC(₹)	AFC(₹)
0	10	00
1	10	10
2	10	5
3	10	3.3
4	10	2.5

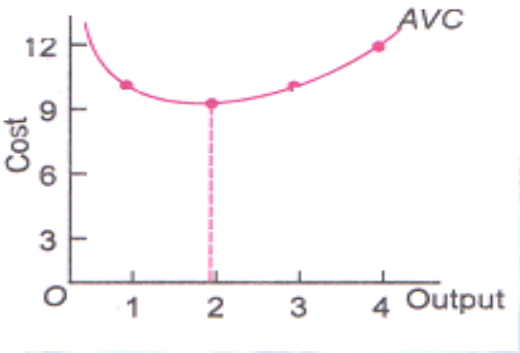
AFC curve derived from TFC curve is a rectangular hyperbola. It shows declining values of fixed cost per unit of output produced. The downward sloping AFC curve can never touch either the x-axis or the y-axis

Average Variable Cost

AVC is defined as the variable cost of producing per unit of the commodity. It obtained by dividing TVC by the level of output.

$$AVC = \frac{TVC}{X}$$

For instance, if TVC of manufacturing 5 pencils is ₹100, then AVC will be ₹20. AVC schedule and AVC curve are:



Units	TVC(₹)	AVC(₹)
1	10	10
2	18	9
3	30	10
4	45.	11.3

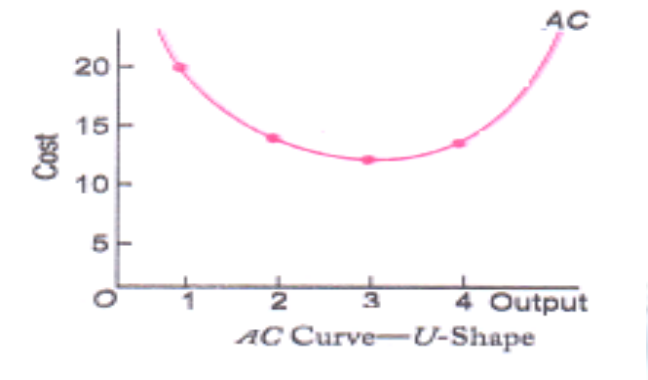
Average cost (AC) or Average Total cost (ATC)

AC is defined as cost of producing per unit of the commodity. AC can be derived in two ways:

1.AC is obtained by dividing TC by the level of output.

$$AC = \frac{TC}{X}$$

Unit.	TC(₹)	AC(₹)
1	20	20
2	28	14
3	40	13.3
4	55	13.8



AC Curve—U-Shape

The AC curve as derived from TC curve is U-shaped. It shows that as output increases the value of AC falls continuously till it reaches a minimum point. Beyond this point, the AC starts rising. The reason behind the U-Shape of AC curve is the law of variable proportion.

2. AC can be obtained by adding AFC and AVC values

AC=AFC+AVC

Unit.	AFC(₹)	AVC(₹)	AC(₹)
1	10	10	20
2	5	9	14
3	3.3	10	13.3
4	2.5	11.3	13.8

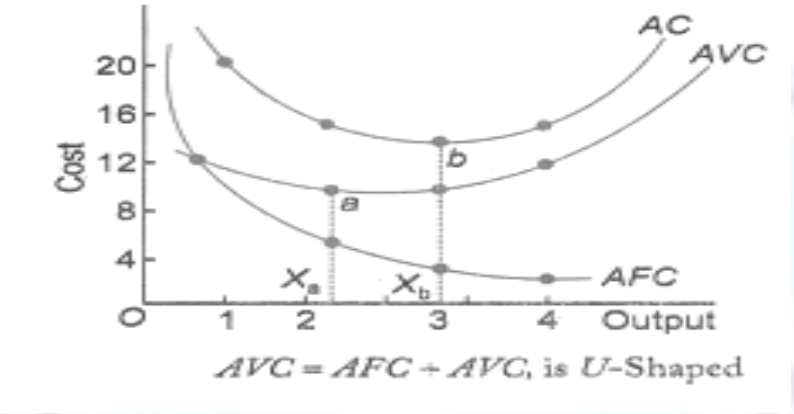
AC curve is U-shaped. The reasons for U-shape of AC curve are:

- ✶ AC includes AFC and AFC falls continuously with increase in output. Once AVC has reaches its minimum point, it starts rising. The rise is because of fall in the AFC. The result is that AC continues to fall. Ultimately, the rise in AVC becomes greater than the fall in the AFC such that AC starts rising.
- ✶ The U-shape of AC curve is due to the law of variable proportion. The law states that, initially when variable factor combined with the; fixed factor, production increases at an increasing rate implying AC falls. The best combination of fixed and variable factors occurs at the lowest point on the AC curve. Beyond that point AC curve starts increasing due overutilisation of the fixed factor.

Relationship between AC and AVC Curves

1. AVC is a part of AC since AC = AFC + AVC.

2. The minimum point of ATC will always occur to the right of the minimum point of AVC
3. Both AVC and AC are U-shaped due to the law of variable proportion



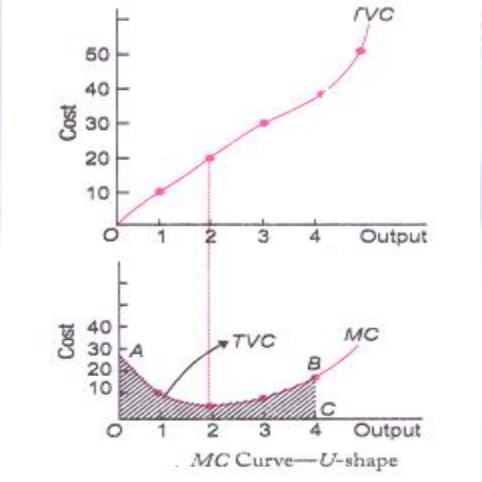
Marginal Cost (MC)

Marginal cost is denned as addition made to total variable cost when one more unit of output is produced.

$$MC = \frac{\Delta TVC}{\Delta X}$$ **OR MC = TCn – TCn-1 OR MC = TVCn – TVCn-1**

Also ∑MC = TVC

The sum total of MC corresponding to different units of output gives TVC. For instance, if the TVC of producing 5 pencils is ₹ 150 and when 6 pencils are produced TVC rises to ₹ 162. Then MC is ₹ 12.



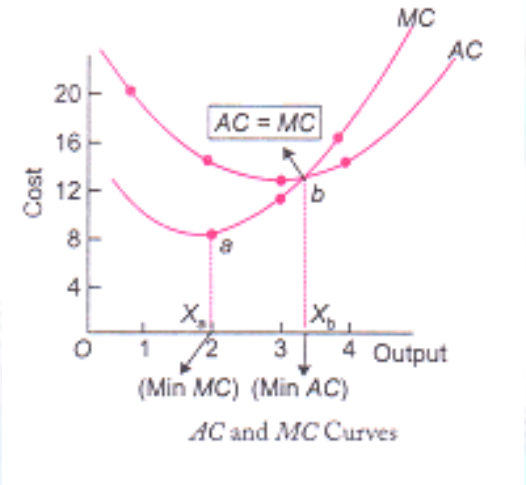
Units	TVC(₹)	MC(₹)
0	0	-
1	10	10
2	18	8
3	30	12
4	45	15

Relationship between TVC and MC Curves

1. MC is the slope of the TVC curve at each and every point. The value of slope declines continuously, reaches a minimum, and then starts rising.
2. To an inverse S-shape of TVC curve which starts from the origin MC is U-shaped.
3. MC is addition made only to variable cost. Fixed costs do not affect MC.
4. When TVC rises at a diminishing rate, MC declines.
5. When TVC rises at an increasing rate, MC rises.
6. TVC is equal to the sum of MC. graphically; TVC is the area under the MC curve. For example, at output TVC is equal to the area OABC.

Relationship between AC and MC Curves

1. Both AC and MC are derived from TC by the formulas:
   1. $AC = \frac{TC}{X}$ OR $MC = \frac{\Delta TC}{\Delta X}$
2. Mathematical derivation of AC and MC values from the TC values is as follows



AC and MC Curves

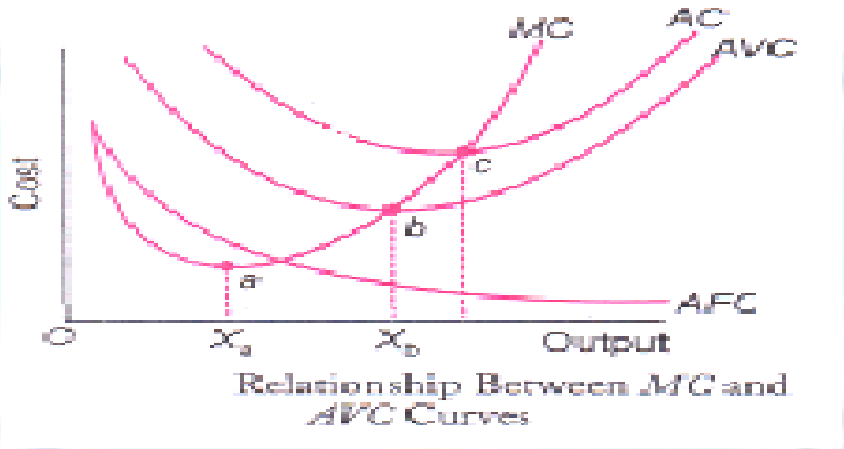
Units	TC(₹)	AC(₹)	MC(₹)	AVC(₹)
0	10	-	-	-
1	20	20	10	10
2	28	14	8	9
3	40	13.3	12	10
4	55	13.8	15	11.3

1. Both AC and MC curves are U-shaped, reflecting the law of Variable Proportion.
2. AC includes both variable cost and fixed cost since AC = AFC + AVC. But MC is addition made only to variable cost when output is increased by one more unit.
3. When AC is falling, then MC is below AC.
4. When AC is rising, then MC is above AC.
5. When AC is neither falling nor rising, then MC=AC
6. MC curve cuts the AC curve at its minimum point.

Relationship between AVC and MC Curves

1. Both AVC and MC are derived from TVC by the formulas,
2. $AVC = \frac{TVC}{X}$ and $MC = \frac{\Delta TC}{\Delta X}$ since MC is the change in TVC or TC due to additional unit produced.
3. Both AVC and MC curves are U-shaped reflecting the law of Variable Proportion.

4. The minimum point of AVC curve will always occur to the right of the minimum point of MC curve.
5. When AVC is falling, MC is below AVC,
6. When AVC is rising, MC is above AVC.
7. When AVC is neither falling nor rising, then MC = AVC.



Relationship Between *MC* and *AVC* Curves

LONG-RUN COST CURVES

In the long-run all inputs are variable. There are no fixed factors and no fixed costs. Firm's long-run decisions are called planning decisions. In the long-run, there are few constraints facing a firm. A firm attempts to maximise profits by selecting scale of plant that minimises cost. For this reason the long-run cost curves are very important as they help in correct choice of a production technology.

Two important costs in the long-run are:

1. **Long-run Average Costs (LAC):** The LAC shows the average cost of production when all factors are variable in supply. **LAC shows the minimum cost per unit of producing each level of output when the capacity of the firm can be varied**.
2. **Long-run Marginal Cost (LMC): The LMC shows addition made to long-run total cost when output is increased by one more unit.**

Both LAC and LMC are U-shaped. The reason behind the U-shape of the LAC is the law of returns to scale. According to this law, a firm enjoys increasing returns to scale when it increases the scale of its operation. Increasing returns occurs due to merits of division of labour and volume discounts. Constant returns to scale operate at a single level of output. Decreasing returns to scale operates when the firm expands beyond its optimum capacity.

Relationship between LAC and LMC curves: (USE SAME DIAGRAM AS SHORT RUN)

(a) The U-shape of the LAC curve implies that LMC is also U-shaped.
(b) The LMC curve cuts the LAC curve at its minimum point.
(c) When LAC is falling, LMC is below it.
(d) When LAC is rising, LMC is above it.
(e) When LAC is at its minimum point, then LMC = LAC