

Tsinseta Lemariam Senior Secondary School Grade -10 Economics

Short Notes on Chapter-3 11/04/2017 E.C

Activities on unit-2

Activity 2.1

1. Define demand.
2. What factors affect demand?
3. Explain the demand schedule and demand curve concepts.
4. What is the difference between changes in quantity demanded and changes in demand?
5. What do you mean by individual demand and market demand?

Activity 2.2

1. Define supply.
2. What is the market supply of 100 identical wheat suppliers if the supply function of a typical supplier is $Q_s = 3p - 2$?

Activity 2.3

1. Explain Excess demand and excess supply.
2. When supply remains unchanged, what is the effect of a change in demand on price?

Activity 2.4

Points	A	B	C	D	E
Price (Birr)	0	2	4	6	8
Quantity	800	600	400	200	0

1. From above table (demand schedule), find the price elasticity of demand between two points (C and E).

Activity 2.5

Income (I) Birr per year	12000	16000	20000	24000	28000
Quantity (Q) unit per year	10	15	18	19000	20000

1. From the above table, compute the income elasticity of demand at an income level of Birr 20,000.

Activity 2.6

1. Explain the meaning and types of elasticity
2. When is the market said to be in a state of equilibrium?
3. What will be the effect on the demand for tea if the price of coffee rises?
4. What factors determine price elasticity of demand?

Unit -3 Theories of Production and Cost

Main Contents;

3.1 Theory of Production

3.2 Theory of Cost

3.1. Theory of Production

Introduction

Production is a scientific process that involves the transformation of raw materials (inputs) into desired products or services (outputs) by adding economic value. Production of goods and services involves transforming resources such as labor power, raw materials, services, and machines into finished products.

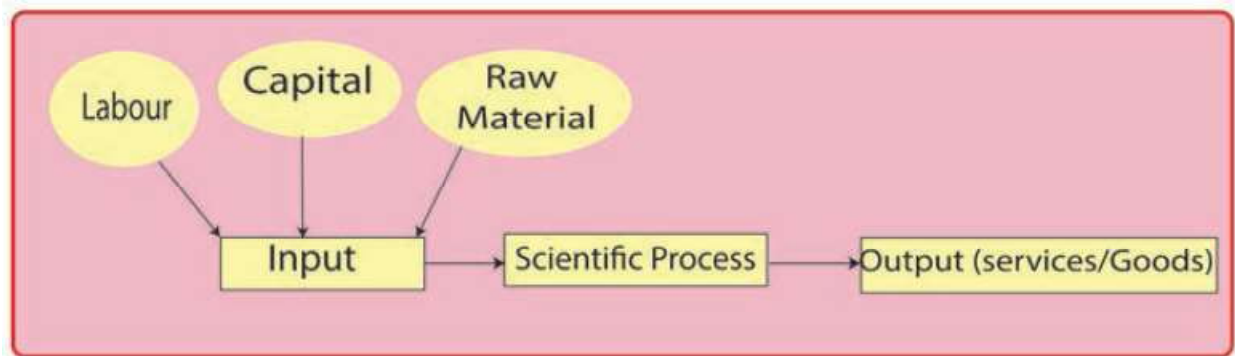


Figure: Production

3.1.1 Production Function

- ✓ is a function which gives the effective output that a producer (firm) can produce for a given combination of raw materials. Let us have inputs labor (L) and capital (K) as the only inputs, mathematically, the production function can be written as: $Q = f(L, K)$.
- ❖ **Short Run:** short-run is the period of time at which at least one factor of production is fixed.
- ❖ **long run:** long run is the period of time which is sufficient when all quantities of raw materials (inputs) are variable.

3.1.2 Short Run Production Function

This is an example of a function at which one input is variable with the other inputs fixed (example: Land (L_a), Capital (K), Labour (L), Technology (T)). And the function is written as: $Q = F(L, L_a, K, T)$. This is a production function in which production changes due to labour while the other inputs remain constant.

- We have three basic interrelated deals in the of the production function as follows:
 - ✓ **Total physical product (total product) (TP)**
 - ✓ **Average physical product (Average product) (AP)**
 - ✓ **Marginal physical product (marginal product) (MP)**

1. Total product (TP): is the total output produced by a given amount of a variable input, keeping the quantity of other (fixed) inputs constant.

2. Average Product (AP): To calculate the average product (AP), the total product is divided by the number of units of that input. $APL = \text{Total product} / \text{Numbers of workers}$.

3. Marginal Product (MP): The marginal product (MP) is the extra or additional output obtained with one extra unit of the variable input while all other variables remain constant. $MPL = (\text{Change in total product}) / \text{Change in number of workers} = (\Delta TTTT) / \Delta LL$

3.1.2.1. The Law of Diminishing Marginal Productivity

Initially, as more of the variable inputs are employed together with the fixed ones, the output level increases dramatically to a certain extent, i.e. the marginal contribution of one more variable input (say, labor) increases sharply. But as the number of labor employed increases with

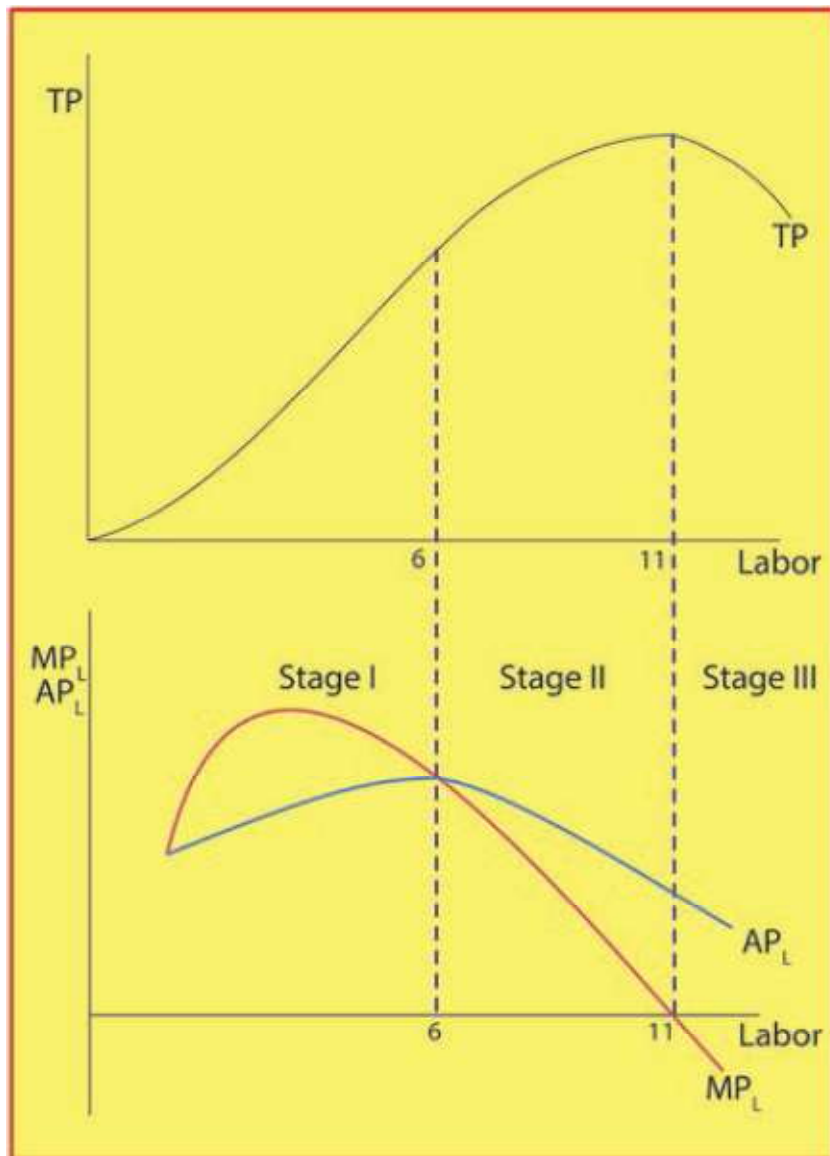
a fixed capital, the production capacity goes to exhaustion and eventually the total output declines, i.e. the additional contribution of extra laborers employed becomes a loss or negative.

- ✓ the **law of diminishing Marginal Productivity** states that increasing the amount of the variable factor (labor) with the fixed factor (capital) will lead to an eventual decline in the marginal contribution of the additional labor to the total output. This leads to an eventual decline in total output.

3.1.2.2 Stages of production

This stage shows different levels of output that the firm can obtain by efficiently utilizing different units of labor.

- 1. Stage I (increasing returns stage):** this stage includes the range of variable inputs at which the MP_L continues to rise, i.e., up to the point of MP_L .
- 2. Stage II (the diminishing returns stage):** is a value over which MP_L is positive but decreasing.
- 3. Stage III (negative returns stage):** defined as a range of negative MP_L or decreasing TP .



NB: this graph shows the relationships between the variable inputs(L), and explains the law of diminishing marginal returns. from the above graph, as we add more units of labor on the fixed inputs, our total product first increases. It, then reaches its maximum and starts to fall. The same is true for MP_L and AP_L . TP and MP_L are related in the following ways:

- MP_L increases when TP increases at an increasing rate.
 - It starts to fall but then remain positive when TP increases at a decreasing rate.
 - MP_L reaches zero when TP is maximum and When TP is falling, MP_L becomes negative.
- AP_L also increases first, reaches its maximum, and starts to fall, but it remains positive whenever TP is positive.

The Relationship between MP_L and AP_L : As you have seen from the above figure, the MP_L curve reaches its maximum before the AP_L curve. Also, as long as the AP_L is rising, the MP_L is above it; when the AP_L is falling, the MP_L is below it. When the AP_L is at its maximum, the MP_L is equal to the AP_L . Thus,

- ✓ For the AP_L to rise the addition to TP (or MP_L) must be greater than the previous AP_L , i.e. AP_L rises when $MP_L > AP_L$.
- ✓ For the AP_L to fall, the addition to TP (or MP_L) must be less than the previous average, i.e. AP_L falls when $MP_L < AP_L$.

3.1.3 The Long-Run Production Function

- ✓ It is a production function in which all inputs are variable (change in their quantities). The firm can produce an output with the variable inputs (capital and labour).

Isoquant: is a curve that shows all possible efficient combinations of variable inputs that yield equal level of output. If both labor and capital are variable inputs, the production function will have the form. $Q = f(L, K)$;

- ❖ **Isoquant schedule:** is a table that represents the various combinations of two variable inputs which yield the same level of output.
- ❖ **Isoquant curve:** is a curve that shows different combinations of two variable inputs which yield the same level of output.

Factor Combinations	labour (units)	Capital (units)	Capital (units)
A	1	11	100
B	2	7	100
C	3	4	100
D	4	2	100
E	5	1	100

This table shows that input combination A, consisting of 1 unit of labor (L) and 11 units of capital (K), produces 100 units of output. While combination B consists of 2 units of labor and 7 units of capital. Similarly, combination C consists of 3 units of labor and 4 units of capital, and so on.

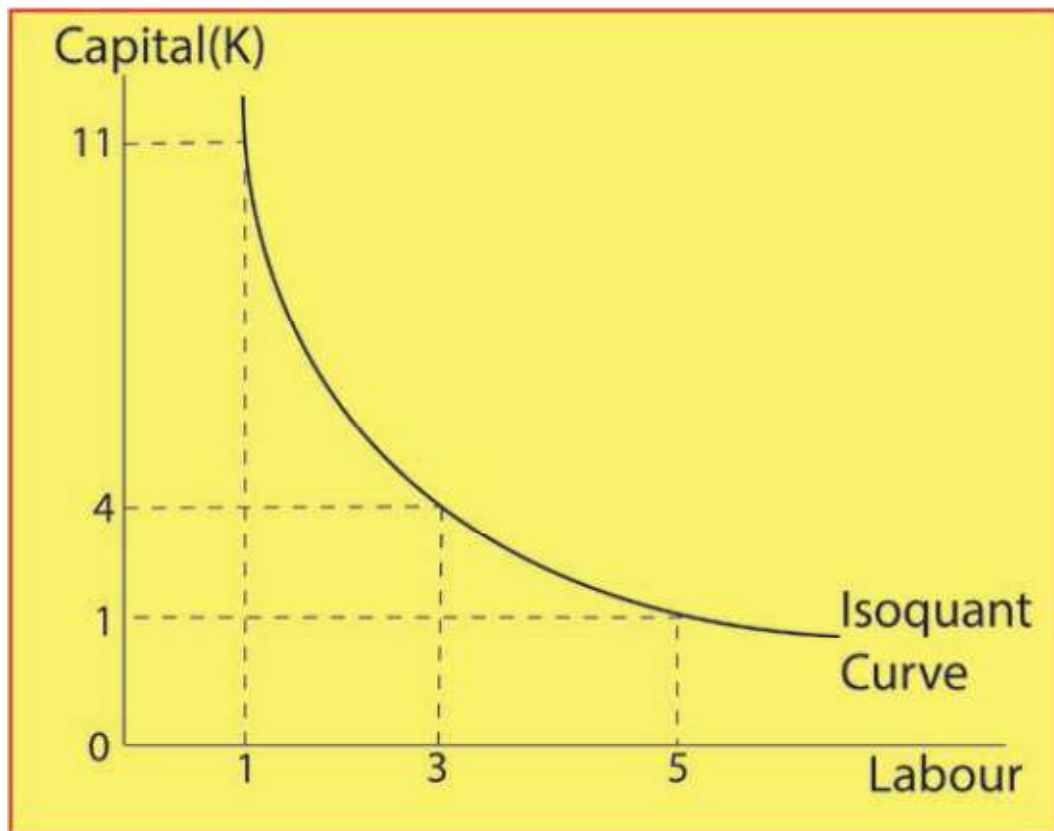
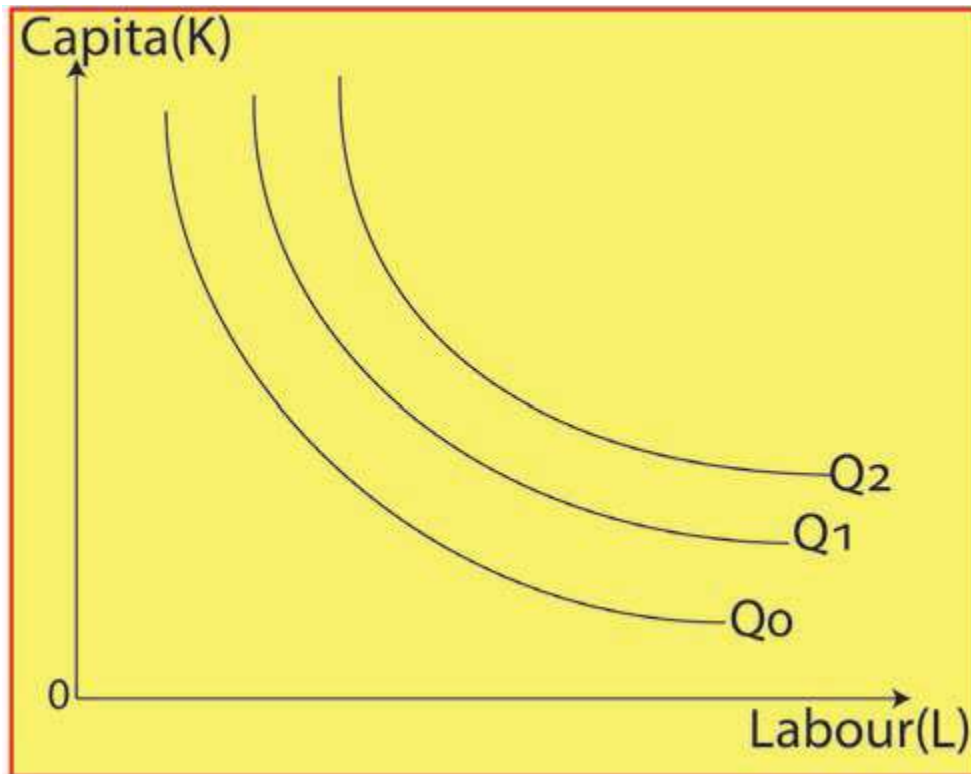


Figure: Isoquant Curve

- ❖ **Isoquant map(graph):** is a graph combining a set of Isoquant. The level of output increases as we move upward to the right, while it remains constant along an Isoquant.



Properties of isoquants

- I. Isoquants are down ward sloping due to using more of one factor than other to produce the same level of out put.**
- II. The further an isoquant lays away from the origin, it denotes the greater the level of output.**
- III. Isoquants do not cross each other.**
- IV. Isoquants are convex to the origin.**

The slope of an isoquant/ marginal rate of technical substitution (MRTS): slope of the isoquant ($\Delta K/\Delta L$) defines the degree of substitutability of the factors of production.

Returns to Scale: it tells us the percentage increase in output when a firm increases all of its input quantities by a given percentage amount. We have three cases of returns to scale: increasing, constant, and decreasing returns to scale.

- I. Increase returns to scale:** when all factors are by the the same proportion “M” leads to an increase in out put by more than “M” scale.
- II. Constant returns to scale:** if both input and output are increased by the same proportion.

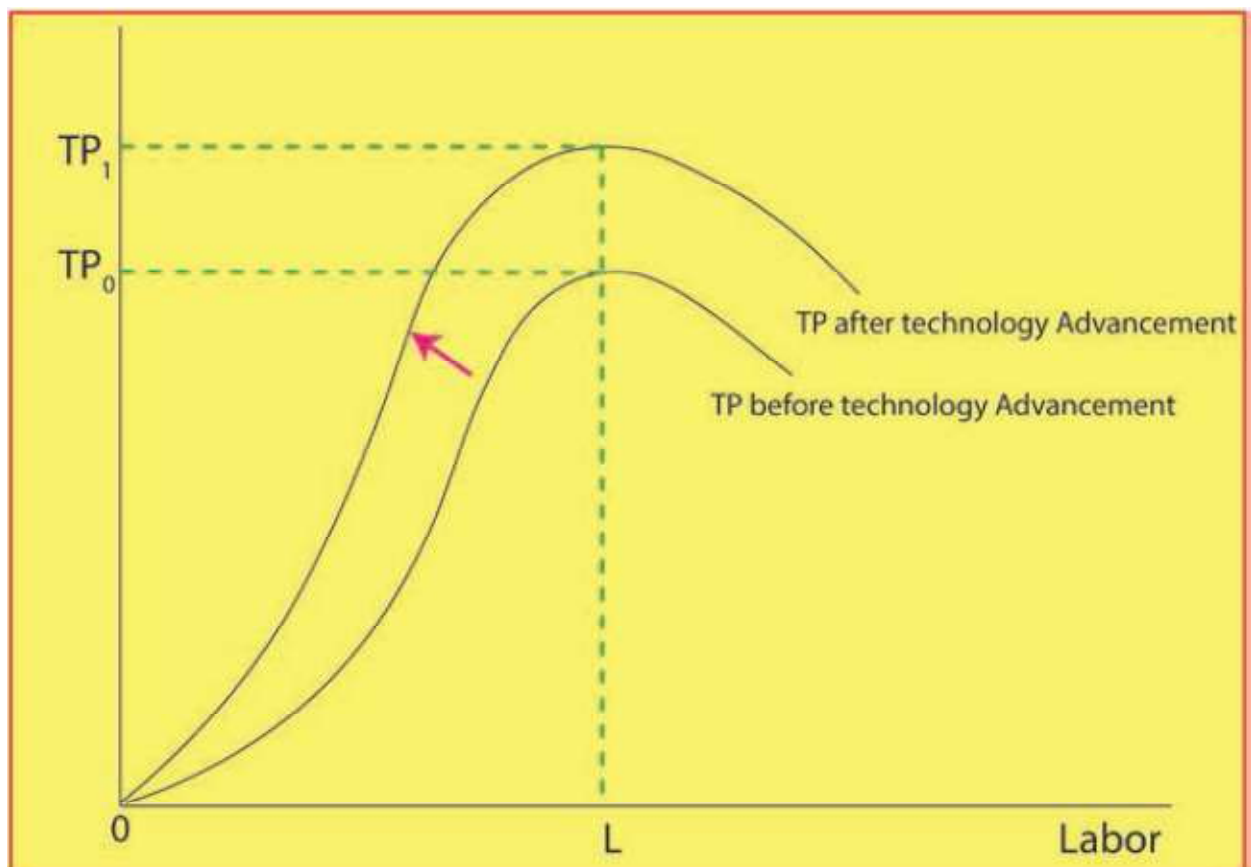
III. Decreasing returns to scale: is when all inputs scaled up by greater than the scale of output.

3.1.4 Technology Change and the Position of Production Curves

Technological change (progress) makes factors of production more productive.

This causes the position of production curves to move upward.

This shift shows that the same output may be produced by less factor inputs, or more output may be produced with the same inputs.



Technical progress may also change the shape (as well as produce a shift) of the isoquant. There are three types of technical progress, depending on its effect on the rate of substitution of the factors of production.

1. Capital side technical progress(capital saving or labor using technical progress): a technical progress which increases the MP_K by more than the MPL . K/L

ratio is constant, the $MRTS_{L,K}$ decreases in absolute terms (the slope of an isoquant

declines). The slope of the shifting Isoquant becomes less steep.

2.Labor side technical progress(labor saving or capital using technical progress): a technical progress which increases the MP_L by more than the MP_K . Capital labor ratio (K/L) is constant, the $MRTS_{L,K}$ increases(the slope of an Isoquant increases in absolute value).

3.Neutral technical progress: MP_L and MP_K by the same percentage, so that the $MRTS_{L,K}$ (along any radius) remains constant.

Activity 3.1

1. Define the function of production.
2. Differentiate between short run and long run production functions.
3. Explain the return to scale.
4. What stages must a firm follow in its production process?
5. Explain technology change and the position of production curves.

3.2. Theory of Cost

Introduction: “cost of production” is referred to as the the prices of inputs or the expenditures the firm incurs on inputs.

3.2.1 Short-Run Costs

Short-run costs are costs over a period during which some factors of production (usually capital equipment and management) are fixed. In short run based fixed and variable inputs, total cost (TC) is divided into two parts:

I . Total Fixed Cost (TFC): TFC is a cost that does not vary with the level of output (it does not change with change in quantity of output).Thus, it is independent of output. Fixed costs consists costs such as: salaries of administrative staff, expenses for building depreciation and repairs, etc.

II .Total variable cost (TVC): TVC is a cost that varies as output varies. These costs vary directly with changes in the volume of output, rising as more is produced and falling as less is produced. The variable costs include: the cost of raw materials, the cost of labor, etc.

Total Cost (TC): Total cost is the cost incurred on all types of inputs fixed. Total cost of production is the sum of all fixed and variable costs ($TC = TFC + TVC$).

Output (Quantities)	TFC (in Birr)	TVC(in Birr)	TC(in Birr)
0	100	0	100
1	100	30	130

2	100	56	156
3	100	75	175

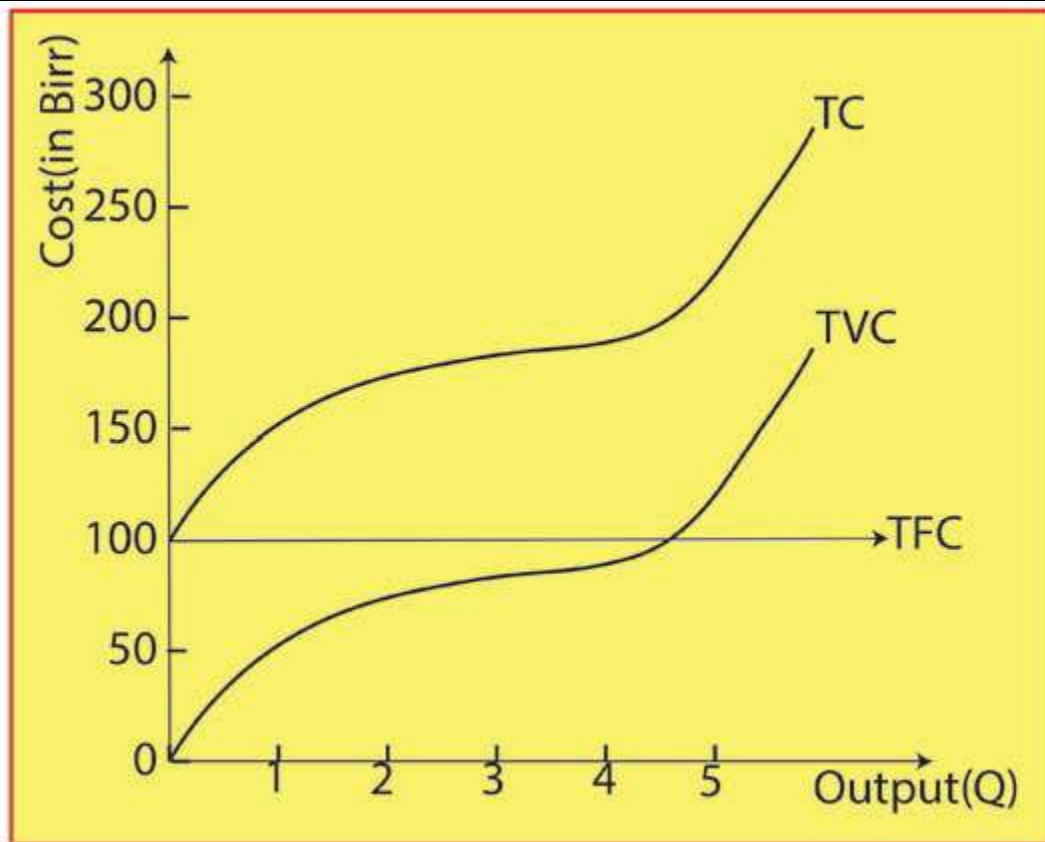


Figure: Total Fixed Cost, Total Variable Cost, and Total Cost Curves

The total variable cost initially increases at a decreasing rate at the initial stage of production, as more of the variable factors are employed. When the productivity of the variable input falls, larger and larger units of the variable input will be needed to increase output by the same unit.

- ❖ **AFC (Average Fixed Cost):** AFC is the total fixed cost divided by the amount of output, i.e., $AFC = TFC/Q$.
- ❖ **Average Variable Cost (AVC):** The average variable cost is the per-unit cost of the variable factors of production. It is obtained by dividing the total variable cost by the total units of output. $AVC = TVC/Q$
- ❖ **ATC (Average Total Cost):** ATC (Average Total Cost) is the per-unit cost of both fixed and variable factors of production.

$$ATC = TC/Q = (TVC + TFC)/Q = (TVC/Q) + (TFC/Q) = AVC + AFC$$

- ❖ **Marginal Cost (MC):** Marginal Cost is the extra or additional total cost that results from producing one more unit of output; or it is the change in total cost resulting from a percentage change in output.

$$MC = \Delta TC / \Delta Q = TFC / \Delta Q + TVC / \Delta Q = TVC / \Delta Q \text{ (because } \Delta TFC = 0\text{)}.$$

The Relationship between Average and Marginal Cost Curves: Cost curves show how average and marginal costs vary with output level. Since the TFC is constant, it falls continuously as output increases. The AVC declines first, reaching a minimum level, then starts rising and shows a U- shaped structure. The MC also declines first, reaches its minimum, and then rises. The MC curve passes through the minimum point of both the AVC and ATC curves. The below Figure shows the relationship between the ATC, AFC, AVC, and MC curves.

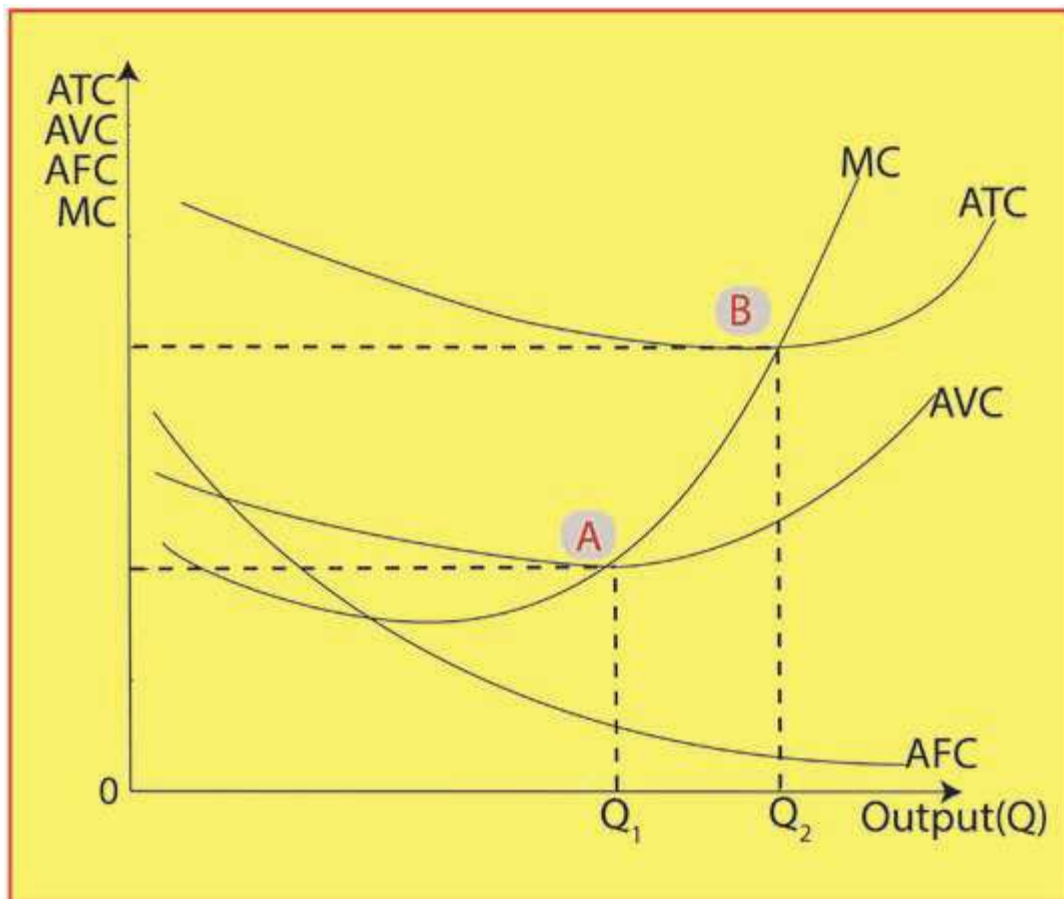


Figure : AC and MC curves

3.2.2 Long-run Costs : In this, the amounts of all the factors of production can be varied so that there are no fixed costs.

NB:For the analysis of the long-run cost of production, we use only three types of curves: the Long- Run Total Cost Curve (LTC), the Long-Run Average Cost Curve (LAC), and the Long-Run Marginal Cost Curve (LMC). Here also, LAC and LMC curves are U-shaped, but they are flatter than the short-run cost curves.

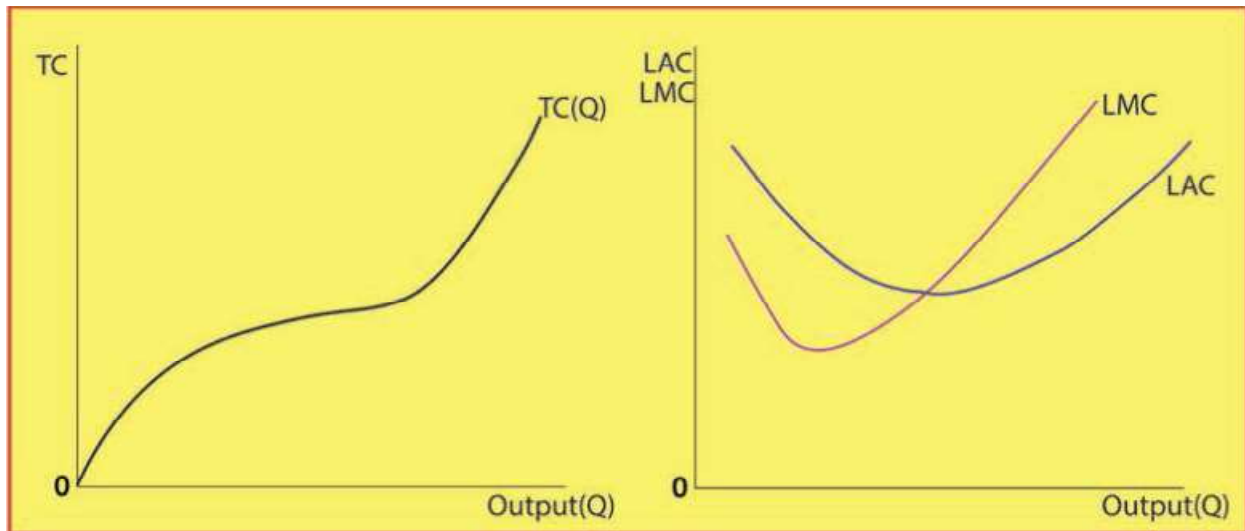


Figure: Long run total cost curve

Figure: Long run average cost and marginal cost curves

The range from the minimum point of LAC to the left is called the “economies of scale range,” which means output can be doubled for less than a doubled cost. The range from the minimum of LAC to the right is called “diseconomies of scale,” because a doubling of output requires more than a doubling of cost.

3.2.3 The Relationship Between Product and Cost Curves

Cost and production curves are mirror images of each other ,i.e. the relationship between cost and production is shown in the figure below.

- ✓ when AP(MP) rises, AC(MC) falls;
- ✓ when AP(MP) falls, AC(MC) rises; and
- ✓ When AP (MP) is maximum, AC (MC) is minimum.

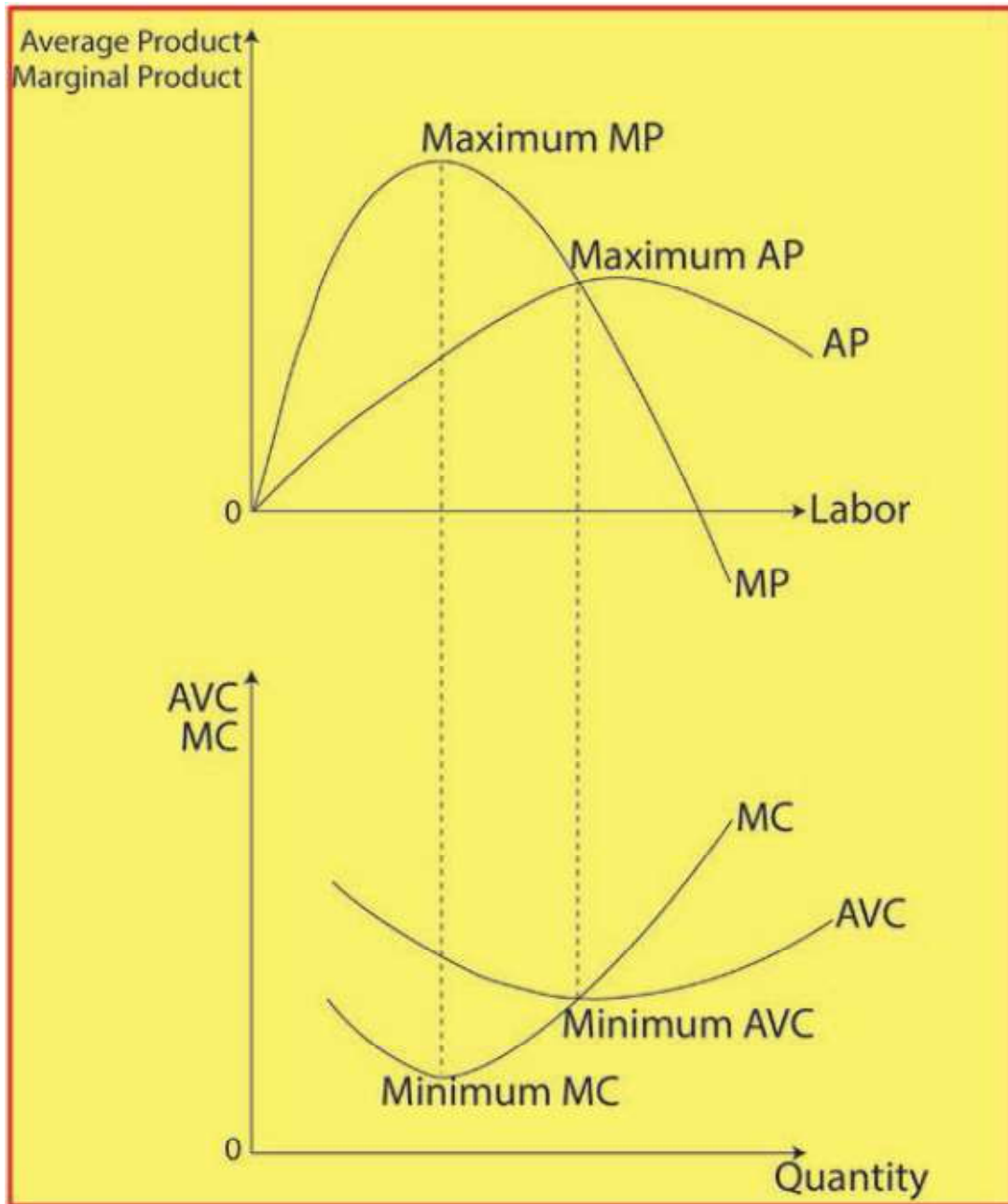


Figure :the relations hips between Production and Cost curves

Activity 3.2

1. Define the cost of production.
2. What is the difference between short run and long run costs?
3. Explain the link between production and costs.
4. Explain the relationship between product and cost curves.

Unit Review Exercises

Part I. Write ‘True’ if the statement is correct or ‘False’ if the statement is incorrect.

1. When marginal products are rising, the total product curve reaches its maximum.
2. Isoquants show the flexibility that firms have when making production decisions.
3. When the marginal product of labor is rising, the average product of labor is also increasing.
4. Advancement in technology may possibly shift the production function outward.
5. The gap between successive multiple isoquants is decreasing for a production function with increasing returns to scale.
6. The law of variable proportions states the marginal product factor will eventually decline.
7. The magnitude of fixed costs does not depend on the level of output.
8. All the short run average cost curves are u-shaped because of the law of diminishing returns.
9. The gap between AVC and AC is continuously narrowing as output increasing.
10. The optimal expansion path for a homogenous production function is a straight line from the origin.

Part II: Multiple-choice items

Direction: Read the following questions and choose the correct answer from the given alternatives.

1. Which of the following is a factor of production?
A . Land. B . Labor. C . Capital. D . All of the above
2. In the third stage of production, A . Marginal product is negative.
B. Marginal product is positive C. A rational firm prefers to operate D. All of the above
3. Technological progress,
A . shift the isoquants inward. B . shift the production function outward
C . reduce cost of production D . All of the above
4. Which of the following is true? A . Total cost is the sum of total fixed cost and total variable cost. B . Total cost is the product of total fixed cost and total variable cost. C . Fixed cost increase as output increase. D . All
5. All of the following curves are “U” shaped except:
A . The AVC curve B . The AFC curve C . The ATC curve D . The MC curve

Part III: Write detailed answers to the following.

1. What is the shape of the total product curve? Why?

A) What is the relationship between the AP & MP? B) What is the law of diminishing return? How is it reflected in the shape of TP curve? In the shape of MP curve? Its relationship to the stages of production?

2. What does an isoquant refer to? What are its characteristics?

3. Given the following TFC and TVC cost information, complete the following table.

Output	TFC	TVC	TC	AFC	AVC	ATC	MC
0	100	0					
1	100	7					
2	100	12					
3	100	15					
4	100	17					
5	100	18					
6	100	20					
7	100	25					

4. If the marginal cost of production is greater than the average variable cost, do you know whether the average variable cost is increasing or decreasing? Explain.