

# **PRICE AND OUTPUT DETERMINATION UNDER PERFECT COMPETITION**

## **CONCEPT OF PERFECT COMPETITION**

Under perfect competition following conditions are being fulfilled in the market:

### **1. HOMOGENEITY OF THE PRODUCT:**

All units of the commodity sold in the market are perfectly identical with each other. There is no difference in size, weight, quality, label etc. Thus every unit of the product is available in the market at one price.

### **2. LARGE NUMBER OF BUYERS AND SELLERS:**

Under perfect competition the number of buyers and sellers is very large. Every seller is having a small quantity of the commodity while, a buyer is only one among thousands. Thus an individual buyer or seller cannot influence market price by his own action. He may sell or buy any quantity, the market price remains un-affected.

### **3. FREE ENTRY AND EXIT:**

Under perfect competition new firms can enter and old firms may leave the industry. Due to free entry and exit of firms, equilibrium between demand and supply establishes only one price in the whole market.

### **4. ELASTIC SUPPLY OF FACTORS OF PRODUCTION:**

In a perfect market the factors of production are assumed more elastic in supply. The units of these factors can easily be adjusted according to the increase or decrease in market demand. Thus the rewards of factors remain the same and a single price of the product is determined in the market.

### **5. PERFECT KNOWLEDGE OF THE MARKET:**

Every buyer and seller is assumed to have full knowledge of market conditions. Due to full awareness about quantity and price of the product, none of the parties will be in a position to exploit the other. Therefore, same price will prevail in the whole market. Result of the above conditions will be only one price of the commodity throughout the market.

## DEMAND CURVE UNDER PERFECT COMPETITION

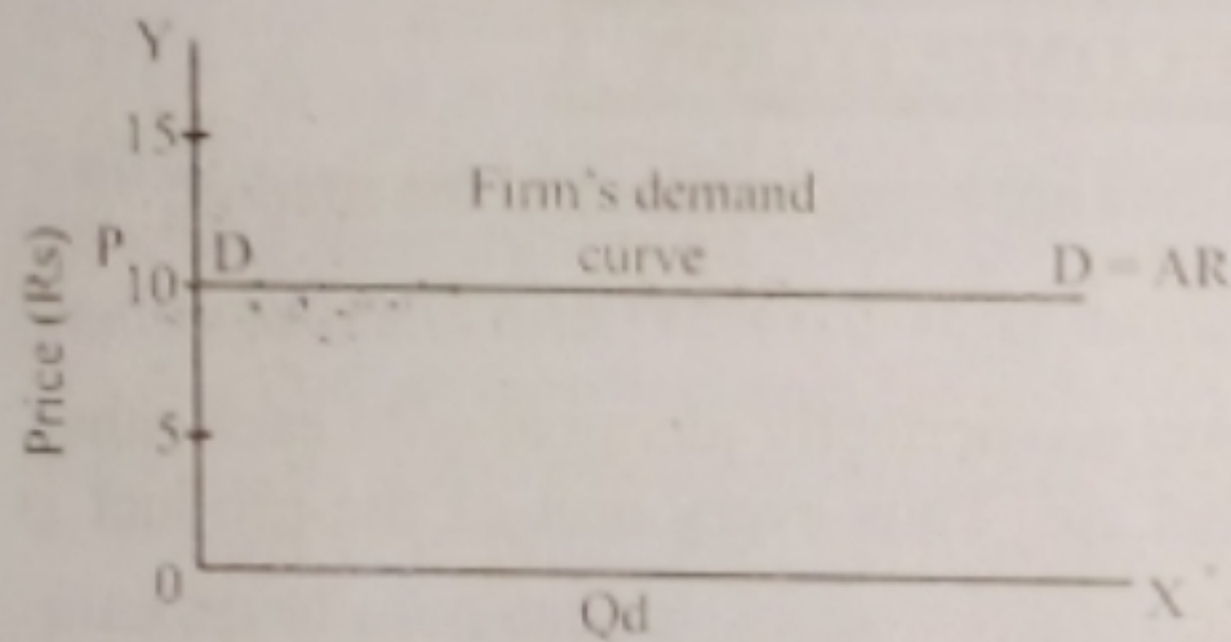
It can be discussed as under:

### DEMAND CURVE OF A FIRM:

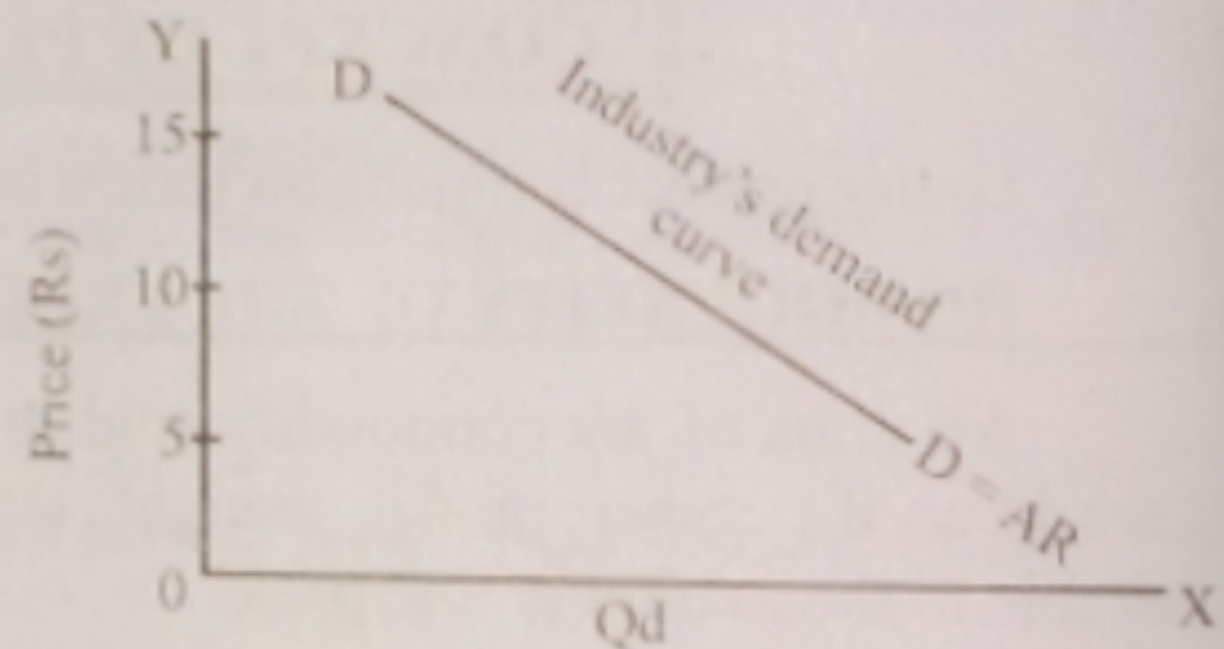
The demand curve of the individual competitive firm is perfectly elastic because the individual firm cannot perceptibly influence the market price which the forces of total demand and supply have established. Thus under perfect competition the firm or seller is price "Taker", rather than a price "maker".

As  $P = AR$  which remains the same at all levels of sale. Thus AR curve of the firm represents the "demand curve" of a competitive firm. This curve is parallel to X-axis and becomes perfectly elastic as shown in the following graph (A).

Graph A



Graph B



### DEMAND CURVE OF AN INDUSTRY:

It has been shown as above in Graph (B), which is negatively sloped just like the market demand curve. It indicates that with the fall in price the demand for the product of the industry expands.

## EQUILIBRIUM OF THE FIRM UNDER PERFECT COMPETITION OR PRICE AND OUTPUT DETERMINATION OF A COMPETITIVE FIRM

The main aim of each firm is to maximize its profit but it must be remembered that the amount of profit of a firm will not be the same at all levels of output. Thus it is but natural to choose the level of output which ensures maximum profit. When a firm achieves this goal (i.e. maximization of profit), it is said to be in equilibrium position.

According to Prof. Lipsey, "When the firm has done every thing in its power to maximize its profit, it is said to be in a position of equilibrium".

There are two methods to explain the equilibrium of a firm.

1. Total revenue and total cost approach

$$\pi = TR - TC$$

2. Marginal revenue and marginal cost approach

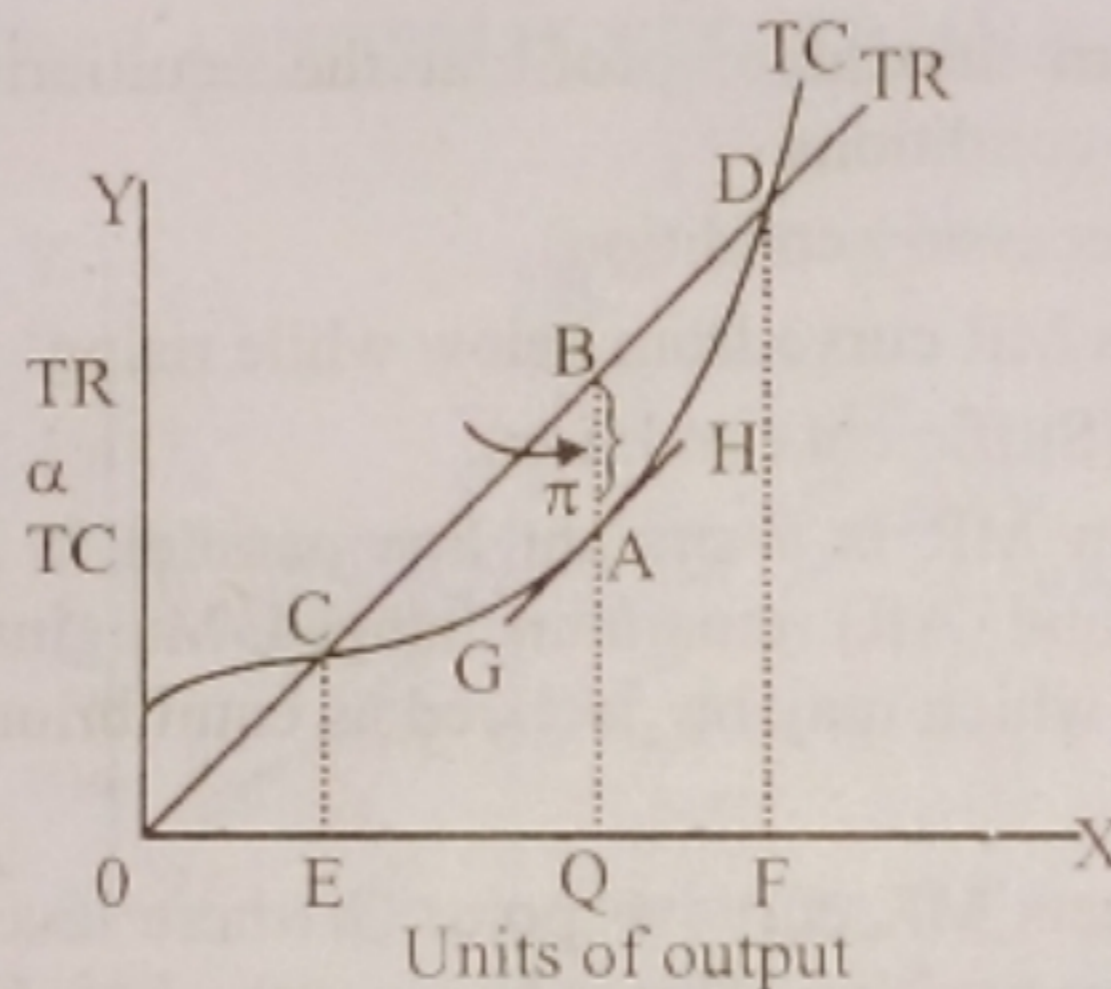
$$MR = MC \text{ approach}$$

## 1. TR - TC APPROACH

Each firm thus tries to maximize the difference between total revenue and total cost. At the level of output where  $TR - TC$  is maximum the equilibrium level will be determined. It is shown in the following diagram.

### EXPLANATION:

Under perfect competition as  $P = AR = MR$  at all levels of output thus TR becomes a straight line starting from the origin as shown in the diagram.



So far as total cost curve (TC) is concerned, initially it falls and then rises in view of "law of variable proportions".

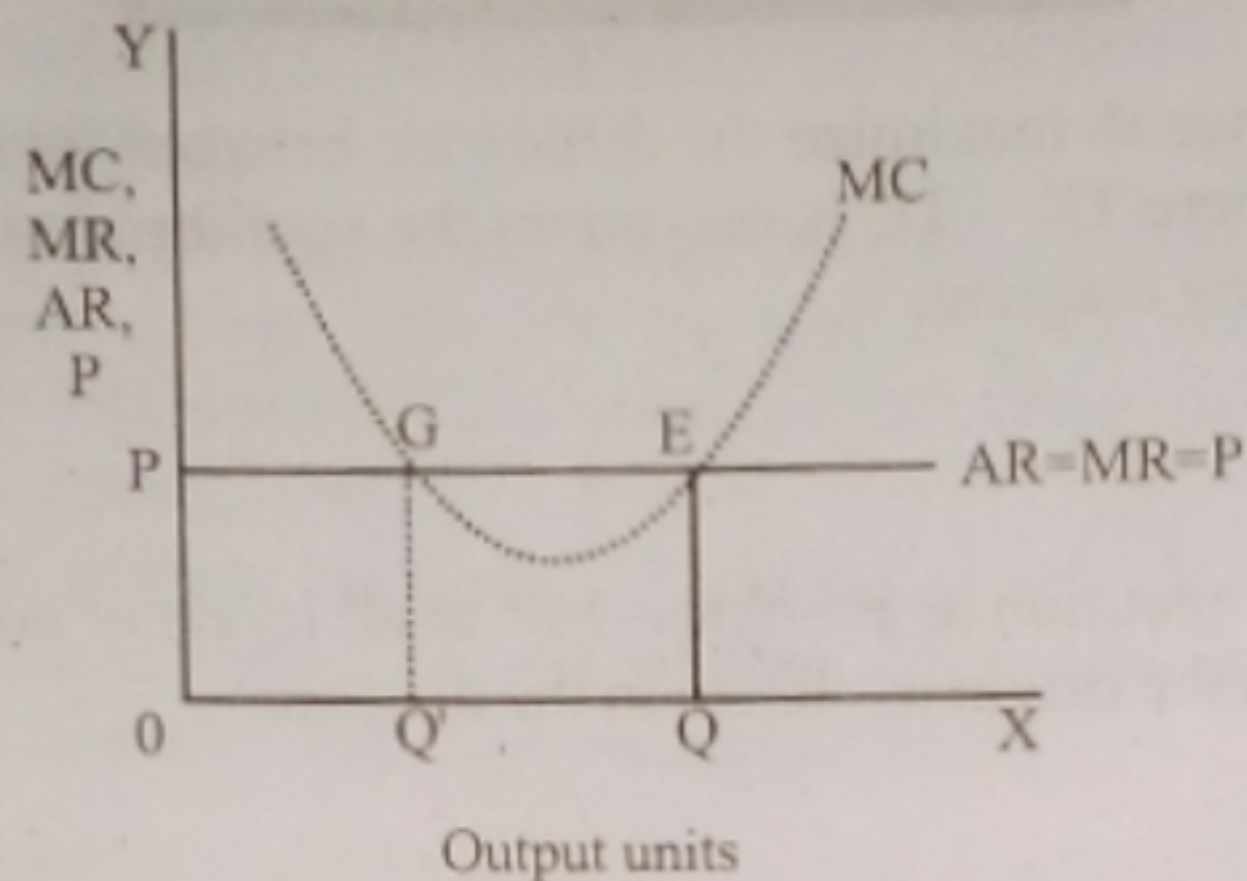
In order to find out the maximum difference between TR and TC, we derive GH curve which is tangent to TC at point A and parallel to TR curve. At this point output level = OQ and  $TR - TC = AB$  which is maximum. In the diagram up to OE level of output,  $TC > TR$  and firm faces loss. At point C,  $TR = TC$  (Firm earns normal profit). When firm produces more than OE it starts earning abnormal profit which becomes maximum at output level OQ (Here difference between TR and TC is highest). Profit starts diminishing beyond OQ output and comes normal at output OF level and point D where again  $TR = TC$ .

It must be noted that output below OE and beyond OF results loss the firm because under both the situations  $TR < TC$ .

Modern economists observe certain limitations and complications in this method i.e.

- (i) it is difficult to find maximum difference between TR and TC.
- (ii) It is not easy to know the price per unit at different levels of output.

## 2. MR = MC APPROACH



A firm can also earn maximum profit at the equilibrium output level. Such an equilibrium level fulfills two conditions:-

1.  $MR = MC$  (necessary condition)
2. MC intersects MR curve from below while rising.

Slope of MC > slope of MR (Sufficient condition).

In the above diagram MR is a straight line parallel to X-axis. It presents perfect competition where price (P) and (AR) remain unchanged. Marginal cost (MC) intersects MR curve from below at point E which may be declared as equilibrium point and level of output is OQ.

Although MC intersects MR curve at point G where level of output is OQ' but this cannot be declared equilibrium position. This is because the firm finds that MC is still falling. 'When MC remains below MR every additional unit of output adds to profit and there is an inducement for firm to produce more. The firm can expand production to point E where MC curve intersects MR from below. Hence E is the equilibrium point of the firm at which equilibrium output is OQ and price is OP which is equal to  $AR = MR$ . At this output firm earns maximum possible profit under existing circumstances.

It must be noted that output less than OQ' and more than OQ will give loss to the firm as under both positions  $MC > MR$ .

### SHORT-RUN EQUILIBRIUM OF THE FIRM UNDER PERFECT COMPETITION

We have already discussed conditions of perfect competition resulting that  $P = AR = MR$ . Thus they make a single line parallel to X-axis. Whereas short-run refers to the time period during which the size of the plant and productive capacity of the firm cannot be changed. New entry and exit in the industry is not possible.

As each firm faces different conditions and different circumstances. Thus the equilibrium level for all of them may not be identical.

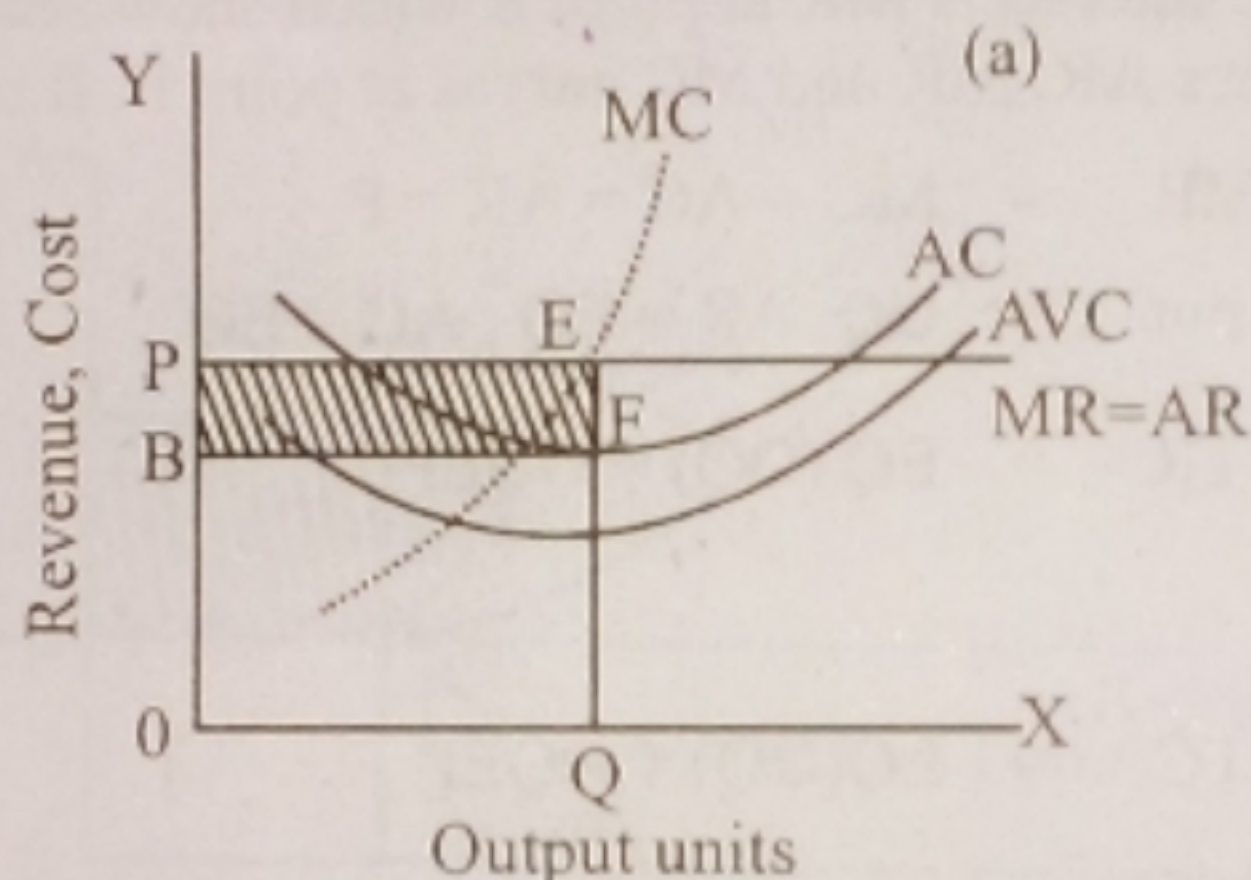
Economists have described four possibilities of equilibrium level in short-run mentioned as under:-

1. Abnormal or Supernormal profit
2. Normal profit
3. A little or Minor loss
4. Shut down or Closing down point (major losses)

Actual position of the firm depends upon market price (AR) and (AC) cost per unit of production and AVC.

- (a) If  $AR > AC$  firm will earn supernormal profit.
- (b) If  $AR = AC$  firm will earn normal profit.
- (c) When  $AR < AC$  firm will face losses.

**1. EQUILIBRIUM UNDER ABNORMAL PROFIT ( $AR > AC$ ):**



In the diagram (a) output is measured along X-axis while revenue and costs are shown along Y-axis. AC = Average cost curve, AVC = Average variable cost curve and MC = Marginal cost curve while MR, AR and P are Marginal revenue, Average revenue and Price respectively.

MC curve intersects MR curve at point E which is the equilibrium level of the firm. OQ is the equ. output.

$$\text{At OQ output AC} = \text{FQ and AR} = \text{EQ}$$

$$\text{As } \pi = \text{TR} - \text{TC. and}$$

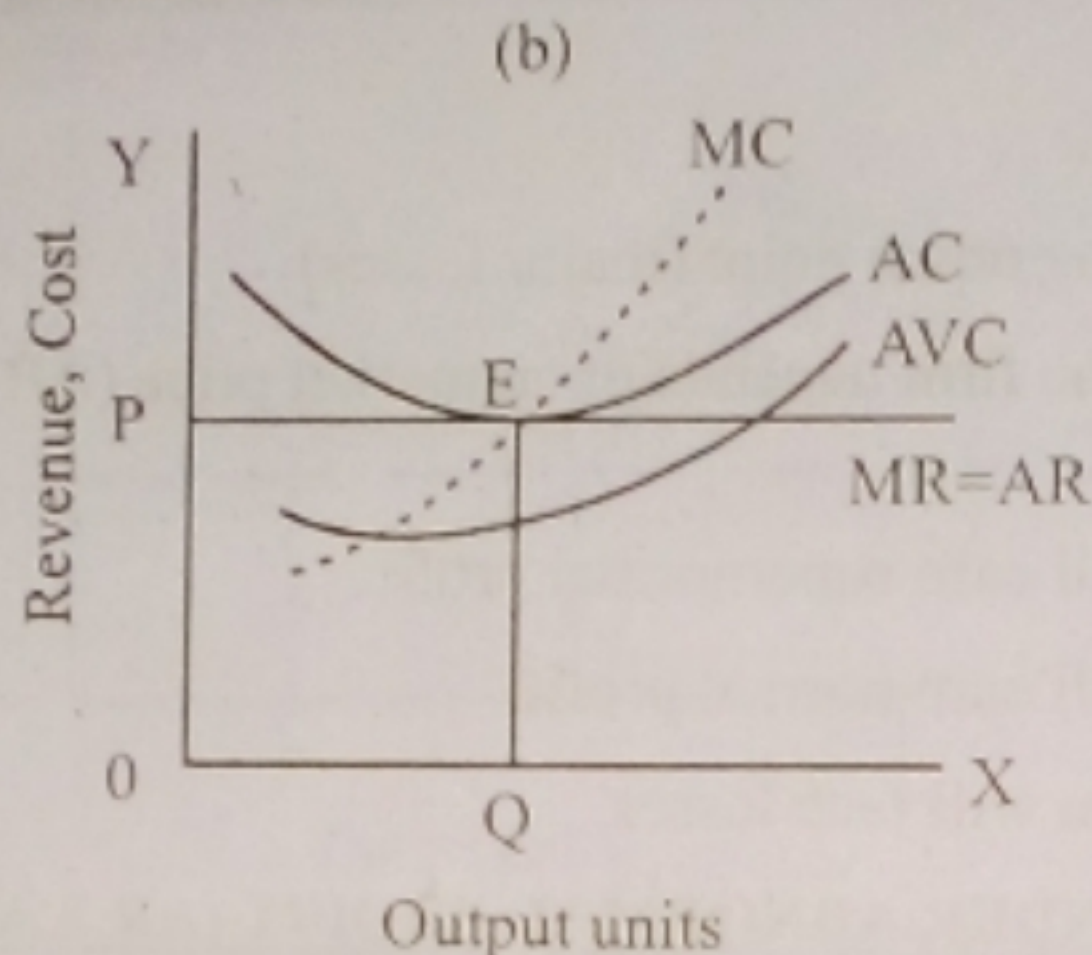
$$\text{TR} = \text{AC (OQ)} = \text{OQEP}$$

$$\text{TC} = \text{AC (OQ)} = \text{OQFB Thus } \pi = \text{OQEP} - \text{OQFB}$$

$$= \text{BFEP (Shaded area in the diagram)}$$

As  $\text{TR} > \text{TC}$  Thus BFE P represents super normal profit

**2. NORMAL PROFIT (AR = AC):**



In diagram (b) MC intersects MR at point E which shows equ. output = OQ. Average cost curve (AC) also touches AR, MR and MC curves at point E. It means that at point E,

$$MR = MC = AC = AR = P$$

$$\text{As here out put} = OQ, AR = EQ, AC = EQ$$

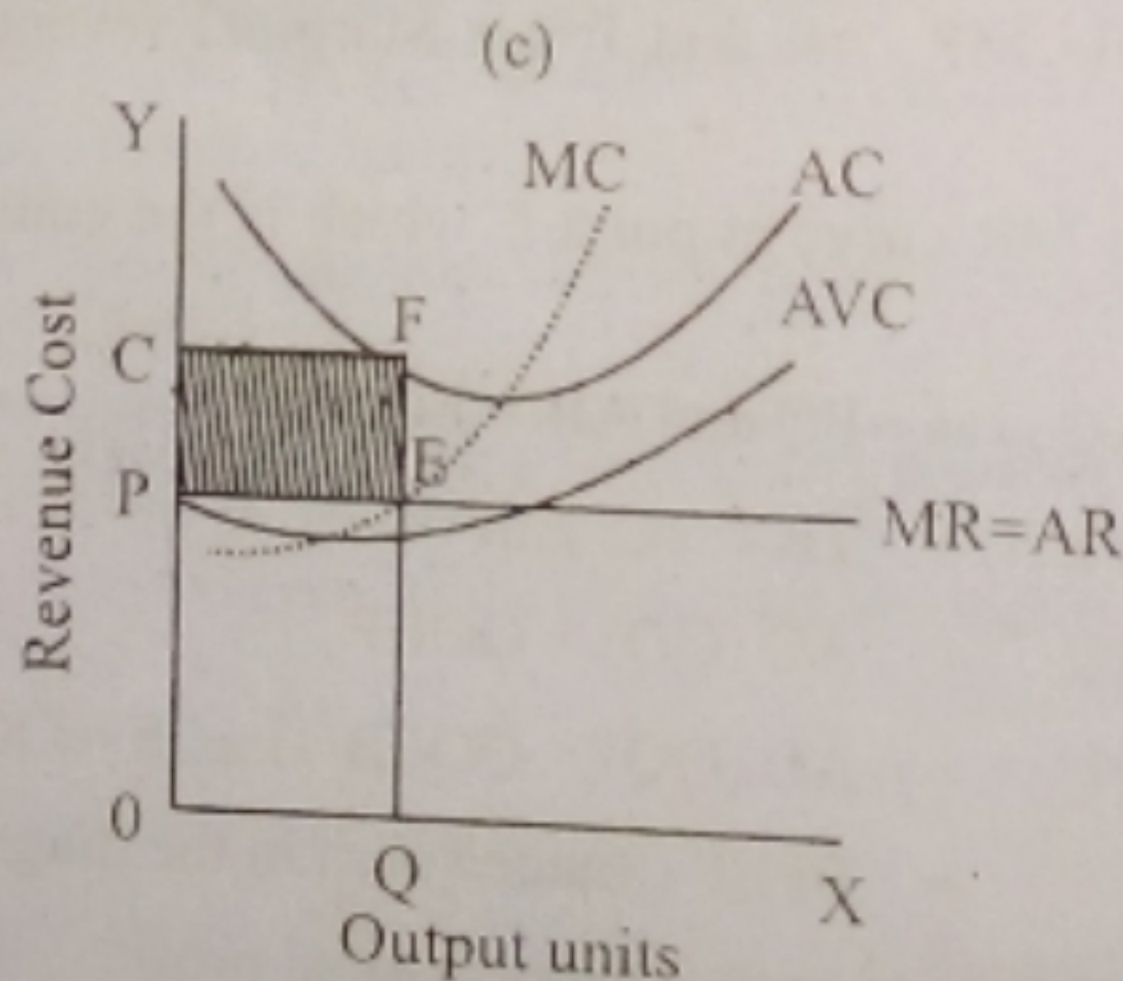
$$\text{Thus TR} = EQ(OQ) = OQEP \quad ]$$

$$OQEP = OQEP$$

$$TC = EQ(OQ) = OQEP \quad ]$$

Because  $TR = TC$ . Hence firm is earning normal profit as it is included in total cost.

**3. A LITTLE LOSS (MINOR LOSS) (AR < AC):**



In diagram (c) MC intersects MR at point E. at which output = OQ.

Average cost curve (AC) passes above the equ. level E. To find AC we move upward to Equ. point E. which touches AC curve at point F. output = OQ,  $AC = FQ$  and  $AR = EQ$ .

Here  $FQ > EQ$  ( $AC > AR$ ). As  $\pi = TR - TC$

$$\text{Hence } TR = OQ(EQ) = OQEP \quad ]$$

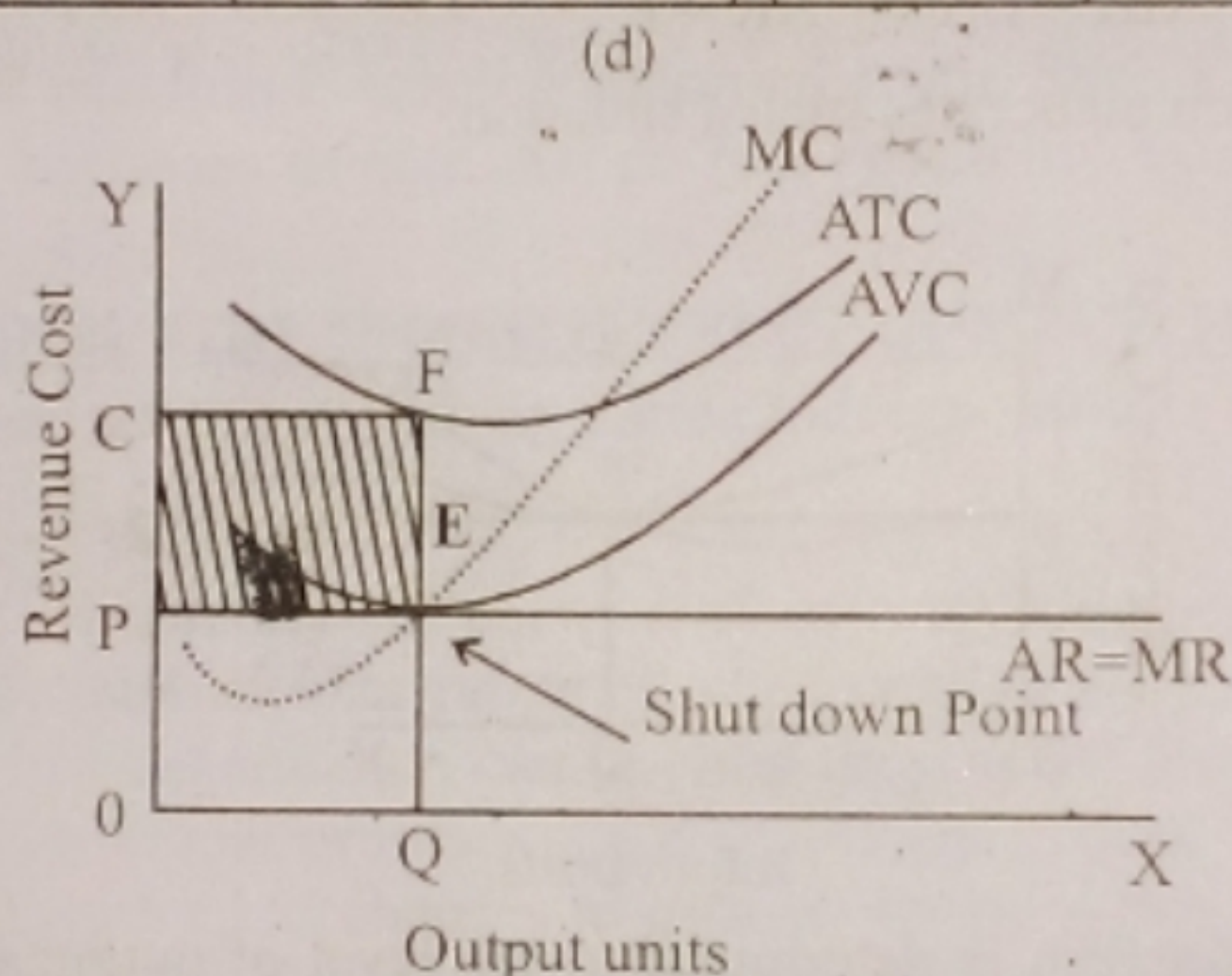
$$TR < TC$$

$$TC = OQ(FQ) = OQFC \quad ]$$

$$\text{loss} = OQFC - OQEP = PEFC \text{ (Shaded area)}$$

It is minor loss as AVC remains below point E. Here Average Variable Cost + Some Part of Fixed Cost is being covered. It is in the interest of firm to continue production process in short-period. If it stops production the loss will be greater in the form of total fixed cost (TFC) which is to be paid even when closed.

#### 4. SHUT DOWN POINT (MAJOR LOSSES) ( $AR = AVC$ ) AND ( $AR < ATC$ ):



In diagram (d) equilibrium point is E and output = OQ. AVC passes through point E, which means that the price of the product is very low which covers firms variable cost only (EQ) and TFC = total loss. Thus the firm is on closing down point. Shut down point is the minimum point on AVC where MC curve intersects AVC curve. A slightest fall in price may ask firm to produce nothing.

$$\text{As loss} = TR - TC \text{ and } TR = OQ(EQ) = OQEP$$

$$\text{While } TC = OQ(FQ) = OQFC$$

$$\text{Loss} = OQFC - OQEP = PEFC \text{ (Shaded area)}$$

The loss is too much and firm seems to be in oxygen tent breathing it's last.

### **LONG-RUN EQUILIBRIUM OF A COMPETITIVE FIRM:**

Long-run is a period of time during which new firms entry and old firms exit is possible in the industry. The size and productive capacity can also be changed according to the market demand. Thus all factors of production become variable. Short-run situation changes and in the long-run following facts are visible:-

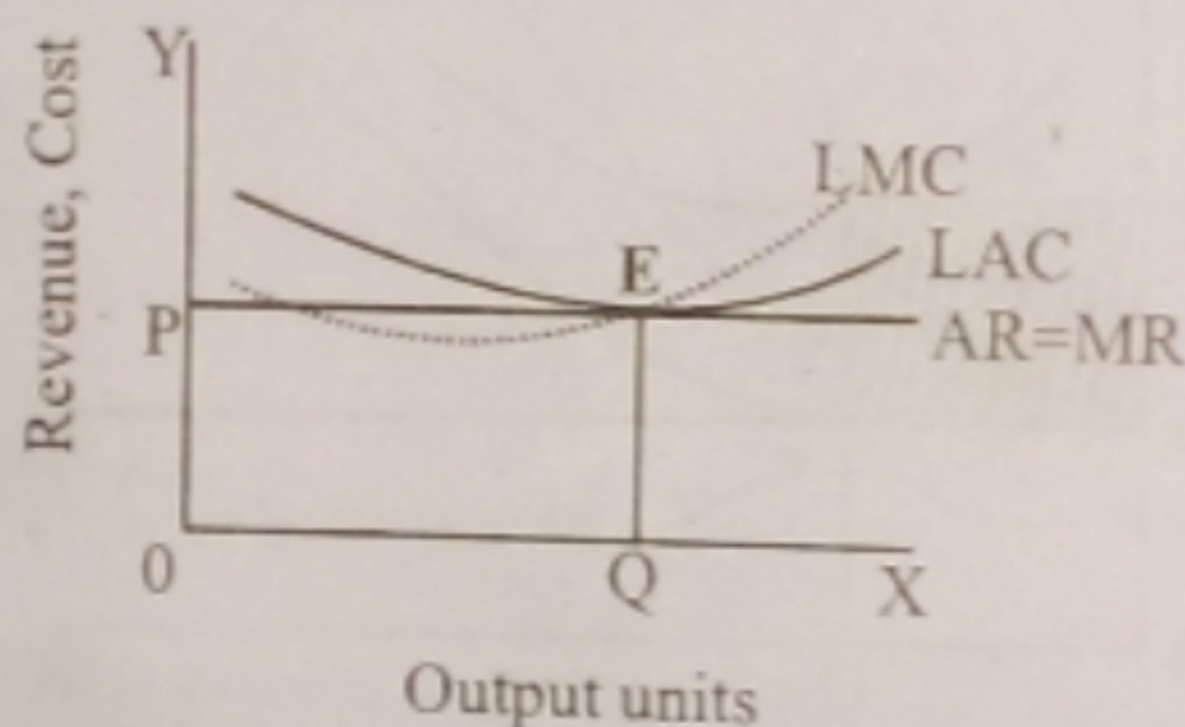
1. The firms facing major losses in short-run are closed down because for a long-period it is not possible to bear such a great loss.
2. The firms running into minor losses have two options before them:
  - (a) Either to improve their business conditions and earn normal profit.
  - (b) Or to leave the industry under adverse circumstances.
3. The firms earning abnormal profits are induced to expand their sizes; moreover the new firms have incentive to enter the industry. Thus supply of the product increases in the market, price falls and supernormal profit disappears.

Hence in the long-run a firm can earn only normal profit under perfect competition. Under this situation firm's equilibrium position is the same as under short-run.

The only difference is that LAC and LMC are flatter than SAC and SMC.

And here  $LMC = MR = LAC = AR = P$

Following diagram elaborates such a situation.



Long-run equilibrium of a firm is determined at the level of output where LMC intersects MR curve from below. Point E shows equilibrium output = OQ and market price  $OP = EQ$  (AR)

Here  $LAC = LMC = EQ$ . As  $AR = AC$  at point E thus firm is earning normal profit.

$$\pi = TR - TC, TR = AR(OQ) = EQ(OQ) = OQEP$$

$$TC = AC(OQ) = EQ(OQ) = OQEP$$

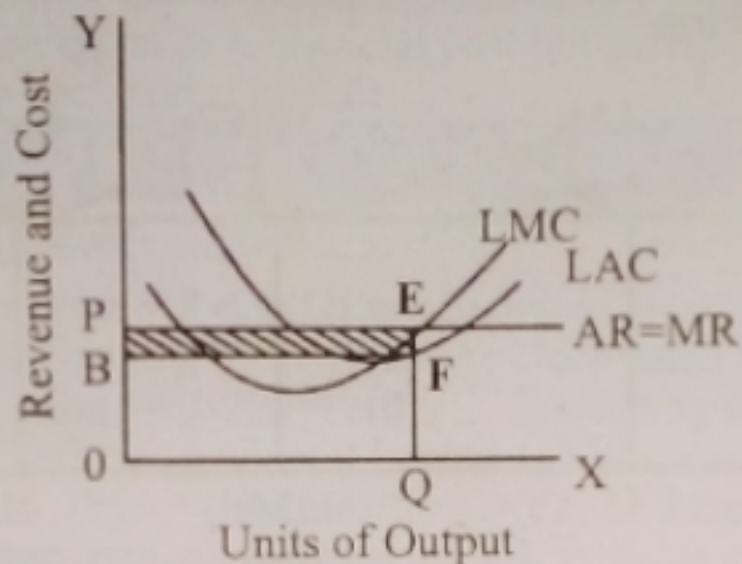
As  $TR = TC$  thus firm is earning normal profit, which is included in TC.

It must be noted that the above mentioned situation may exist only if all the factors are homogeneous, the price of every factors is uniform and LAC of all the firms is identical.

Practically it is not possible, clear difference in the ability, education, training, experience and mental approach of entrepreneurs is visible. Thus they are Heterogeneous and an intelligent, efficient and devoted entrepreneur may earn abnormal profit. It is shown in the following diagram with PBF E shaded area.



IN THE DIAGRAM:



LAC = FQ and AR = EQ

Here  $AR > LAC$ ,  $EQ > FQ$

Thus  $TR > TC$  and firm is earning abnormal profit. Such a firm is known as "Intra-Marginal firm". It is important to note that no loss possibility exists in the long-run under perfect competition.