

A) Very short questions: For 1 mark

i. Define cost

→ Cost is the sum of prices paid to the inputs like rent, interest, wages and others, by the producer to produce goods and services. It includes the expenditure incurred by the producer on the production of goods and services.

ii. What is the meaning of direct cost?

→ Direct cost is the expenditure incurred for the payment of variable factors of production. It is also known as variable cost or prime cost. It is 0 when output is 0. When output increases, direct cost increases at a decreasing rate. Some examples of direct cost are fuel expenses, ^{cost of} raw materials, electricity charge over and above the minimum charge, wages of casual labour, etc.

iii. Define indirect cost

→ Indirect cost is the expenditure incurred for the payment of fixed factors of production. It is also known as ^{fixed} indirect cost or supplementary cost. It remains same regardless of output. Rent, property tax, salary, insurance premium are the examples of indirect cost.

iv. Define economic cost.

→ Economic cost is the aggregate of explicit and implicit cost. It covers both monetary cost and non-monetary services provided by the producer including normal profit.

v. Define accounting cost.

→ The monetary payment or cash expenditures which a firm makes to those inputs which are not owned by the firm itself is called accounting cost. They are the cost recorded in the books of accounts. It does not include real cost, implicit cost and the opportunity cost of self-owned or self-employed resources.

vi. Define explicit and implicit cost with example.

→ The monetary payment or cash expenditures which a firm makes to those inputs which are not owned by the firm itself are called explicit cost. Example: payment to employee, ~~rent~~ office rent, etc.

Implicit cost is the non-monetary cost that could be paid to unhired factors of production if they were hired. For an example, if a producer uses his own land and building for operation and does not pay for it in monetary terms, then the rent of the building is ~~an~~ implicit cost.

vii. Clarify the meaning of fixed cost with example.

→ Fixed cost are the expenses incurred for the payment of fixed factors of productions. These costs are also known as indirect costs or supplementary costs. They do not change with the change in volume of output. Some examples of fixed cost are: rent of factory building, wages of permanent employees, interest on fixed capital, insurance charges, property tax, etc.

viii. State the meaning of variable cost with example.

→ Variable cost are the expenses incurred for the variable factors of productions. These costs are also known as direct cost or prime cost. These cost vary with the change in volume of output. When output is zero, total variable cost is zero. As the output increases, variable cost also increases in a decreasing rate. Examples: fuel expenses, electricity charges over and above the minimum charge, cost of raw materials, wages of casual labour, etc.

ix. If the total cost rises from Rs. 500 to Rs. 650 because of rise in level of output from 5 units to 6 units then calculate the value of marginal cost.

Solⁿ

$$\text{Here } \Delta TC = \text{Rs. } 650 - \text{Rs. } 500 = \text{Rs. } 150$$

$$\Delta Q = 6 - 5 = 1 \text{ unit}$$

We know,

$$MC = \frac{\Delta TC}{\Delta Q} = \frac{\text{Rs. } 150}{1} = \text{Rs. } 150$$

2. Why AFC continuously falls downward along with rise in level of output?

→ Average Fixed Cost (AFC) is obtained by dividing total fixed cost by corresponding level of output.

$$\text{i.e. } AFC = \frac{TFC}{Q}$$

But, TFC remains the same for all units of output. Hence, when output (Q), which is inversely proportional to AFC increases while TFC is constant, AFC falls.

21. Why short run average variable cost is of U shape? 121

→ Short run average variable cost (AVC) is obtained by dividing Total Variable Cost (TVC) by the corresponding level of output (Q). That is, $AVC = \frac{TVC}{Q}$.

Thus, AVC is the ratio of TVC and Q. Graphically, AVC curve at each level of output, can be found by dividing the vertical distance of the TVC by the corresponding horizontal distance measuring the level of output. Hence, short run average variable cost is of U shape.

xii. What is the logic behind U shape of short run average cost curve?

→ Short run average cost curve (AC) is calculated by dividing total cost (TFC + TVC) by the corresponding level of output. So, $ATC \text{ or } AC = \frac{TFC + TVC}{Q}$.

Graphically, AC at each level of output is represented by the distance on the vertical axis of the total cost curve divided by the corresponding horizontal distance of it. Hence, Average Variable Cost curve is U shape because of U shaped average variable cost curve resulting from the operation of the law of DMU or law of variable proportion.

xiii. What is short run cost?

→ Cost incurred on both fixed and variable factors of production in the short-run is known as the short-run cost. In a short-run, all factors of production cannot be changed. So, short

run consists of fixed cost and variable cost.

iv. Define long run cost.

→ Cost incurred on the factors of productions in the long run is called long run cost. In long run, all factors of productions are variable, so long run cost depends upon the volume of production and factor prices. It can be expressed as $C = F(Q, Pf)$.

B. Short questions: For 5 marks

i. Define and derive all short run total cost curves.

→ Short-run is the short period of time in which all factors of productions cannot be changed. Hence, short run total cost is the sum of fixed cost and variable cost incurred on short run.

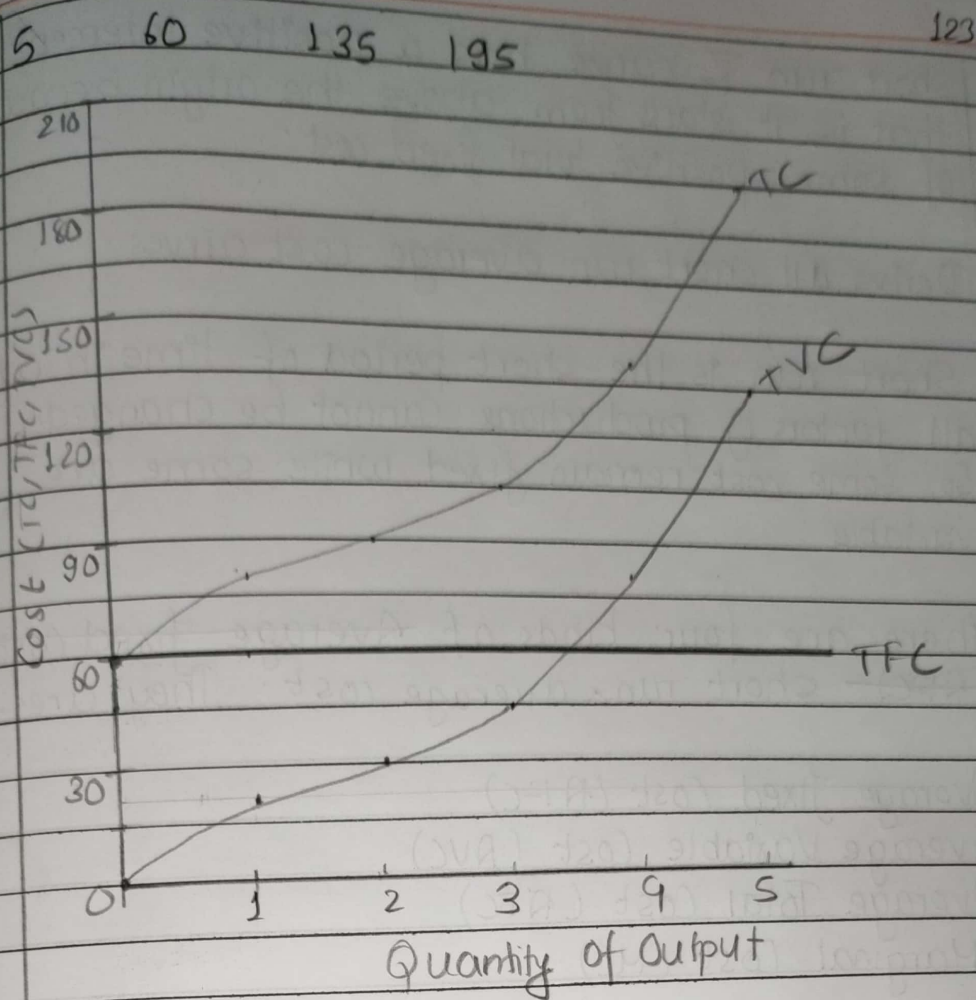
There are three types of short-run cost curves.

They are:

- i. Total Fixed Cost Curve
- ii. Total Variable Cost Curve
- iii. Total Cost Curve

They are derived below:

Quantity of Output (Q)	TFC	TVC	TC = TFC + TVC
0	60	0	60
1	60	20	80
2	60	30	90
3	60	45	105
4	60	80	140



TFC is the total fixed ^{cost} curve. It is a horizontal straight line implying that TFC remains the same whatever be the output.

TVC is the total variable cost. It starts from origin implying that when output is zero, TVC is zero. TVC is upward sloping ~~sto~~ showing that ~~whi~~ with the increase in output, TVC also increases and vice-versa. It is inverse S-shaped because of law of variable proportions.

TC is the total cost curve. Since $TC = TFC + TVC$, both TC and TVC curve have the same slope and the vertical distance between these two curves is always the same. It is also inverse S-shaped because of law of diminishing returns in production. The

short-run TC curve has a positive intercept, that is, it starts from above the origin because of some positive total fixed cost.

ii. Derive all short run average cost curves.

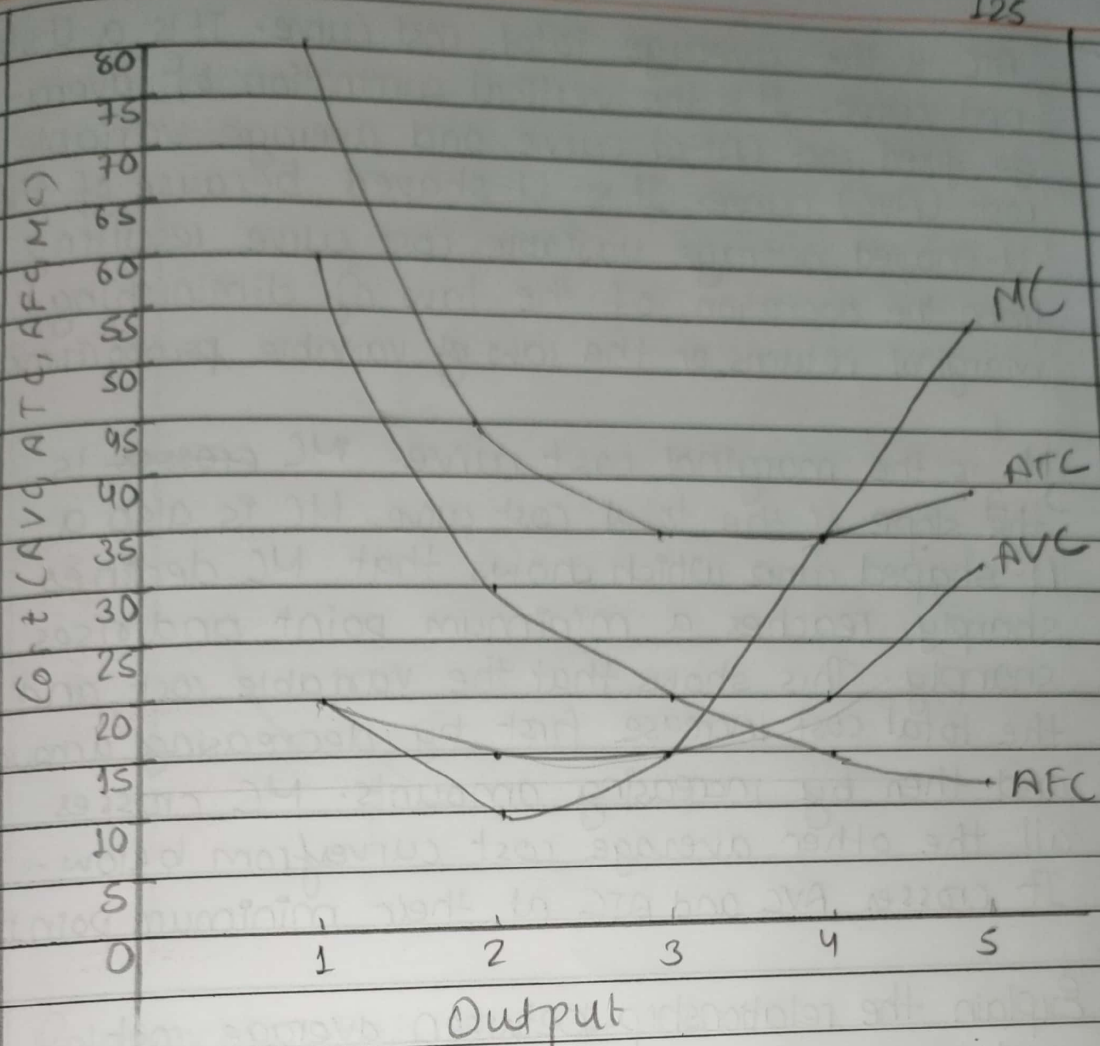
→ Short run is the short period of time in which all factors of production cannot be changed. So, some cost remain fixed while some are variable.

There are four kinds of Average fixed cost (AFC) - short run - average cost. They are:-

- i. Average fixed cost (AFC)
- ii. Average Variable Cost (AVC)
- iii. Average Total Cost (ATC)
- iv. Marginal Cost (MC)

They are derived below:

Q	TFC	TVC	TC	AFC	AVC	ATC	MC
0	60	0	60	-	-	-	-
1	60	20	80	60	20	80	20
2	60	30	90	30	15	45	10
3	60	45	105	20	15	35	15
4	60	80	140	15	20	35	35
5	60	135	195	12	27	39	55



AFC is the average fixed cost curve. It is a continuously decreasing function because total fixed cost is independent of output. Graphically, average fixed cost curve is a rectangular hyperbola which indicates that at very low level of output AFC is high though it declines continuously as production increases but remains positive.

AVC is the average variable curve. It is a U-shaped curve. It reflects the law of diminishing returns as it initially declines, reaches its minimum and increases with the expansion of output.

ATC is the average total cost curve. It is a U-shaped curve. It is the vertical summation of average fixed cost (AFC) curve and average variable cost (AVC) curve. It is U-shaped because of the U-shaped average variable cost curve resulting from the operation of the law of diminishing marginal returns or the law of variable proportions.

MC is the marginal cost curve. MC ~~crosses~~ is the slope of the total cost curve. MC is also a U-shaped curve which shows that MC declines sharply, reaches a minimum point and rises sharply. This shows that the variable cost and the total cost increase first by decreasing amounts and then by increasing amounts. MC crosses all the other average cost curves from below. It crosses AVC and ATC at their minimum points.

iii. Explain the relationship between average cost and marginal cost by using the diagram.

→ Average Cost (AC) is the per unit cost of output. It is obtained by dividing total costs by units of output

$$\text{i.e. } AC = \frac{TC}{Q}$$

$$\text{Also, } AC = AFC + AVC$$

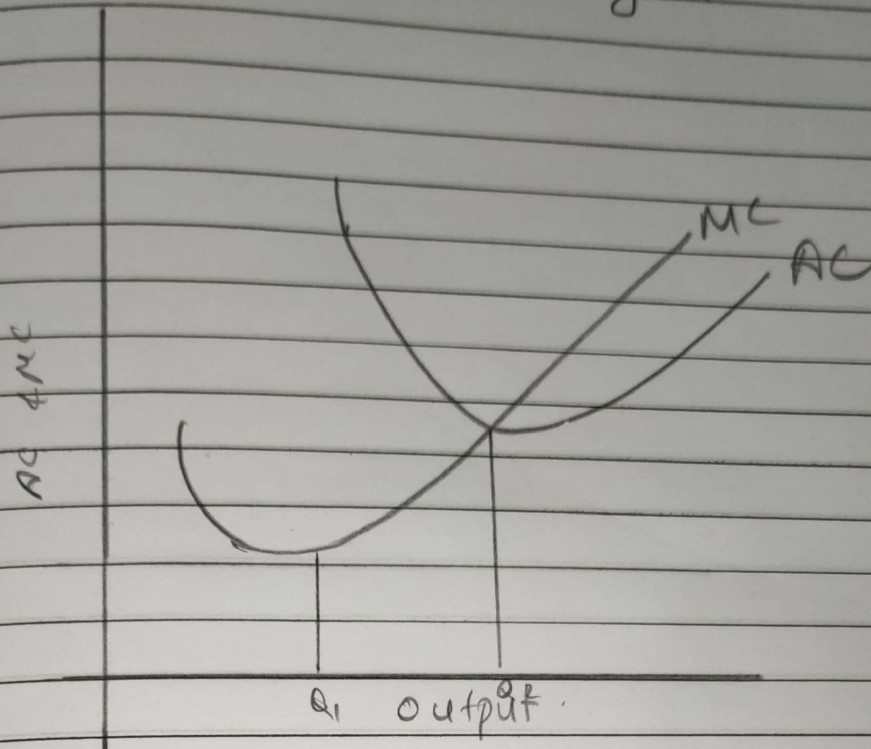
Marginal Cost (MC) is the change in TC due to the change in units of output.

$$MC = \frac{\Delta TC}{\Delta Q}$$

Alternatively, It is the addition made to TC due to one additional unit of output.

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

The relationship between AC and MC is explained below with the help of a diagram.



Relationship between AC and MC

- AC and MC both are derived from TC curve.
- If AC is greater than MC, AC falls.
- If $AC = MC$, AC is the minimum.
- If AC is less than MC, AC rises.
- The minimum point of MC comes before the minimum point of AC.
- If MC is falling, AC must fall.

C Long questions: ~~for~~ 8 marks.

- Explain the relationships between all SACs and SMC by using the table and diagram.

Unit 2-3

Theory of Price and Output Determination

A. Very short questions: for 1 mark

i. Define firm and industry with suitable example.
 → firm is an individual producing unit of the industry. For example: Goldstar and Shilchar are the firms of shoe industry

Industry is a group of firms producing homogeneous products. For example: a group of firms producing footwear form a shoe industry.

ii. Distinguish between firm and industry.

Firm

1. Firm is an individual producing unit of the industry

2. A firm is a price taker not a price maker. It follows the price determined by the industry.

Industry

1. Industry is a group of firms producing a homogeneous products.

2. An industry determines price at the intersecting point of demand and supply curves.

iii. State the meaning of equilibrium.

→ Equilibrium means a point of rest from which there is no ~~ted~~ tendency of movement. It means a point where market demand and supply are equal and the market is cleared as there is neither excess supply nor excess demand.

iv. In which situation firm attains equilibrium under TR-TC approach?

→ According to TR-TC approach, firm attains its equilibrium when the gap between TR and TC is maximum.

v. What are the conditions to be satisfied for equilibrium of a firm under MR-MC approach?

→ The conditions for equilibrium under MR-MC approach are:

i. $MC = MR$

ii. MC must cut MR from below.

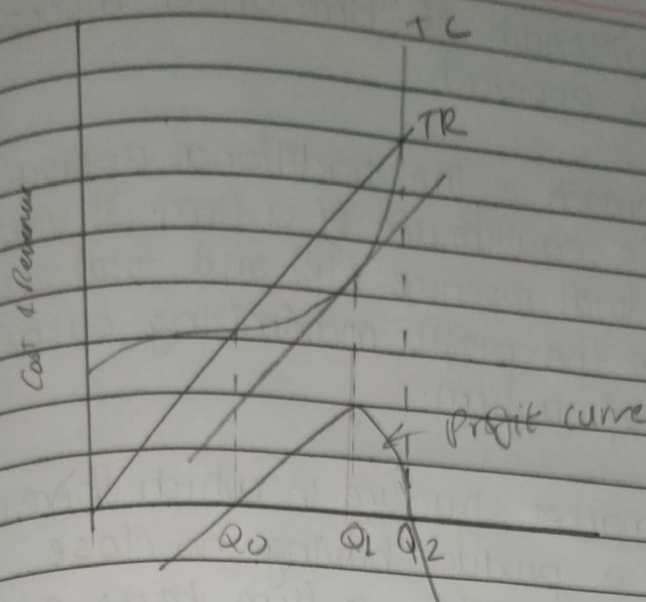
B. Short questions: For 5 marks

i. Explain the equilibrium of firm under perfect competition market by using TR-TC approach.

→ The TR-TC approach is the traditional approach to determine the equilibrium of a firm. It uses the concept of total revenue (TR) and total cost (TC) to determine the profit maximizing output and equilibrium of a firm.

A perfect competition market is the market structure in which there are a large number of sellers of a ~~firm~~ homogeneous product. Under perfect competition, a firm faces an inverse S-shape total cost (TC) curve and straight line total revenue (TR) curve.

Under TR-TC approach profit (π) = TR - TC. The firm is said to be in equilibrium when the gap between TR and TC is maximum.



In the figure, output is measured on x -axis and cost and revenues are measured on y -axis. TR is total revenue curve and TC is the total cost curve. Given the total revenue and total cost curves, the firm is in equilibrium at Q_1 level of output production for which TR exceeds TC by the greatest amount. At output levels Q_0 and Q_2 , there is break even because at these output levels, TR and TC are equal.

The maximum level of output and profit and output is determined by drawing a tangent to the S-shaped total cost curve making parallel to the straight line TR. The vertical distance between TR and TC measures the maximum level of profit per unit.

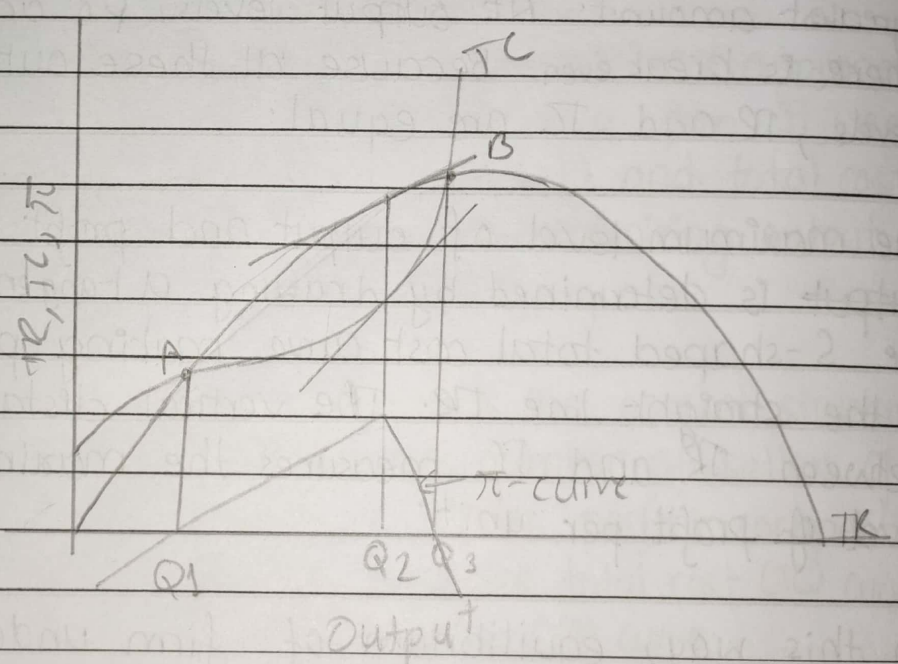
In this way, equilibrium of firm under perfect competition can be obtained by using TR-TC approach.

ii. Explain the equilibrium of firm under monopoly by using TR-TC approach.

→ The TR-TC approach is the traditional approach to determine the equilibrium of a firm. It uses the concept of total revenue (TR) and total cost (TC) to determine the profit maximizing output and equilibrium of a firm.

Monopoly is a market structure in which there is a single seller of a product having no close substitutes. Under monopoly, a firm faces an inverse S-shaped total cost (TC) curve and half-oval shape total revenue (TR) curve.

Under TR-TC approach profit $(\pi) = TR - TC$. The firm is said to be in equilibrium when the gap between TR and TC is maximum.



In the figure, output is measured on x-axis and cost, revenue and profit are measured on y-axis. TR is total revenue curve, TC is total cost curve and π -curve is profit curve. Given the total revenue

and total cost curves, the firm is in equilibrium at Q_2 level at output. TR exceeds TC by the greatest amount. At output levels Q_1 and Q_3 , there is break even because at these output levels, TR and TC are equal.

The maximum level of output and profit is determined by drawing tangent lines on both TR and TC curve, making them parallel to each other. The vertical distance between the lines measures the maximum level of profit per unit.

In this way, equilibrium of firm under monopoly can be obtained by using $TR-TC$ approach.

iii. How a firm attains the equilibrium under monopoly market perfect competition according to $MR-MC$ approach? Explain.

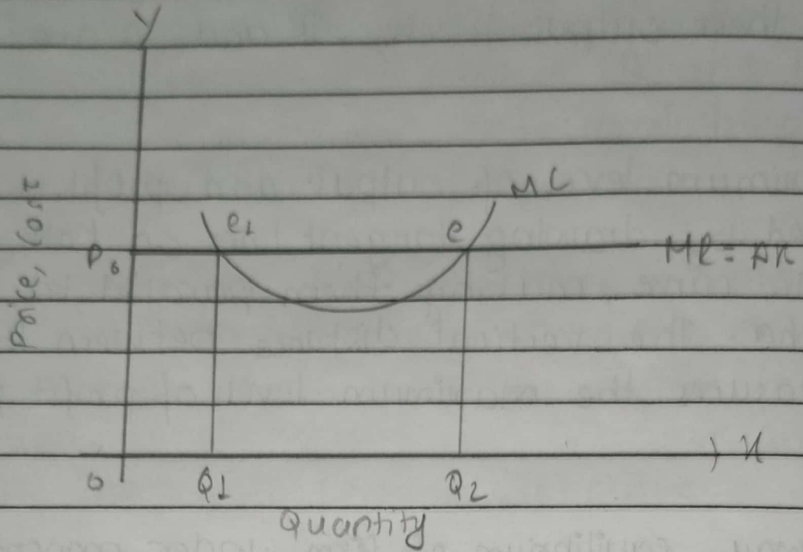
-> The $MR-MC$ approach is the modern approach to determine the equilibrium of a firm. It uses the concept of marginal revenue (MR) and marginal cost (MC) to determine the profit maximizing output and equilibrium of a firm.

Perfect competition is a market structure in which there are a large number of sellers of a homogeneous product. Under perfect competition, a firm faces U-shaped MC curve and a horizontal MR curve.

Under ~~$TR-TC$~~ ^{$MR-MC$} approach, two conditions must be fulfilled simultaneously for the equilibrium of a firm.

They are:

- $MR = MC$ (first order condition)
- MR (must cut MC from below) (Second order condition)



In the figure, cost and revenue of the firm are measured on y-axis and output is measured on x-axis. In the figure, the first order condition is fulfilled at two points 'e' and 'e1' because $MR = MC$ at both the points.

However, point 'e' is the real equilibrium because at the point 'e' MR curve is cut by MC curve from below.

In this way, equilibrium can be obtained under perfect competition market by using MR-MC approach.

iv. Describe the equilibrium of a firm under monopoly market according to MR-MC approach.

→ The MR-MC approach is the modern approach to determine the ~~output~~^{profit} maximizing output and the equilibrium of a firm. It uses the concept

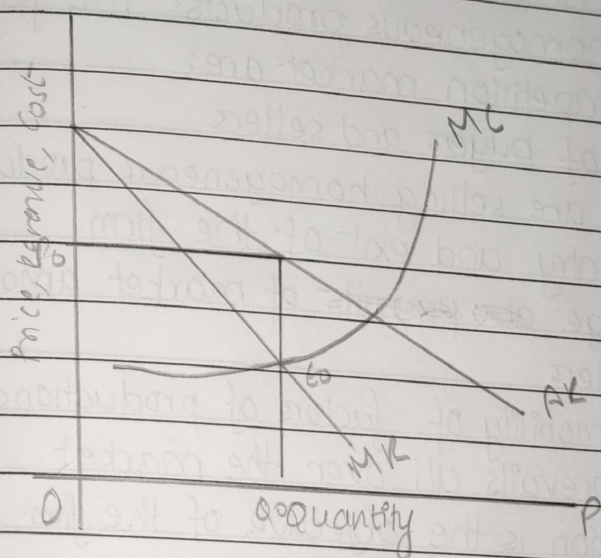
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of marginal revenue (MR) and marginal cost (MC) to determine the profit maximizing output and equilibrium of a firm.

Monopoly is the market structure in which there is a single seller of a product having no close substitutes. Under monopoly, a firm faces a U-shaped MC curve and a downward sloping straight line as MR curve.

Under MR-MC approach, there are two conditions which must be satisfied for a firm to obtain equilibrium. They are:

- $MR = MC$ (first order condition)
- MC must cut MR from below (second order condition)



In the figure, cost, revenue and price is measured on Y-axis and output is measured on X-axis. In the figure, the first order ^{second order} condition is fulfilled in ~~the~~ point 'E0' and 'A' because MC because in that point $MR = MC$ and MC cuts the MR curve from below. Hence, E0 is the equilibrium point and P_0 and Q_0 are equilibrium price and quantity respectively.

In this way, equilibrium of a firm ~~is~~ under monopoly market can be obtained by using MP- MC approach.

long questions: for 8 marks

1. How equilibrium price and outputs are determined under perfect competition market in short run? Explain.

OR

Explain equilibrium of firm and industry under perfect competition market in short run.

→ Perfect competition is the market structure in which there are a large number of sellers of a homogeneous products. The features of perfect competition market are:

- i. Large number of buyers and sellers
- ii. All the sellers are selling homogeneous product
- iii. There is free entry and exit of the firm
- iv. Perfect knowledge ~~also prevails~~ of market among buyers and sellers
- v. There is perfect mobility of factors of productions.
- vi. Uniform price prevails all over the market
- v. Profit maximization is the objective of the firm.

Under perfect competition, a firm and a industry are different. A firm is an individual producing unit of a industry where as an industry is a group of firms producing homogeneous products.

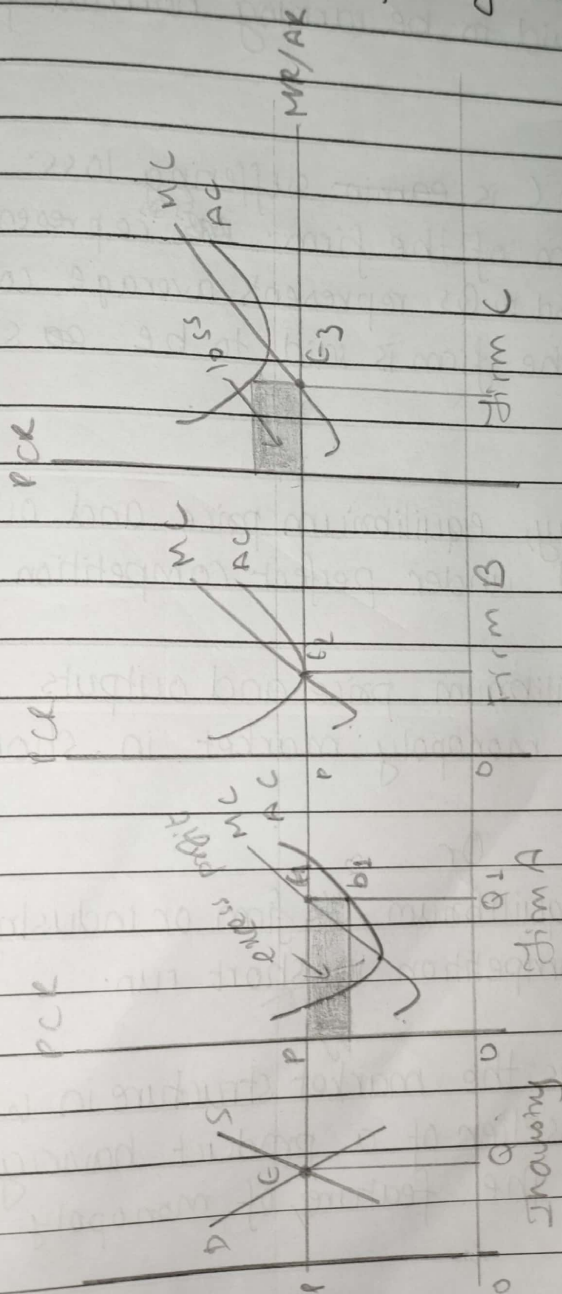
The conditions of equilibrium of a firm are:

- i. $MC = MR$
- ii. MC must cut MR from below.

The condition of equilibrium of an industry is:
 Demand (D) = Supply (S)

Short run equilibrium of a firm does not mean that firm is profit or not depends upon AR and AC. So, there are three possibilities.

- ① If $AR > AC$, the firm is earning super natural profit.
- ② If $AR = AC$, the firm is earning normal profit.
- ③ If $AR < AC$, the firm is suffering loss.



The firm A is earning supernormal profit. Its equilibrium point is OQ_1 . G_1Q_1 represents average revenue and b_1Q_1 represents average cost. Since $AR > AC$, the firm is said to be earning supernormal profit.

The firm B is earning normal profit. OQ_2 is the equilibrium of the firm. G_2Q_2 represents average revenue and G_2Q_2 also represents the Average Cost. $\therefore AR = AC$ and hence the firm is said to be earning normal profit.

The firm C is earning suffering loss. OQ_3 is the equilibrium of the firm. ~~AR~~ G_3Q_3 represents average revenue and b_3Q_3 represents average cost. Since $AR < AC$, the firm is said to be ~~is~~ suffering loss.

In this way, equilibrium price and output are determined under perfect competition in short run.

ii. How equilibrium price and outputs are determined under monopoly market in short run? Explain.

Or

Explain equilibrium of firm or industry under perfect competition in short run.

→ Monopoly is the market structure in which there is single seller of a product having no close substitutes. The features of monopoly market are:

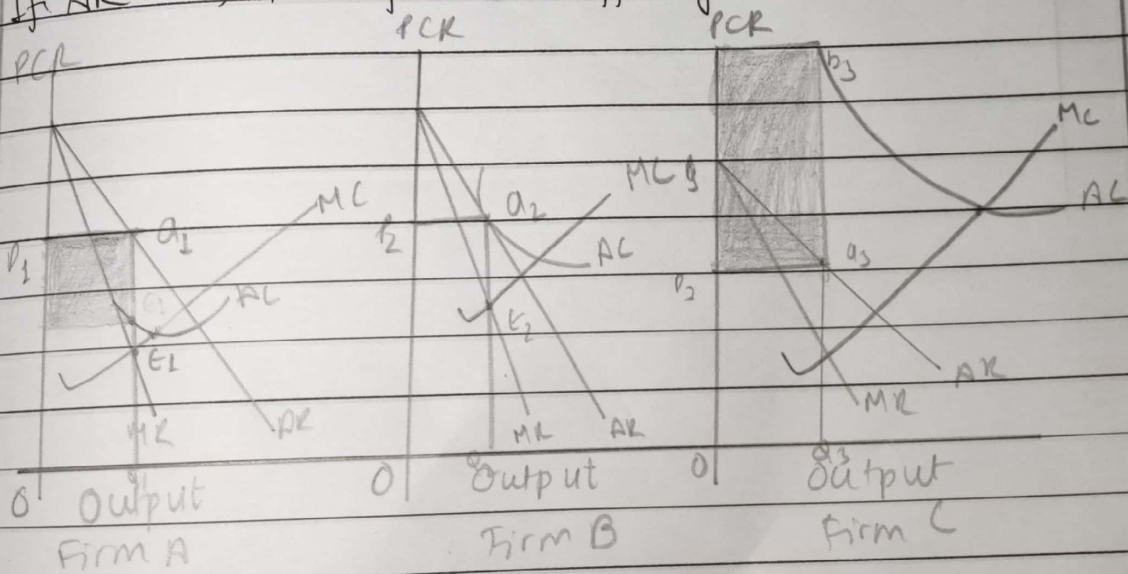
1. Single seller of a product
2. No close substitutes
3. Barrier to entry and exit of the firm
4. Imperfect knowledge about market.
5. Imperfect mobility of factors of production
6. Price discrimination.
7. Profit maximization is the objective of the firm

Under monopoly, there is no difference between firm and industry. The conditions for equilibrium of the firm and industry are:

- i. $MR = MC$
- ii. MC must cut MR from below.

Short run equilibrium of a firm does not mean that firm is . Whether the firm earns profit or not depends upon AR and AC. So, there are three possibilities:

- ① If $AR > AC$, the firm is earning super natural profit.
- ② If $AR = AC$, the firm is earning normal profit.
- ③ If $AR < AC$, the firm is suffering loss.



Firm A is earning super-normal profit. The equilibrium output of the firm is given by Q_1 . Similarly, AR is given by $a_1 Q_1$ and AC is $b_1 Q_1$. Since $AR > AC$, the firm is earning Super normal profit.

Firm B is earning normal profit. The equilibrium output of the firm is Q_2 because AR is given by $a_2 Q_2$ and AC is $b_2 Q_2$. At that point, Q_2 is the equilibrium quantity.

Firm C is suffering loss. The equilibrium of the firm is Q_3 because AR is given by $a_3 Q_3$ and AC is given by $b_3 Q_3$. Since $AR < AC$, the firm is suffering loss. The total loss = $P_3 a_3 b_3 Q_3$.

In this way, equilibrium price and output is determined under monopoly in short run.