

CHAPTER – 3 PRODUCTION AND COSTS

I Choose the correct answer (each question carries 1 mark).

1. The formula of production function is
 - a) $q = f(L, K)$
 - b) $q = d(p)$
 - c) $y = f(x)$
 - d) None of the above
2. In the short run, a firm
 - a) Can change all the inputs
 - b) Cannot vary all the inputs
 - c) Can keep the inputs fixed
 - d) None of the above
3. The change in output per unit of change in the input is called.
 - a) Marginal product
 - b) Average product
 - c) Total product
 - d) Product
4. Cobb-Douglas production function is
 - a) $q = (x, x)$
 - b) $q = (x_1, x_2)$
 - c) $q = (x_1^\alpha, x_2^\beta)$
 - d) $q = (0)$
5. $TC =$
 - a) TVC
 - b) TFC
 - c) $TFC + TVC$
 - d) $AC + MC$

Ans: 1) a 2) b 3) a 4) c 5) c

II Fill in the blanks (each question carries 1 mark).

1. In the long run, all inputs are _____.
2. _____ is defined as the out put per unit of variable input.
3. Marginal product and Average product curves are _____ in shape.
4. SMC curve cuts the AVC curve at the _____ point of AVC curve form below.

5. _____ is the set of all possible combinations of the two inputs that yield the same maximum possible level of output.

Ans : 1) Variables 2) Average product 3) Inverse U shape
4) Minimum 5) Isoquant Curve

III Match the following: (each question carries 1 mark).

| A | B |
|------------------|------------------------------|
| 1. CRS | a. $\Delta TC/\Delta Q$ |
| 2. SAC | b. Long Run Average Cost |
| 3. LRAC | c. Short Run Average Cost |
| 4. $TFC + TVC =$ | d. Constant Returns to scale |
| 5. SMC | e. TC |

Solutions

| | |
|------------------|---------------------------|
| 1. CRS | Constant Returns to scale |
| 2. SAC | Short Run Average Cost |
| 3. LRAC | Long Run Average Cost |
| 4. $TFC + TVC =$ | TC |
| 5. SMC | $\Delta TC/\Delta Q$ |

IV Answer the following questions in a sentence/word.

(Each question carries 1 mark).

1. What do you meant by Total product?

The total volume of goods and services produced during a specified period of time generally a year is called total product.

2. What is Average product?

Per unit production of the variable factor is known as Average Product.

3. Give the meaning of Marginal product.

Change in output per unit of change in the input when all other inputs are held constant is called Marginal product.

4. Write the meaning of cost function of the firm.

The functional relationship between cost and output is called cost function.

5. What is total fixed cost.

Those cost which do not vary directly with the level of output is called fixed cost.

6. What is average fixed cost?

The per unit of Fixed Cost of Production is called Average Fixed Cost.

V Answer the following questions in 4 sentences.

(Each question carries 2 marks)

1. What is Isoquant?

The set of all possible combinations of the two inputs that yield the same maximum possible level of output is called isoquants.

For example : When factors of production such as labour and capital are combined in different proportions and put to use, they yield the same level of output. Since any combination of these factors yields the same level of output.

2. Give the meaning of the concepts of short run and long run.

A period in which output can be changed by changing only variable factors is called short period.

In the short run, production can be changed by increasing variable factors like unskilled labour, raw materials, fuel etc.

A period in which output can be changed by changing all factors of production is called long period.

In long run firm can change its factory size, adopt to new techniques of production, purchase of new machinery etc.

3. Mention the types of Returns to scale.

There are three types of Returns to scale. They are,

- 1) Increasing Returns to Scale (IRS)
- 2) Constant returns to scale (CRS)
- 3) Decreasing Returns to Scale (DRS)

4. Name the short run costs.

- | | |
|--------------------------|------------------------|
| 1) Total fixed cost | 2) Total Variable Cost |
| 3) Total Cost | 4) Average Fixed Cost |
| 5) Average variable Cost | 6) Average Cost |
| 7) Marginal Cost | |

5. What are long run costs?

The cost of output in the long run is called long run costs.

In the long run since all factors are variable, therefore all costs are variable. The distinction between fixed and variable cost disappears in the long run.

VI. Answer the following questions in 12 sentences.

(Each question carries 4 marks)

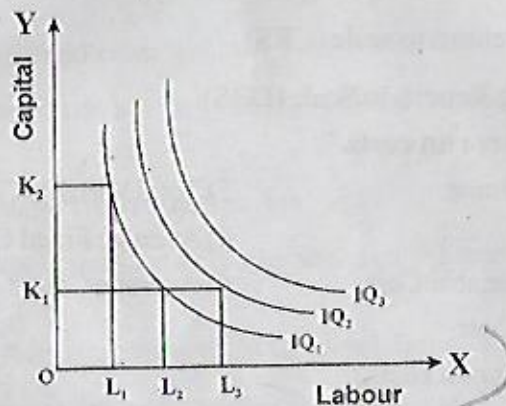
1. Explain Isoquant with the help of the diagram.

The set of all possible combinations of the two inputs that yield the same level of output is called isoquants.

Isoquants curve indicates different combinations of two factors of production which can yield equal level of output to the producer of a given period.

For example : When factors of production such as labour and capital are combined in different proportions and put to use, they yield the same level of output. Since any combination of these factors yields the same level of output, producer will be indifferent among them. Because of this reason, equal product curve is also called production indifference curve.

The isoquant can be explain with the help of following diagram.



In the above diagram ox axis represent labour, oy axis represent capital. In the diagram there are three isoquants curves, when labour and capital are combined in different proportions and put to use. In the above diagram two input combinations (L_1, K_2) and (L_2, K_1) give us the same level of output q_1 .

If we fix capital at K_1 and increase labour to L_3 , output increases and we reach a higher isoquant q_2 . When marginal products are positive, with greater amount of one input, the same level of output can be produced only using lesser amount of the other. Therefore, isoquants are negatively sloped.

2. Explain TP, MP and AP with the examples.

The concept of product can be looked at from three different angles.

- 1) Total Product
- 2) Average Product
- 3) Marginal Product

1) Total Product (TP) :

The total volume of goods and services produced during a specified period of time generally a year is called total product.

Total product can be increased by increasing the supply of variable factors in the short period. However, in the longrun, total product can be raised by increasing both fixed and variable factors.

Total product can be calculated with the help of following formula.

$$TP = \sum MP$$

- 1) Total product produced by 4 units of labour and capital are 70 units. They are sum of marginal product of 1, 2, 3 and 4th units of labour and capital.

$$TP = \sum MP$$

$$70 = 25 + 20 + 15 + 10$$

2) Average Product (AP) :

Per unit production of the variable factor is known as Average Product.

When we divided total output by the quantities of a variable factor, we get average product. The following formula is used to calculate average product.

$$AP_L = \frac{TP_L}{L}$$

- 1) Total product produced by 4 units of labour and capital is 70 calculate average product.

$$AP_L = \frac{TP_L}{L}$$

$$AP_L = \frac{70}{4} \quad AP_L = \boxed{17.5}$$

3) Marginal Product (MP) :

The addition to total product by the employment of an additional unit of a factor is called marginal product.

Marginal product can be calculated by following formula

$$MP_L = TP_L - TP_{L-1}$$

Here MP_L = Marginal Production

TP_L = Total Product of 'n' units

TP_{L-1} = Total product of n-1 units

1) If the total product produced by 4 units of labour and capital is 70 and total product produced by 5 units of labour and capital is equal to 75 units. Calculate marginal product.

$$\begin{aligned} MP_L &= TP_L - TP_{L-1} \\ &= 75 - 70 \\ &= 5 \text{ units} \end{aligned}$$

3. Write a brief note on returns to scale.

The behaviour of production or returns when all the productive factors are increased or decreased simultaneously in the same ratio is called returns to scale.

The study of changes in output as a consequence of changes in the scale is the subject matter of the returns to scale. In this laws of returns to scale, all productive factors or inputs are increased or decreased in the same proportion simultaneously.

Stages of returns to scale :

When all the inputs are increase in the same proportion. The following three types of situations in output are observed. They are:

- 1) Increasing Returns to Scale (IRS)
- 2) Constant Returns to Scale (CRS)
- 3) Diminishing Returns to Scale (DRS)

1) Increasing returns to scale (IRS)

When a proportional increase in all inputs results in an increase in output by a larger proportion, is called Increasing Returns to Scale.

For example : If 50% increase in all the factors by a firm results in more than 50% increase in total output, it is a case of increasing returns to scale. If it is more than doubled, then IRS holds.

2) Constant returns to scale (CRS).

When a proportional increase in all inputs results in an increase in output by the same proportion, is called Constant returns to scale.

For example : If the inputs are doubled, then the output becomes double. If increase in all the factors by 50%, results in 50% increase in total output. It can be an example for constant returns to scale. If the output gets doubled, the production function exhibits CRS.

3) Diminishing returns to scale (DRS)

When a proportional increase in all inputs results in an increase in output by a smaller proportion is called Decreasing Returns to Scale.

For example : 50% increase in all the factors causes 40% increase in output. If output is less than doubled, then DRS holds,

4. Explain the long run costs.

The time period in which all inputs needed for production can be changes is called long-run.

All factors are available in the long run. There are no fixed costs. The total cost and the total variable cost therefore, coincide in the long run.

LRMC curve is therefore a 'U'-shaped curve. It cuts the LRAC curve from below at the minimum point of the LRAC. In the diagram shows the shapes of the long run marginal cost and the long run average cost curves for a typical firm.

LRAC reaches its minimum at q_1 . To the left of q_1 , LRAC is falling and LRMC is less than the LRAC curve. To the right of q_1 , LRAC is rising and LRMC is higher than LRAC.

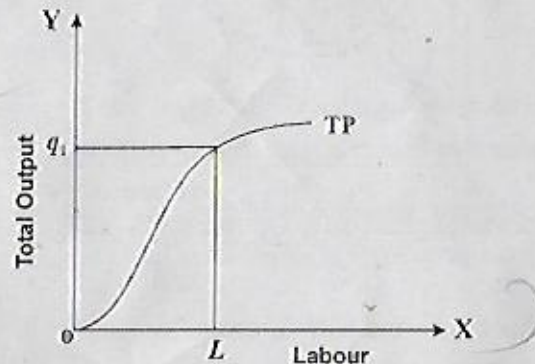
3) Explain the shapes of TP, MP and AP curves.

1) Total Product (TP) :

The total volume of goods and services produced during a specified period of time generally a year is called total product.

Total product can be increased by increasing the supply of variable factors in the short period. However, in the longrun, total product can be raised by increasing both fixed and variable factors.)

An increase in the amount of one of the inputs keeping all other inputs constant results in an increase in output. The total product curve in the input-output plane is a positively sloped curve. The following diagram shows the shape of the total product curve for a typical firm.



We measure units of labour along the horizontal axis and output along the vertical axis. With L units of labour, the firm can at most produce q_1 units of output.

2) Marginal Product (MP) :

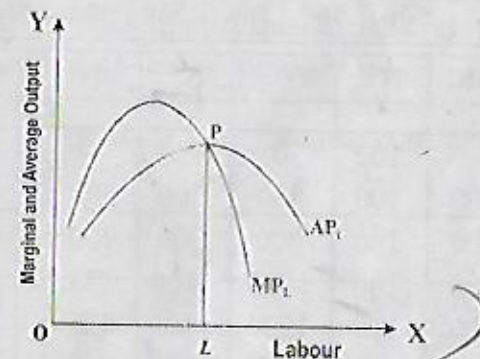
The addition to total product by the employment of an additional unit of a factor is called marginal product.

According to the law of variable proportions, the marginal product of an input initially rises and then after a certain level of employment, it starts falling. The MP curve therefore, looks like an inverse 'U'-shaped curve.)

3) Average Product (AP) :

Per unit production of the variable factor is known as Average Product.

When we divided total output by the quantities of a variable factor, we get average product. The shape of AP and MP curve can be shown in the following diagram.



In the above diagram ox axis represents labour, oy axis represents marginal and average product. For the first unit of the variable input, one can easily check that the MP and the AP are same. Now as we increase the amount of input, the MP rises. AP being the average of marginal products, also rises, but rises less than MP.

Then, after a point, the MP starts falling. However, as long as the value of MP remains higher than the value of the AP, the AP continues to rise. Once MP has fallen sufficiently, its value becomes less than the AP and the

There are two types of Long run cost. They are,

1) Long run average cost (LRAC):

Cost per unit of output in the long run is called Long run average cost.

$$\text{LRAC} = \frac{\text{TC}}{\text{Q}}$$

2) Long run marginal cost (LRMC):

The change in the total cost per unit of change in output is called Long run marginal cost.

$$\text{LRMC} = \text{TC}_{q_1} - \text{TC}_{q_1-1}$$

Just like the short run cost curves, the LAC and LMC are also U-shaped. Their U shape can be explained by the economies and diseconomies of scale. Initially, when a firm increases its scale of production, it enjoys economies of scale and as a result LAC starts declining. But beyond a point, further increase in scale of production results in diseconomies of scale and LAC starts rising.

In general, LAC and LMC curves are U-shaped and the LMC curve cuts the LAC at its minimum point. The reason for being U-shaped is the operation of law of returns to scale, not the law of diminishing return. We can summarise it like this:

Increasing returns to scale - LAC decreases with output

Constant returns to scale - LAC does not change with output

Decreasing returns to scale - LAC increases with output

5. The following table gives the TP schedule of labour. Find the corresponding average product and marginal product schedules.

| | | | | | | |
|-----------------|---|---|----|----|----|----|
| TP _L | 0 | 1 | 35 | 50 | 40 | 48 |
| L | 0 | 1 | 2 | 3 | 4 | 5 |

| L | TP _L | AP _L | MP _L |
|---|-----------------|-----------------|-----------------|
| 0 | 0 | 0 | 0 |
| 1 | 15 | 15 | 15 |
| 2 | 35 | 17.5 | 20 |
| 3 | 50 | 16.67 | 15 |
| 4 | 40 | 10 | 10 |
| 5 | 48 | 9.6 | 8 |

1) In the above table AP can be calculated with the help of following formula.

$$\text{AP}_L = \frac{\text{TP}_L}{L}$$

2) In the above table MP can be calculated with the help of following formula.

$$\text{MP}_L = \text{TP}_L - \text{TP}_{L-1}$$

VII. Answer the following questions in 20 sentences (each question carries 6marks)

1. Explain the various short run costs with the help of a table.

In short run there are some factors which are fixed, while other are variable. Similarly short run cost can be divided into following types.

- 1) Fixed Cost
- 2) Total Variable Cost
- 3) Total Cost
- 4) Average Fixed Cost
- 5) Average variable Cost
- 6) Average Cost
- 7) Marginal Cost

1) Fixed Cost :

Those cost which do not vary directly with the level of output is called fixed cost.

For example : Rent of the factory, salaries of permanent employees, maintenance of building, licence fee etc.

2) Total Variable Cost (TVC) :

Those costs which vary directly with the level of output is called variable cost.

For example : Wage of temporary labourers, cost of electricity, raw materials etc.

3) Total Cost (TC) :

The total expenditure incurred by a firm on the factors of production required for the production of a commodity is called total cost.

TC is the sum of total fixed cost (TFC) and total variable cost at various levels of output. Total cost can be written as,

$$TC = TFC + TVC$$

4) Average Fixed Cost (AFC) :

The per unit of Fixed Cost of Production is called Average Fixed Cost.

We can obtain average fixed cost by dividing the total fixed cost by the number of units produced. So,

$$AFC = \frac{TFC}{Q}$$

5) Average variable Cost (AVC) :

The per unit of variable cost of production of a commodity is called average variable cost.

It is calculated by dividing TVC by total output.

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

6) Average Cost (AC) :

The per unit of total cost of production is called average cost.

We can obtain average cost by dividing cost by the number of units produced. So,

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

7) Marginal Cost (MC) :

The cost of producing an extra unit of a commodity is called marginal cost.

Marginal cost can be calculated with the help of following formula.

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

Different cost concept can be explained in the following table.

| Output (units) | TFC (Rs) | TVC (Rs) | TC (Rs) | AFC (Rs) | AVC (Rs) | SAC (Rs) | SMC (Rs) |
|----------------|----------|----------|---------|----------|----------|----------|----------|
| 0 | 20 | 0 | 20 | - | - | - | - |
| 1 | 20 | 10 | 30 | 20 | 10 | 30 | 10 |
| 2 | 20 | 18 | 38 | 10 | 9 | 19 | 8 |
| 3 | 20 | 24 | 44 | 6.67 | 8 | 14.67 | 6 |
| 4 | 20 | 29 | 49 | 5 | 7.25 | 12.25 | 5 |
| 5 | 20 | 33 | 53 | 4 | 6.6 | 10.6 | 4 |
| 6 | 20 | 39 | 59 | 3.33 | 6.5 | 9.83 | 6 |
| 7 | 20 | 47 | 67 | 2.86 | 6.7 | 9.57 | 8 |
| 8 | 20 | 60 | 80 | 2.5 | 7.5 | 10 | 13 |
| 9 | 20 | 75 | 95 | 2.22 | 8.33 | 10.55 | 15 |
| 10 | 20 | 95 | 115 | 2 | 9.5 | 11.5 | 20 |

To calculation of TVC we use the following formula :

4) $SAC = TC / \text{Output}$

5) Explain the law of variable proportions with the help of a diagram.

Law of variable proportions is one of the most important laws of production. It shows the nature of rate of change in output due to a change in variable factors. In the short run, when one input is variable and all other inputs are fixed, the firm's production function exhibits the law of variable proportions. This law shows the nature of rate of change in output due to change in only one variable factors of production.

Statement of law :

Law of variable proportions states that, as we increase quantity of only one input, keeping other inputs fixed, total product initially increases at an increasing rate, then at a decreasing rate. This can be explained with the help of following table.

| Land | Labour | Total Output (TP) | Marginal Output (MP) | Average Output (AP) |
|------|--------|-------------------|----------------------|---------------------|
| 4 | 0 | 0 | - | - |
| 4 | 1 | 10 | 10 | 10 |
| 4 | 2 | 24 | 14 | 12 |
| 4 | 3 | 40 | 16 | 13.33 |
| 4 | 4 | 50 | 10 | 12.5 |
| 4 | 5 | 56 | 6 | 11.2 |
| 4 | 6 | 57 | 1 | 9.5 |

In the first stage from the above table it is clear that when one unit of labour is employed TP, AP and MP become 10 units. When 2 units of

THE

1. Choose
1. J. **Market Price**

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foregone from the second

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average revenue.

needed to keep a firm in the existing

profit.

Profit that a firm earns over and above the normal profit is called the super normal profit.

6. What does market supply curve show?

The market supply curve shows the output levels that firms in the market produce in aggregate corresponding to different values of the market price.

V. Answer the following questions in 4 sentences (each question carries 2 marks)

1. Mention the conditions needed for profit by a firm under perfect competition.

- 1) The price, (P), must equal MC
- 2) Marginal cost must be non-decreasing at q_0
- 3) For the firm to continue to produce, in the short run, price must be greater than the average variable cost ($p \geq AVC$);

In the long run, price must be greater than the average cost ($p \geq AC$).

2. Give the meaning of shut down point.

The point where SMC curve cuts AVC curve at the minimum is called the short run shut down point of the firm.

A firm continues to produce as long as the price remains greater than

or equal to the minimum of AVC. Below the minimum point of AVC there will be no production. Because firm incurring losses.

3. Write the meaning of opportunity cost with an example.

Opportunity cost is the next best alternative foregone.

For example : A plot of land is a resource. This land can be used for different purposes like, for agriculture, or for constructing a factory or a school. If we use the land for agriculture, the community will be deprived of a factory or a school.

4. Mention the two determinants of a firm's supply curve.

- 1) Technological progress
- 2) Input prices

5. Give the meaning of price elasticity of supply and write its formula.

The percentage change in quantity supplied due to a one percent change in the market price of the goods is called price elasticity of supply.

$$es = \frac{\frac{\Delta Q}{Q} \times 100}{\frac{\Delta P}{P} \times 100} = \frac{\Delta Q}{Q} \times \frac{P}{\Delta p}$$

VI Answer the following questions in 12 sentences :

(Each question carries 4 marks)

1. Write a short note on profit maximisation of a firm under the following conditions

- a) $P = MC$
 - b) MC must be none decreasing at q_0 .
- 1) Condition 1 ($P = MC$)

The difference between total revenue and total cost is called profit.

CHAPTER – 4
THE THEORY OF FIRM UNDER
PERFECT COMPETATION

I Choose the correct answer (each question carries 1 mark):

- In a perfect competition each firm produces and sells
 - Hetrogenous products
 - Homogeneous Products
 - Luxury goods
 - Necessary goods
- The increase in total revenue for a unit increase in the output is
 - Marginal Revenue
 - Average Revenue
 - Total Revenue
 - Fixed Revenue
- The firm's profit is denoted by
 - Σ
 - Δ
 - θ
 - π
- When the supply curve is verticle the elasticity of supply is
 - $es = 1$
 - $es > 1$
 - $es = 0$
 - $ex = \infty$
- The revenue per unit of output of a firm is called as
 - TR
 - MR
 - AR
 - None of the above

Ans: 1) b 2) a 3) d 4) c 5) c

II Fill in the blanks (each question carries 1 mark):

- Price taking behaviour is the single most distinguishing characteristic of _____ Market.
- _____ is a tax that the government imposes per unit sale of output.
- For a price taking firm marginal revenue is equal to _____
- The point of minimum AVC where the SMC curves cuts the AVC curves is called _____

- _____ cost of some activity is the gain forgone from the second best activity.

Ans : 1) Perfect competition 2) Unit tax 3) Market Price
4) Shutdown point of the firm 5) Opportunity

III. Match the following: (each question carries 1 mark).

| A | B |
|------------------------|------------------------|
| 1. TR = | a. Perfect information |
| 2. π | b. Zero profit |
| 3. AR = | c. $P \times Q$ |
| 4. Normal Profit | d. TR - TC |
| 5. Perfect competition | e. |

Solutions

| | |
|------------------------|------------------------|
| 1. TR = | a. $P \times Q$ |
| 2. π | b. TR - TC |
| 3. AR = | c. $\frac{TR}{Q}$ |
| 4. Normal Profit | d. Zero profit |
| 5. Perfect competition | e. Perfect information |

**IV Answer the following questions in a sentence/word :
(Each question carries 1 mark)**

1. Define marginal revenue.

The additional revenue generated from the sale of an additional unit of the commodity is called marginal revenue.

2. To which side does supply curve shift due to the technological progress?

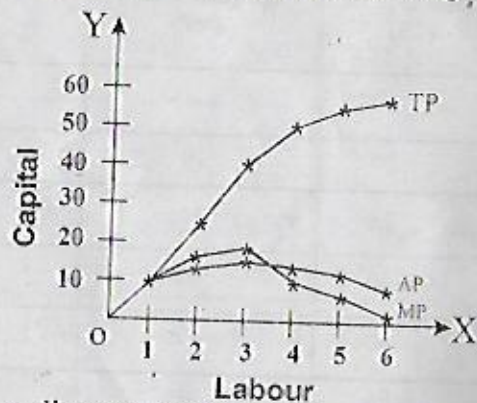
Supply curve shift from left to right due to the technological progress.

labour are used, total production increases to 24 units. It means TP is more than doubled when unit of labour used doubles. Here MP increase by 14 units and AP is 12 units. When 3 units of labour are employed TP increases to 40 units. Here MP is 16 units and AP is 13.33 tonnes. It means till the employment of 3rd unit of labour TP increase at an increasing rate.

Notice that the MP first increases (upto 3 units of labour) and then begins to fall. This tendency of the MP to first increase and then fall is called the **Law of variable proportions** or the **law of diminishing marginal product**. Law of variable proportions say that the marginal product of a factor input initially rises with its employment level. But after reaching a certain level of employment, it starts falling.

In the second stage from the above table that when 4th unit of labour is used TP increase to 50 units. But MP decreases 10 units and AP decreases to 12 units. When 5th unit of labour is used TP increases to 56 units and MP decreases to 6 units and AP decreases to 11.2 units at diminishing rate. Here both MP and AP remain positive.

This can be explained with the help of following diagram.



In the above diagram, in the first phase, every additional variable factor adds more and more to the total output. It means, TP increases at an increasing rate and MP of each variable factor rises in a part and then falls. The average product curve rises throughout and remains below the MP curve.

As we hold one factor fixed and keep increasing the other, the factor proportions change. Initially, as we increase the amount of the variable input, the factor proportions become more and more suitable for the production and marginal product increases. But after a certain level of employment, the production process becomes too crowded with the variable input. So the output added by each additional worker is now proportionately less, the marginal product begins to fall.

VIII Assignment and Project oriented Questions.

(Each question carries 5 marks)

1. Find the Missing products in the following table

| Factor 1 | TP | MP ₁ | AP ₁ |
|----------|----|-----------------|-----------------|
| 0 | 0 | 0 | 0 |
| 1 | 10 | - | 10 |
| 2 | 24 | - | 12 |
| 3 | 40 | 16 | 13.33 |
| 4 | - | 10 | - |
| 5 | - | 6 | 11.2 |
| 6 | 57 | 1 | 9.5 |

Solutions

| Factor 1 | TP | MP ₁ | AP ₁ |
|----------|----|-----------------|-----------------|
| 0 | 0 | 0 | 0 |
| 1 | 10 | 10 | 10 |
| 2 | 24 | 14 | 12 |
| 3 | 40 | 16 | 13.33 |
| 4 | 50 | 10 | 12.5 |
| 5 | 56 | 6 | 11.2 |
| 6 | 57 | 1 | 9.5 |

Both total revenue and total cost increase as output increases. Notice that as long as the change in total revenue is greater than the change in total cost, profits will continue to increase. Recall that change in total revenue per unit increase in output is the marginal revenue; and the change in total cost per unit increase in output is the marginal cost.

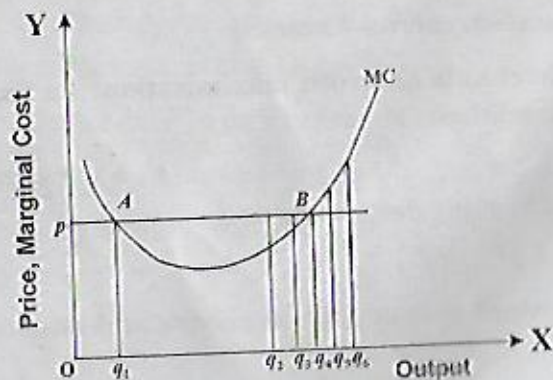
Therefore, we can conclude that as long as marginal revenue is greater than marginal cost, profits are increasing. By the same logic, as long as marginal revenue is less than marginal cost, profits will fall. It follows that for profits to be maximum, marginal revenue should equal marginal cost.

In other words profits are maximum at the level of output for which $MR = MC$

For the perfectly competitive firm, we have established that the $MR = P$. So the firm's profit maximizing output becomes the level of output at which $P = MC$.

Condition 2 MC must be none decreasing at q_0 .

Consider the second condition that must hold when the profit-maximising output level is positive. This can be explained with the help of a following diagram. Note that at output levels q_1 and q_2 , the market price is equal to the marginal cost. However, at the output level q_1 , the marginal cost curve is downward sloping. We claim that q_1 cannot be a profit-maximising output level.



Observe that for all output levels slightly to the left of q_1 , the market price is lower than the marginal cost. Immediately implies that firm's profit at an output level slightly smaller than q_1 , exceeds that corresponding to the output level q_1 . This being the case, q_1 cannot be a profit-maximising output level.

2. Explain the determinants of a firm's supply curve.

A firm's supply curve is a part of its marginal cost curve. Thus, any factor that affects a firm's marginal cost curve is of course a **determinant of its supply curve**. The following are the two important determinants of a firm supply curve.

1. Technological Progress

Technological changes influence the supply of a commodity. Advanced and improved technology reduces the cost of production, which raises the profit margin. It induces the seller to increase the supply.

However, technological degradation and outdated technology will increase the cost of production and it will lead to decrease in supply.

It is expected that this will lower the firm's marginal cost at any level of output; that is, there is a rightward (or downward) shift of the MC curve. As the firm's supply curve is essentially a segment of the MC curve, **technological progress shifts the supply curve of the firm to the right**. At any given market price, the firm now supplies more units of output.

2. Input Prices

A change in input prices also affects a firm's supply curve. If the price of an input (say, the wage rate of labour) increases, the cost of production rises. The consequent increase in the firm's average cost at any level of output is usually accompanied by an increase in the firm's marginal cost at any level of output; that is, there is a leftward (or upward) shift of the MC curve. This means that the firm's supply curve shifts to the left: at any given market price, the firm now supplies fewer units of output.

3. Explain the features of perfect competition.

A market situation in which there are a large number of buyers and sellers who buy and sell homogeneous products at a uniform price is called perfectly competitive market.

Feature of Perfect competitive market :

The following are the main features of perfectly competitive market.

1) Large number of buyers and sellers :

In perfect competition market, there will be large number of buyers and sellers. The number would be so large, that no individual firm would have enough capacity to influence the price, demand and supply. The price of the commodity is determined by the combined actions of all the firms and buyers in the market.

2) Homogeneous product :

The producers under perfect competition produce homogeneous product. There should not be any differentiation of products by way of quality, colour, design etc.

3) Single price (uniform price)

In perfect competition market commodity is sold at uniform price all over the market. Price is determined by the joint efforts of buyers and sellers. So all the firms will have to follow the same price.

4) Free entry and exit of firms :

Under perfect competition market there is no restriction of the entry of new firm in the industry or exit of the existing firms from the industry. If the existing firms earn huge profit in the short run, new firms can enter the market. On the other hand if an individual firm incur losses in the short run it might leave the industry.

5) Complete Knowledge :

In perfect competition the sellers and buyers will have complete

knowledge of market conditions. Therefore, the same price would be in force in this market. Because of the complete knowledge of the market there will not be much about the advertisement.

6) Price taking behaviour :

Price taking is often thought to be a reasonable assumption when the market has many firms and buyers have perfect information about the price prevailing in the market where each firm in the market charges the same price. Suppose now that a certain firm rises its price above the market price. Observe that since all firms produce the same good and buyers are aware the market price the firm in question losses all its buyers.

Further more as these buyers switch their purchases to other firms no adjustments problem arises, their demand is readily accommodated when there are so many firms in the market.

4. Explain the average revenue or price line of a firm under perfect competition with the help of a diagram.

The amount of revenue per unit sold is called average revenue.

Average revenue can be obtained by dividing the total revenue by the quantity of sold.

If a firms output is q and the market price is p , then TR equals $p \times q$ Average revenue can be calculated with the help of following formula;

$$AR = \frac{TR}{q} = \frac{p \times q}{q} = p$$

In other words, for a price taking firm, average revenue equals the market price.

The average revenue or price line of a firm under perfect competition can be explain with the help of following diagram.

2 : Price less than the minimum LRAC

In the above diagram ox axis represents price and cost. Suppose the market price is p_2 , which is less than the minimum LRAC. We have argued that if a profit-maximising firm produces a positive output in the long run, the market price, p_2 , must be greater than or equal to the LRAC at that output level. In the above diagram that for all positive output levels, LRAC strictly exceeds p_2 . In this situation firm incurring loss. So, when the market price is p_2 , Because LRAC is greater than price. So, The firm produces zero output.

VIII. Assignment and Project oriented Questions.

(Each question carries 5 marks)

1. Compute the total revenue, marginal revenue and average revenue schedules in the following table when market price of each unit of goods is Rs. 10.

| Quantity sold | TR | MR | AR |
|---------------|----|----|----|
| 0 | | | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |

Solutions

| P | Q | TR=P×Q | AR= | MR _n =TR _n -TR _{n-1} |
|----|---|--------|-----|-----------------------------------------------------|
| 10 | 0 | 0 | 0 | 0 |
| 10 | 1 | 10 | 10 | 10 |
| 10 | 2 | 20 | 10 | 10 |
| 10 | 3 | 30 | 10 | 10 |
| 10 | 4 | 40 | 10 | 10 |
| 10 | 5 | 50 | 10 | 10 |
| 10 | 6 | 60 | 10 | 10 |