

Micro Economics

Theory of Demand & Supply

Date :

a) Demand :

A demand is a desire which has three characteristics -

- i) Willingness to buy
- ii) Ability to buy
- iii) Willingness to spend

b) Demand Function: $[Q_d \equiv Q_D \equiv DD \equiv dd \equiv D \equiv d]$

$$Q_d = f(P, \underbrace{P_s, P_c}_{\text{Cross Price}}, Y, T)$$

Here,

Q_d = Quantity demand

P = Own price

P_s = Price of substitute

P_c = Price of complement

Y = Income

T = Taste

Ex:

Quantity demand for tea,

$$Q_{d, \text{tea}} = f(P_{\text{tea}}, \overbrace{P_s(\text{coffee}), P_c(\text{milk}), Y, T}^{\text{Ceteris paribus}})$$

Date:

IV) Demand Equation: (Identifying DD fn)

$$\text{Demand eqn} = \pm a - bp$$

Hence, a = constant

b = value of slope

P = slope

$$\text{Ex: } Q = 200 - 3P$$

Hence,

$$a = 200$$

$$b = 3$$

Since this fn has a -ve slope, it is a demand fn.

V) Factors affecting Demand:

i) Income:

As people's income rises, people buy more of each good (normal good).

ii) Size of the market:

It is mainly measured by the population size.

iii) Price & availability of related goods:

Demand of good A tends to fall if price of a substitute good B is low.

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VI) Preferences:

Preferences are individual's attitudes towards goods & services.

V) Expected future prices:

Demand for a good increases

If the price of the good is expected to grow in future.

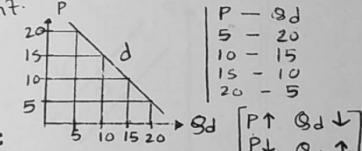
VI) Movement & Shifting of Demand Curve:

i) Movement along the demand curve:

It happens when own price changes & the rest of the variables remain constant.

$$Q_d = f(P, P_s, P_c, Y, T)$$

constant

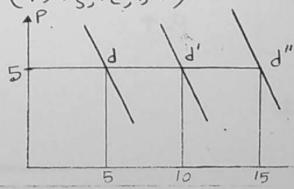


ii) Shifting of demand curve:

It happens when own price remains constant and the rest of the variables change.

$$Q_d = f(P, P_s, P_c, Y, T)$$

constant

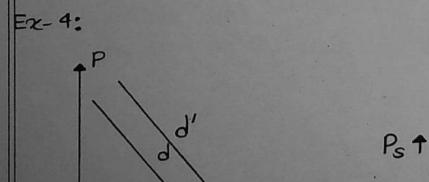
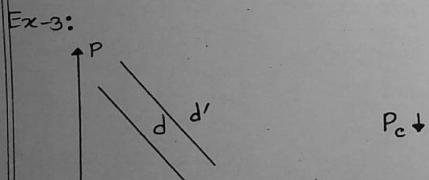
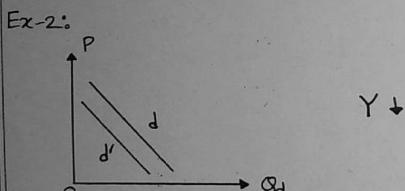
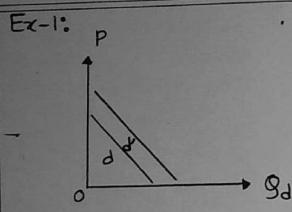


P - Qd	5 - 5
	5 - 10
	5 - 15

(अपने गुण
पर्याप्ति का
में पर्याप्ति
का मौजूदा है।)

Same P but
diff variables
are affected
as change in
DD shift

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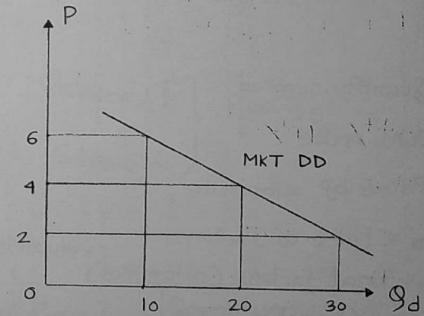


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Market Demand Curve:

The market demand for a commodity depends ^{on} all the factors that determines individual's demand & in addition on the no. of buyers of the commodity in the market.

Price (P)	DD of A (Q _{d1})	DD of B (Q _{d2})	DD of C (Q _{d3})	MKT Demand Q _{d1} + Q _{d2} + Q _{d3}
2	10	15	5	30
4	7	10	3	20
6	3	6	1	10



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■ Supply:

Supply means how much a seller wants to sell at particular time at different prices.

If a firm supplies goods and services, the firm

- 1) Has the resources and technology to produce it
- 2) Can profit from producing it
- 3) Has ^{made} a definite plan to produce it and sell it.

■ Supply Function: $[Q_S \equiv Q_s \equiv SS \equiv ss \equiv S \equiv s]$

$$Q_S = f(P, P_S, P_{factors}, N, T, S)$$

Here,

Q_S = Quantity supplied

P = Own price

P_S = Price of substitute

$P_{factors}$ = Price of factors

N = Natural factors (calamities)

T = Tax (import)

S = Subsidy

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Ex: Quantity supply for rice,

Ceterus paribus

$$Q_{S_{rice}} = f(P_{rice}, \underbrace{P_S}_{\text{Own Price}}, \underbrace{P_{wheat}, P_{factors}, N, T, S}_{\text{Other factors}})$$

■ Law of supply:

According to Marshal, "Other things

(Ceterus paribus) remaining constant, if the price of rice (own price) increases, the supply of rice ($Q_{S_{rice}}$) increases.

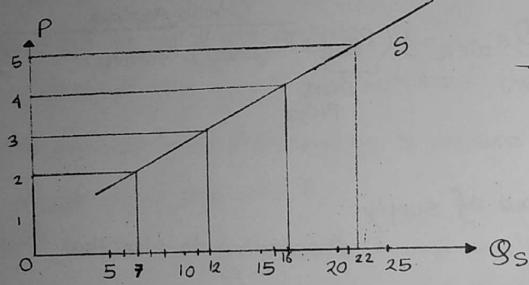
$$\left. \begin{array}{l} P_{(rice)} \uparrow Q_{S_{(rice)}} \uparrow \\ P_{(rice)} \downarrow Q_{S_{(rice)}} \downarrow \end{array} \right\} P \propto Q_S$$

■ Supply Schedule:

	Price (\$ per unit)	Quantity (Million mand per year)
A	5	22
B	4	16
C	3	12
D	2	7

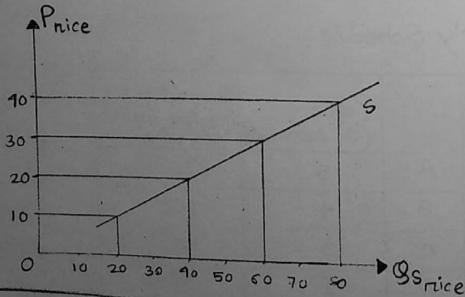
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Supply Curve:



Ex: Supply schedule & supply curve for rice,

Price	Q_s rice
10	20
20	40
30	60
40	80



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Supply Equation (Identifying s fⁿ):

$$\text{Supply eq}^n = \pm a + bp$$

Here,

a = constant

b = value of slope

P = slope

$$\text{Ex: } Q = 200 + 0.5P$$

Here, $a = 200$

$$b = 0.5$$

Since, this f^n has a +ve slope, it is a supply f^n .

Factors determining Supply:

i) Cost of production:

When the cost of production of a good is low relative to its market price, it will be profitable for producers to produce a great deal. Technological advancement and change of prices of inputs clearly affect production cost.

ii) Prices of production substitutes:

If the prices of one production substitute rises, the supply of other substitute decrease; example - if the price of diesel fuel rises

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the supply of gasoline decreases.

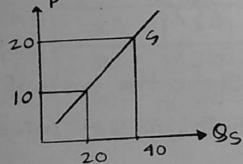
III) Market organization:
If the market becomes monopolized it will tend to raise the price at each level of output.

■ Movement and shifting of supply curve:

I) Movement along the supply curve:

It happens when own price changes & the rest of the variables remain constant.

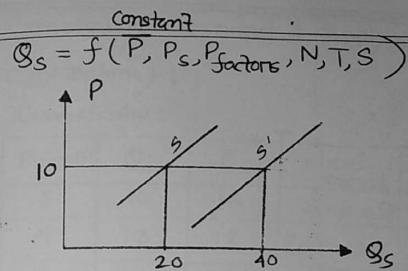
$$Q_S = f(P, \overbrace{P_S, P_{\text{factors}}, N, T, S}^{\text{constant}})$$



$$\begin{bmatrix} P \uparrow Q_S \uparrow \\ P \downarrow Q_S \downarrow \end{bmatrix} \text{अपनी विक्री के साथ स्पॉर्ट्स की बढ़ती है।}$$

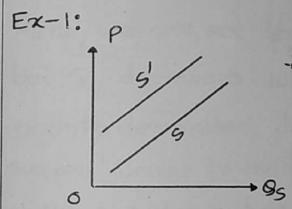
II) Shifting of supply curve:

It occurs when own price remains constant and price of other commodity, price of factors of production, natural factors, tax, subsidy change; example - as production cost falls, supply of rice rises.

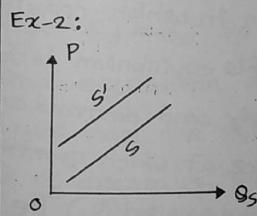


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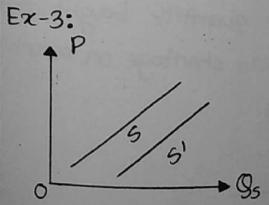
[Same P but \rightarrow variables अंदर बदलती हैं तो SS shift होती है]



$P_{\text{factors}} \uparrow$



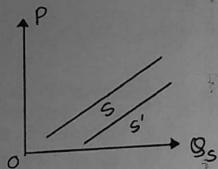
N (then there occurs a draught)



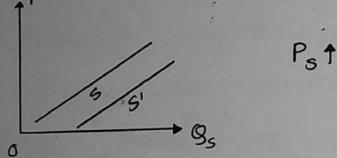
$S \uparrow$

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Ex-4:



Ex-5:



Equilibrium of demand and supply :

An equilibrium is a situation in which opposite forces balance each other. This equilibrium is found at the intersection of the supply and demand curves. The equilibrium price is a price at which quantity demanded (Q_d) equals quantity supplied (Q_s). The equilibrium quantity (E) is the quantity bought and sold at the equilibrium price. No shortage or surplus is found at equilibrium prices.

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Combining Demand & Supply (determination of market equilibrium) :

Numerically :

Price(P)	Q_d	Q_s	State of Market	Pressure on Price
6	10	16	Surplus	Downward(↓)
4	12	12	Equilibrium	Neutral
2	16	10	Shortage	Upward(↑)

Here, we can see that, when P decreases Q_d increases but Q_s decreases. When price of a good is \$6 then quantity demanded decreases but supply increases. So surplus occurs in the market. So, to bring the market in equilibrium, price(P) falls. When the price becomes \$4 then $Q_d = Q_s$. So, pressure on price becomes neutral and equilibrium occurs in the market. When becomes lower than the equilibrium price then Q_d increases & Q_s decreases. So, the market faces shortage & to make it neutral the price(P) of that good rises.

P.T.O

Graphically,

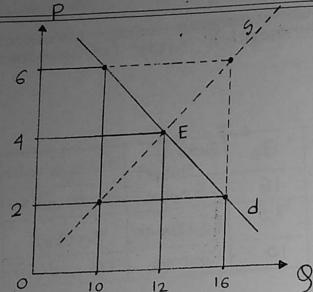


fig: Equilibrium of Demand & supply curve

the equilibrium

To determine price & quantity in demand and supply diagram, the two curves (DD & SS) intersect at a point E at a price \$4. Quantity willingly demanded is 12 units. When the P is lower than the equilibrium price then Q_d increases & Q_s decreases. When the price is higher than the equilibrium price, Q_s increases & Q_d decreases. When Q_d exceeds Q_s , shortage occurs, driving price back to equilibrium price. When Q_s exceeds Q_d , surplus occurs, driving price down to equilibrium price.

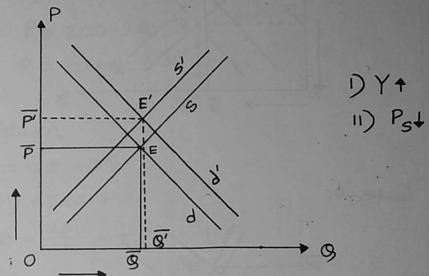
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Effects of shift in supply & demand curves:

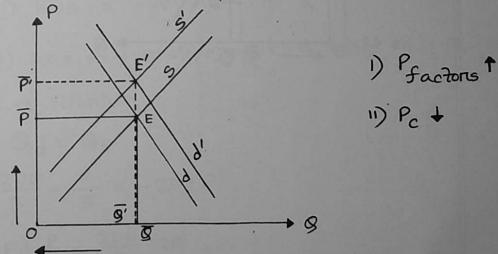
- (shift in equilibrium)
- i) Same as in DD & SS diagram right shift in S: (Left)
 - ii) Opposite direction to that for (Right)

Case-1:



- i) $Y \uparrow$
- ii) $P_s \downarrow$

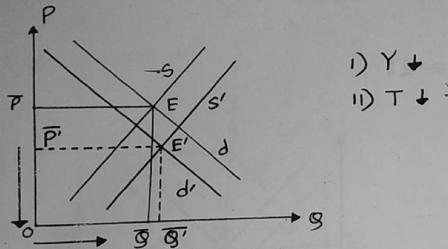
Case-2:



- i) $P_{factors} \uparrow$
- ii) $P_c \downarrow$

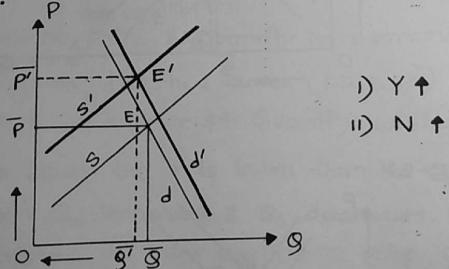
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Case-3:



- I) Y ↓
II) T ↓

Case-4:



- II) Y ↑
II) N ↑

Mathematical Analysis:

Problem-1: From the following eqn's identify the demand and supply fn's. Find the equilibrium price & quantity.

$$P = 200 - 3Q$$

$$P = 20 + Q$$

Sol'n: Given,

$$P = 200 - 3Q$$

$$\Rightarrow 3Q = 200 - P$$

$$\Rightarrow Q = \frac{200}{3} - \frac{1}{3}P \quad \dots (I)$$

$$P = 20 + Q$$

$$\Rightarrow Q = -20 + P \quad \dots (II)$$

$Eqn(I)$ has a -ve slope, so it's a demand eqn.
 $Eqn(II)$ has a +ve slope, so it's a supply eqn.

In equilibrium,

$$Q_d = Q_s$$

$$\Rightarrow \frac{200}{3} - \frac{1}{3}P = -20 + P$$

$$\Rightarrow P + \frac{P}{3} = \frac{200}{3} + 20$$

$$\Rightarrow 3P + P = 200 + 60$$

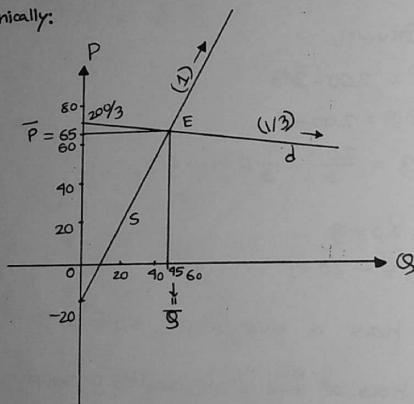
$$\Rightarrow 4P = 260$$

$$\bar{P} = 65$$

$$(I) \Rightarrow Q = -20 + P \\ = -20 + 65 \\ = 45$$

$$\therefore \bar{Q}_S = 45 = \bar{Q}_d$$

Graphically:



$$\text{Problem-2: } P = 200 - 3Q$$

$$P = Q$$

Find equilibrium of P & Q

Sol'n: Given,

$$P = 200 - 3Q$$

$$\Rightarrow 3Q = 200 - P$$

$$\Rightarrow Q = \frac{200}{3} - \frac{P}{3} \quad \dots (I)$$

Since it has a -ve slope, it's a demand eqn.

$$P = Q$$

$$\Rightarrow Q = 0 + P \quad \dots (II)$$

Since it has a +ve slope, it's a supply fn.

In equilibrium,

$$Q_d = Q_S$$

$$\Rightarrow \frac{200}{3} - \frac{P}{3} = P$$

$$\Rightarrow P + \frac{P}{3} = \frac{200}{3}$$

$$\Rightarrow 3P + P = 200$$

$$\Rightarrow 4P = 200$$

$$\therefore P = 50$$

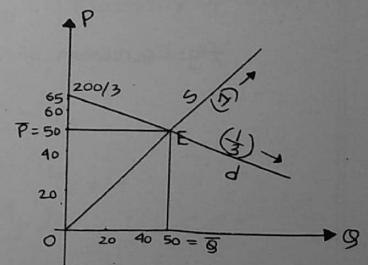
$$(I) \Rightarrow Q = P = 50$$

$$\therefore \bar{Q}_S = 50 = \bar{Q}_d$$

Date

Date

Graphically:



- Date:
- Combining Demand & Supply for Wheat:

P	Q _D	Q _S	State of Market	Pressure on Price
5	9	18	Surplus	↓
4	10	16	Surplus	↓
3	12	12	Equilibrium	Neutral
2	15	7	Shortage	↑

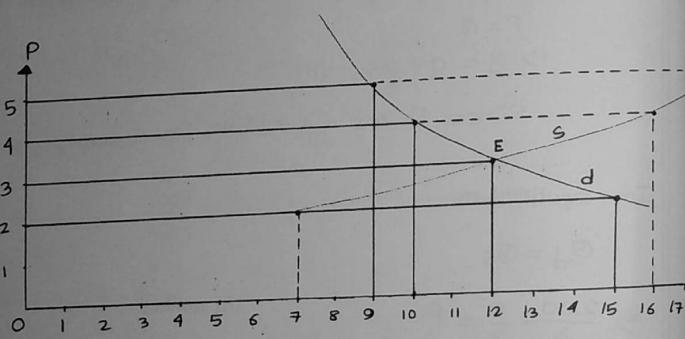


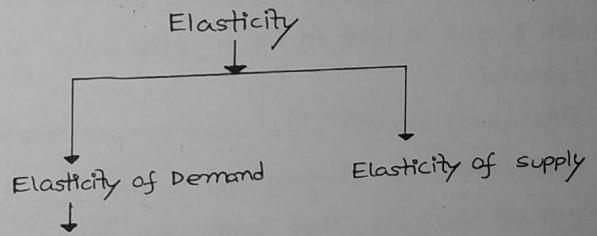
fig: Equilibrium of demand & supply for wheat

Date:

Elasticity of Demand & Supply:

Demand elasticity is a measure of how much the quantity demanded will change if another factor changes. One example is the price elasticity of demand; this measures how the quantity demanded changes with price.

Price elasticity of supply is a measure used in economics to show the responsiveness, or elasticity, of the quantity supplied of a good or service to a change in its price.



- Own price elasticity (η_{P_x})
- Cross-price elasticity ($\eta_{P_{x,y}}$)
- Income elasticity (η_y)

Date :

- **Elastic Demand:**

Elastic demand means that demand for a product is sensitive to price changes.

For example - If the selling price of a product is increased, there will be fewer units sold. If the selling price of a product, ^{is} decreased, there will be an increase in the number of units sold.

- **Inelastic Demand:**

A situation in which the demand for a product does not increase or decrease correspondingly with a fall or rise in its price, is called inelastic demand.

This usually occurs with goods or services that people need everyday. They've got to buy it, ^{even} if the price goes up similarly, they won't buy ^{much} more, even if the price drops.

Date :

Mathematical Analysis:

- ① Derive the demand function for a desktop when,

$$Q_d \text{ desktop} = 20 - 0.5 P_{\text{desktop}} + 0.2 P_{\text{laptop}} - 0.3 P_{\text{RAM}} + 0.0001 Y$$

Where,

$$P_{\text{desktop}} = 50,000$$

$$P_{\text{laptop}} = 60,000$$

$$P_{\text{RAM}} = 10,000$$

$$Y = 1,00,000$$

$$Q_d \text{ desktop} = 50,000$$

Find, the elasticity of demand.

Sol'n:

Given,

$$Q_d \text{ desktop} = 20 - 0.5 P_{\text{desktop}} + 0.2 P_{\text{laptop}} - 0.3 P_{\text{RAM}} + 0.0001 Y$$

Where, $P_{\text{desktop}} = 50,000$ & $Q_d \text{ desktop} = 50,000$

$$P_{\text{laptop}} = 60,000$$

$$P_{\text{RAM}} = 10,000$$

$$Y = 1,00,000$$

Date:
i) Own price elasticity: ($\eta_{P_{\text{desktop}}}$)

$$\eta_{P_{\text{desktop}}} = \frac{\Delta(Q_{d_{\text{desktop}}})}{\Delta P_{\text{desktop}}} \times \frac{P_{\text{desktop}}}{Q_{d_{\text{desktop}}}}$$

$$= -0.5 \times \frac{50,000}{50,000}$$

$$= -0.5$$

$$= |0.5| < 1$$

= change in $Q_{d_{\text{desktop}}}$ < change in P_{desktop}

Comment:
Desktop is a necessary good.

NB: If $\eta_{P_{\text{desktop}}} > 1$, then desktop is a luxury good.

ii) Cross-price elasticity: ($\eta_{P_{\text{desktop}}, \text{laptop}}$)

$$\alpha) \eta_{P_{\text{desktop}}, \text{laptop}} = \frac{\Delta(Q_{d_{\text{desktop}}})}{\Delta P_{\text{laptop}}} \times \frac{P_{\text{laptop}}}{Q_{d_{\text{desktop}}}}$$

$$= 0.2 \times \frac{60,000}{50,000}$$

$$= 0.24$$

Comment:

Desktop & Laptop are substitutes.

NB: If $\eta_{P_{\text{desktop}}, \text{laptop}} = (+1)$, then

Laptop & Desktop are perfect substitutes.

$$b) \eta_{P_{\text{desktop}}, \text{RAM}} = \frac{\Delta(Q_{d_{\text{desktop}}})}{\Delta P_{\text{RAM}}} \times \frac{P_{\text{RAM}}}{Q_{d_{\text{desktop}}}}$$

$$= -0.3 \times \frac{10,000}{50,000}$$

$$= -0.06$$

Comment:

Desktop & RAM are complements.

NB:

If $\eta_{P_{\text{desktop}}, \text{RAM}} = (-1)$; then

RAM & Desktop are perfect complements.

iii) Income Elasticity: (η_Y)

$$\begin{aligned}\eta_Y &= \frac{\Delta(Q_{\text{desktop}})}{\Delta Y} \times \frac{Y}{Q_{\text{desktop}}} \\ &= 0.0001 \times \frac{1,00,000}{50,000} \\ &= 0.0002\end{aligned}$$

Comment:

Desktop is a normal good.

N.B: If η_Y is negative then, desktop is an inferior good.

② Derive the demand fn for laptop when it is a luxury good & normal good having one perfect substitute & one perfect compliment.

Solⁿ:

Let,

$$Q_{\text{laptop}} = 20 - 1.5P_{\text{laptop}} + 0.5P_{\text{desktop}} - 3P_{\text{mouse}} + 0.0$$

Date.....

Date.....

Where,

$$Q_{\text{laptop}} = 30,000$$

$$P_{\text{laptop}} = 30,000$$

$$P_{\text{desktop}} = 60,000$$

$$P_{\text{mouse}} = 10,000$$

$$Y = 1,00,000$$

i) Own price elasticity:

$$\begin{aligned}\eta_{P_{\text{laptop}}} &= \frac{\Delta(Q_{\text{laptop}})}{\Delta P_{\text{laptop}}} \times \frac{P_{\text{laptop}}}{Q_{\text{laptop}}} \\ &= -1.5 \times \frac{30,000}{30,000}\end{aligned}$$

$$= -1.5$$

$$= |1.5| > 1$$

= change in Q_{laptop} > change in P_{laptop}

Comment:

Laptop is a luxury good.

Date:

II) Cross-price elasticity:

$$a) \eta_{P_{\text{laptop}}, \text{desktop}} = \frac{\Delta Q_{\text{d laptop}}}{\Delta P_{\text{desktop}}} \times \frac{P_{\text{desktop}}}{Q_{\text{d laptop}}}$$

$$= 0.5 \times \frac{60,000}{30,000}$$

$$= 1$$

Comment:

Laptop & Desktop are perfect substitutes.

$$b) \eta_{P_{\text{laptop}}, \text{mouse}} = \frac{\Delta Q_{\text{d laptop}}}{\Delta P_{\text{mouse}}} \times \frac{P_{\text{mouse}}}{Q_{\text{d laptop}}}$$

$$= -3 \times \frac{10,000}{30,000}$$

$$= -1$$

Comment:

Laptop & mouse are perfect complements.

Date:

III) Income elasticity:

$$\eta_Y = \frac{\Delta Q_{\text{d laptop}}}{\Delta Y} \times \frac{Y}{Q_{\text{d laptop}}}$$

$$= 0.001 \times \frac{1,00,000}{30,000}$$

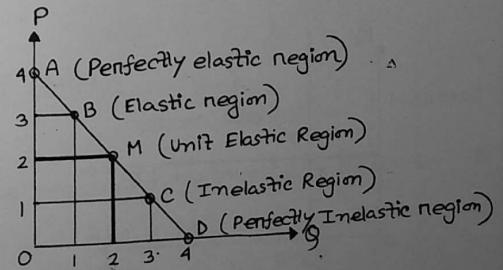
$$= 3.33 \times 10^{-4}$$

Comment:

Laptop is a normal good.

Elasticity of a straight line DD curve using point elasticity formula:

$$e_{\text{point}} = \frac{\text{lower segment}}{\text{upper segment}}$$



Theory of Utility (Demand)

Date

Now,

$$\text{Elasticity of point A, } e_A = \frac{1}{0} = \infty [e = \infty]$$

$$\text{Elasticity of point B, } e_B = \frac{3}{1} = 3 [e > 1]$$

$$\text{Elasticity of point M, } e_M = \frac{2}{2} = 1 [e = 1]$$

$$\text{Elasticity of point C, } e_C = \frac{1}{3} = 0.333 [e < 1]$$

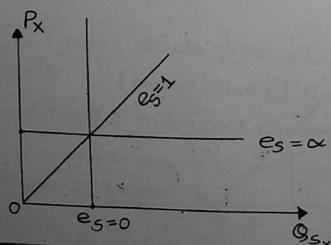
$$\text{Elasticity of point D, } e_D = \frac{0}{4} = 0 [e = 0]$$

- अनुग्रहीत प्रेफर एक्सात्र point C (luxury good)
- निःनुग्रहीत प्रेफर एक्सात्र point B (necessary good)

Elasticity of supply ($\eta_{Q_{S_x}}$): (मात्र लागावा ना)

$$\eta_{Q_{S_x}} = \frac{\Delta(Q_{S_x})}{\Delta P_x} \times \frac{P_x}{Q_{S_x}}$$

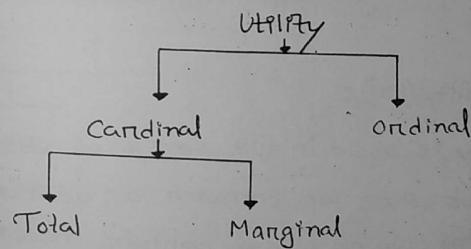
= +ve



Utility:

Utility denotes satisfaction. It refers to the subjective pleasure or usefulness that a person derives from consuming a good or service. It is a scientific construct that economists use to understand how rational consumers divide their limited resources among the commodities that provide them satisfaction.

Measurement of Utility:



Cardinal Utility:

Gossen, Walras and Marshall defined

utility to be measured by numbers. Example - 2 are twice times of 1 etc.

• Ordinal Utility:

According to Tucks, utility is a normal condition, so it should not be measured by numbers, rather it should be expressed through ordering.

Example - 1st, 2nd, 3rd etc and $\text{III} > \text{II} > \text{I}$

The analysis of ordinal utility is in differentiate curve analysis. Example: AUST $>$ NSU $>$ AIUB

• Total Utility (TU):

It is the sum of all the marginal utilities added from beginning.

• Marginal Utility (MU):

Marginal utility is used in the sense of additional or extra. Thus when we consume an additional unit of anything, we receive a certain increment to our psychic utility which is MU.

Example -

$$MU_{\text{Bread}} > MU_{\text{CD}}$$

If we want, $MU_{\text{Bread}} = MU_{\text{CD}}$ then we have to consume more bread & we have to decrease the usage of CD.

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Date :

• Law of Diminishing MU:

The law states that, as the amount of a good consumed increases, the MU of the good tends to diminish.

The explanation of law of diminishing marginal utility:

Numerically - (Same taste & size margo)

Quantity of a good consumed (Q)	Total Utility (TU)	Marginal Utility (MU)
0	0	0
1	4	4
2	7	3
3	9	2
4	10	1
5	10	0
6	8	-2

Column (2) shows that, TU which is the sum of all the marginal utilities (MU) added from the beginning increases as consumption (Q) grows but at a decreasing rate.

Date :.....

Column(3) measures MU. With the increase in consumption, MU falls. When TU is maximum, MU is zero. If we continue to consume the good after the point where $MU=0$, then MU becomes negative.

If consumption is continuous, this law is valid. But in case of discontinuity, the law becomes invalid.

Graphically—

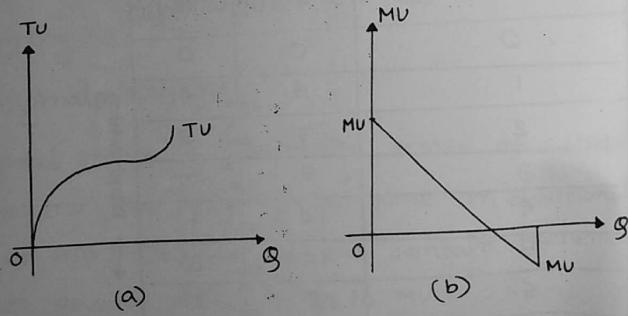


Fig-(a) shows how TU increases, but at a decreasing rate. Fig-(b) shows MU when we work with sizable unit of diminishing MU, which means that the curve in Fig (b) must be a slope of TU curve.

• Shortcoming of the law:

① Suitable unit:

It is assumed that the commodity is taken in suitable units. If you begin taking water in spoonfuls when thirsty, your thirst will at first be stimulated rather than assuaged and MU may at first rise.

* assuaged — to make an unpleasant feeling less severe

② Suitable time:

It is further assumed that the good is taken within a certain time; otherwise the law will not apply.

③ No change in consumer taste:

The consumer must not develop a craving. The more music is heard the greater is the MU.

④ Normal persons:

The law applies to normal persons and not to abnormal persons like misers.

⑤ Constant income:

Any change in income will falsify the law.

Date

* falsify -

to change a law that is no longer true.

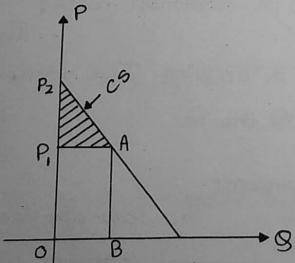
⑥ Rare Collection:

In this case the law does not hold good. For instance the MU of coins tends to increase as the collector collects more.

⑦ Not applicable to money:

It is said that the more money he has, the more he wants.

• Consumer Surplus (CS): when the supply of a good is more than the demand, it is known as consumer surplus. Difference between actual and expected prices.



Date

Equilibrium Condition: Equal MU per dollar for every good

A consumer arranges his consumption so that every single good is bringing him the same MU per dollar of expenditure. In that way he is attaining maximum utility from his purchases.

The law of equal MU per dollar states that each good is demanded up to the point when the MU of the last dollar spent on it is exactly the same as the MU of the last dollar spent on any other good.

Consumer equilibrium under cardinal system

= Equal MU for every good

$$= \frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} = \frac{MU_Z}{P_Z} = \dots = \lambda$$

where,

λ = constant utility of money

λ = MU per dollar of income provided that income is fixed and market price is given.

Date

Mathematical Analysis:

① $P_d = (Q-1)^2$, where $P_0 = 4$, $Q_0 = 6$. Find consumer surplus CS.

Soln:

Given, $\rightarrow [Q_0 - 2Q + 1]$
 Formula
 सम्पुर्ण ज्ञान
 तारामंजस
 अवधारणाएः

$$P_d = (Q-1)^2 \quad \text{Hence, } P_0 = 4 \quad \& \quad Q_0 = 6$$

Now,

$$\begin{aligned} CS &= \int_0^{Q_0} f(Q) dQ - P_0 Q_0 \\ &= \int_0^{Q_0} (Q-1)^2 dQ - P_0 Q_0 \\ &= \left[\frac{(Q-1)^3}{3} \right]_0^{Q_0} - P_0 Q_0 \\ &= \frac{1}{3} [(Q-1)^3]_0^{Q_0} - P_0 Q_0 \\ &= \frac{1}{3} [(Q-1)^3]_0^6 - P_0 Q_0 \\ &= \frac{1}{3} [(6-1)^3 - (0-1)^3] - (4 \times 6) \\ &= \frac{1}{3} [5^3 - (-1)^3] - 24 \\ &= \frac{1}{3} (125 + 1) - 24 = 42 - 24 = 18 \end{aligned}$$

$\therefore CS = 18$ Ans:

Date

② Given, $P_d = (Q-1)^3$ when $P_0 = 4$, $Q_0 = 6$. Find CS.

Soln:

Given, $\rightarrow [Q^3 - 3Q^2 + 3Q - 1]$
 Formula
 सम्पुर्ण ज्ञान
 तारामंजस
 अवधारणाएः

$$P_d = (Q-1)^3 \quad \text{Hence, } P_0 = 4 \quad \& \quad Q_0 = 6$$

Now,

$$\begin{aligned} CS &= \int_0^{Q_0} f(Q) dQ - P_0 Q_0 \\ &= \int_0^{Q_0} (Q-1)^3 dQ - P_0 Q_0 \\ &= \left[\frac{(Q-1)^4}{4} \right]_0^{Q_0} - P_0 Q_0 \\ &= \frac{1}{4} [(Q-1)^4]_0^6 - P_0 Q_0 \\ &= \frac{1}{4} [(6-1)^4 - (0-1)^4] - (4 \times 6) \\ &= \frac{1}{4} (625 - 1) - 24 \\ &= 156 - 24 \\ &= 132 \end{aligned}$$

$\therefore CS = 132$

Ans:

Production:

The act or process of producing, bringing forth, or causing to view; as - the production of commodities, of a work, That which is produced, yielded, or made, whether natural or by the application of intelligence and labour; as - productions of the earth, the productions of handicraft, the productions of intellect or genius.

In economics production of a good requires four

- Land (L)
- Natural
- Immobile
- Non-uniformity of return (fertility decreases)
- Labour (A)
 - Application of intelligence and labour
 - Bargaining ability
 - Working capability decreases
- Capital (K)
 - manmade
 - mobile
 - Uniformity of return

Organisation (O)

Why land is not capital?

Land is not capital As it is a gift of nature, it is immobile and it has a non-uniformity of return.

Inputs of production → LAND (L)
→ LABOUR (A)
→ CAPITAL (K)
→ ORGANISATION (O)

Production Function:

It is the technical name given to the relationship between the maximum amount of output that can be produced and the inputs required making that output. It is defined for a given state of technical knowledge.

$$Q = f(L, A, K, O)$$

Hence,
 Q = Output of production

Long run and short run production function:

• Short-run production function:

The short run is the period of time in which variable inputs, such as materials and labours can be adjusted but insufficient length for all inputs to be changed. Hence, fixed

Date :.....

factors such as plant and equipment cannot be fully modified or adjusted.

$$Q = f(L, A, K, O)$$

Since, land, capital and organisation are fixed, this is an example of short run production function.

- As L, K and O are fixed, O/P will not increase. It's a problem.

• Long-run production function:

It is the period such that all fixed and factors employed by the firm can be changed including labour, materials and capital.

$$Q = f(L, A, K, O)$$

Since, all factors are variable, this is an example of long run production.

Example - Production rate gets doubled in one year.
It means long-run production.

Date :.....

Types of Product:

i) Total Product: (TP):

It designates total amount of output produced in physical units. Such as - bushel, kg etc.

$$\bullet \text{Total product} = TP$$

ii) Average product: (AP):

It is measured by total output divided by total units of input. Such as -

$$\bullet \text{Average product, } AP = \frac{TP}{L/A/K/O}$$

iii) Marginal Product: (MP):

The MP of an input is the extra product added by 1 extra unit of that input, while other inputs are held constant.

Such as -

$$\bullet \text{Marginal product, } MP = \frac{\Delta(TP)}{\Delta(L/A/K/O)}$$

• Law of diminishing Marginal Product (MP):

The law states that the MP of each unit of input will decline as the amount of that input increases, while other inputs are held constant.

The explanation of the law of diminishing

Numerically - (For short run production fn)

$$Q = f(L, A, K, O)$$

Units of Labour	TPA	MPA	APA
0	0	0	0
1	2000	2000	2000
2	3000	1000	1500
3	3500	500	1167
4	3800	300	950
5	3900	100	780

From column ②, we can see that TP, which is the total amount of output produced in physical units increases but at a decreasing rate as extra labour have to share the fixed inputs.

[Same land, Fixed etc but variable Farmer]

$$\bullet \text{APA} = \frac{\text{TP}}{\text{Units of labour}}$$

such as -

$$\frac{3800}{4} = 950$$

From column ③ we can see that, MP of each extra unit of labour falls as more and more extra labour is added. Graphically -

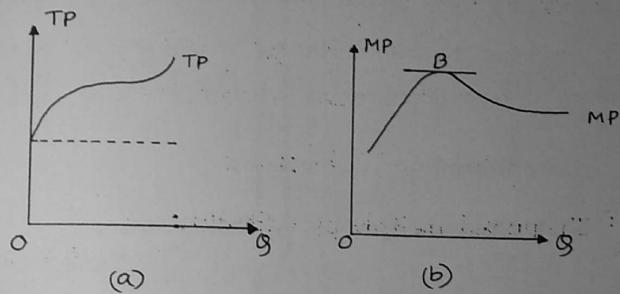


Fig-(a) represents how TP increases, but at a decreasing rate. Fig-(b) shows after point B, labour's MP is the change in total harvested output resulting from one extra unit of labour. We can calculate MP of each input (land, machinery, fertilizer etc) and it would be applied to any output. We will find that other inputs also tend to obey the law.

• Law - यह नियम वे फसलें के लिए लागू होता है जो अचानक बढ़ने लगती है।

Rationale for the law:

As more and more of an input like labour (A) is added to a fixed amount of machinery and other inputs, the labour has less of factors to work with the machinery is overworked the jobs done become less important.

Short-comings of the law:

i) Improved methods of cultivation:

Scientific notation of crops, improved seeds, modern implements, animal manures, better irrigation facilities, etc. bound to give increasing return at first.

ii) New soil:

When a new land is brought under cultivation, the MP for each successive doses of labour may increase for a time.

These limitations can check the operation of the law but for a very short time, the law will eventually hold true.

Date

Date

Return to Scale: [For long-run production $\rightarrow Q = f(L, A, K, O)$,

It reflects the responsiveness of TP when all inputs are increased proportionately.

• Production of inputs same rate of increase \Rightarrow CRS
Ex- if land, labour, capital and other inputs are doubled, then under CRS output will be double and $CRS = 2(L, A, K, O) = 2Q$

Types:

a) Constant Returns to Scale (CRS):

It denotes a case where a change in all inputs leads to an equally large increase in output.

Ex- if land, labour, capital and other inputs are doubled, then under CRS output will be double and $CRS = 2(L, A, K, O) = 2Q$

b) Decreasing Returns to Scale (DRS):

It occurs when a balanced increase in all inputs leads to less than proportional increases in total output.

Ex- if an increase in all input by 50% results in an increase in output by 40%, many productive activities involving natural resources (forestry) show DRS

Date

$$DRS = 2(L, A, K, O) = 1.59$$

c) Increasing Returns to Scale (IRS):

It occurs when an increase in all inputs to a more than proportional increase in the level output. Many manufacturing process enjoy modest IRS for plants up to the largest size used today.

$$IRS = 2(L, A, K, O) = 1.59$$

- Produce a schedule to show that the process needs at least five labours. [5th no is highest MPI]

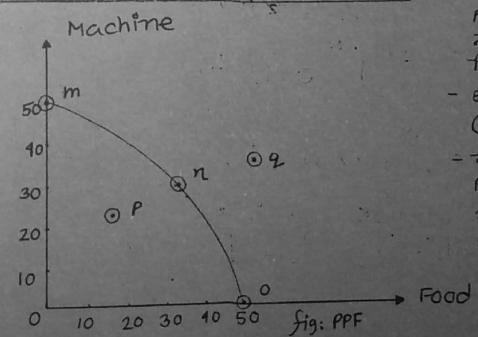
Units of Labour	TPA	MPA	APA
0	0	0	0
1	500	500	500
2	1500	1000	750
3	2600	1100	866.67
4	3750	1150	937.5
5	4950	1200	990
6	5750	800	1150
7	6400	650	914.3

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■ Production Possibility Frontier (PPF):

If a firm can produce two or more outputs or can produce output in two or more periods, a PPF can describe the possible combinations of output that can be attained for a given set of inputs.

Possibilities	Food	Machine
A	0	50
B	10	40
C	20	30
D	30	20
.....
Z	50	0



- PPF A only A & Z (extreme high & low) mark 2/2/1
- Then PPF A shape 'D' 2/2 curve 2/2/1
- PPF A then 1st point 1/1 2nd point possibilities 2/1 Just PPF feasible Place
- 5th 2nd 2nd (A & Z)
- 3rd 3rd 1/1 PPF 2nd Middle 1st PPF 1st (অন্তর্ব, অন্তর্ব PPF 2nd একাধী)

Date:

The economy should always be on the PPF(m), not at the two extremes (m & o), below(P) or above(q).

Mathematical Analysis:

① $P_s = (Q+1)^2$ where $P_0 = 125$, $Q_0 = 6$. Find producer surplus (PS).

Sol'n:

Given,

$$P_s = (Q+1)^2 \quad \text{Hence,} \\ P_0 = 125 \\ Q_0 = 6$$

Now,

$$PS = P_0 Q_0 - \int_0^{Q_0} f_2(Q) dQ \\ = (125 \times 6) - \int_0^{Q_0} (Q+1)^2 dQ \\ = 750 - \int_0^{Q_0} (Q^2 + 2Q + 1) dQ \\ = 750 - \left[\frac{Q^3}{3} + 2\frac{Q^2}{2} + Q \right]_0^{Q_0}$$

Date:

$$= 750 - \frac{1}{3}(6^3 - 0) - (6^2 - 0) - (6 - 0) \\ = 750 - 72 - 36 - 6 \\ = 636 \\ \therefore PS = 636 \\ \text{Ans:}$$

② $P_s = (Q+1)^3$ where $P_0 = 125$, $Q_0 = 6$. Find the PS .

Sol'n: Given,

$$P_s = (Q+1)^3 \quad \text{Hence, } P_0 = 125 \\ Q_0 = 6$$

Now,

$$PS = P_0 Q_0 - \int_0^{Q_0} f_2(Q) dQ \\ = (125 \times 6) - \int_0^{Q_0} (Q+1)^3 dQ \\ = 750 - \int_0^{Q_0} (Q^3 + 3Q^2 + 3Q + 1) dQ \\ = 750 - \left[\frac{Q^4}{4} \right]_0^{Q_0} - \left[\frac{3Q^3}{3} \right]_0^{Q_0} - \left[\frac{3Q^2}{2} \right]_0^{Q_0} - [Q]_0^{Q_0} \\ = 750 - \frac{1}{4}(6^4) - (6^3) - \frac{3}{2}(6^2) - 6 \\ = 750 - 324 - 216 - 54 - 6 \\ = 150 \quad \therefore PS = 150 \quad \text{Ans:}$$

Theory of cost

Date

Cost of production:

In economics, the cost of production theory of value is the theory that the price of an object on condition is determined by the sum of the costs of the resources that went into making it. The cost can comprise any of the factors of production (land, labour, capital, organization)

a) Land = $L = \text{rent} = r$

b) Labour = $A = \text{wage} = w$

c) Capital = $K = \text{Interest} = i$

d) Organization = $O = \text{profit} = \pi$

$\therefore \text{Cost of producing } g = r + w + i + \pi$

• Profit is the prize of risk bearing.

• Loss is the criticism of risk bearing

Date

Types of cost:

a) Total cost (TC):

It represents the lowest total dollar expenses needed to produce such level output (g).

b) Fixed cost (FC):

It represents the total dollar expense that is paid even when no output is produced.

c) Variable cost (VC):

It represents expenses that vary with the level of output including raw materials, wages and fuel etc and includes all costs that are not fixed.

By definition,

$$\text{Total cost} = \text{Total Fixed cost} + \text{Total Variable cost}$$

$$\therefore TC = TFC + TVC$$

2) Average Cost (AC):

It is the total cost by the number of unit produced, that is,

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

Hence,
TC = Total cost
Q = Quantity

$$\Rightarrow AC = \frac{TFC + TVC}{Q}$$

$$\Rightarrow AC = \frac{TFC}{Q} + \frac{TVC}{Q}$$

$$\therefore AC = AFC + AVC$$

Hence,

AFC = Average Fixed cost

AVC = Average Variable cost

$$\cdot TVC = AFC \times AVC$$

3) Marginal Cost (MC):

It depends on the extra or additional cost of producing 1 extra of output.

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

Example: $MC = 0$ ~~isn't~~ ^{if} ~~in~~ ⁱⁿ C2 cost can never be zero.

Units of Q production	TC	MC	AC
0	55		
1st	85	30	85
2nd	110	25	55
3rd	130	20	43.33
4th	170	40	42.5
5th	230	60	46

$$\cdot \frac{TC}{\text{Units of prod.}} = AC$$

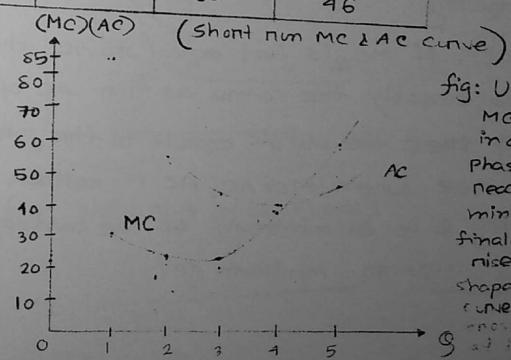


fig: U shaped
MC curve
in an initial
Phase that
reaches a
minm point &
finally begins
rise & U
shaped AC
curve. MC
encloses AC
at its minm

Date:

Discuss minimum average cost (AC):

MC curve cuts the minimum point of AC curve

The AC curve is always pierced at its min^m point by the rising MC curve.

If MC is below AC, then AC must be falling because then the last one produced costs less.

So, the new AC must be less than the old AC.

Thus if MC curve is below the AC curve, AC curve must be falling.

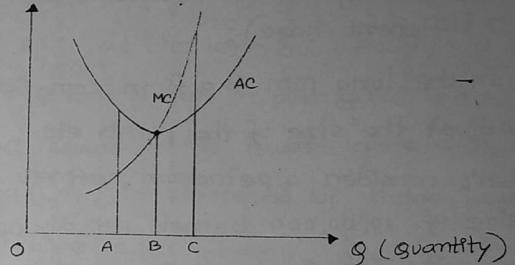
If MC is above AC, then AC must be rising because then the last one produced costs more than the average cost of earlier units. So the new AC must be greater than the old AC. So, AC must be rising.

Finally, if MC is just equal to AC the last unit costs exactly the same as the AC of all earlier units then the old AC equals to the new AC. So in this case when $MC = AC$, AC is neither falling nor rising & is at minimum. so, we can say,

$MC = AC = \text{Minimum AC}$

Date:

MC, AC (Costs)



At point A, $AC > MC$

At point B, $AC = MC$

At point C, $AC < MC$

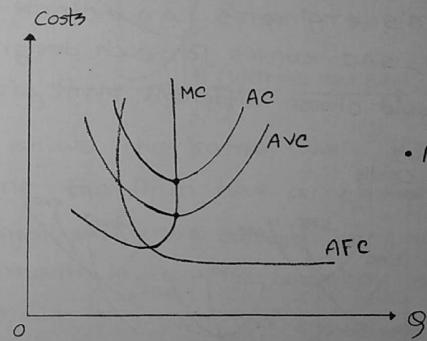


fig: Short run cost curves

• MC will go through the min of AC and AVC

Date:

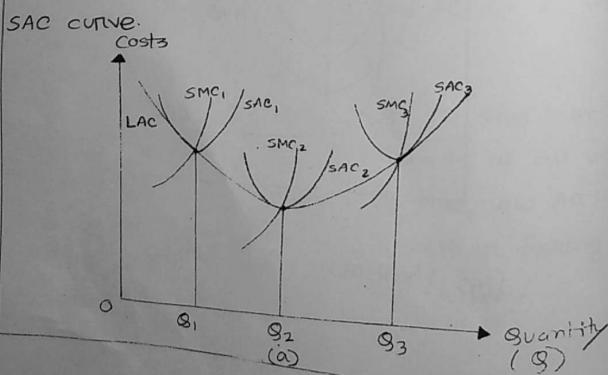
Discuss long run envelope curve (with the help of 3 different phases):

In the long run the firm can replace capital, adjust the size of the plants etc.

Let's consider, a petroleum refiner has a plant size of 10,00,000 barrels per day of refining capacity. Its short run AC curve is called SAC.

If the firm builds a larger refinery, its cost minimizing output will be larger, so the new SAC curve must be drawn further to the right.

The firm's engineer's can estimate the different U shaped SAC curves. For each design capacity, the firm would choose different plant size and differ-



Date:

Fig. (a) shows how in the long run the firm would select an SAC at the left but at a low Q . For intermediate Q it is better to plant to use SAC. For a large Q SAC leads to the lowest costs. The curve long average (LAC) is composed of three lowest branches of three SAC curves.

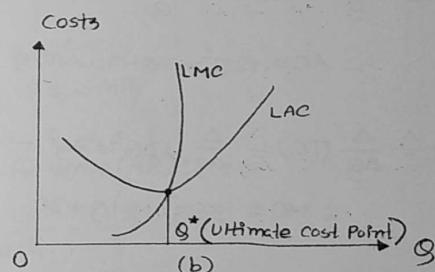


Figure (b) shows the same lower limit in the curve where the firm has a choice of many infinitely small short run curves. The LAC (long run average) curve is smooth lower the boundary of the many SAC curves. It is called an envelope curve because it wraps around the outside of all the curves. The long run envelope curve provides long run marginal cost curve (LMC) that can be derived from the LAC. As with all the AC and MC curves, the LMC goes through the min^m point of the LAC.

Date

Mathematical Analysis:

$$\textcircled{1} \quad TC = 12Q^3 + 7Q^2 + 30Q + 10$$

Find AC and MC.

Solⁿ: Given,

$$TC = 12Q^3 + 7Q^2 + 30Q + 10$$

$$AC = \frac{TC}{Q} = \frac{12Q^3 + 7Q^2 + 30Q + 10}{Q}$$

$$\therefore AC = 12Q^2 + 7Q + 30 + 10/Q$$

$$MC = \frac{\Delta}{\Delta Q} (TC) = \frac{\Delta}{\Delta Q} (12Q^3 + 7Q^2 + 30Q + 10)$$

$$\therefore MC = 36Q^2 + 14Q + 30$$

Ans:

$$\textcircled{2} \quad AC = 5Q^2 + 10Q + 2/Q$$

Find MC.

Solⁿ: Given,

$$AC = 5Q^2 + 10Q + 2/Q$$

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

$$\Rightarrow TC = Q \cdot AC = 5Q^3 + 10Q^2 + 2$$

$$MC = \frac{\Delta}{\Delta Q} (TC) = \frac{\Delta}{\Delta Q} (5Q^3 + 10Q^2 + 2)$$

$$= 15Q^2 + 20Q$$

Ans:

Theory of Revenue

Date

Revenue (R) → Producer
(Seller)

Consumer → Income (Seller)

Types of Revenue:

1) Total Revenue (TR):

$$TR = P \times Q$$

Hence, P = Price

Q = Quantity

2) Average Revenue (AR):

$$AR = \frac{TR}{Q} = \frac{PQ}{Q} = P$$

3) Marginal Revenue (MR):

$$MR = \frac{\Delta}{\Delta Q} TR$$

Example:

If, P = 5
Q = 10

$$TR = P \times Q = 5 \times 10 = 50$$

$$AR = P = 5$$

$$MR = \frac{\Delta}{\Delta Q} (PQ) = P = 5$$

Market Structure

(গোচার খাতা + Sheet)

Date.....

Mathematical Problem:

1) $AR = 12Q^2 + 5Q + 7/Q$ Find MR?

Given,

$$SOLN: AR = 12Q^2 + 5Q + 7/Q$$

Now,

$$AR = TR/Q$$

$$\Rightarrow TR = Q \times AR$$

$$\Rightarrow TR = Q \times (12Q^2 + 5Q + 7/Q)$$

$$\therefore TR = 12Q^3 + 5Q^2 + 7$$

$$\therefore MR = \frac{\Delta}{\Delta Q} (TR)$$

$$= \frac{\Delta}{\Delta Q} (12Q^3 + 5Q^2 + 7)$$

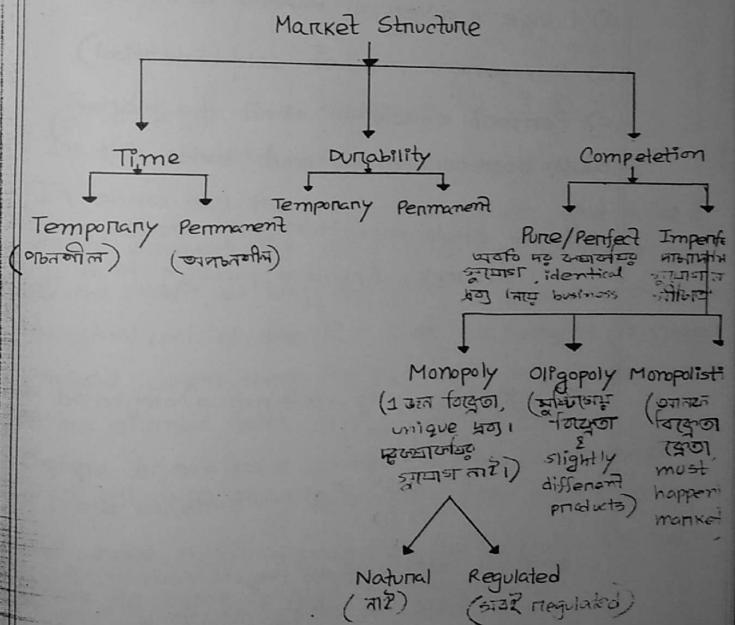
$$= 36Q^2 + 10Q$$

Ans:

Market:

In economics, 'place' is not considered as 'market'. Hence, 'market' is understood by a process where consumers and producers exchange goods according to their needs.

Classification:



Date:

• Perfect/Pure Competition:

It occurs when no producer can affect market price. Most specifically, under perfect competition there are many small firms, each producing one identical product and each is too small to affect the market price. Under such condition, each producer faces a completely horizontal demand curve.

Assumption:

- Large number of buyers and sellers
- Homogeneous product sold (Identical)
- Perfect knowledge about the market.
- No bar for entry and exit.

• firm - single production unit - आवश्यकता की तरह

Example: Engineers producing firm. AUSL, NSU etc

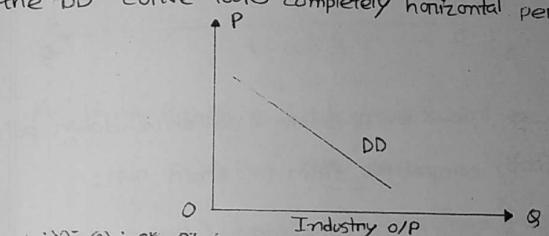
• Industry - इसका लिए अपनी विद्युत फिर्म नियंत्रित करती है।

Example: Engineers producing industry

• लालिज़िट्टा चालें याकाब नहीं Perfect competition. इसका example नहीं नहीं

Under such conditions, each producer faces a completely horizontal demand curve. Reasons for horizontal DD curve:
★① A competitive industry is populated by a multitude of small firms; the firm's segment of DD curve is nothing but a tiny segment of the curve.

Graphically, the competitive firm portion of the DD curve is so small that to the eye of the perfect competitor, the DD curve looks completely horizontal perfectly elastic.

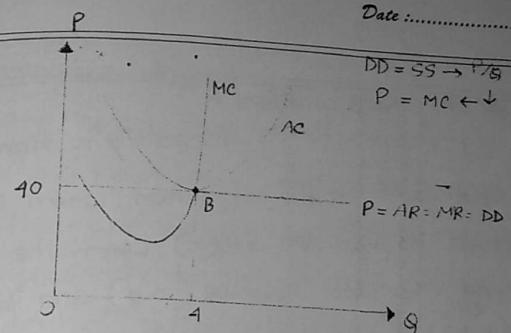
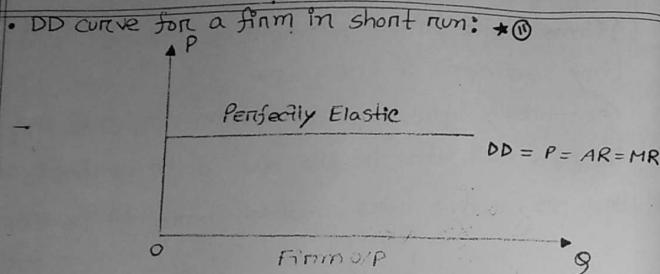


(पर्फेक्ट कंपिटिशन)

In this condition, there is no profit, no loss.

In short run the firm's break even point is at $P = MC$. Because the firm can always make additional profit so long, the price is greater than the marginal cost of the last unit. Total profit is maximised when there is no longer any extra profit to be earned from selling extra output.

Before break even condition profit is not possible. A profit maximising firm will set its output at that level where $MC = P$. Diagrammatically, this means that a firm's MC curve is also its supply curve.



- Discuss break even point and shut down point of perfectly competitive firm in short run:

Break even point / condition: (Price o/p determines)

In this condition, there is no profit, no loss.

In short run the firm's break even point is at $P = MC$. Because the firm can always make additional profit so long, the price is greater than marginal cost of the last unit. Total profit is maximised when there is no longer any extra profit to be earned from selling extra output.

Before break even condition profit is not possible. A profit maximising firm will set its output at the level where $MC = P$. Diagrammatically, this means that firm's MC curve is also its supply curve.

$$\text{At } B \rightarrow \text{Profit, } \pi = TR - TC$$

$$\Rightarrow \pi = PQ - ACQ$$

$$= (40 \times 4) - (10 \times 4)$$

$$= 160 - 160$$

$\therefore \pi = 0$ = normal profit
 $(\text{Investment} = \text{return})$

At equilibrium, $P = MC$

Ques. Pattern:

Product — Market — LR/SR — Profit or Loss

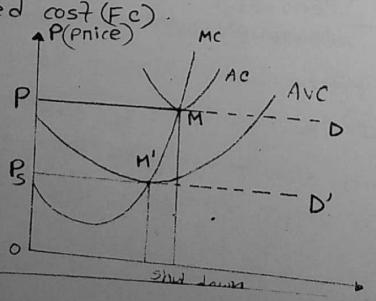
Electrical Engineer — Perfect Competition — SR — Profit + Loss

Shut down condition: \times

Generally a firm will be shut down in the short run, when it can no longer cover its variable cost (VC). When the price falls below the total revenue ($P \times q$) and less than VC, the firm will maximize its losses by shutting down.

The critically low market price where AVC is called the shut down point (M'). Along the prices above the shut down point, the firm will produce MC curve because even though the firm may be losing money, it would lose more money by shutting down.

For prices below the shut down point, the firm will produce nothing at all and will shut down because by shutting down the firm will lose on its fixed cost (F_C).



Date: Date:

The analysis of shut down condition gives a surprising result that profit maximizing firms in the short run may continue to operate even though they are losing money. Such a paradox occurs practically for the firms which own a great deal of capital, therefore have high fixed cost. Because it is often less costly to continue producing at a loss than shut down and still be forced to pay high fixed costs.

• Imperfect competition:

Imperfect competition prevails in an industry whenever sellers have some measure of control over the price of their o/p.

Imperfect competition does not imply that a firm has absolute control over the price of its product.

Ex -

In a cola market where coca-cola and pepsi together have the major share of the market and imperfect competition clearly prevails.

Date: The nature of imperfect competition:

The economists found that there are three major factors which are present in imperfect competition market.

a) Cost:

When the min^m efficient size of operation for a firm occurs at a sizeable fraction of its o/p, only a few firms can profitably survive and oligopoly is likely to result.

b) Barriers to competition:

When there are large economies of scale or govt. restrictions to entry, they will limit the number of competitors in an industry.

c) Strategic interactions:

When only a few firms operate in a market, they will soon recognize their interdependence which is genuinely a new feature of oligopoly that has inspired the field of game theory. This occurs when each firm's business plans depend upon the behaviour of its rivals.

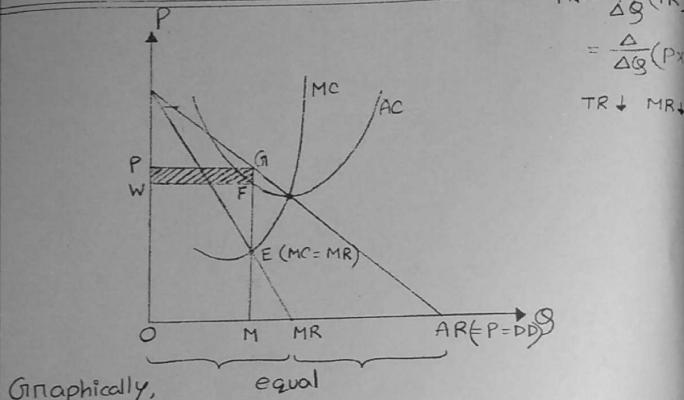
Monopoly:

It is the extreme case where a single seller has complete control over an industry. He is the only one producing in the industry and there is no industry producing a close substitute for the respective good.

Ex: Local telephone, gas, water and electricity etc.

• Equilibrium condition for a firm under monopoly / price output determination under monopoly ($MC=MR$): (Natural Monopoly)

A monopolist will maximize its profit by setting output at the point where $MC=MR$. Because the monopolist has a downward sloping demand curve, that means $P>MR$, reflecting the fact that, to sell the last unit, the monopolist had to lower the price on earlier units. In maximizing profits, the monopolist reduces o/p below the competitive level, price is therefore above MR.



Graphically, equal

At E, where MC intersects MR; equilibrium position of maximum profit is found. Any movement from E will lose some profit. Price is at G above E and since P is above AC, the maximized profit is (+ve) profit.

$$\begin{aligned} TC &= AC \times Q \\ &= OW \times OM / (MF \times OM) \\ &= OWFM / (OMFW) \end{aligned} \quad \left. \begin{array}{l} \text{constant term?} \\ \text{?} \end{array} \right\}$$

$$\begin{aligned} TR &= P \times Q \\ &= OP \times OM \\ &= OPGM \end{aligned}$$

$$\begin{aligned} \text{Profit, } \pi &= (TR - TC) = OPGM - OWFM \\ &= PGFW \text{ which is (+ve) or } > 0 \\ &= \text{Super normal profit} \end{aligned}$$

NB: Normal one

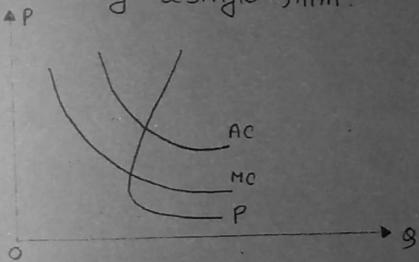
$$\begin{aligned} MR &= \frac{\Delta P}{\Delta Q} (TR) \\ &= \frac{\Delta P}{\Delta Q} (P_x) \\ TR \downarrow & MR \downarrow \end{aligned}$$

Date: Date:

Discuss public utility regulation in a natural monopoly:

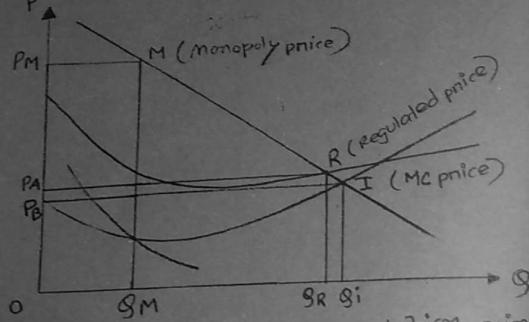
A review of the reasons for regulation suggests that the major economic argument is to prevent the monopoly pricing by natural monopoly.

Let us see, exactly how regulated central the activities of a monopolist. A natural monopoly is an industry in which the most efficient way of organizing production is through a single firm.



Let's observe the legislative access to impose public utility regulation to a particular industry. To do this firstly would be needed to set up a public utility commission to oversee prices, services and entry into the exit form of the industry. The most important decision would be to determine the pricing of the monopoly firm. Traditionally, average cost pricing is imposed on regulated firms.

For example, an electric utility would take all its costs and distribute them to each product sold. Then a class of customers would be charged the fully-distributed average cost of that service.



This fig. shows public utility regulation point M. In traditional regulation, the monopolist is allowed to charge a price only high enough to cover average cost. In this case, the firm will set its price where the demand curve DD intersects the AC curve. Hence, the equilibrium is at point R with output Q_R .

Requiring $P=MC$ is the ideal target for economic efficiency. But one serious problem arises. A firm with declining cost and produces where prices are above marginal cost will be incurring and in chronic loss.

The reason of this illustrates fig-1. In fig-1, if AC is falling, then $MC < AC$. So setting $P=MC$ implies having $P < AC$. When price is less than AC, the firm is losing money. Definitely a firm will not operate for long when it is running at a loss. Hence, the ideal regulatory soln requires the govt. to subsidize the decreasing cost producer. The requirement to raise taxes to pay for the ideal regulatory soln has prevented this approach from becoming a popular one and it is only rarely applied.

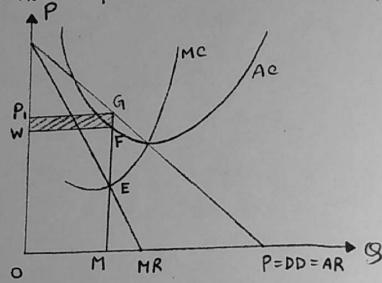
Oligopoly:

It means 'few sellers'. 'Few', in this context, can be a number as small as 2 or as large as 10 or 15 firms. The important feature of Oligopoly is that each individual firm can affect a market price. In the airline industry, the decision of a single airline to lower fare can be set off a price war, which brings down the fare charged by all its competitors. Oligopoly is an intermediate form of imperfect competition in which an industry is dominated by a few firms.

Monopolistic Competition:

- Large number of buyers and sellers
- Most happening competition

a) Short run super normal profit ($MC = MR$):



$$\text{Profit, } \pi = TR - TC$$

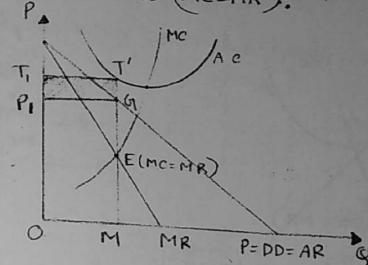
$$TR = P \times Q = OP_1 \times OM = OP_1 GM$$

$$TC = AC \times Q = OW \times OM = OWM$$

$$\therefore \pi = TR - TC = OP_1 GM - OWM$$

$$\therefore \pi = P_1 GM > 0 \quad [\text{+ve profit}]$$

b) Short run loss ($MC = MR$):



$$\text{Profit, } \pi = TR - TC$$

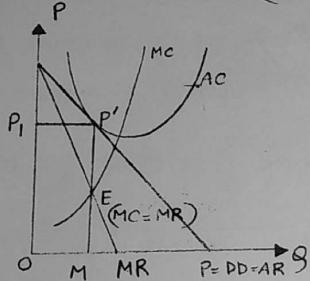
$$\begin{aligned} TR &= P \times Q \\ &= OP_1 \times OM \\ &= OP_1 GM \end{aligned}$$

$$\begin{aligned} TC &= AC \times Q \\ &= MT' \times OM \\ &= OT_1 T' M \end{aligned}$$

$$\begin{aligned} \pi &= OP_1 GM - OT_1 T' M \\ &= -T_1 T' GP_1 \end{aligned}$$

$$\therefore \text{Loss} = T_1 T' GP_1$$

c) Long run normal profit ($AC = AR$, $MC = MR$):



$$\text{Profit}, \pi = TR - TC$$

$$\begin{aligned} TR &= P \times Q \\ &= OP_1 \times OM \\ &= OP_1 P' M \end{aligned}$$

$$\begin{aligned} TC &= AC \times Q \\ &= MP' \times OM \\ &= OP_1 P' M \end{aligned}$$

$$\therefore \pi = OP_1 P' M - OP_1 P' M = 0 = \text{Normal profit}$$

Assignment: 2ff? check assignment

$$\begin{array}{c} P \\ \downarrow \\ MR \\ \downarrow \\ MC \\ \Downarrow \\ MC = MR = P' \\ P' \\ \Downarrow \\ P = DD = AR \end{array}$$

Date: Mathematical Problem:

D) A monopoly sells two goods, x and y whose demand functions are:

$$x = 25 - 0.5P_x$$

$$y = 30 - P_y$$

$$C = x^2 + 2xy + y^2 + 20$$

Find,

- Profit maximizing level of o/p (x, y)
- Profit maximizing level of prices (P_x, P_y)
- Max^m profit.

Solⁿ:

$$\text{a) Profit, } \pi = TR - TC$$

$$\begin{aligned} &= TR_x + TR_y - TC \\ &= (P_x \cdot x) + (P_y \cdot y) - TC \end{aligned}$$

$$= (50 - 2x)x + (30 - y)y - TC \quad [x = 25 - 0.5P_x \Rightarrow 0.5P_x = 25]$$

$$= 50x - 2x^2 + 30y - y^2 - x^2 - 2xy - y^2 \quad \Rightarrow P_x = 50 - 2x$$

$$\therefore \pi_{x,y} = 50x - 3x^2 + 30y - 2y^2 - 2xy - 20 \quad y = 30 - P_y \Rightarrow P_y = 30 - y$$

Date

$$\Pi_{x,x} \Rightarrow 50 - 6x - 2y = 0 \quad [d\Pi/dx]$$

$$\Rightarrow 6x + 2y = 50 \quad \dots \text{(I)}$$

$$\Pi_{y,y} \Rightarrow 30 - 1y - 2x = 0 \quad [d\Pi/dy]$$

$$\Rightarrow 2x + 4y = 30 \quad \dots \text{(II)}$$

Solving (I) and (II),

$$\bar{x} = 7$$

$$\bar{y} = 4 \quad \text{Ans:}$$

b) $P_x = ?$

$$P_y = ?$$

$$\bar{x} = 25 - 0.5P_x$$

$$\Rightarrow 0.5P_x = 25 - \bar{x}$$

$$\Rightarrow P_x = \frac{25 - \bar{x}}{0.5} = \frac{25 - 7}{0.5} = 36$$

$$\bar{y} = 30 - P_y$$

$$\Rightarrow P_y = 30 - \bar{y} = 30 - 4 = 26 \quad \text{Ans:}$$

c) $\Pi_{x,y} (\max^m) = 50\bar{x} - 3\bar{x}^2 + 30\bar{y} - 2\bar{y}^2 - 20 - 2\bar{x}$

$$= (50 \times 7) - 3(7)^2 + (30 \times 4) - 2(4)^2 - 20 - 2(7 \times 4)$$

$$= 215 \quad \text{Ans:}$$

Date

Macro Economics

- Discuss Macroeconomics and its concerns?

Macroeconomics is concerned with the behaviour of the economy as a whole. It focuses on the economic behaviour and policies that affect consumption and investment, trade balance, determinants of changes in wages and prices, monetary and fiscal policies, the money stock, national budget, interest rates and the national debt.

Fundamental concerns -

- Output and employment
- Inflation
- Economic growth

Objectives -

- To measure economic success
- To measure and identify remedies of high unemployment
- Make price stable

Policy instruments for macroeconomics -

- Fiscal policy
- Monetary
- Income

National Income Accounting
Date

- National Income Accounting: (GDP, GNP, NNP and NIP and their disadvantages?)

- Gross Domestic Product (GDP): (in BD)

It is the value of final goods produced within the country.

$$\text{Ex. } \text{GDP}_{(2014)} = \text{Price}_{(2014)} \times \text{Quantity}_{(2014)}$$

- $\text{GDP}_{(2007)}$ (for shirt & pant)

$$\begin{aligned} &= 200 \times 10 (\text{shirt}) + 50 \times 5 (\text{pant}) \\ &= 2000 + 250 \\ &= 2250 \text{ Tk} \end{aligned}$$

- Gross National Product (GNP): (in USA)

It is the value of goods and services produced by domestically owned factors of production within a given period (generally a year).

$$\text{GNP} = \text{GDP} + \text{Income from abroad}$$

(কোরি কোরি মালয়েশিয়া জোব কোরি ১৩৭
income)

- Difference between GDP and GNP:

Part of GNP is earned abroad. For example, a Bangladeshi worker working in Japan is part of Bangladesh's GDP.

NNP:

(flour, bread) - 2 kg flour, 2 kg intermediate good and 2 kg bread A (flour, egg, etc) 2 kg flour and 2 kg bread

Date

- Net National Product (NNP): (least used method)

$$\text{NNP} = \text{GNP} - \text{Depreciation}$$

(প্রতি) / (কুল প্রক্রিয়াজমান)

- National Income product (NIP):

$$\text{NIP} = \text{GNP} - \text{Depreciation} - \text{Indirect taxes} + \text{Subsidy}$$

Tax : a) Direct Tax - Income tax
- Property tax

b) Indirect Tax - VAT
- Sales tax

- Discuss the difference b/w Nominal GNP and Real GNP?

Nominal GNP: (Base year quantity \times Base year price)
It measures the value of output in a given period in the prices of that period or in current prices.

Real GNP: (Current year quantity \times Base year price)
It measures changes in physical output in the economy b/w different time periods by valuing all goods produced in the two periods at the same time.

Date

Difference:

NGNP measures the o/p value in a given time period but RGNP measures changes in physical quantity between different time periods, by valuing all goods produced in the two periods at the same time.

$$\text{• GNP deflator} = \frac{\text{Nominal GNP}}{\text{Real GNP}} \times \\ (\text{Rate of Inflation})$$

Mathematical Problem:

① Item	2013		2014	
	P	Q	P	Q
Oranges	\$.25	20	\$.35	30
Apples	\$.30	30	\$.40	25

Find NGNP₂₀₁₃, NGNP₂₀₁₄, RGNP₂₀₁₄, GNP deflator

Soln:

$$\text{NGNP}_{2013} = \$ (.25 \times 20 + .30 \times 30) \\ = \$ 19$$

$$\text{NGNP}_{2014} = \$ (.35 \times 30 + .40 \times 25) \\ = \$ 20.5$$

Date

Date

$$\text{RGNP}_{2014} = \$ (.25 \times 30 + .30 \times 25) \\ = \$ 15$$

$$\text{GNP Deflator} = \frac{\text{NGNP}_{2014}}{\text{RGNP}_{2014}} \% \\ = \frac{20.5}{15} \% \\ = 1.37\%$$

Ans: RGNP
(always RGNP as basis of 2014 NGNP)

Ans: National Income

② GNP = 70,000 Cr

Depreciation = 5,000 Cr

Indirect tax = 900 Cr

Subsidy = 40% of indirect tax

Find National income.

Ans:

National Income

$$= \text{GNP} - \text{Depreciation} - \text{Indirect tax} + \text{Subsidy} \\ = 70,000 - 5,000 - 900 + (900 \times \frac{40}{100}) \\ = 64,960 \text{ Cr}$$

Ans:

Aggregate Demand
and
Aggregate Supply

Date
22 Dec 2019

• Aggregate Demand and Supply:

• Aggregate Demand (AD):

It is the total quantity (Q) of output that is willingly bought at a level of prices, other things held constant.

Components of AD:

a) Consumption (C):

It is primarily determined by disposable income (personal income - tax). Other factors affecting consumption are longer term trends in household wealth and the aggregate price level. It focuses on the determination of real consumption.

(Nominal Consumption)
Price level

b) Investment (I):

(Price of investment = i = interest rate) Investment spending includes private purchases of structures and equipment and accumulation of inventories. Major determinants of investment are the level of output, cost of capital and expectations about future. The major economic channel by which economic policy affects investment

is monetary policy.

c) Government Purchases (G):

This refers to the government purchases of goods like road building equipment and services like that of judges and teachers. It is determined directly by the government decisions.

d) Net export ($X - M$): ($X = \text{Export}$; $M = \text{Import}$)

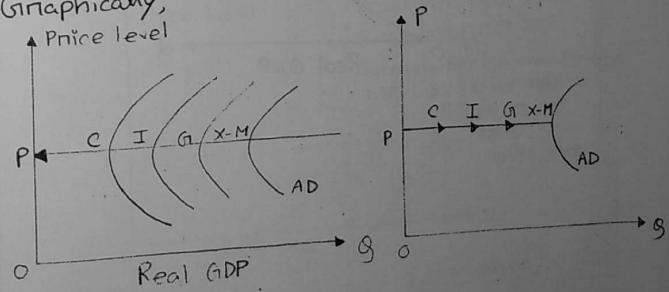
It determines the domestic and foreign income relative price and exchange rates.

In short,

$$AD = C + I + G + (X - M) \quad (\text{C, I, G, X, M याजान्तरित होते हैं})$$

$\downarrow AD$

Graphically,

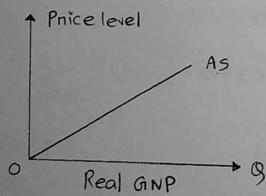


- Date:
 • Why does AD curve slopes downward?

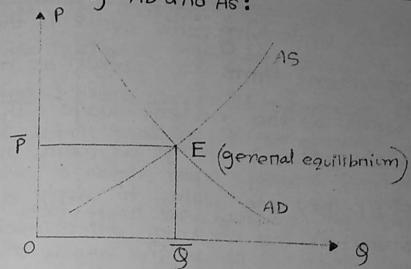
Total spending falls when the overall price rises primarily because a fixed money supply, be partitioned among money demands by rising interest rates, tightening credit and reducing spending. The effect is a movement along a downward sloping curve.

• Aggregate Supply (AS):

The AS curve describes the combination of output price level at which firms are willing, at a given price level, to supply the given quantity of output.



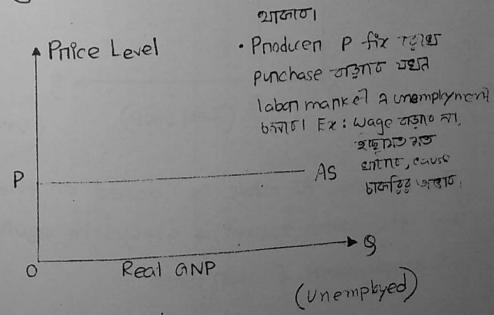
- Date:
 • Equilibrium of AD and AS:



- Two extreme cases of AS:

i) The Keynesian AS curve:

It is horizontal, indicating that firms will supply whatever amount of goods is demanded at the existing price level.

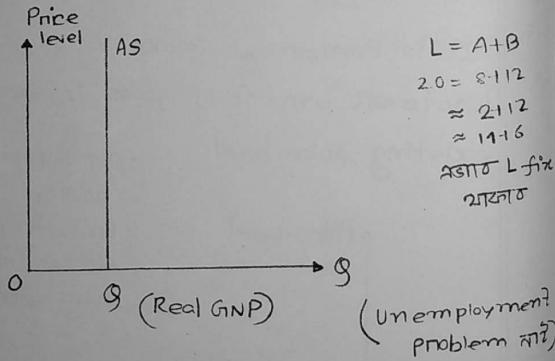


Date

The idea underlying this curve is that as there is unemployment, firms can obtain as much labor as they want at the current wage. Their AC of production will not change as their output level. Accordingly they are willing to supply as much as demanded at the existing price level.

II) The classical AS curve:

It is vertical, indicating that same amount of goods will be supplied whatever the price level is.



Now if all the existing price level the quantity of goods demanded increases firms try to obtain more labor and offer higher wages if necessary. But there is no more labor available in the economy and so firms are unable to obtain more workers. Instead in competition against each other for workers they merely bid up wages. As wages are higher the prices charged by the firms will also be higher. But o/p will be unchanged. Thus the AS curve will be vertical at a level of output corresponding to full employment of the labor force.

The classical AS curve is based on the assumption that the labor market is always in equilibrium with full employment of labor force.

Inflation

Date:

- Define - i) Inflation (a problem for economy)
- ii) Deflation (Problem)
- iii) Stagflation

Ans:

i) Inflation:
(Inflation applies to a period of time)
Inflation is a rise in the general level of prices of goods and services in an economy over a period of time. When the general price level of each unit of currency buys fewer goods and services, it means that money has lost some of its purchasing power. Consequently, inflation also reflects erosion in the purchasing power of money - a loss of real value in the internal medium of exchange and unit of account of the economy.

When too much money is chasing a few - inflation. It is welcome when it is in a moderate rate. But if it's high, it leads to a recession but inflation reflects a shift in the economy's long run aggregate demand curve (LRAS). Unemployment.

ii) Deflation: (inflation is opposite)
Deflation occurs when general level of prices fall.

iii) Stagflation:
Stagflation occurs when general level of prices is rising but output remains constant or falls.

- Calculate rate of inflation:

It is defined as the rate of change of the price level (as measured by CPI or PPI) & is measured as follows:

$$R.O.I(t) = \frac{\text{Price level}(t) - \text{Price level}(t-1)}{\text{Price level}(t-1)} \times 100\%$$

R.O.I → C.P.I (Consumer Price Index) (सभादार)
→ P.P.I (Producer Price Index)
→ GNP Deflator

- Discuss types of inflation.

Inflation:

Inflation occurs when general level of price is rising.

Types of inflation:

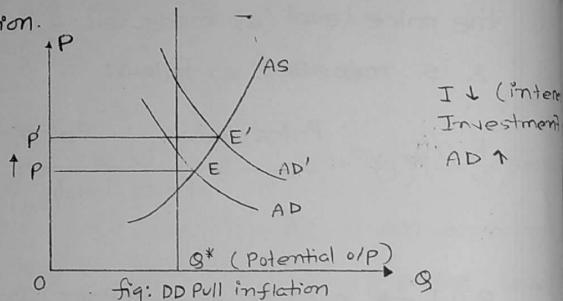
There are two types of inflation.

- DD pull inflation
- Cost push inflation

Date

(a) DD pull inflation:

When the economy is at or above potential output a demand increase leads to a demand pull inflation.



Suppose, the economy is in an initial equilibrium at the intersection of AS and AD curves at point E. The price level at point E is P . Now if there is an expansion of government spending that pushes the AD curve to the right. The equilibrium moves from E to E' . At this higher level of demand, prices have risen from P to P' . DD pull inflation has taken place.

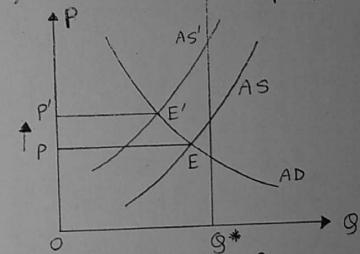
* Q^* = maximum attainable output for the given resources

Each & every factor must work hard to produce potential output but it's not possible all

Date

(b) Cost push inflation:

A more realistic description notes that no country has ever long enjoyed full employment, free markets and stable prices. When cost push prices up during periods of high employment and lack of resource utilization, we call this cost push inflation.



Suppose a terrible drought occurs and the economy is in recession then cost increase shifts up the AS curve from AS to AS'. Consequently, prices rise from P to P' . Cost push inflation has taken place here.

P.T.O

Date:

Mathematical Problem:

- (a) Suppose the CPI in 2008 is 90. Consumers spend 50% of their income on food, 30% on shelter and 20% on education. Now in 2009, prices of food rise by 10% and prices of education fall by 5%. Calculate CPI and ROI for 2009.

Soln: $CPI_{2008} = (90 \times 0.5 + 90 \times 0.3 + 90 \times 0.2)$
 $= 90$

2009:

$$\begin{aligned} \text{Price of food } 10\% \uparrow &= 90 + \frac{90 \times 10}{100} \\ &= 90 + 9 \\ &= 99 \end{aligned}$$

$$\text{Price of shelter} = 90$$

$$\begin{aligned} \text{Price of education } 5\% \downarrow &= 90 - \frac{90 \times 5}{100} \\ &= 90 - 4.5 \\ &= 85.5 \end{aligned}$$

$$\begin{aligned} CPI_{2009} &= (99 \times 0.5 + 90 \times 0.3 + 85.5 \times 0.2) \\ &= 93.6 \end{aligned}$$

$$ROI_t = \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}} \times 100\%$$

$$\begin{aligned} \Rightarrow ROI_{2009} &= \frac{CPI_{2009} - CPI_{2008}}{CPI_{2008}} \times 100\% \\ &= \frac{93.6 - 90}{90} \times 100\% \\ &= 4\% \end{aligned}$$

Comment:

Since ROI is +ve, price level has increased in the year 2009 compared to the year 2008 by 4%.

- (b) Suppose the CPI in 2008 is 100. Consumers spend 50% of their income on food, 30% on shelter and 20% on education. Now in 2009, prices of food and education fall by 10%. Find CPI and ROI.

Soln: $CPI_{2008} = (100 \times 0.5 + 100 \times 0.3 + 100 \times 0.2)$
 $= 100$

$$\begin{aligned} 2009: \quad \text{Price of food } 10\% \downarrow &= 100 - \frac{100 \times 10}{100} = 100 - 10 = 90 \end{aligned}$$

Date.....

Prices of shelter = 100

$$\text{Price of education } 10\% \downarrow = 100 - \frac{100 \times 10}{100} = 100 - 10 =$$

$$\therefore CPI_{2009} = (90 \times .5 + 100 \times .3 + 90 \times .2) \\ = 93$$

$$ROI_{2009} = \frac{CPI_{2009} - CPI_{2008}}{CPI_{2008}} \times 100\% \\ = \frac{93 - 100}{100} \times 100\% \\ = -7\%$$

Comment:

Since ROI is -ve, price level has decreased the year 2009 compared to the year 2008 by

P.T.O

- What is economic growth and development? What's the difference b/w them?

Economic growth means quantitative increase in the inflation-adjusted market value of the goods and services produced by an economy over time. It is conventionally measured as the percent rate of increase in real gross domestic product, or real GDP. Economic development is the sustained, concerted acts of policy makers and communities that promote the standard of living and economic health of a specific area. It can also be referred to as the quantitative and qualitative changes in the economy.

An economy can grow but it may not develop because poverty, unemployment and inequality may continue to persist due to the absence of technological and structural changes but it is difficult to imagine development without economic growth in the absence of an increase in output per capital particularly when population is growing rapidly.

Date: Discuss the vicious circle of poverty: (R. Nurkse)

In a poor country, the level of productivity and income is very low which means a low purchasing power. Since the purchasing power of the people is low, scope for business and industry is correspondingly limited. The inducement to invest is practically absent. The rate of investment being low, productivity is low and the incomes are small continuing the vicious circle.

Thus the under-developed countries face the vicious circle of poverty on the demand side of capital formation because the size of market is too small.

The result is that there is not much inducement for the businessmen and industrialists to make investments as division of labor is limited by the size of the market. Similarly the inducement to invest is also limited by the size of the market. The result is that in the under-developed countries, the size of the market, i.e. the demand for goods is limited, the inducement to invest is small.

Date: The two diagrams of vicious circle on DD side and SS side is given below:

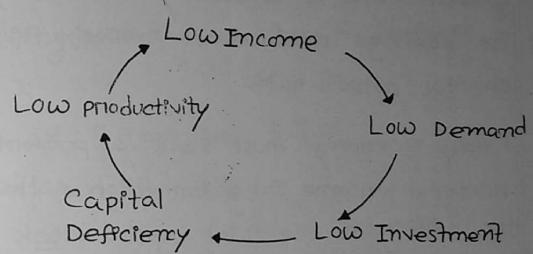


fig: Vicious circle on DD side

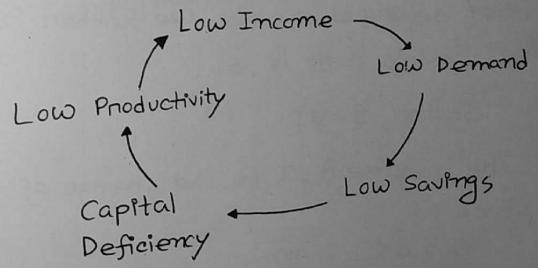


fig: Vicious circle on SS side

Date: • Discuss Harrod-Domar growth model:

Harrod-Domar growth model shows that the growth rate of a country is directly related to its savings ratio and inversely related to its capital output ratio.

Every economy must save a proportion of its national income. In order to grow, the investment adding to the total capital stock are needed. We assume that there is a relationship between the total capital stock, K and the total GNP, Y . This relationship is known as a capital / output ratio. It is denoted by κ , roughly it is 3:1 for least developed countries. We further assume the savings ratio is s .

$$\therefore \text{Saving}, S = sY \dots (i)$$

The investment, I is the change of total capital stock.

$$\therefore I = \Delta K \dots (ii)$$

Since the capital/output ratio is related to the capital stock and total GNP.

$$R = \frac{K}{Y}$$

$$= \frac{\Delta K}{\Delta Y}$$

$$\therefore \Delta K = R \Delta Y \dots (iii)$$

But saving and investment must be equal,

$$\therefore S = I$$

$$\Rightarrow sY = \Delta K \quad [\text{From } (i) \text{ and } (ii)]$$

$$\Rightarrow sY = R \Delta Y \quad [\text{From } (iii)]$$

$$\Rightarrow \frac{\Delta Y}{Y} = \frac{s}{R}$$

From this relation we see that, the growth rate of country is directly related to its savings ratio and inversely related to its capital-output ratio.

Date

Discuss Lewis Model of economic development (with unlimited labor supply) : (Lewis - 1993 - Nobel Prize)

W. Arthur Lewis has presented a theory of economic development with the use of unlimited supply of labor. The supply of labor in underdeveloped countries is generally perfectly elastic at the current wage rate. This unlimited supply of labor is available at the subsistence wage. This unlimited supply of labor is drawn from surplus agricultural labor, casual labor, domestic servants etc. In all these sectors, the marginal productivity of labor is negligible or zero. Lewis model is more in accord with this reality. This model is not based on unemployment but on some other conditions :

- I) The wage rate in the industrial sector is above its marginal productivity in the subsistence sector by a small but fixed margin.
- II) The investment in the industrial sector is large relative to population growth.
- III) The cost of training of the skilled workers is constant. In an over-populated country, the capitalist

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sector draws labor from the subsistence sector of which there is almost infinite supply.

Since marginal productivity in the capitalist sector is higher than the current wage rate, it yields a surplus of profits to the capitalist. The surplus is reinvested and creates new capital, which in turn raises the marginal productivity and increases employment in the capitalist sector.

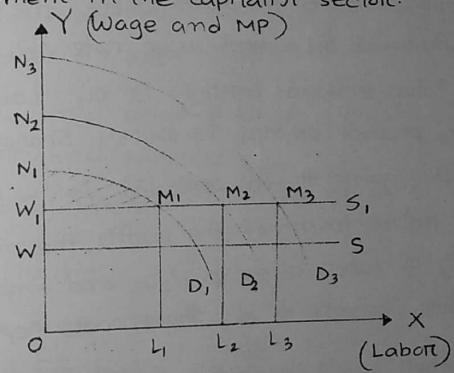


fig: Quantity of labor employed

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In this diagram, the quantity of labor is measured along Ox and wages and MP along Oy , represents subsistence earning (just enough money to stay alive) and OW_1 represents capitalist wage, is the perfectly elastic supply of labor at

Initially the demand for labor is represented by marginal productivity (MP) curve of labor, $N_1 D_1$. Labor employed up to the point where the marginal productivity equals the current wage rate OW_1 . Thus the amount of labor employed initially is OL_1 . Labor share in total product $ON_1 M_1 L_1$ is $OW_1 M_1 L_1$. Share of profits or surplus going to the capitalist is $W_1 N_1 M_1$.

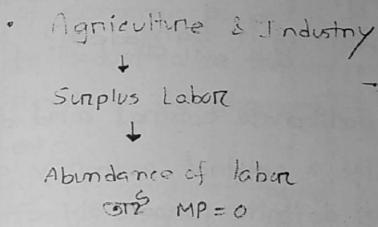
On reinvestment of the profits, the marginal productivity of labor rises to $N_2 D_2$ and employment of labor increase to OL_2 . The process repeats itself.

Arthur Lewis, however points out that the process of economic growth must come to an end when

- a) no surplus labor is left
- b) population declines
- c) food prices rise, pushing up wages
- d) workers press for higher wages

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It's a dualistic method.



Surplus labor ~~can't~~ training first industry to place England development 2021

But conditions are applied -

- Industrial wage must be higher than the agricultural wage.
- Cost of training must be zero.

In the fig.,

OW = agri. wage

OW_1 = Industrial wage

$OW_1 > OW$

So, we can apply Lewis model.

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• What is planning? What are the pre-requisites of a successful planning in Bangladesh?

Planning means deliberate control and direction of the economy by a central authority on the purpose of achieving definite larger objectives within specified period of time.

Pre-requisites for successful planning in Bangladesh

i) Planning Commission:

By setting up an organized planning commission which should be divided and sub-divided under experts like economists, statisticians, engineers etc. It is the first pre-requisite.

ii) Statistical Data:

Surveys are essential for the collection of statistical data and information with regard to total available capital and human natural resources of the economy.

iii) Objectives:

The plan may be drawn by the following objects
- to increase national & per capita income, to reduce

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inequalities of income and wealth and concentration of economic power, to raise agricultural production to industrialize the economy, to achieve balanced regional development, to achieve self-reliance etc.

iv) Fixation of target and properties:

Government planning consists of intelligent priorities for the public investment programme formulating a sensible and consistent set of public policies to encourage the growth in the public sector.

v) Mobilization of Resources:

Saving profit of public enterprises, net marketing, borrowings, taxation and deficiency are the principle internal sources of finance.

vi) Inconspicuous and efficient Administration:

A strong and inconspicuous administration is the "sine qua non" of successful planning.

vii) Economy in Administration:

Every effort should be made to effect economies in administration.

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viii) A theory of consumption:

Bangladesh should follow the consumption pattern of the more developed countries.

ix) An education base:

Planning to be successful must take care of the ethical standard of the people.

x) Public co-operation:

Planning requires full cooperation of the people.

P.T.O

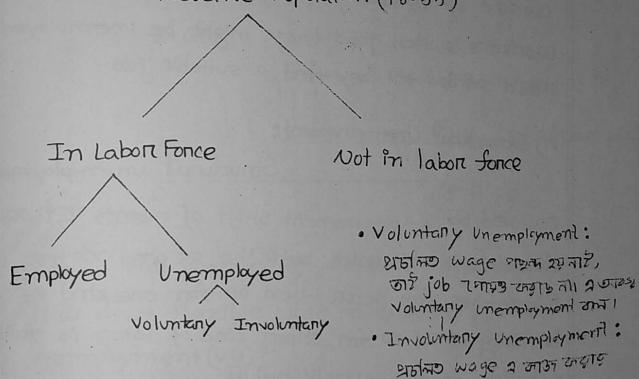
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Unemployment

ILO: International Labor Organization

Employment Dynamics

Productive Population (18-55)



- Voluntary Unemployment:
প্রচলিত wage পাওয়া যাবার,
তাঁর job পেন্সিন-কর্তৃত না প্রদান
Voluntary unemployment এবং।
- Involuntary Unemployment:
প্রচলিত wage এ জাওয়া থাকা
মতো থাকা নাওয়া না
প্রয়োজন।

• Unemployment:

Unemployment is defined by the ILO as a situation in which people are without jobs and they have actively looked for a job for the past four weeks. According to this definition, people who do not look for a job will not be considered as unemployed.

Types of unemployment:

a) Frictional Unemployment:

caused by temporary job loss. For example - when workers switch jobs they might be unemployed for short period till they find a suitable job.

b) Structural Unemployment:

Structural unemployment is caused by a permanent shift of events. It occurs when there is a mismatch between the SS and DD for labor. Mismatches can occur when DD for one kind of labor is rising while DD for other kind of labor is falling or supplies do not quickly adjust.

For example -

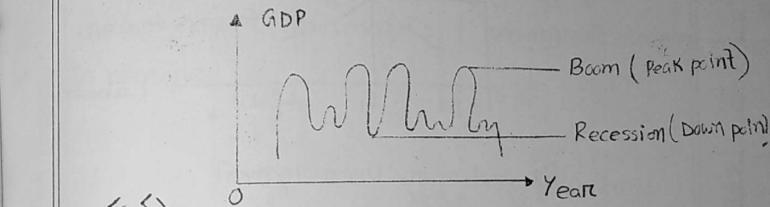
If a country shuts down its jute factories and starts readymade garments industry then workers of the industries may find it very difficult to find a job in readymade garments industry as the skills set does not match.

c) Natural rate of unemployment:

It is the level of unemployment when the economy is at the full employment level. The natural rate of unemployment is a combination of both frictional and structural unemployment.

d) Cyclical Unemployment:

It is the deviation of natural rate of unemployment from the actual employment. It exists when overall DD for labor is low.



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Discuss the creation of Voluntary Unemployment.
How does flexible wage rate lead to voluntary unemployment (vv)?

The existence of voluntary unemployment points to an important misconception about unemployment. An economy performing at the peak of efficiency may create certain amount of unemployment. The voluntarily unemployed workers might prefer leisure, school or other activities than to work at the going market wage rate.

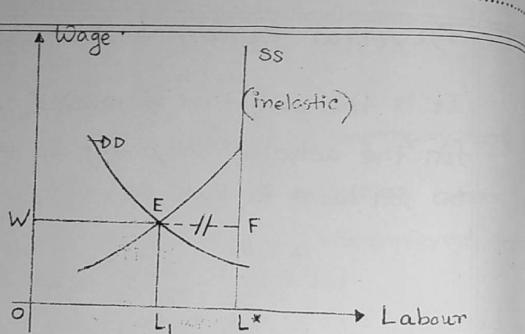
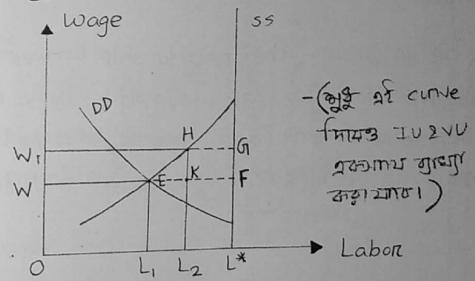


Fig: Voluntary Unemployment

At the competitive market clearing equilibrium of DD and labor ss at point E , with a wage of ow (flexible wage), the going wage rate ensures that firms will hire all qualified workers who wish to work at that wage. Here, the amount of workers is OL_1 . The number of workers employed is represented by the segment WE . The total labor force is OL^* . The segment EF of the labor force would like to work at a higher wage. The amount of workers in the segment EF is $L_1 L^*$. They are voluntarily unemployed in the sense that they do not want to work at the going market wage rate.

- Discuss the creation of involuntary unemployment.
 - / How does inflexible wage rate lead to involuntary unemployment?

To understand how inflexible wage leads to involuntary unemployment, an analysis of non-market clearing economy is required.



The figure shows in the wake of an economic disturbance the labor market finds itself with a high wage rate. Labor price is set at W_1 , rather than at the equilibrium wage of W . At the too high wage rate there are qualified workers desiring to work than there are jobs looking for workers. The number of workers looking for job at high wage rate W_1 is OL^* and it is represented by the portion $W_1 G$. The firm only wants the portion $W_1 H$ where the amount of workers is OL_1 . As the wage is above the market clearing wage.

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 Level there is a surplus of labor. The quantity (P_E) is ultimately employed and the segment (H_G) remains involuntarily unemployed.

- The Phillips Curve (PC):

(shows the relationship between inflation and unemployment)

The PC shows the relationship between unemployment and inflation. The key assumption here is that, inflation and unemployment are inversely related. More unemployment is required if you want to hold own inflation.

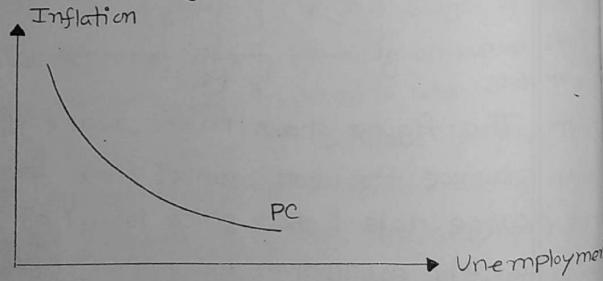


fig: Phillips curve

- The consumption function:

The relationship between consumption and disposable income is described by the consumption function. Assuming consumption demand increases with the level of income, then,

$$C = \alpha Y \quad \text{where } 0 < \alpha < 1 \quad (1)$$

Here,

C = Consumption function

Y = Disposable Income

α = Marginal propensity to consume (MPC)

[Disposable income, $Y_D = \text{Nominal income} - \text{Tax}$

$$\Rightarrow Y_D = Y - T$$

$$\text{If } Y = 10,000$$

$$T = 100$$

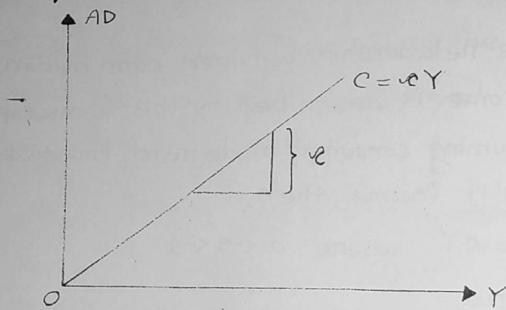
$$Y_D = 10,000 - 100$$

$$= 9,900$$

where, suppose, 9000 (consumption)

800 (saving)]

Graphically -



The level of consumption is proportional to income (disposable). For every \$1 increase in income, consumption rises by $c\bar{c}$. i.e., if $c\bar{c}$ is 0.9, then for every \$1 increase in income, consumption rises by 90 cents.

The slope of the consumption fn₁ is $c\bar{c}$ (MPC). MPC is the increase in consumption per unit increase in income. It is less than 1, which implies that, out of a dollar increase in income only a fraction, $c\bar{c}$ is spent on consumption. A step means a high MPC and vice-versa.

Consumption can never be zero or negative.

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- The saving Function:

The saving fn relates saving to disposable income. Since what is saved is the save as what is not consumed, savings and consumption schedules are mirror images in the sense that,

$$\text{Saving} + \text{Consumption} = \text{Disposable Income}$$

$$\Rightarrow S + C = Y$$

$$\Rightarrow S = Y - C$$

$$\Rightarrow S = Y - c\bar{c}Y \quad [\text{from (1)}]$$

$$\Rightarrow S = Y(1 - c\bar{c})$$

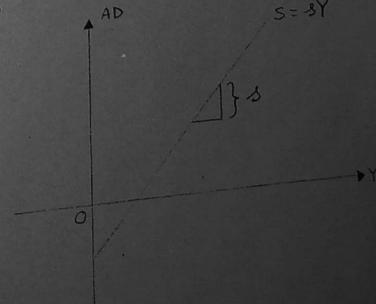
$$\Rightarrow S = sY \quad \dots (ii)$$

Hence,

$$c\bar{c} = \text{MPC}$$

$$s = \text{Marginal propensity to save (MPS)}$$

Graphically,



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The fig. shows that, saving is an increasing fn of level of income as the MPS is +ve. I.e., 0.9 means 90 cents out of each extra dollar of income is saved, MPS is 10 meaning that the remaining 10% of each extra dollar of income is saved.

Planned investment :

$$AD = AS \quad \text{--- (1)}$$

$$C + \bar{I} + G + (X - M) = Y \quad \text{--- (2)}$$

Assumptions :

1) There is no government sector in a closed economy

$$\text{So, } G + (X - M) = 0$$

$$\therefore C + \bar{I} = Y \quad \text{--- (3)}$$

2) Investment is autonomous.

Thus,

$$\bar{I} = A \quad \text{--- (4)}$$

Based on the two assumptions,

$$C + \bar{I} = Y$$

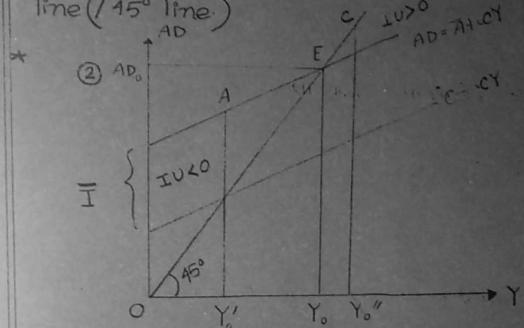
$$\Rightarrow C + A = Y \quad [\text{From (4)}]$$

$$\Rightarrow A = Y - C$$

$$\Rightarrow A = Y - cY$$

$$\therefore A = Y(1 - c)$$

- Date:
- Discuss equilibrium output determination in a closed economy / Discuss equilibrium output determination with the help of income output line (45° line))



\bar{I} is its output at equilibrium level at point E where $AD_0 Y_0$ corresponds to the income and output level Y_0 .

At any higher level of output, AD is below the O/P level, firms are unable to sell all they produce and there is undesired accumulation of inventories. Firms therefore reduce O/P .

Similarly, any O/P below Y_0 , AD exceeds output, firms run short of goods to sell and therefore increases output. Only at Y_0 , the firms are producing amount that is demanded.

Date: ... At point A, $IU < 0$;

At point C, $IU > 0$;

At point E, (equilibrium),

$$AD_0 = Y_0$$

$$\Rightarrow A_0 + C = Y_0$$

$$\Rightarrow A_0 + cY_0 = Y_0$$

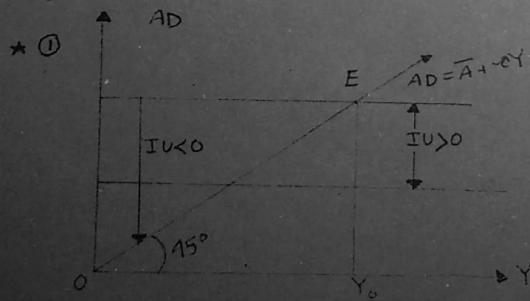
$$\Rightarrow A_0 = Y_0 - cY_0$$

$$\Rightarrow A_0 = Y_0(1 - c)$$

$$\Rightarrow Y_0 = \frac{A_0}{1 - c}$$

$$\text{So, } Y_0 \propto A \propto c$$

Where, A (= Autonomous Spending) is the intercept and c (MPC) is the slope of AD schedule. This equilibrium output becomes higher, the longer the MPC and A become.



Mathematical Problem:

- ① $C = 1200 + 0.8Y_D$; Where $Y_D = Y - T$ and $T = 100$. Find MPC and MPS.

Sol'n:

Given,

$$C = 1200 + 0.8Y_D$$

$$= 1200 + 0.8(Y - T)$$

$$= 1200 + 0.8(Y - 100)$$

$$= 1200 + 0.8Y - 80$$

$$\therefore C = 1120 + 0.8Y$$

$$\therefore MPC, \beta = \frac{\Delta C}{\Delta Y} C$$

$$= \frac{\Delta}{\Delta Y} (1120 + 0.8Y)$$

$$= 0.8$$

$$\therefore MPS, \delta = 1 - \beta$$

$$= 1 - 0.8$$

$$= 0.2$$

Ans:

Date:
 ② Planned Consumption, $C = \$10 + 0.75Y$
 Planned Investment, $I = 60\$$

Find,

- a) Equilibrium level of income
- b) Equilibrium planned spending / show that equilibrium planned spending = value of o/p (income)
- c) Equilibrium planned saving / prove that, planned savings = planned investment

Soln:

a) Equilibrium level of income,

$$Y = C + I$$

$$\Rightarrow Y = 10 + 0.75Y + 60$$

$$\Rightarrow Y - 0.75Y = 100$$

$$\Rightarrow Y(1 - 0.75) = 100$$

$$\Rightarrow Y = \frac{100}{1 - 0.75}$$

$$\therefore Y = 400\$$$

b) We have to show that, At equilibrium, planned spending = value of o/p (income)

$$C + S = Y \dots \text{(I)}$$

At $Y = 400\$$,

$$C = 10 + 0.75Y$$

$$= 10 + (0.75 \times 400) = 10 + 300 = 310\$$$

(I) \Rightarrow

$$C + S = Y$$

$$\Rightarrow S = Y - C$$

$$= (400 - 310) \$$$

$$\therefore S = 60 \$$$

c) At equilibrium, planned investment = planned saving
 We have to prove that,

$$\therefore \text{Planned saving} = 60 \$$$

$$S = I$$

$$\Rightarrow 60\$ = 60\$ \quad [\text{proven}]$$

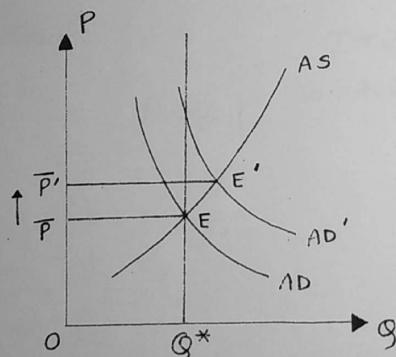
Ans:

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Assignment - 2

1) Suppose the economy has just reached potential output and interest rate falls. Discuss the impact.

When the country has just reached at or above the potential output, the demand increases and leads to a demand pull inflation.



Hence, $g^* = \text{potential output}$

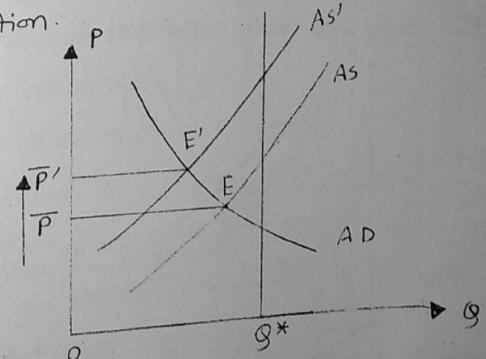
Suppose,

the country is in an initial equilibrium E which is the intersecting point of AS and AD. The price level is at point \bar{P} . If there occurs an interest rate falling it will push the demand curve from AD to AD' . Then the equilibrium point E shifts to the point E' .

This way, high level of demand pushes the price level upto the point at \bar{P}' from \bar{P} . Therefore, a demand pull inflation takes place.

2) Suppose the economy has not reached the potential output and a draught occurs. Discuss the impact.

When the country has not reached the potential output, the cost pushes price up during the fact of high stock resource utilization and unemployment. In this case, we call it a cost push inflation.



$g^* = \text{Potential output}$

Draught has occurred.

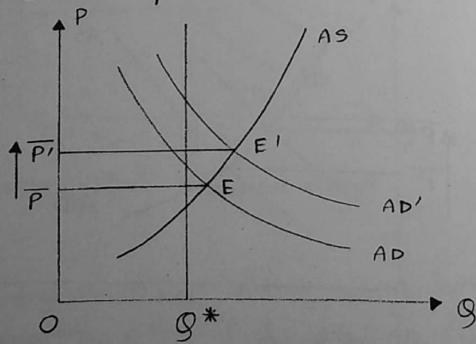
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Suppose, a country goes through a draught and it is in recession. For this reason, the cost pushes the supply curve from AS to AS' . The equilibrium point has moved from E to E' and the price level has also moved from \bar{P} to \bar{P}' . For this reason, a cost push inflation takes place.

3) Suppose, the economy is beyond the potential output and price of computer accessories fall.

Discuss the impact.

When the economy is beyond the potential output of a country, the demand increases. The fact is called demand pull inflation.



Q^* = Potential Output

Price of computer accessories fall (\downarrow)

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Suppose, falling of the price of computer accessories made the demand curve shift from AD to AD' as cost pushes. As the price of computer accessories falls, demand increases. The equilibrium point has moved from E to E' and price level has also moved from \bar{P} to \bar{P}' . For this reason demand pull inflation takes place.

4) Suppose the government fixes the wage of garment workers at tk. 8000. Discuss the impact.

জরুর মিল ২য়ে $OW_1 = 8000 \Rightarrow OW = (8000 \text{ টা})$

(minimum value)

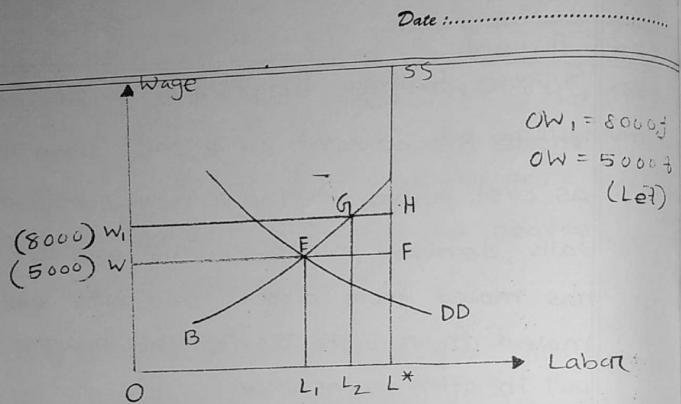
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\Rightarrow double $2 \times 8000 = 16000$ টা

$\Rightarrow OW = 16000$ টা।
Consider the labor DD curve where

the govt. fixes the minimum wage of garment workers at tk. 8000 which is OW_1 of the labor DD curve.

The wage rate of OW ensures that the firms will hire all qualified workers who wish to work at the wage.



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Workers (labor force) get are unemployed because of surplus of labor in the market. So this impact is known as involuntary unemployment.

Hence, OL^* = Total labor force

OW = Flexible wage

OW_1 = Inflexible wage

GHI = Involuntarily unemployed

EF = Voluntarily unemployed

BE = Number of workers employed

DD = Labor demand

SS = Labor supply

The number of workers employed is represented by the line BE .
The labor force of segment EF would like to work at a higher wage of Tk. 8000. Voluntarily unemployed labor force (EF) do not want to work at the flexible wage rate of Tk. 5000. So govt. has taken some steps to increase the wage rate which is fixed at Tk. 8000 (OW_1). But still some garment

Assignment

Date :

(1)

Name of the market	No. of the seller	Type of competition	Type of product	Example	
				Domestic	International
Pure/Perfect	Large	Pure/Perfect	Homogeneous	EEE Engineers	EEE Engineers
Monopoly	single	Imperfect	Unique	BTCL / DESA / Local telephone authority	MICROSOFT / IBM
Oligopoly	Some/few	Imperfect	Slightly different	Local mobile service providers	OPEC
Monopolistic competition	Large	Imperfect	Slightly differently homogeneous	Basmati Rice	Basmati Rice

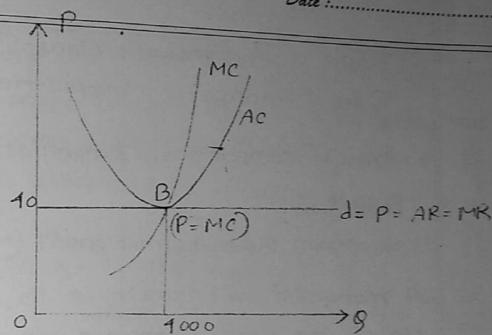
(2) a) Name of the product: EEE Engineers

Type of Market : Pure/Perfect

Type of competition: Short run

Profit/Loss:

In short run the firms break even condition is $P = MC$. Because the firm can always make additional profit so long the price is greater than the marginal cost of the last unit. Total profit is maximized when there is no longer any extra profit to be earned from selling extra output.



When the mkt price of a/p is \$40, the firm can find that the production level corresponding to the MC is 4000 units. Hence, for a mkt price of \$40, the firm will wish to produce and sell 4000 units. At a production level of 4000 units, AC will also be \$40. So, the firm breaks even then with total revenues ($MC * P$) just equals total cost ($AC * q$).

At point B,

$$\begin{aligned}
 \text{Profit, } \pi &= TR - TC \\
 &= (MC * P) - (AC * q) \\
 &= (40 * 4000) - (40 * 4000) \\
 &= 0
 \end{aligned}$$

This is called normal profit.

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b) Name of the product: Circuit

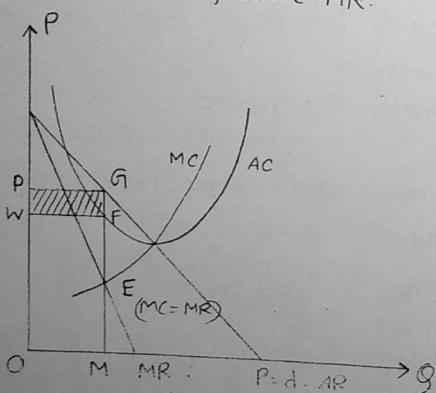
Type of market: Monopolistic market

Type of competition: Imperfect competition

Profit/Loss:

Shortrun super-normal profit ($MC = MR$)

A monopolist will maximize its profit by setting o/p at the point where $MC = MR$. As the monopolist competition has a downward sloping demand curve that means $P > MR$, reflecting the fact that, to sell the last unit, the monopolist had to lower the price of earlier units. In maximizing profits, the monopolist reduces o/p below the competitive level price which is therefore, above MR .



At E, where MC intersects MR , equilibrium position of maxⁿ profit is found. Any movement from E will lose some profit. Price is at G above E & since P is above AC, the maximized profit is a +ve profit.

$$TC = AC \times Q = MF \times OM = OMFW$$

$$TR = P \times Q = OP \times OM = OPGM$$

$$\therefore \text{Profit}, \Pi = TR - TC$$

$$= OPGM - OMFW$$

$$= PGFW > 0$$

It is a supernormal profit.

c) Name of the product: Circuit

Type of market: Monopolistic Market

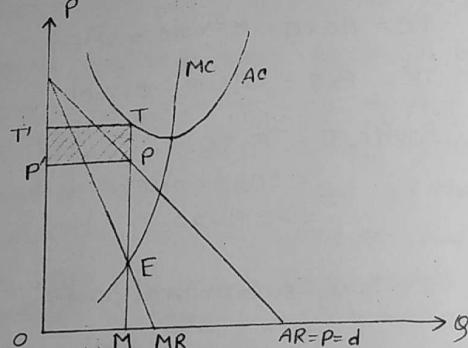
Type of competition: Imperfect competition

Short run loss ($MC = MR$):

A monopolist will maximize its profit by setting output at the point where $MC = MR$. Because the monopolist has a downward sloping demand curve that means $P > MR$, reflecting the fact that, to sell the last unit, the monopolist had to lower the price on earlier units.

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But if the demand and cost situations are less favourable, then the monopolistically competitive firm will be facing losses in the short run as the price $OP (=MP)$ which is less than the average cost ATC . The loss per unit of the output $OM (=PP')$.



The total loss is represented by the shaded part $TPP'T'$.

$$TR = OP \cdot PM$$

$$TC = OT' \cdot TM$$

$$\text{Loss} = T'TPP'$$

This is called short run loss.

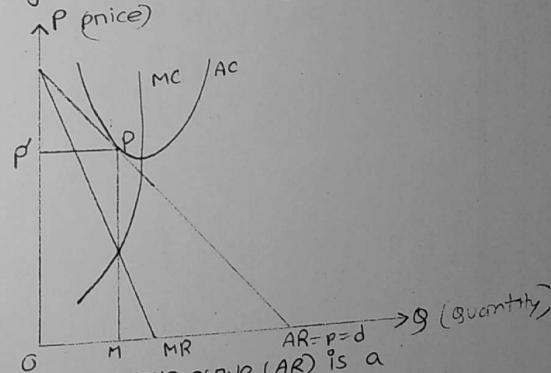
d) Name of the product: circuit

Type of market: Monopolistic market

Type of competition: Imperfect

Longrun normal profit ($AC = AR$ & $MC = MR$):

A monopolist will maximize its profits by setting output at the profit where $MC = MR$. In long run, large number of substitutes will be available. Therefore equilibrium is established when firms are earning only normal profits. Now, profits are zero only when, average revenue = average cost.



Hence, average revenue curve (AR) is a tangent to the average cost curve (AC) at P. So the equilibrium output in the long run is OM and the corresponding price is $MP (=OP)$. At this point, average cost is also MP .

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and so is average revenue. Therefore, there are no super normal profit, there are only normal profits which form part of the cost of production.

$$\begin{aligned} \text{Profit, } \pi &= TR - TC \\ &= (P \times Q) - (AC \times Q) \\ &= OMPP' - OMPP' \\ &= 0 \end{aligned}$$

This is called long run normal profit.

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