* Economics comes from the Greek word 'oikonemica' which has two parts oikos (household) and nemica (management) making it household management.

Definitions for 'Economics':

Dictionary Definition:

Economics is the social science which deals with the study of consumption, production and distribution of resources.

Wealth Definition: (1776, Adam Smith, Wealth of Nation)

The great objective of the political economy of every country is to increase the riches and power of that country or nation.

Welfare Definition: (1890, Alfred Marshal, Principles of Economics)

Economics is the study of mankind in the ordinary business of life. It examines that part of individual and social action which is most intemently connected with attainment and use of material requisites of well being.

Scarsity Definition: (1932, Leonel Robbins, Nature and significance of Eco-Sc.)

Economics is defined as a science which studies human behaviour as a relationship between ends and scars, means of which has alteonate uses.

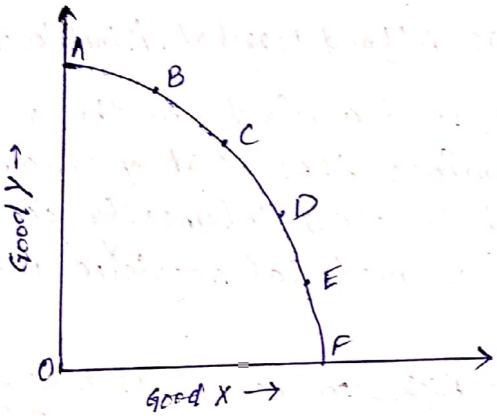
OR: Economic problem is problem of scarcity and choice. Explain. Discuss central economic problems of a country

* Basic Problems Of Economics :

* Unlimited wants and limited resources lead to the origin of basic economic problems in all types of economics.
* We always have the problem of allocating scare resources so as to achieve the greatest possible satisfaction of wants.
* These problems focuses mostly on production, consumption and distribution, hence need to be solved for future growth.

a. Problem of Allocation of Resources (what to produce)

* It directly arises from scarcity of resources, hence we face the problem of choice.
* Here, to overcome this we need to decide which goods and in what quantities are to be produced to satisfy the wants of people
* This means selecting which wants to be satisfied and which wants to be left unsatisfied.



as we move from A to F along the curve, we observe that as wants for good X increased then production of good Y decreased a bit to make up the balance.

b. Problem of choice of suitable method of production (how to produce)

* There are two techniques : labour intensive or capital intensive and we have to choose one for producing a particular good.
* Several factors are responsible in the production, so to overcome this problem we need to understand which combination of resources is to be used and which technology would be suitable.
* The choice of a method of production by a society depends on the available resources and related capital investment.

c. Problem of Distribution of output (for whom to be produced)

* The distribution directly depends on distribution of income, i.e., people with larger income would have greater share & vice-versa.
* Generally factors like land, labour, capital and entrepreneurs contribute to the production of national out and get prices for their contribution.

d. **Problem of full employment of resources:**

* A community should aim at utilising its organic and its scarce resources in most efficient way possible in order to achieve maximum satisfaction.
* Thus a community will not consciously allow the resources to lie idle (unutilised).

e. **Problem of economic efficiency:**

* The production is said to be efficient if the productive resources are utilised in a way that it is impossible to produce more of one good without reducing others.
* The same principle applies to national product distribution.
* As in fig-2, the point B reflects economics in an inefficiency, because it lie way inside the current ppc.
* On other hand, points A, B and C on the ppc not only indicate efficiency in economics but also reflect full employment level of output.

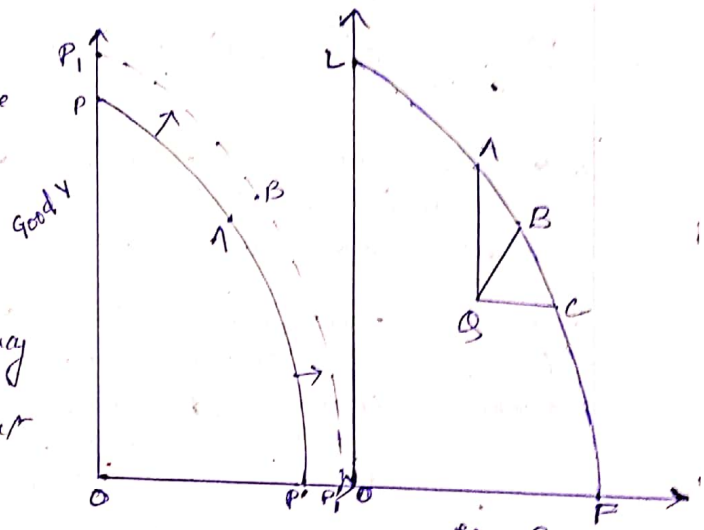


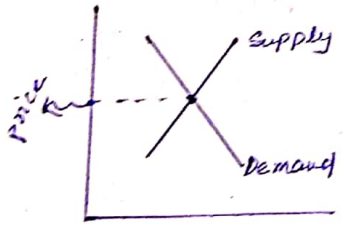
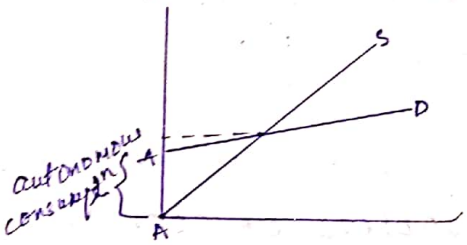
fig-1 fig-2.

f. **Problem of economic growth:**

* Growing productive capacity will bring about an increase in the livings standards of the people.
* It also brings technical advancements, human skills increase and increase in rate of capital formation.
* fig-1 depicts that the advancements have brought about a shift in the graph from PP' to P_1P_1'.
* Hence, an outward shift in graph of ppc curve, indicates economic growth.

d/dx b/w micro and micro economics :

The terms micro and macro were first used by Ragnare Frisch in Oslo University in 1933.

MICRO - ECONOMICS	MACRO - ECONOMICS
* It deals with analysis of small individual units of economy such as individual consumers, firms and small aggregate groups.	* It deals with analysis of the national economy as a whole and its large aggregates are total income, output, employment and total investment & consumption.
* It is the study of various parts of economy Eg: consumption pattern of a particular household.	* It is the study of economy as a whole. eg: consumption pattern of all households of a nation
* Its objective is to maximize satisfaction, output, sales revenue, and minimize cost.	* Its objective is to attain full employment, price stability and economic growth etc.
* Basis of micro economics is the price mechanism which operates through demand and supply interaction.	* Basis is income, output and employment mechanism which are determined by interaction of aggregate supply & aggregate demand
	
* Based on partial equilibrium analysis, i.e, it studies equilibrium condition of an individual, a firm or an industry.	* It is based on general equilibrium analysis., i.e, it studies the equilibrium of the national economy as a whole.
* Here the study of equilibrium is analysed at a particular period of time.	* Here study of equilibrium is based on time-lags and rate of change etc.
* It is static in nature	* It is dynamic in nature.

Demand:

* Valuable wants are called demand; where valuable wants means willingness for good, ability to pay and willingness to handover the money.
* Whenever these conditions are fulfilled, it is called demand
* Or, willingness to buy at a particular price, particular time of a consumer is called as demand.
* **Factors affecting:**
  - ↳ Price of product (P)
  - ↳ Related goods price (P_n)
  - ↳ Taste of consumer (T)
  - ↳ Weather (W)
  - ↳ Income of consumer (Y)
  - ↳ Expectation price (E_x)
  - ↳ Govt. policies (G)
  - ↳ Quality and brand (X)
* **Function of demand (D)**

  Relationship between quality of demand and the factors affecting to demand is the function of demand.

$$D = f(P, Y, P_n, E_x, T, G, W, X)$$

Law of Demand:

"When other factors remaining constant or same, only the relationship between price and quantity of demand is called as law of demand".

or

By Alfred Marshal: "When price increases, demand decreases and when price decreases, demand increases. This relationship between price and quantity of demand is called as law of demand".

mathematically, $D \propto \frac{1}{P}$

Assumptions:

→ consumer must be a rational or normal person.

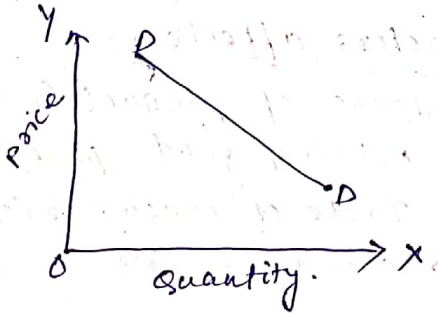
→ Income of consumer as well as other factors of demand must be constant.

Explaination :

Individual Demand : demand of a particular individual.

: Analysis in tabular form is called Individual demand schedule and in graph is called Individual demand curve.

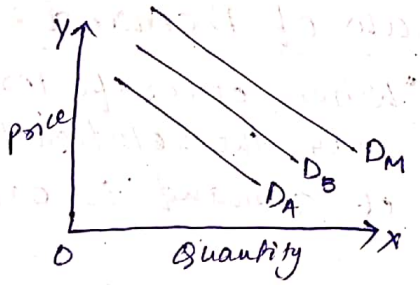
Price	Quantity
10	18
11	16
12	14
13	12
14	10



Market Demand : deals with analysis of demands of market at large.

: Tabular and graphical forms are named respectively.

Price	A_Q (price of A, quantity of A)	B_Q	Market Quantity Σ(A)(B)
10	18	22	40
11	16	18	34
12	14	17	31
13	10	15	25



nb: Market demand curve is always more flatter than Individual demand curve. because the former results after summation of all individual curves.

Criticism :

(law is not valid in certain conditions)

↳ when consumer is irrational

↳ if factors doesn't remain constant

↳ in case of Giffen goods

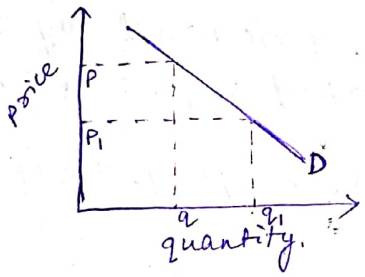
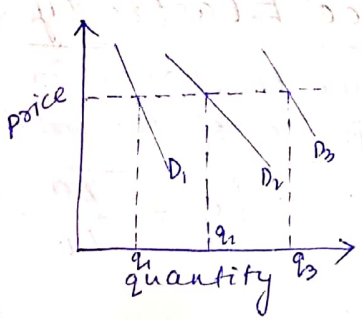
↳ in case of luxurious goods

↳ when interest lies in collection of antique goods.

* **Giffen Goods**: When price increases, demand increase and vice versa holds true, then that kind of inferior goods were introduced by Sir Robert Giffen and hence the name

* **Inferior Goods**: When income increases and demand decreases and vice-versa holds true, such goods are called inferior goods.

* **$\frac{d}{dx}$ b/w change in quantity of demand & change in demand**

Δ in Quantity of demand	Δ in demand.
* When quantity of demand changes only by change in price.	* When quantity of demand changes by factors other than price.
	 these are several demand curves because of several factors changing
* Other factors than the price should be constant * when price increases and demand decreases it is called contraction of demand, and the vice-versa is called as expansion of demand.	* Price should remain constant but others can vary. * Here we have increase of demand or decrease of demand basing on a shift to or shift to left respectively.

* **Elasticity of demand**

* It is the degree or percentage of change in quantity of demand by change in the factors of demand like price, income etc. is called elasticity of demand.

- Income Elasticity
- Price Elasticity
- Cross Elasticity.

Income Elasticity (E_y)

Degree of change in quantity of demand by change in only income is called as income elasticity.

$$E_y = \frac{\Delta q}{\Delta Y} \cdot \frac{Y}{q}$$

where, q = quantity of demand
Y = income.

Cross Elasticity (E_{AB})

Degree of change in quantity of demand of good A, by change in price of another good B is called as cross elasticity.

$$E_{AB} = \frac{\Delta q_A}{\Delta P_B} \cdot \frac{P_B}{q_A}$$

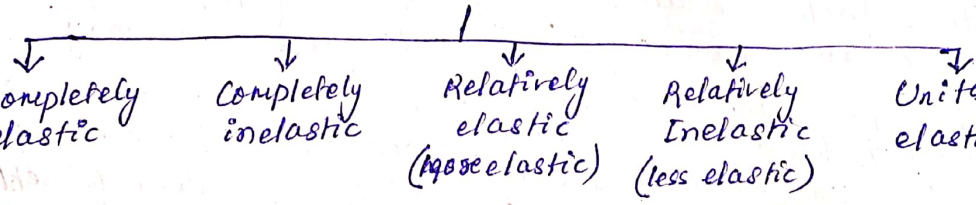
where, q_A = quantity of demand of good A
P_B = price of demand for good B.

Price Elasticity (E_p)

Degree of change in quantity of demand by change in price of the product is called as price elasticity.

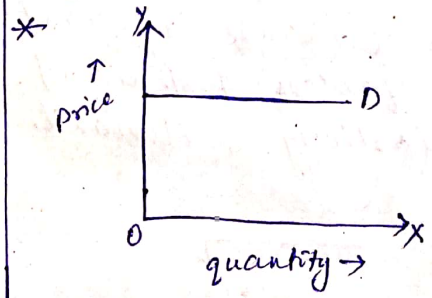
$$E_p = \frac{\Delta q}{\Delta P} \cdot \frac{P}{q}$$

where, P = price of product.



completely Elastic :

* when price is constant and demand changes unlimitedly.
* Eg: stock market

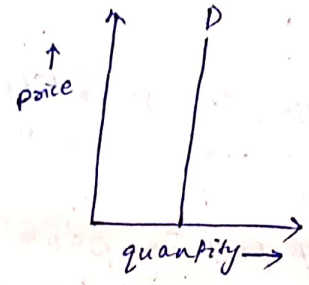


the demand curve here is a straight line horizontal and parallel to $\overrightarrow{OX}$.

* Here, $E_p = \infty$, because $\Delta P = 0$.

Completely Inelastic:

* When any change in price doesn't affect quantity of demand
* Eg: requirement of salt.
*

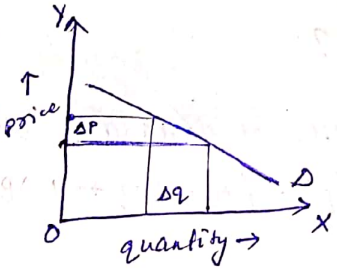


here the demand curve is a vertical straight line, parallel to $\overrightarrow{OY}$.

* Here $E_p = 0$ as $\Delta q = 0$.

Relatively Elastic

* When change in quantity of demand is more than change in price.
* Eg: luxurious goods.
*

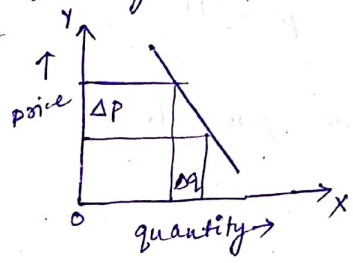


here the demand curve is a flatter line.

* Here $E_p > 1$ as $\frac{\Delta q}{q} > \frac{\Delta P}{P}$

Relatively Inelastic:

* When change in quantity of demand is less than degree of change in price.
*

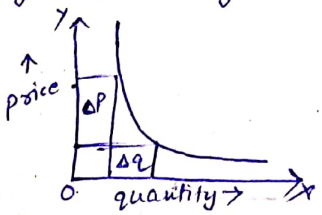


here the demand curve is dipper and dips towards OX.

* Here $E_p < 1$ as $\frac{\Delta q}{q} < \frac{\Delta P}{P}$

Unitary Elastic:

* When degree of change in quantity of demand equals the degree of change in price.
*



Here the demand curve is a rectangular hyperbola.

* Here $E_p = 1$ as $\frac{\Delta q}{q} = \frac{\Delta P}{P}$

Methods to calculate e_p :

Total Outlay/Expenditure Method:

* Total expenditure is calculated by multiplying price of a commodity with its quantity of demand. Thus, total expenditure, $\boxed{T_E = PQ}$
* When price of a commodity falls, its quantity of demand rises, but total outlay may increase, may decrease or may remain same.
* Taking into account the effect of fall in price of a commodity on its total outlay, Marshal has put forwarded following 3 propositions:
  - i) If due to fall in price, total outlay increases $\Rightarrow e_p > 1$
  - ii) If due to fall in price, total outlay decreases $\Rightarrow e_p < 1$
  - iii) If due to fall in price, total outlay remains same $\Rightarrow e_p = 1$

Pf Let price $= P$, quantity of demand $= Q$

Total expenditure, $T_E = PQ$

new price $= P - \Delta P$, new quantity of demand $= Q + \Delta Q$

new expenditure $= (P - \Delta P)\cdot(Q + \Delta Q) = PQ + P\Delta Q - Q\Delta P - \Delta P \Delta Q$

i) Given new expenditure > original expenditure

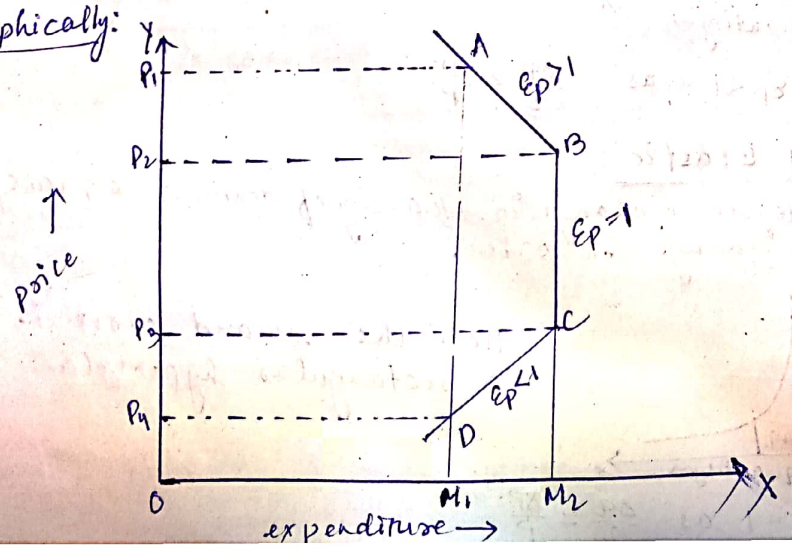
$\Rightarrow PQ + P\Delta Q - Q\cdot\Delta P - \cancel{\Delta P \Delta Q}^{\,0} > PQ$ [neglecting small changes.]

$\Rightarrow P\Delta Q > Q\Delta P$

$\Rightarrow \frac{\Delta Q}{\Delta P}\cdot\frac{P}{Q} > 1 \Rightarrow \boxed{e_p > 1}$ (proved)

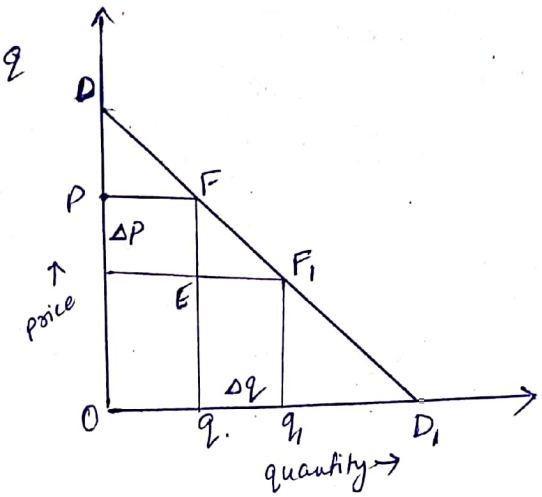
Ily ii) $e_p < 1$ and iii) $e_p = 1$ can be proved.

*Graphically:



Point Method

Let price be P and quantity q and corresponding point on demand curve DD_1 be F.
Let F shifts to F_1.



so $\varepsilon_p = \frac{\Delta q}{\Delta P} \cdot \frac{P}{q}$

$= \frac{\overline{qq_1}}{\overline{PP_1}} \cdot \frac{\overline{OP}}{\overline{Oq}}$

$\Rightarrow \varepsilon_p = \frac{\overline{EF_1}}{\overline{EF}} \cdot \frac{\overline{OP}}{\overline{Oq}}$ ——(I)

we can see that $\Delta EFF_1 \sim \Delta qFD_1$

$\Rightarrow \frac{\overline{EF_1}}{\overline{EF}} = \frac{\overline{qD_1}}{\overline{qF}} \Rightarrow \frac{\overline{EF_1}}{\overline{EF}} = \frac{\overline{qD_1}}{\overline{OP}}$ ——(II)

from (II) & (I) we get

$\varepsilon_p = \frac{\overline{qD_1}}{\overline{OP}} \cdot \frac{\overline{OP}}{\overline{Oq}} \Rightarrow \varepsilon_p = \frac{\overline{qD_1}}{\overline{Oq}}$ ——(III)

Again $\Delta DPF \sim \Delta FqD_1$

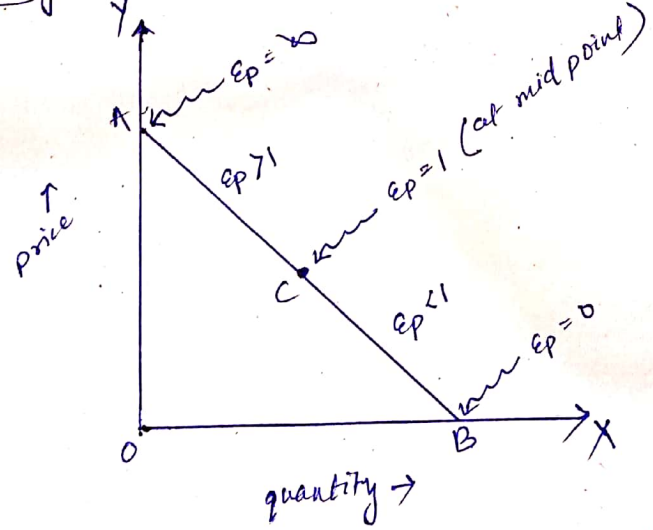
$\Rightarrow \frac{\overline{DF}}{\overline{D_1F}} = \frac{\overline{qD_1}}{\overline{D_1F}} \Rightarrow \frac{\overline{DF}}{\overline{Oq}} = \frac{\overline{FD_1}}{\overline{qD_1}} \Rightarrow \frac{\overline{qD_1}}{\overline{Oq}} = \frac{\overline{FD_1}}{\overline{DF}}$ ——(IV)

from (IV) and (III) we have

$$\boxed{\varepsilon_p = \frac{FD_1}{FD}}$$

so $\varepsilon_p = \frac{\text{lower segment}}{\text{upper segment}}$.

* Graphically:



Arc Method :

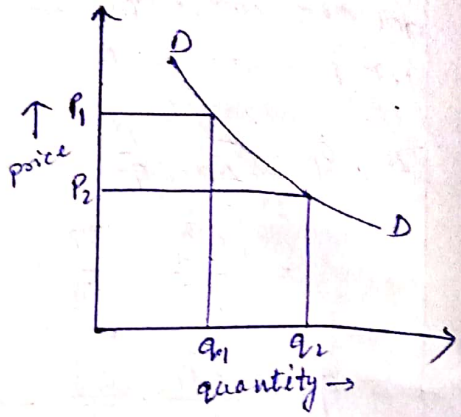
* It means considering average values of price and quantity of demand to calculate the elasticity.

so Price, $P = \frac{P_1 + P_2}{2}$

Quantity of demand, $q = \frac{q_1 + q_2}{2}$

$\therefore \varepsilon_p = \frac{\Delta q}{\Delta P} \cdot \frac{P}{q}$

$\Rightarrow \boxed{\varepsilon_p = \frac{(q_2 - q_1)}{(P_2 - P_1)} \cdot \frac{(P_1 + P_2)}{(q_1 + q_2)}}$



Revenue Method :

* Revenue refers to the selling price obtained after total output.

so Total Revenue, $T.R. = PQ$

and Average Revenue, $A.R. = \frac{T.R.}{q} = P$

finally, Marginal Revenue, $M.R. = TR_n - TR_{n-1}$, i.e, change in total revenue when 1 unit of product is changed.

or $\boxed{M.R. = \frac{d(T.R.)}{dq}}$

the formula for $\boxed{\varepsilon_p = \frac{AR}{AR - MR}}$

Q: When $q = 10 + 2p$ be the demand function, find value of ε_p when $q = 3$.

Given: $q = 10 + 2p \Rightarrow p = (q - 10)/2$

so $A.R. = P = \frac{q - 10}{2}$ and $T.R. = PQ = \frac{q^2 - 10q}{2}$

$\therefore M.R. = \frac{d(T.R.)}{dq} = \frac{d}{dq}\left(\frac{q^2 - 10q}{2}\right) = q - 5$

$\therefore \varepsilon_p = \frac{A.R.}{A.R. - M.R.} = \frac{(q-10)/2}{\frac{(q-10)}{2} - (q-5)}$

$\Rightarrow \varepsilon_p\Big]_{q=3} = -\frac{7}{3}$ so $|\varepsilon_p| = \frac{7}{3} > 1$

so it is a case of relatively elastic

Alternate Method

we know, $\varepsilon_p = \frac{\Delta q}{\Delta p} \cdot \frac{p}{q} = \frac{dq}{dp} \cdot \frac{p}{q}$

$\Rightarrow \varepsilon_p = \frac{d(10+2p)}{dp} \cdot \frac{(q-10)}{2q}$

$\Rightarrow \boxed{\left| \varepsilon_p \right]_{q=3} \Big| = \frac{7}{3}}$ (Ans)

Q Find value of ε_p where demand function $q = 20 - 3p$ and $q = 3$.

Given: $q = 20 - 3p \Rightarrow \frac{dq}{dp} = -3$

when $q = 3 \Rightarrow p = \frac{q-20}{3} = \frac{3-20}{3} = -17/3$

$\therefore \varepsilon_p = \frac{\Delta q}{\Delta p} \cdot \frac{p}{q} = \frac{dq}{dp} \cdot \frac{p}{q}$

$\Rightarrow \left| \varepsilon_p \right]_{q=3} \Big| = \left| -3 \times \frac{-17/3}{3} \right|$

$\Rightarrow \left| \varepsilon_p \right]_{q=3} \Big| = \frac{17}{3} > 1$

$\Rightarrow$ So relatively elastic.

Supply:

* The willingness to sell a particular product at a particular price, at a particular time to a particular consumer is called as supply.

* **Factors affecting:**

↳ Price of product (P)
↳ cost of Product (C)
↳ Related goods price (P_R)
↳ Factor cost (F_c)
↳ Transportation & comm. cost (T_c)
↳ Change in Technology (T)
↳ Availability of Inputs (I)
↳ Govt taxation (G)
↳ Expectation price (E)
↳ Aim of producer (A)
↳ Durability of product (D)

* **Function of Supply (Q_s)**

Relationship between quantity of supply and the factors affecting supply is called as the function of supply.

$$Q_s = f(P, C, P_R, F_c, T_c, T, I, G, E, A, D)$$

Law of Supply:

"While other factors remaining same or constant, the relationship only between price and quantity of supply is called as law of supply".

mathematically

$$Q_s \propto P$$

Assumption:

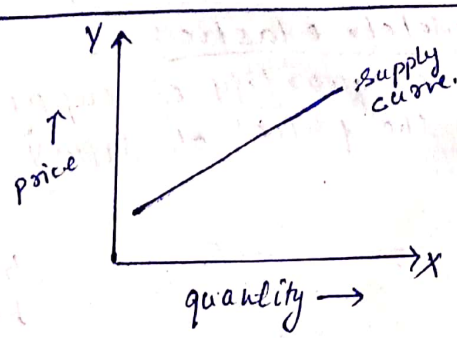
↳ Producer or seller should be a rational or normal person.
↳ factors other than price of product must remain constant.

Explaination:

Individual Supply : refers to supply by a particular individual only.

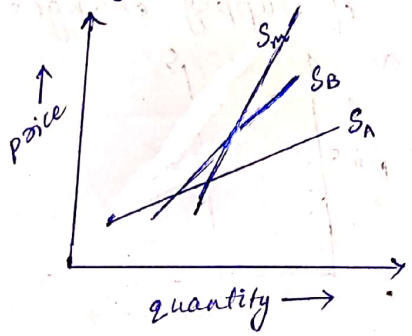
: Analysis of this in tabular form is called individual supply schedule and its corresponding curve in the graph is called individual supply curve.

Price	Q_s
10	10
11	20
12	30
13	40



Market Supply : deals with analysis of supply of goods to the market at large.
: its tabular and graphical forms are named respectively.

Price	Q_s of A	Q_s of B	$\Sigma Q_{SA} Q_{SB}$
10	10	15	25
11	20	30	50
12	30	45	75
13	40	60	100



Criticism:
(law is not valid in certain conditions)
i) If seller is not a rational person
ii) If factors other than price do not remain constant.

Elasticity of Supply:

Degree of change in quantity of supply by degree of change in price of product is called as elasicity of supply.

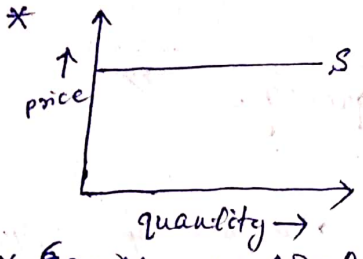
$$E_{ps} = \frac{\Delta q_s}{\Delta P_s} \cdot \frac{P_s}{q_s}$$

where, q_s = quantity of supply
P_s = price of supply.

- $E_{ps} = 0$ — Completely Elastic
- $E_{ps} > 1$ — Completely Inelastic
- $E_{ps} = 1$ — Relatively Elastic
- $E_{ps} < 1$ — Relatively Inelastic
- $E_{ps} = \infty$ — Unitasy Elastic.

ⓐ **Completely Elastic:**

* Where quantity of supply changes unlimitedly but the price of supply remains constant

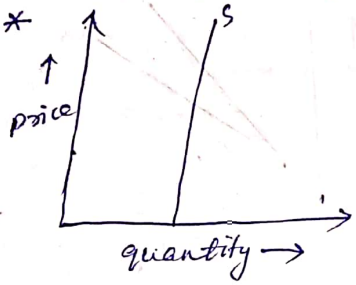


here curve is a horizontal line parallel to quantity-axis.

* $E_{ps} = \infty$ as $\Delta P = 0$

ⓑ **Completely Inelastic**

* Where quantity of supply is fixed but the price of supply changes.

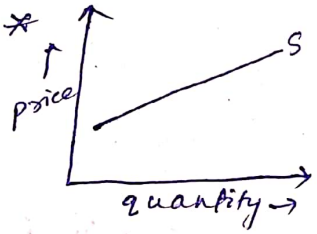


here curve is a vertical line parallel to the price-axis.

* $E_{ps} = 0$ as $\Delta q = 0$

ⓒ **Relatively Elastic**

* degree of change in quantity of supply is more than that in the price.

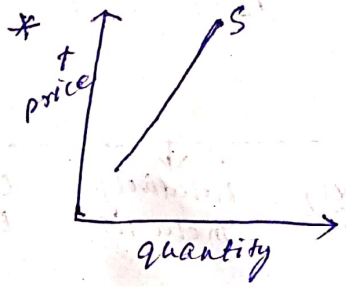


here curve is a straight line with positive slope and relatively flatter

* $E_p > 1$ as $\frac{\Delta q}{q} > \frac{\Delta P}{P}$

ⓓ **Relatively Inelastic**

* degree of change in quantity of supply is less than that in price.



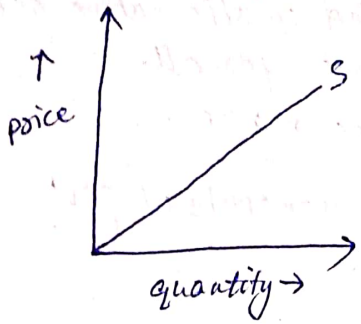
here curve is a straight line with positive slope but relatively dipper.

* $E_p < 1$ as $\frac{\Delta q}{q} < \frac{\Delta P}{P}$

⑧ Unitary Elastic

* where degree of change in quantity of supply is equal to degree of change in price.

*



These curve is a straight line with unit slope.

* $e_p = 1$ as $\frac{\Delta Q}{Q} = \frac{\Delta P}{P}$

Market:

* Relationship between a buyer and seller for exchange of product is called as a market.

- Perfect Competetion Market (PCM)
- Monopoly Market (MM)
- Imperfect Competetion Market (ICM)
  - Monopolystic Competetion Market (MCM)
  - Oligopoly Market (OM)

a. Perfect Competetion Market

* Here large number of buyers as well as sellers are there and they are involved in homogenous or similar kind of products.
* Conditions: : free entry and free exit
  : both buyer and seller have perfect knowledge.
  : A fixed price
  : Absence of transportation and advertisement
  : Unchangeable and equal price for all buyers.
  : seller is the price taker.
* It involves highest number of buyers and sellers.

Monopoly Market:

* This kind of market involves only one seller.
* Conditions: strict restriction for entering into market.
  : absence of any kind of alternative good.
  : price is not same for all.
  : seller is the price maker.
* Eg: nuclear industry is the monopoly of govt.

Monopolystic Competetion Market

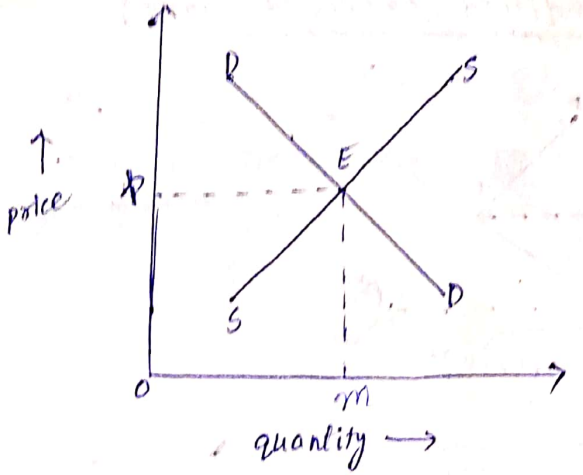
* Has got large number of buyers and sellers and exists in practical world.
* It involves alternate goods and a big amount of advertisement cost.
* Price of any product depends on the condition of market.

Oligopoly Market

* It involves few number of large sellers, i.e; less no. of manufacturers but large no. of distributers.
* It involves only one product.
* Price of the product depends directly on the seller and their inter relativity; Hence price variation varies from seller to seller directly.

Price Mechanism (Determination of Equilibrium Price)

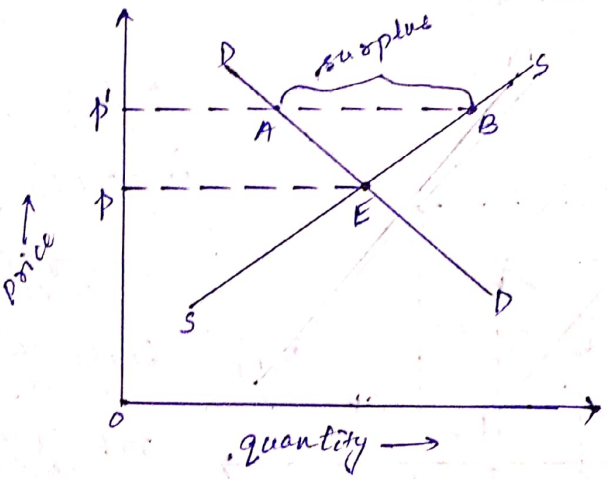
* Equilibrium in the market refers to the situation in which the market price reaches a level where the quantity of demand equals to the quantity of supply.



SS = supply curve
DD = Demand curve

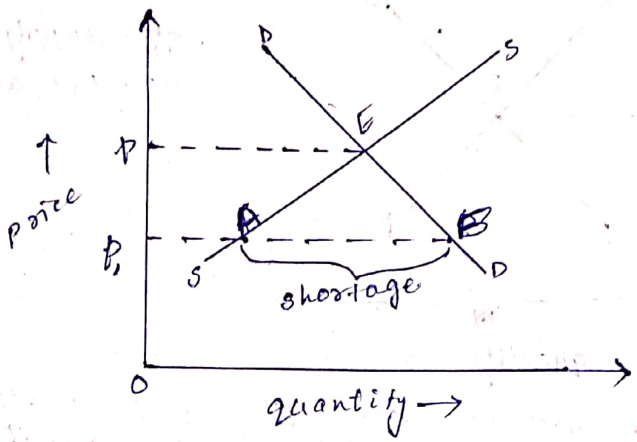
* In above graph we see the DD and SS curves intersect each other at E, which is the equilibrium.
* Price corresponding to point E is p, which is the point representing equilibrium price, and, quantity corresponding to E is point 'm' which represents the equilibrium quantity.
* In other words equilibrium price balances the Q_s & Q_d and at E, $Q_s = Q_d$.
* Hence, at equilibrium price, quantity of goods that buyers are willing to buy exactly balances the quantity of goods that sellers are willing and able to sell.
* Equilibrium price is also called as clearing price because at this price everyone in the market is satisfied.
* The action of buyers and sellers naturally move the market towards the equilibrium of supply and demand.

Surplus Condition (Excess Supply)



* In this case the quantity supplied ($P''B$) exceeds the quantity of demand ($P'A$), due to a growth in market price from the equilibrium price.
* Then sellers respond to the surplus by cutting the price and this moves P_1 to P, i.e, towards equilibrium.

Shortage condition (Excess Demand)

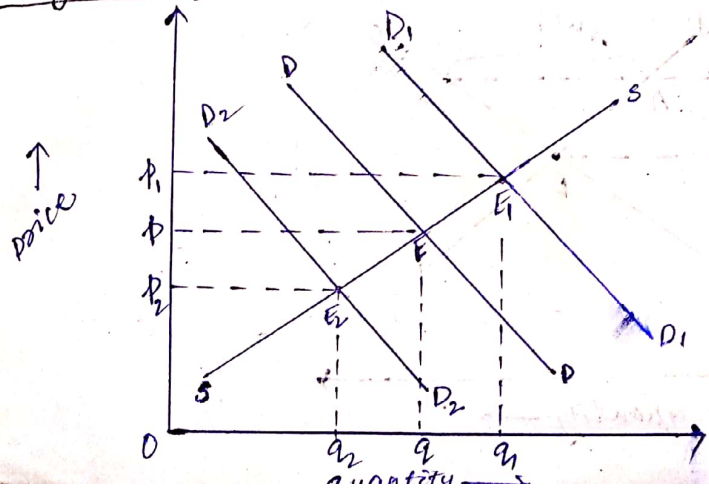


* In this case quantity supplied (P_1A) is less than the quantity of demand (P_1B), due to a fall in market price from the equilibrium price.
* So now the price is raised so that the quantity of demand meet the available quantity of supply, i.e, until equilibrium is reached.

* So, whether price is too high or too low, the activities of buyers and sellers automatically push the market price towards equilibrium price.

* The equilibrium price and quantity depend on the position of the supply and demand curves. The equilibria in the market can change due to shift of either curves or both the curves :

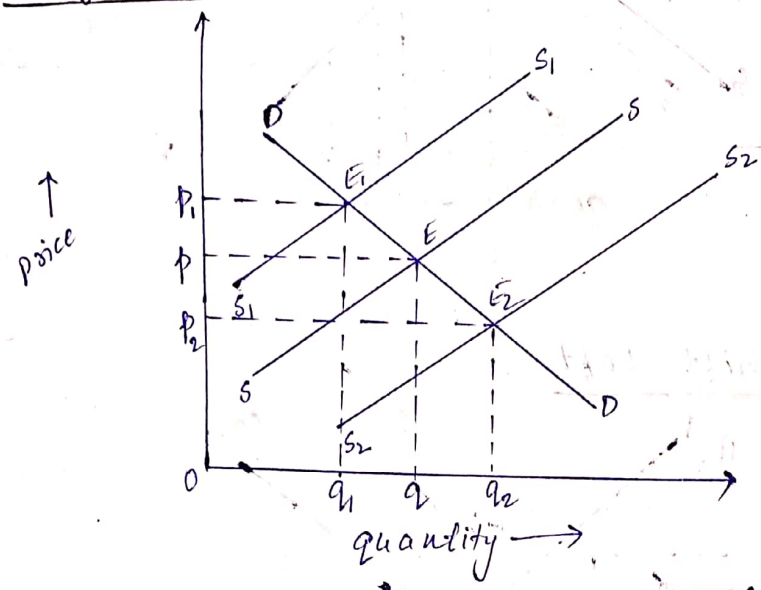
Change in equilibrium due to shift in demand only :



where,
SS = supply curve
DD, D_1D_1, D_2D_2 = demand curves.
E = original point of equilibrium
E_1, E_2 = shifted points of equilibrium
P, q = equilibrium price & quantity

* In this case the supply curve remains constant but the demand curve varries.
* In case the demand curve shifts to right, the equilibrium price and quantity tends to rise. (as we see in D_1D_1 curve: $P_1 > P$ and $q_1 > q$)
* In case the demand curve shifts left, the equilibrium price and quantity tends to decrease. (in curve D_2D_2 : $P_2 < P$ and $q_2 < q$)

change in equilibrium due to shift in supply only



where

DD = demand cur

SS = supply curve original

S_1S_1, S_2S_2 = shifted supply curve

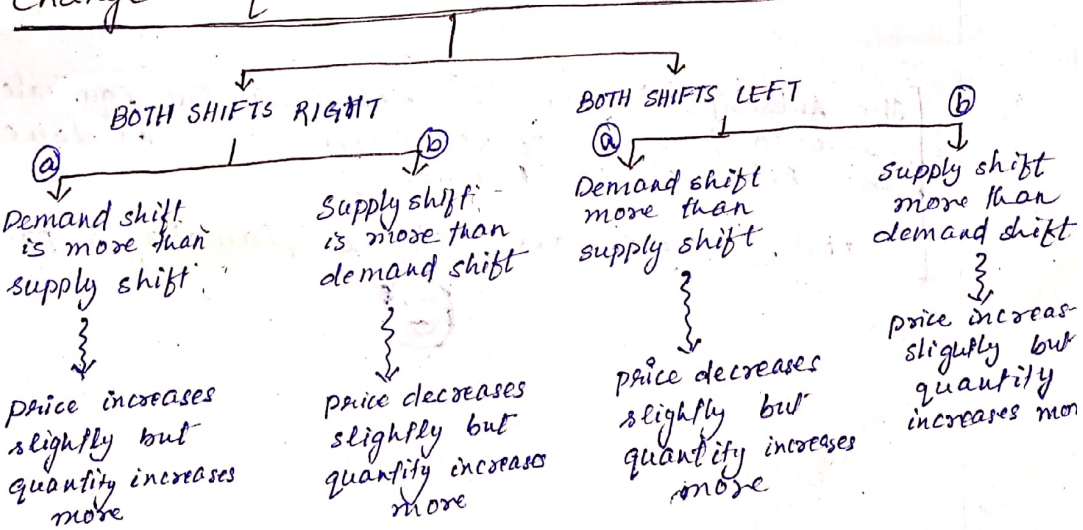
E = original equilib point

E_1, E_2 = shifted points of equilibrium

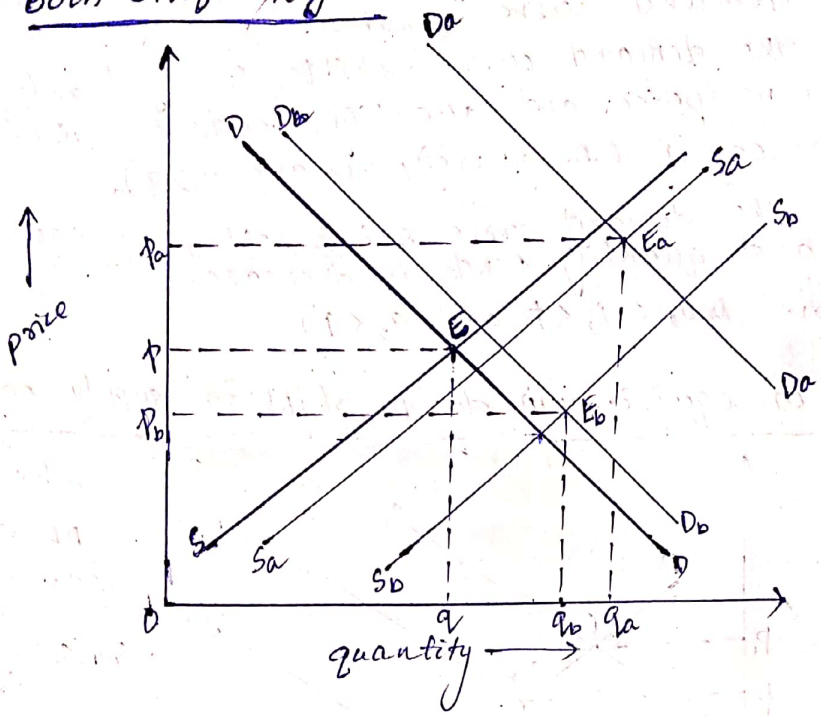
P, Q = equilibrian price & quantity

* In this case the demand curve remains constant but the supply curve varries.
* In case the supply curve shifts to right, the equilibrium price decreases but the equilibrium quantity increases (in curve S_2S_2 : $P_2 < P$ and $q_2 > q$)
* In case the supply curve shifts left, the equilibrium price increase but the equilibrium quantity decreases. (in curve S_1S_1 : $P_1 > P$ and $q_1 < q$)

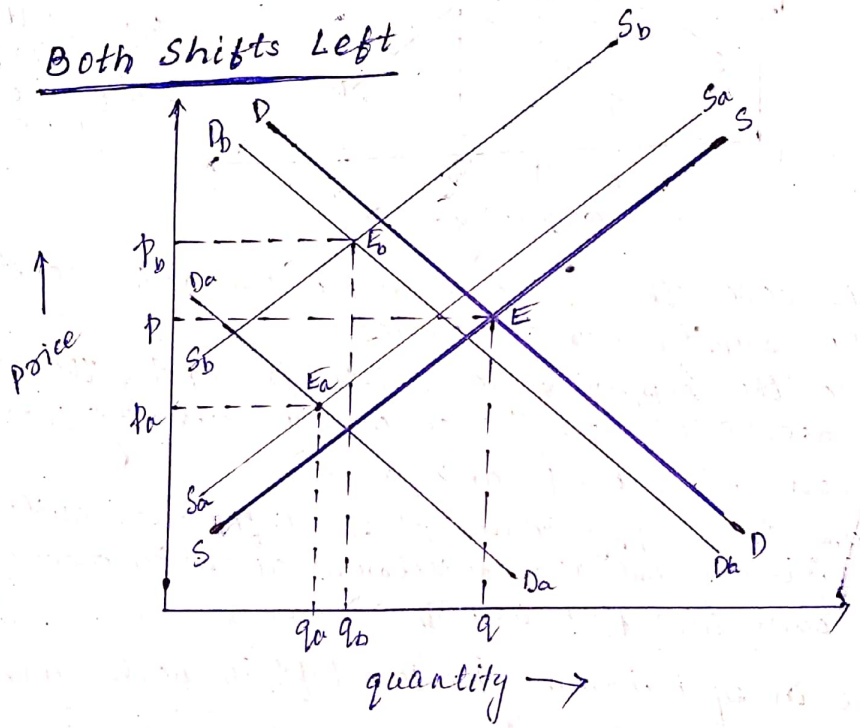
Change in equilibrium due to shift in both curves



Both Shifts Right :



Both Shifts Left



[The subscripts 'a' and 'b' refers to the equivalent curves and points of respective cases as done in the heirarchical branching

and, curves are self-explainatory as previous ones]

Production:

* Transformation of inputs into outputs is called as production.
* In other terms creations of material goods is called as production.

* **Factors of Input:**
  * Land (L)
  * Labour (S)
  * Capital (C)
  * Organiser (O)
  * Raw materials (R)

* **Productive Function (Q)**

It is the purely technical relationship between the inputs (factors) and output

$$\therefore \boxed{Q = f(L, S, C, O, R)}$$

- **Short-Run Productive Function** (short period of time)
- **Long-Run Productive Function** (long period of time)

* **Fixed Factors (F):** The factors which cannot change in short-run by change in output.
  Eg: Land, Capital, Organizer.

* **Variable Factors (V):** The factors which can be changed in short run by change in output.
  Eg: Labour, Raw Materials.

Law Of Variable Production / Short Run Prodⁿ Functⁿ

It states that:
"If the inputs of resource is increased by an equal increment per unit of time while other inputs are held constant, total output will increase but beyond some point, the resulting output increase will become smaller and smaller."

by Benham: "As the proportion of the factor in a combination of factors is increased, after a point, first the marginal and then the average product of that factor will diminish."

Assumptions:

* only one factor is variable, i.e, labour
* all units of labour are homogenous
* It is possible to change the factor proportion.
* It is possible only in short run.
* Production technique must be constant.
* The output is measured in physical units.
* There should be atleast a factor remaining constant.
* The variable factor must increase in equal increment, i.e., there should not be a sudden jump.

Explaination:

(a) **Total Production (T.P.)**: refers to total amount of goods and services produced in a given period

(b) **Average Production (A.P.)**: total production per unit of varying factor.

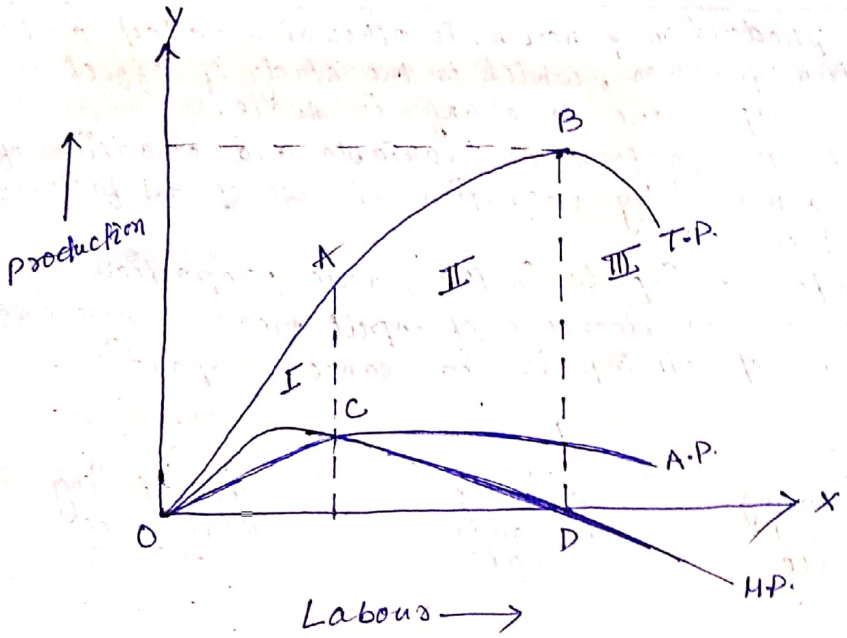
$$\therefore A.P. = \frac{T.P.}{S}$$

(c) **Marginal Production (M.P.)**: change in total production due to change in one unit of a variable factor.

$$M.P = TP_n - TP_{n-1}$$

F	V	T.P.	A.P.	M.P.	Stage of Product	
10	1	8	8	8	I	region of sharp increase
10	2	20	10	12		
10	3	36	12	16		
10	4	48	12	12		
10	5	55	11	7	II	region of slow increase
10	6	60	10	5		
10	7	60	8.57	0		
10	8	56	7	−4	III	region of decrease

in curve:



* These are 3 regions in the curve:
  - ⓐ region 1: increasing return, i.e, proper utilisation of fixed factors by varying number of labours.
  - ⓑ region 2: diminishing return, i.e, high utilisation of fixed factors by varying number of labours.
  - ⓒ region 3: negative return, i.e, over utilisation of fixed factors by varying number of labours.

* Some salient features are:
  - MP curve is larger than AP curve in region 1, meet each other at C and then starts getting smaller.
  - MP curve touches x-axis at D, i.e, when production is maximum and then gains negative value.
  - Production is maximum at B.

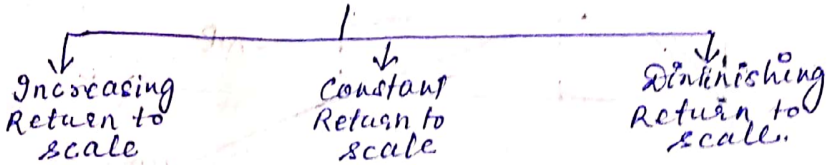
Criticism:

The following conditions may violate the stated law, i.e, if
- more than one variable factors are there
- all units of labour are not homogenous.
- production technique is varried.
- other factors also vary.
- if variable factor increase unequally.

Causes: region 1: too much fixed factors; variable factors inefficiency; inavisibility of factors in production
region 2: inadequate fixed factors to variable factors; imperfect substitute of one factor to other
region 3: excess quantity of variable factors in relation to fixed factor.

Law of Return to scale / Long run Production Function

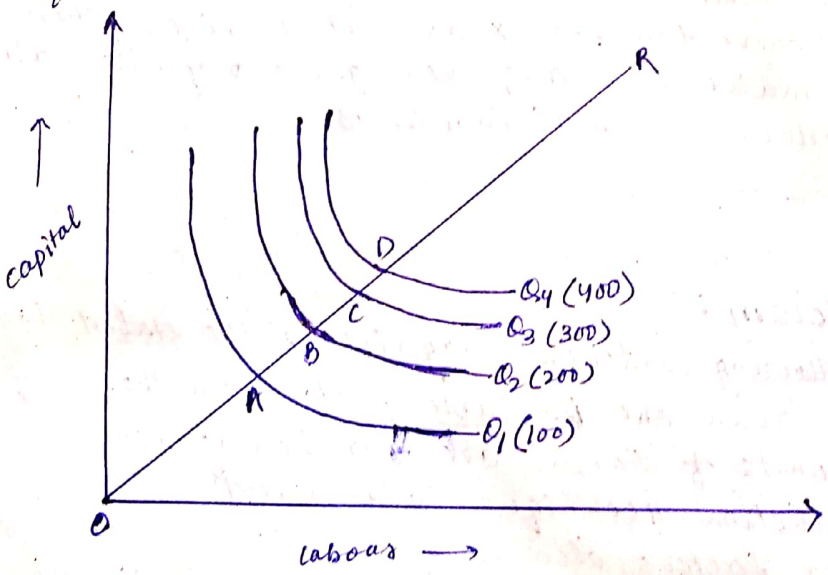
* Longrun production function is otherwise called as homogenous production function, which is the study of effect on the level of output due to change in scale.
* Here all the factors are variable and expansion of output can be achieved by variation in use of all factors of production.
* Scale refers to inputs in the same proportion change ie, increase or decrease of scale means increase or decrease of all inputs in same proportion.



Increasing Return to scale

* It operates in the initial stages when a firm expands i.e, a situation when increase in scale leads to increase in return more than proportionately.
* In this case, successive isoquants will lie at smaller distances along the scale line.

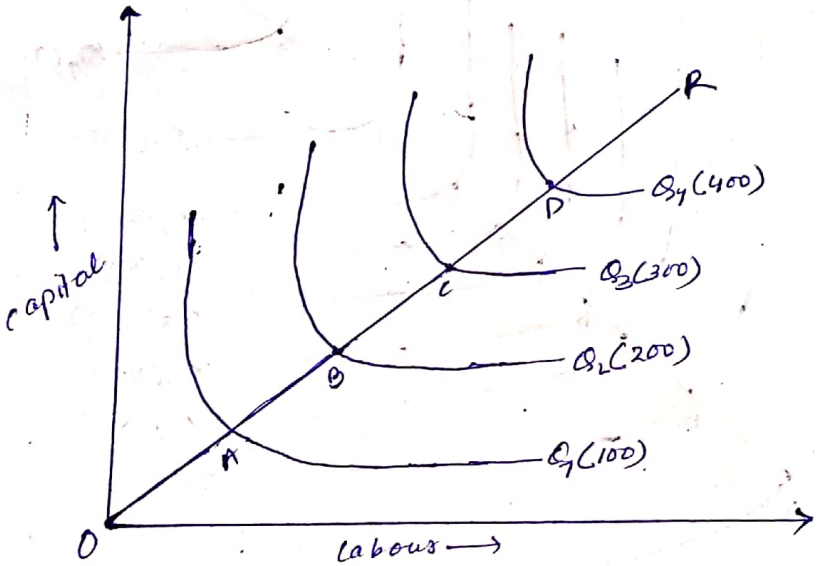
* **Causes:**
  - ↳ Indivisibility of factors of production
  - ↳ Greater possibility of specialisation of labour and machinary
  - ↳ Better management and supervision
  - ↳ Greater economics of scale in relation to diseconomics of scale



* In the graph, isoquants Q_1, Q_2, Q_3, Q_4 represent 100, 200, 300 and 400 units of output respectively.
* for production of 100 units, OA scale is required and so on.
* we can see that OA > AB > BC > CD, i.e, lesser and lesser amount of scale is required for equal increments in output

Constant Returns to scale

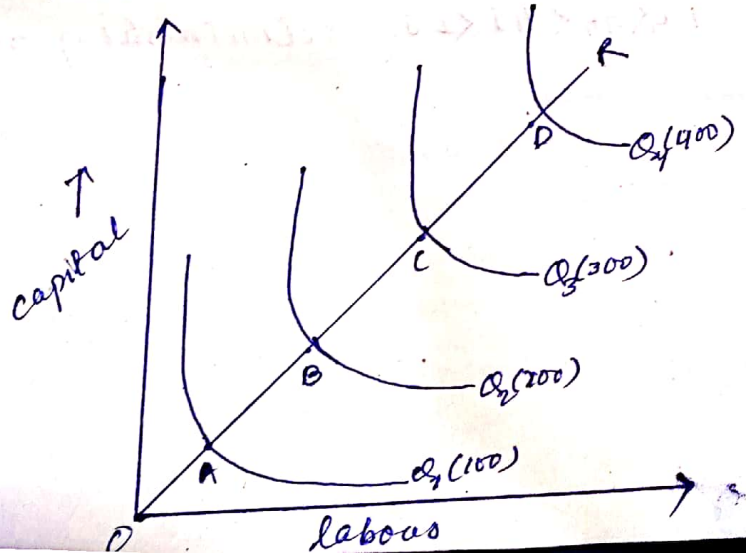
* This case occurs in long run after a certain level.
* It is otherwise called as linear and homogenous production function of degree one.
* Here, change in scale gives same change in return, hence, the successive isoquants lie at an equal distance
* **Causes**
  - ↳ Divisibility and proportionality of factors of production
  - ↳ economics of scale are balanced with diseconomics of scale.



* In above graph we can clearly see, OA = AB = BC = CD, i.e, equal amount of scale is required for equal increments in output

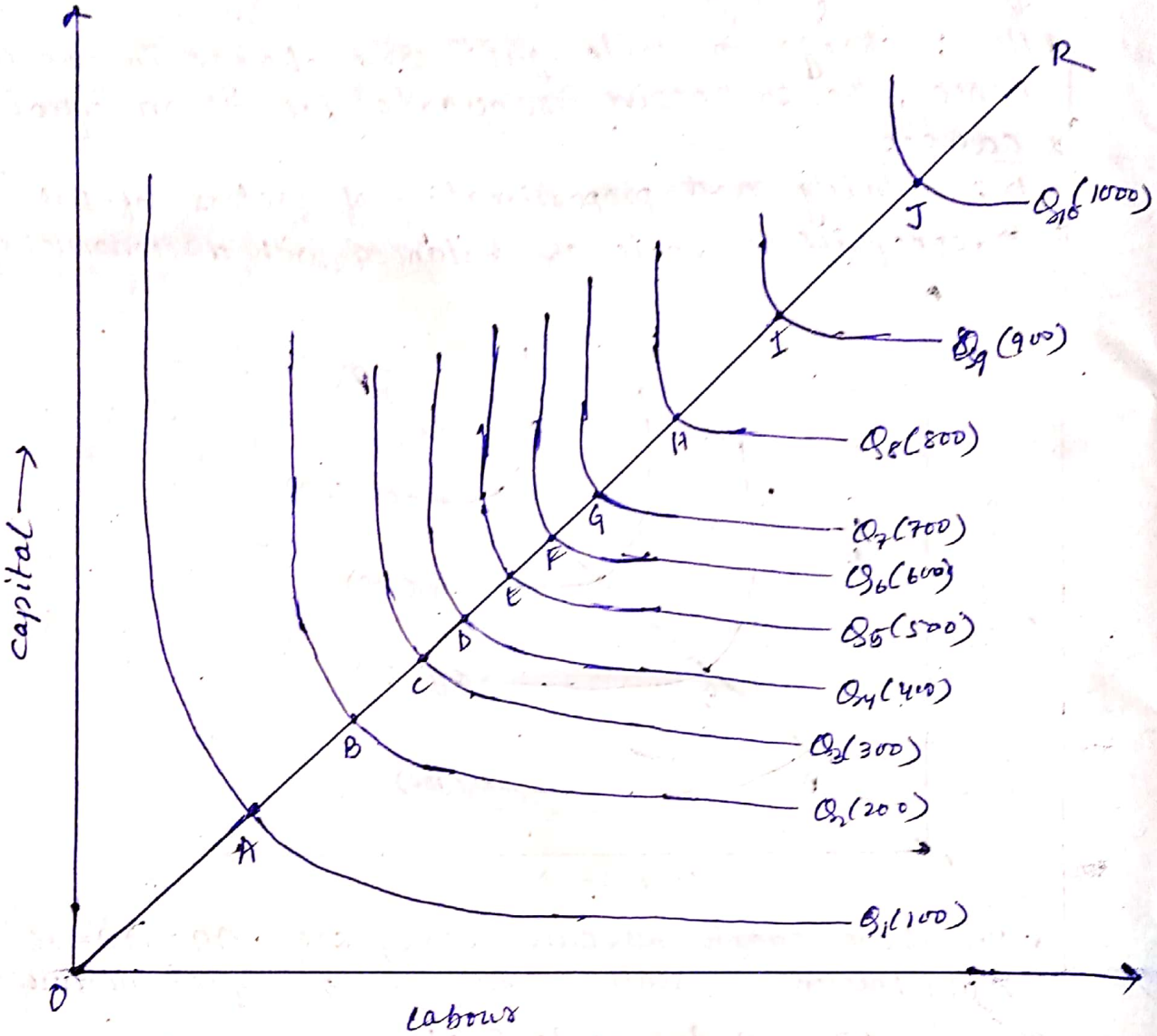
Diminishing Returns to Scale:

* Beyond a point, if scale is further increased, we get this stage.
* Here change in scale will result change in return less that the proportionality.
* successive isoquants will lie at greater distances.
* **Causes:**
  - ↳ Increasing difficulty of management
  - ↳ Lack of co-ordination and control
  - ↳ entrepreneur is a fixed factor of production
  - ↳ diseconomics of scale exceeds economics of scale.



* Here we can see that OA < AB < BC < CD i.e., greater amount of scale is required for equal increments in the output.

Hence the entire operation of return to scale can be written in a graph as:



From the figure; upto point 'C' we see an increasing return to scale; then from 'C' to 'F', we see a constant return to scale and finally beyond 'F' we get diminishing return to scale.

Mathematically, $OA > AB > BC > CD$: increasing return

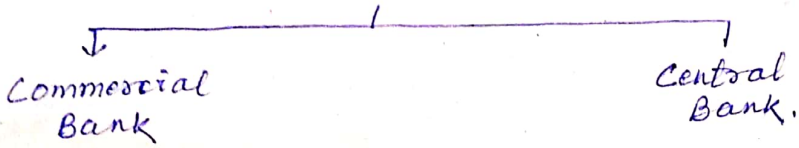
$CD = DE = EF = FG$: constant return

$FG < GH < HI < IJ$. : diminishing return

Banking

Bank

* It is an institution which deals with money and credit. hence in other words, banks are institutions which extend credit out of funds which they own, borrow or create.
* There are two important kinds of banks:



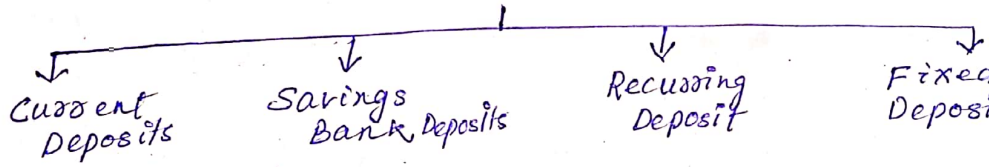
Comercial Banks:

* It is a financial institution which deals with money and credit., i.e., it accepts deposits from the public, makes the funds available to these who need them and helps in remittance of money from one place to another.
* It creates demand deposits which serve as a medium of exchange and as a result, the banks manage the payment system of the country.

Functions of a Commercial Bank

(A.) Accepting Deposits

* It is the primary function, i.e, to accept deposits.



→ **Current Deposit** : money from these accounts can be withdrawn as many times
: no interest is paid on these accounts.

→ **Savings Bank Deposit** : restrictions imposed on 'no. of withdrawals and 'amount of withdraw'.
: low rate of interest is there

→ **Recurring Deposit** : money is deposited in monthly installments for a fixed period.
: repaid to depositors with interest on maturity

→ **Fixed Deposit** : deposited for a fixed period of time
: cannot be withdrawn before maturity
: highest rate of interest.

(B) Advancing Loan

* The banks extend their excess reserves to needy ones.

Money at call and short notice
* Bank to bank
* short period loans and can be called back at very short notice (1-14 days)

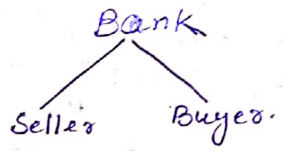
Cash Credit
* Loan against current assets like shares, stocks, bonds.
* Interest only on the sum withdrawn from loan account.
* for limited ones i.e, not for all

Over drafts
* facility to withdraw more than their deposits.
* Interest is charged on the overdrawn amount

Terms Loan.
* medium to long term loans. i.e, maturity is more than 1 year.
* Interest charged on the entire sum and repaid either on maturity or in installments.

another special category is:

Discounting Bills & Exchange:



This entire process happens via a bond paper and is mostly done from seller side.
After making some marginal deductions, the bank pays the value of the bill to the holder.

(C) Credit Creation:

* It is nothing but the process of loan, i.e, the process by which bank creates bank money.
* Whenever bank grants a loan, it creates an equal amount of bank deposit, called as credit creation.

(D) Promoting Cheque System:

* Check is most developed credit mechanism, and these banks are the promoters.
* Some kinds are: bearer cheques, crossed cheques, bankers cheque, gift cheques etc.

(E) Agency Functions

Bank as an agency helps in:
- ⇒ transferring funds.
- ⇒ paying subscriptions or insurance
- ⇒ undertaking purchase & sale of various bonds, shares (securities)
- ⇒ collecting interest
- ⇒ preserving wills.

(F) Other General Functions:

* Include · ATM, SMS updates, exchange of foreign cash etc.

Central Bank:

* In India the central bank is none but the RBI, i.e, Reserve Bank of India.
* Established in the year 1935 (April), it is the apex monetary institution which supervises, controls, regulates and develops the financial system of nation.
* Hence, it is the banker's bank or bank of banks.

Functions of RBI:

(A) Monetary Management

* It is one of its main function, to regulate issue of bank notes and keeping of reserves with a view to securing monetary stability
* Also operate the currency and credit system of the country to its advantage

(B) Issue of Bank Notes

* RBI has the monopoly to issue currency notes, except the one rupee notes, which are issued by ministry of finance.
* It follows a minimum reserve system in note issue. and it is required to maintain gold and foreign exchange reserves of Rs. 200 crore. (115 in gold).

(C) Custodian of Foreign Exchange Reserves:

* RBI has the responsibility of maintaining exchange value of the rupee, i.e, custody of international currency reserve
* All Indian remittances to foreign countries and foreign remittances to India are made through RBI.

(D) Banker To Govt.

* RBI acts as govt. banker, agent and advisor, which maintains and operates govt. deposits.
* It advices govt. on all financial matters, and represents govt. of India as member of the IMF and the World Bank
* It provides developments to carry out 5 year plans as well as helps floating new loans & manage public debt

(E) A Bankers Bank :

* It keeps certain min. cash reserves of each and every commercial bank, which are changable.
* As head of all banking institutions, it serves as the lender of last resort by rediscounting bills of exchange of commercial banks.

(F) Controller of Credit :

* There are two methods

- Direct or Qualitative method
  - by restricting the amount of loan that can be extended by commercial banks
- Quantitative method.
  - CRR (Cash Reserve Ratio)
  - BR (Bank Ratio)
  - Open Market operation (selling the bonds in open market)

* The quantitative methods are followed most likely as varying CRR and BR can bring faster stability.
* Hence, RBI controls the commercial banks in order to ensure internal price stability and economic growth.

(G) Promoter of Development :

* It is the work of RBI to perform the developmental and promotional functions to increase the finance of a nation.
* Eg: special agricultural credit cells.
  : IDBI is to solve the allied problems of industries
* Bank also assists govt. in economic planning.
* Again it also collects all required stats to publish bulletins and annual reports of economic, financial and banking developments.

COST :

* The expenses spent by the produces to pay for the factors of production is known as cost of producti.
* By Alfred Marshal:
"All the efforts and sacrifices made by the producer is the real cost of production, while the money paid to other factors of production for these efforts is termed as the the expenses of production."

Money Cost	Real Cost
* It is also known as nominal cost, which refers to total amount of money money spent in the production of goods. * Money cost is the cash payment made to the factors of production to produce a given output.	* It is a subjective concept. which is used to denote the toil, trouble, discomfort, pain, dis pleasure and sacrifice, which the factor owners experience at the time of supplying them to produce.

Explicit Cost	Implicit Cost
* Those cash payments which the farms make to outsiders for their goods & services. * It refers to the production cost which are explicitely spent by the producers for factor services which do not belong to the producer himself.	* These are the cost of the self-owned and self employed resources. * There are certain productive resources which are normally supplied by the producer himself which are called as self-owned or self employed resources.

Accounting Cost	Economic Cost
★ Refers to those costs which are paid by the entrepreneur at time of hiring the factor of production from outside.	★ It includes both the accounting cost and implicit cost.
★ The accountant maintains a record of these costs for estimating the total cost.	★ Sum total of the imputed and values of range of the entreprenuer like own building, wages of his own labour and intrest on his own capital used in his own farm is called as economical implicit cost.
★ It is also called as explicit and historical cost.	

Private Cost	Social Cost
★ The cost bear by an individual in producing a good is termed as the private cost	★ It is the sum of private cost and external cost.
★ It refers to the cost spent by an individual form to produce a given level of output.	★ When a commodity is produced members of the society who are in no way connected with its production, suffer from some disadvantages, which is called external social cost.

Opportunity Cost:

★ Opportunity cost of anything is the next best alternative that could be produced instead of the same factors or by individual group of factors costing same amount of money.

★ Eg: on a piece of land, you invest ₹1000 each simultaneously for grow of rice, wheat and barely. You earn ₹3000, ₹4000 and ₹5000 respectively. So best alternative is barely.

Time Elements of Cost

Unit of output	T.F.C.	T.V.C	T.C.	A.F.C.	A.V.C	A.C.	M.C
1	10	5	15	10	5	15	5
2	10	9	19	5	4.5	9.5	4
3	10	12	22	3.3	4	7.3	3
4	10	14	24	2.5	3.5	6	2
5	10	15	25	2	3	5	1
6	10	20	30	1.6	3.3	5	5
7	10	28	38	1.4	4	5.4	8
8	10	40	50	1.2	5	6.2	12
9	10	54	64	1.1	6	7.1	14
10.	10	70	80	1	7	8	16

In above table : TFC = Total Fixed Cost

TVC = Total Variable Cost

TC = Total Cost

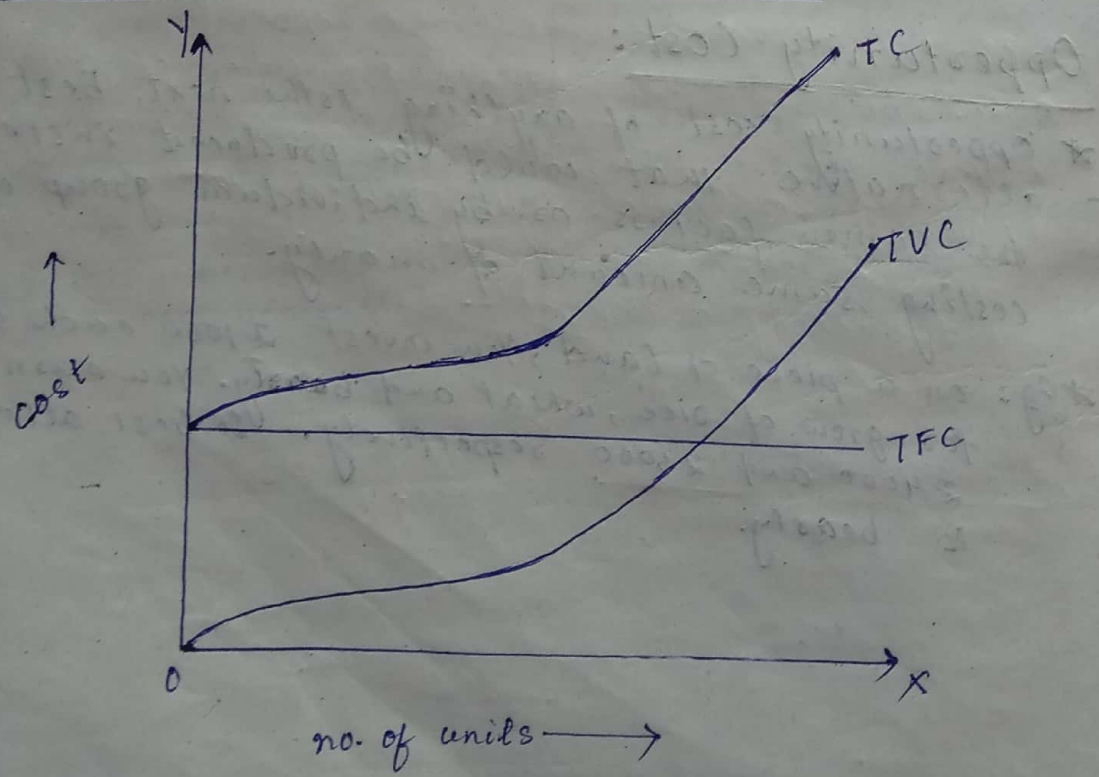
AFC = Avg. Fixed Cost = TFC/output

AVC = Avg. Variable Cost = TVC/output

AC = Avg. Cost = TC/output

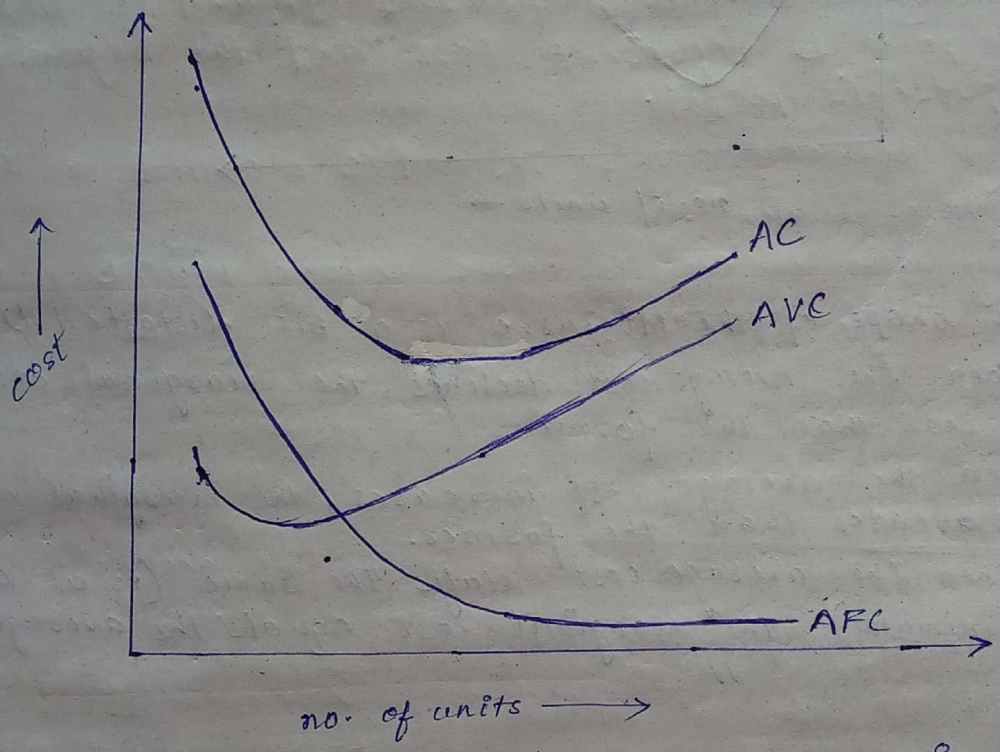
MC = Marginal Cost = $TC_n - TC_{n-1}$

Relation Between TFC, TVC & TC :



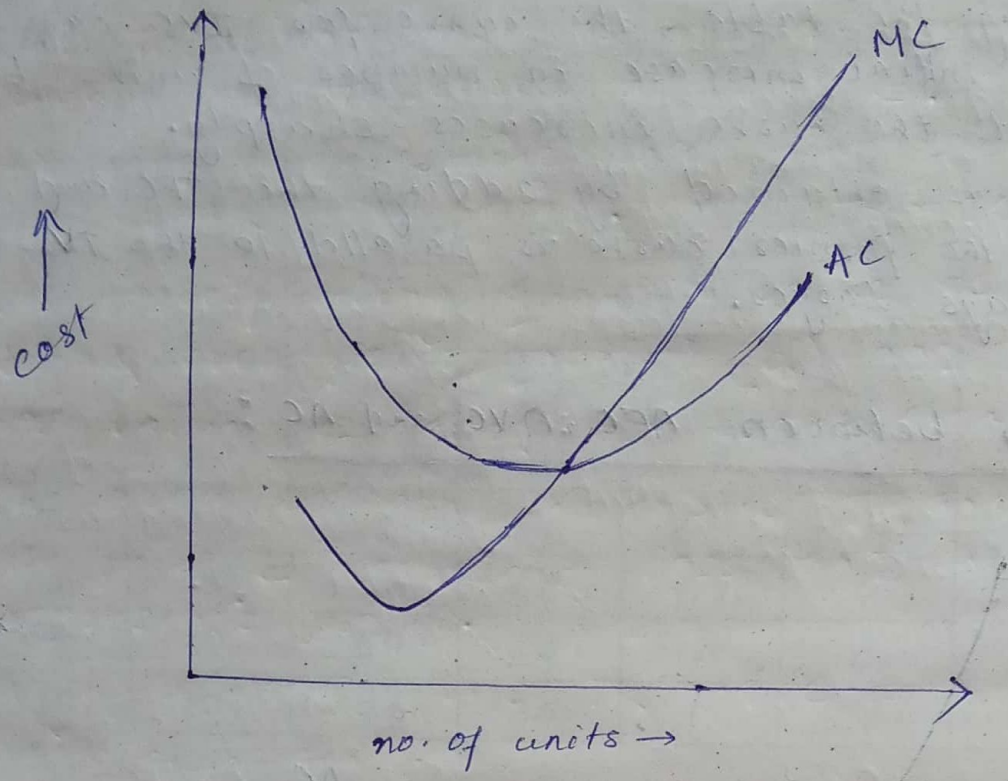
* We can mark that TFC curve is a straight horizontal line parallel to units-axis.
* Analysing the table, the curve for TVC can be sensed as for initial increase in numbes of units but after a point the curve increases sharply.
* The TC is obtained by adding the TFC and TVC hence, the former curve is parallel to the TVC curve but always larger.

Relation between AFC, AVC and AC:



* The AFC curve decreases with increase in no. of units: initialy we find a rapid fall and towards end the decrease in curve becomes less and less and finally the curve becomes almost parallel to unit-axis
* The AVC curve initialy decreases but beyond a point it increases gradually.
* The AC curve is obtained by adding the AVC and AFC curves, which becomes a U-shaped curve.

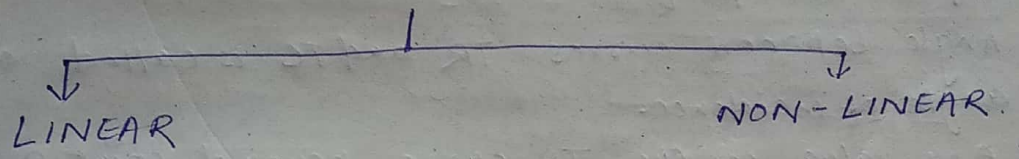
Relation between AC and MC :



* The shape of the MC curve is a bit distorted U-shaped
* When the Average cost declines, the Marginal cost is less than the former.
* When the average cost increases, the marginal cost is greater than the former.
* When the average cost stays the same (is at a minimum), the marginal cost equals the average cost.

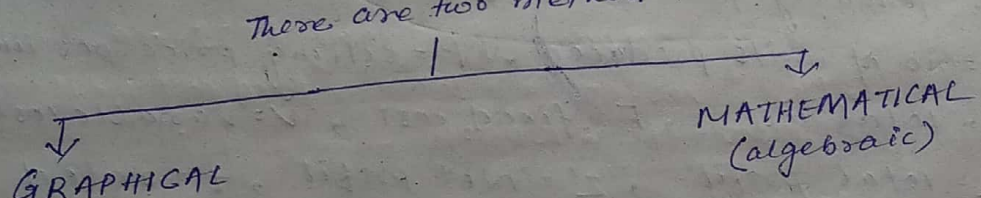
Break Even Analysis :

* It is also known as profit contribution analysis.
* It is an important analytical technique used to study the relationship between the total cost, total revenue and total profit & losses., over the whole range of stipulated output.
* In other words it is basically concerned with finding the point at which the revenue and cost agree exactly, i.e., they are equal.
* Again it is called no loss-profit analysis.

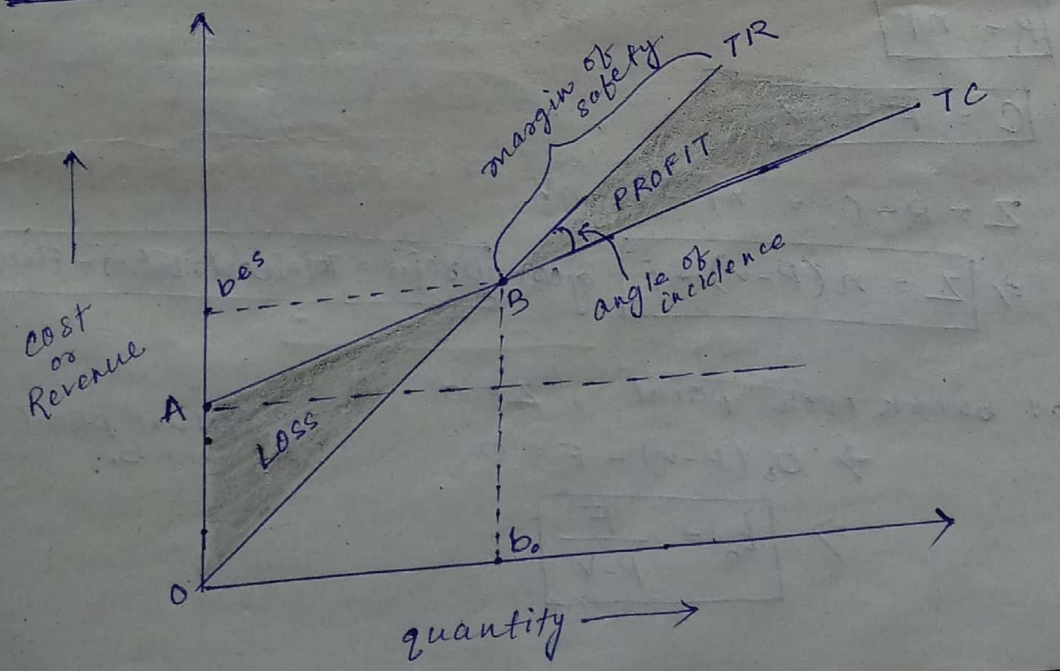


Linear Break Even Analysis :

* When the revenue and the variable cost are directly proportional to the output, then the break even analysis done is called linear break even analysis.



GRAPHICAL :



* The total revenue curve is a straight line passing through origin and inclined at 45° to both axes.
* The Total cost curve is also a straight line which meets the TR curve at point B.
* We need to determine that point B only which is the break-even point, where TR = TC.
* The corresponding quantity value is called as break even point quantity (b_0) and corresponding cost value is called as break even sales (bes).
* The area between the curves TR and TC below the point B represent loss and the beyond B represents profit.
* Angle between curves TR and TC is called as the angle of incidence.
* Any value in the TR curve beyond point B is called as margin of safety.

ALGEBRAIC:

The following factors need to taken into account.

n = no. of units produced, P = selling price per unit

C = total cost, F = fixed cost, V = variable cost per unit

Z = total profit, Z' = Net profit, t = rate of tax.

R = sales revenue, b_0 = break even quantity.

BES = break even sales

$$\boxed{R = nP}$$

$$\boxed{C = F + nV}$$

$$Z = R - C = nP - F - nV$$

$$\Rightarrow \boxed{Z = n(P-V) - F}$$ again $\boxed{\text{profit} = \text{Total Contribution} - \text{Fixed Cost}}$

at break even point, $Z = 0$ [at that point $n = b_0$

$$\Rightarrow b_0(P-V) - F = 0$$

$$\Rightarrow \boxed{b_0 = \frac{F}{P-V}}$$

(P-V) is the contribution (i.e, contribution of one unit of sale to the profit)

$$\therefore \boxed{b_0 = \frac{\text{fixed cost}}{\text{contribution per unit}}}$$

$\therefore$ Total contribution $= n \times (P-V) = nP - nV = R - nV$

$\Rightarrow \boxed{\text{Total contribution} = (\text{Revenue}) - (\text{variable cost total})}$

$$\therefore BES = b_0 \times P \Rightarrow \boxed{BES = \frac{FP}{P-V} = \frac{F}{1-\frac{V}{P}}}$$

now, margin of safety, $\boxed{MS = \text{Actual Revenue Sales} - BES = \text{profit} * \text{sales/contribution}}$

Q: A company has following details:
$F = ₹20 \times 10^5$, $V = ₹100$ per unit, $P = ₹200$ per unit.
find: (i) b_0, (ii) BES and (iii) Contribution & MS; if actual production quantity $(n) = 60000$ units.

(i) $b_0 = \frac{F}{P-V} = \frac{20 \times 10^5}{200-100} \Rightarrow \boxed{b_0 = 20000 \text{ units}}$

(ii) $BES = b_0 \cdot P = 20000 \times 200 \Rightarrow \boxed{BES = ₹40 \times 10^5}$

(iii) per unit contribution $= P - V = 200 - 100 = ₹100$

$\therefore \boxed{\text{Total contribution} = ₹6000000}$

$MS = R - BES = nP - BES = 120 \times 10^5 - 40 \times 10^5$

$\Rightarrow \boxed{MS = ₹80 \times 10^5}$

$\therefore$ Total profit $\Rightarrow Z$ = Total contribution − Fixed cost

$\Rightarrow \boxed{Z = ₹40 \times 10^5}$

Q Calculate BES from following information:
F = ₹75000, Total sales = 3×10^5 rupee,
direct material = ₹1×10^5, direct labour = ₹60000
direct expenses = ₹40000

$$BES = \frac{\text{Fixed cost} \times \text{total sales}}{\text{total contribution}}$$

contribution = sales − variable cost
= sales − (direct materials + direct labour + direct expenses)
= $3 \times 10^5 - 10^5 - 0.6 \times 10^5 - 0.4 \times 10^5$

⇒ contribution = ₹10^5

$$BES = \frac{75000 \times 3 \times 10^5}{10^5} \Rightarrow BES = ₹2.25 \times 10^5$$

∴ Profit = contribution − F = 100000 − 75000

⇒ profit = ₹25000

Q Possession of a company for year 2003 was as follows sales = 1.2 lk, var. cost = ₹96000, fixed cost = ₹16000. Find profit for sales of ₹180000

when sales = 1.2×10^5 ⇒ var. cost = 96000

⇒ when sales = 1.8 lk ⇒ var. cost = $\frac{96000}{1.2 \times 10^5} \times 1.8 \times 10^5$

⇒ var. cost = ₹1.44×10^5

∴ contribution = sales − var. cost = 1.8 − 1.44 = ₹0.36×10^5

∴ profit = $(0.36 - 0.16) \times 10^5$

⇒ profit = ₹20×10^3

Q: Given; selling price per unit = ₹150 , V = ₹90, F = ₹6×10^5

(a) what will be selling price per unit if b_0 = 8000 units

(b) Cal. sales required to earn a profit of 2.2 lakh.

(a) $b_0 = \frac{F}{P-V} \Rightarrow 8000 = \frac{6\times10^5}{P-90}$

$\Rightarrow$ **P = ₹165**

(b) profit = Total contribution − Fixed cost

$\Rightarrow Z = n(P-V) - F$

$\Rightarrow$ **$n = \frac{Z+F}{P-V}$** $= \frac{220000+600000}{150-90} = \frac{820000}{60}$

$\Rightarrow$ **n = 13666.67 units.**

Q: Given: Direct labour = ₹1.5 × 10^5 ; direct materials = ₹ 4.1 × 10^5

Fixed overrates = ₹1.2 × 10^5 ; Variable overheads = ₹2 × 10^5

Sales = ₹10 × 10^5, studying the effect of BES of

i) An increase of 10% on fixed overheads.

ii) An increase of 10% on variable overheads.

$$BES = \frac{\text{Fixed cost} \times \text{sales}}{\text{Total contribution}} = \frac{\text{Fixed cost} \times \text{Sales}}{\text{Sales} - \text{Total Var cost}}$$

Total var. cost = var. overhead + direct labour + direct material

= (2 + 1.5 + 4.1) lk.

= 7.6 × 10^5 rupees.

$$\therefore BES = \frac{1.2\times10^5\times10\times10^5}{10\times10^5 - 7.6\times10^5} = \frac{12\times10^5}{2.4} = 5\times10^5$$

so **BES = 5 lakh**

(ii) at 10% increase in var. overheads we have. new

var. cost = $\left(\frac{11}{10}\times2 + 4.1 + 2.1\right)$ lk = 7.8 × 10^5 rupees

new BES = $\frac{1.2\times10^5\times10\times10^5}{10\times10^5 - 7.8\times10^5} \Rightarrow$ new **BES = 5.45 lakh**

(i) at 10% increase in fixed overheads we have new

BES = $\frac{11/10\times1.2\times10^5\times10\times10^5}{10\times10^5 - 7.6\times10^5} \Rightarrow$ **BES = 5.5 lak**

Q From the following data: selling price, = ₹20 /unit, var. manufacturing cost = ₹11/unit, var. selling cost = ₹3/unit, Fixed overheads = 5.4 lakh/year. fixed selling cost = 2.52 lakh

(a) Calculate BES
(b) No. of units that must be sold to earn a profit of ₹60000/year.
(c) How many units are to be sold to earn an income of 10% of sales.

(a) $BES = \frac{\text{Fixed cost} \times \text{sales}}{\text{Sales} - \text{Total Var cost}}$

Total var. cost / unit = var. manufacturing cost/unit + var. selling cost/unit

$= 11 + 3 = ₹14$

Total Fixed cost = Fixed overheads + Fixed selling cost = 5.4 + 2.52 = 7.92 lakh

$\therefore BES = \frac{7.92 \times 10^5 \times 20}{20 - 14} \Rightarrow$ BES = 26.4 lakh (Ans)

(b) Total no. of sales = $\frac{\text{Profit} + \text{Fixed cost}}{\text{(contribut/unit)}} = \frac{60000 + 7.92 \times 10^5}{6}$

$\Rightarrow$ Total no. of sales = 1.4 lakh (Ans)

(c) Let required no. of sales be x

So profit here as per given = 10% of total sales

$= \frac{10}{100} \times 20x$

$\Rightarrow Z = 2x$

we know, no. of sales = $\frac{\text{profit} + \text{Fixed cost}}{\text{contribut}^n \text{ per unit}}$

$\Rightarrow x = \frac{2x + 7.92 \times 10^5}{6}$

$\Rightarrow x = 1.98 \times 10^5$ (Ans)

Depriciation:

* It is the loss of value of the physical assets used in the production.
or
whenever a machine or equipment performs useful work, its wear and tear is bound to occur.
* Efficiency and value of machine or assets constantly reduces with the lapse of time during its use which is known as depriciation.
* The money which is deduced yearly is called as depriciation charge. This amount of money is deposited in a fund, which is called as the depriciation or sinking fund.
* Causes:

⇒ Physical Depriciation: without proper lubrication and cooling, it is very common to most of the machinaries.

⇒ Physical Decay: some articles go on reducing with lapse of time because of climatic and atmospheric effect, eg: furniture, electric cables, vessels, buildings.

⇒ Time Factors:
some legal assets come for fixed period and eventually loss their value. Eg: patents, copyrights

⇒ Depriciation by accident/sudden failure:
Accidents are sudden and unfortunate which can cause minor to heavy damage.

⇒ Depletion: assets like mines, oils wells undergo such depriciation because of extraction of raw materials from them.

⇒ Deferred maintenance and neglect: proper maintenance is needed which is as per the instructions given on the usage of the machinary given by the manufacturers.

⇒ Inadequacy/Functional depriciation: can be of two types:
loss of efficiency or because of growth and change in firm. When firm is not able to cope with demand and need upgrade.

⇒ Obsolescence/Technological Depriciation: it refers to process of being outdated because of new technically advanced machinaries. As people prefer new technologies so old one's value gets reduced.

* Need for depriciation :

⇒ To know true profit.
profit = income − depriciation
⇒ To show true financial position of firm.
⇒ To make provision for replacement of assets.
⇒ To provide for the recovery of capital that has been invested in physical property.
⇒ To enable cost of depriciation to be charged to cost of producing products or services that result from use of propert
⇒ Depriciation cost is deductible in computing profits on which income tax is paid.

* Methods to compute Depriciation

Two methods are basically used:

- Straight line method.
- Decline balance method.

Straight Line Method

* this method assumes that value of an asset depriciates at a constant rate over its lifetime.
* In other words, loss of value of machine is directly proportional to its lifetime

$$\therefore \quad D_c = \frac{I - S}{n}$$

where, D_c = amount of depriciation per year.
I = initial cost or investment.
S = salvage value of scrap value of asset at end of its life.
n = life of asset (in years)

∴ rate of depriciation to initial investment,

$$D = \frac{D_c}{I} \times 100 = \frac{(I-S)}{In} \times 100$$

$BV(i) = I - D_c(i)$, $BV(i)$ = book value on accounting records at end of i^{th} year, i.e, difference between purchase price and amount accumulated by depriciation cost by end of i^{th} year.

Q: Computers purchased by a public utility cost ₹25000 each. Past records indicate that they should have a useful life of 10 years, after which they will be disposed of, with a salvage of Rs 2000 each. Determine

(a) D_c during year 1. (b) D_c during year 2.

(c) depreciation reserve accumulated by end of year 3.

(d) BV(3).

Given: $I = ₹25000$, $S = ₹2000$, $n = 10$

(a) $D_c(1) = \frac{I-S}{n} = \frac{25000-2000}{10} = ₹2300$.

(b) $D_c(2) = D_c(1) = ₹2300$ as every year it is same rate.

(c) Depreciation reserve $= D_c(1) + D_c(2) + D_c(3)$

$= 3 \times 2300$

$\Rightarrow$ **depreciation reserve = ₹6900**

(d) $BV(3) = I - [D_c(3)] = 25000 - 6900$

$\Rightarrow$ **$BV(3) = ₹18,100$**

Declining Balance Method

* Also called as diminishing balance method.
* It is based on the assumption that value of an asset declines at a decreasing rate, i.e, the amount of depreciation anually decreases with life of asset.

$$D_c(i) = \frac{R}{n} \cdot BV(i-1)$$

, R = rate of depreciation $= 1 - \left(\frac{S}{I}\right)^{1/n}$

$$BV_{(i)} = I(1-R)^i \quad \Rightarrow \quad BV_{(i)} = I\left(\frac{S}{I}\right)^{1/n}$$

Q with values: $I = 5000$; $S = 1400$; $n = 4$ find DC_2

now $R = 1 - \left(\frac{S}{I}\right)^{1/n} = 1 - \left(\frac{1400}{5000}\right)^{1/4} = 0.2725$

$$BV_1 = I\left(\frac{S}{I}\right)^{1/n} = 3637.135$$

so $DC_1 = \frac{0.2725}{4} \times 3637.135 \Rightarrow$ **$DC_2 = 247.71$**

Q A company has purchased a bus for its office for ₹ 12×10^5. The expected life of bus is 10 years. Salvage value is ₹ 4×10^5. Find by declining balance method
(a) DC_3 & DC_5 (b) BV_2 and BV_8

(a) $S = 4 \times 10^5$, $I = 12 \times 10^5$, $n = 10$

so $R = 1 - \left(\frac{S}{I}\right)^{1/n} = 1 - \left(\frac{4 \times 10^5}{12 \times 10^5}\right)^{1/10} = 0.1040$

(a) $BV_2 = 12 \times 10^5 \times \left(\frac{4 \times 10^5}{12 \times 10^5}\right)^{2/10} \Rightarrow BV_2 = 763289.87$

$\therefore DC_3 = \frac{0.1040}{10} \times 983289.87 \Rightarrow \boxed{DC_3 = ₹ 10018.21}$

$BV_4 = 12 \times 10^5 \times \left(\frac{4 \times 10^5}{12 \times 10^5}\right)^{4/10} \Rightarrow BV_4 = 773272.81$

$\therefore DC_5 = \frac{0.1040}{10} \times 773272.81 \Rightarrow \boxed{DC_5 = 78042.03}$

(b) we've already found $\boxed{BV_2 = 763289.87}$

now $BV_8 = 12 \times 10^5 \times \left(\frac{4 \times 10^5}{12 \times 10^5}\right)^{8/10} \Rightarrow \boxed{BV_8 = ₹ 498292.37}$

Module 3

Time Value Of Money

A rupee today worth more than a rupee one or more years from now because of the interest it can earn is called the value of money.

or

Money today is valued more because it gives liquidity and an opportunity to invest and earn return (interest) on it, is called time value of money.

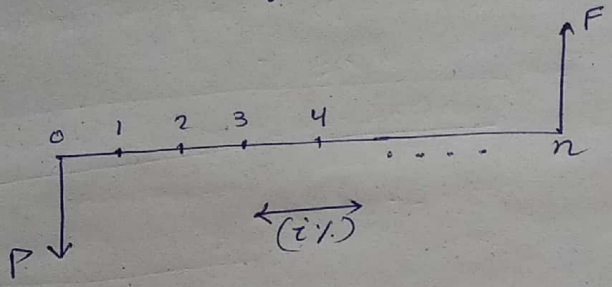
or

Purchasing power of money at a particular time is called as time value of money.

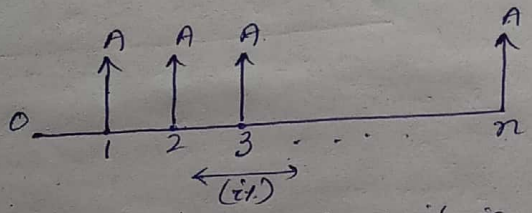
Cash Flow Diagrams

* These are tools to help the decision maker to understand and solve problems in the process of engineering decision making.
* These are visual representations of cash inflows and outflows along a time line.
* Cash inflows are shown by vertical lines above the axis and cash outflows below the axis.
* It is of 5 types:

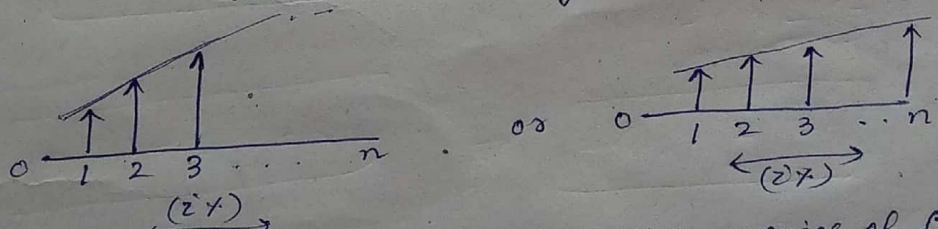
(i.) **Single Payment**: it involves a single present or future cash flow.



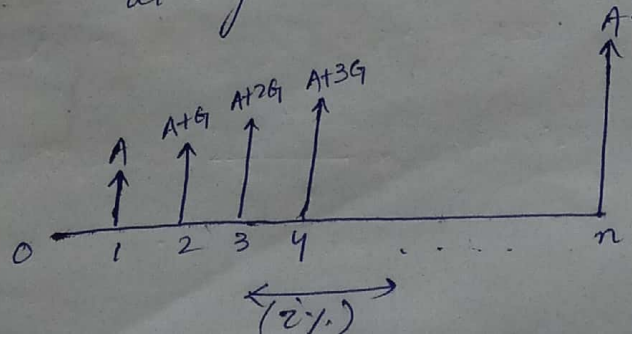
(ii) **Uniform Payment Series**: it involves a series of flows of equal payment at regular interval.



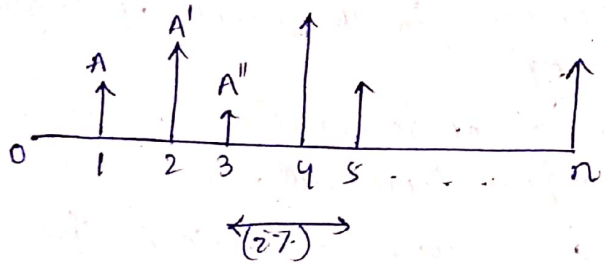
(iii) **Linear Gradient Series**: it is a series of flows increasing or decreasing by a fixed amount at regular intervals.



(iv) **Arithmatic Gradient series**: it is a series of flows increasing or decreasing by a fixed percent at regular intervals.



(v) **Irregular Series Cashflow**: It is one of which exhibits no regular overall pattern of cashflows.



Technique for adjusting Time value of Money:

P = principal amount. i = interest rate

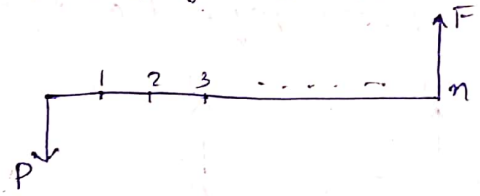
n = no. of interest periods F = future amount at end of 'n' yrs

A = Annuity (equal amount deposited at end of every interest period)

G = uniform amount which will be added or subtracted period after period from amount of deposit.

* Single Payment Compound Amount / Future Value of an amount

we need to find a single future sum total with an initial amount P and years 'n'!



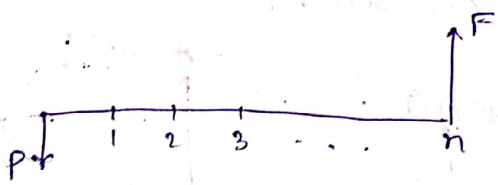
$$F = P(1+i)^n \Rightarrow \boxed{F = P \times (F/P, i, n)}$$

Q A person deposit a sum of ₹20000 at interest rate 18% compounded annually for 10 years. Find maturity after 10 yrs.

$$F = P \times (F/P, i, n) = 20000 \times (F/P, 18, 10) = 20000 \times 5.234$$

$$\Rightarrow \boxed{F = ₹10,46,680}$$

* Single Payment Present Worth amount



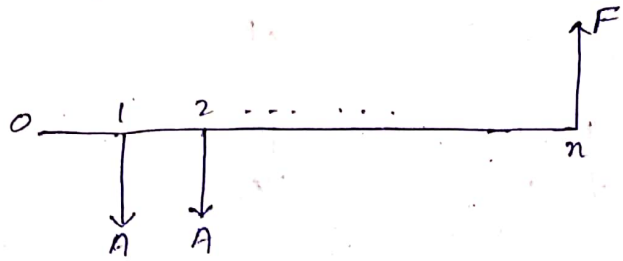
$$P = \frac{F}{(1+i)^n} \Rightarrow \boxed{P = F \times (P/F, i, n)}$$

Q A person wishes to have a future sum of ₹100000 for his son's education, after 10 years from now. What is single payment that he has to deposit so that he gets the amount desired if rate is 15%

$$P = F \times (P/F, i, n) = 100000 \times (P/F, 15, 10) = 100000 \times 0.2472$$

$$\Rightarrow \boxed{P = ₹\ 24720}$$

* Equal Payment Series Compound Amount or Future Value of an annuity



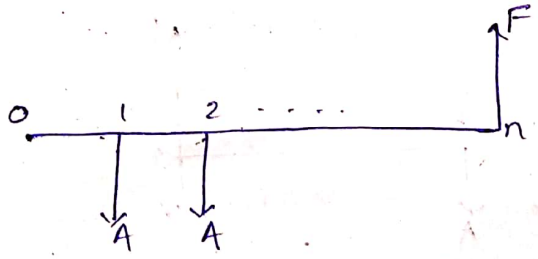
$$F = A\left[\frac{(1+i)^n - 1}{i}\right] \Rightarrow \boxed{F = A \times (F/A, i, n)}$$

Q: A person who is now 35 yrs is planning for his retired life. He plans to invest an equal sum of ₹10000 at end of every year for next 25 yrs. Starting from end of next year. The bank gives 20% interest rate compounded annually. Find maturity value of his account.

$$F = A \times (F/A, i, n) = 10000 \times (F/A, 20, 25) = 10000 \times 471.981$$

$$\Rightarrow \boxed{F = ₹47,19,810}$$

* Equal Payment Series Sinking Fund



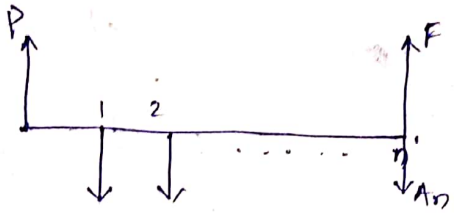
$$A = \frac{F\,i}{(1+i)^n - 1} \Rightarrow \boxed{A = F \times (A/F, i, n)}$$

Q A company has to replace a present facility after 15 yrs. At any outlay of ₹500000. It plans to deposit an equal amount at end of each year. at interest rate of 15%. find fixed amount of deposit every year.

$$A = F \times \left(A/F, i, n\right) = 500000 \times 0.0164$$

$$\Rightarrow \boxed{A = ₹8200}$$

* Equal Payment Series Present Worth Amount



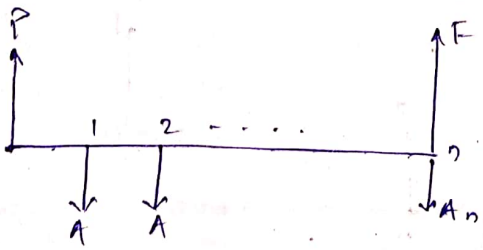
$$P = A\left[\frac{(i+1)^n - 1}{i(1+i)^n}\right] \Rightarrow \boxed{P = A \times \left(P/A, i, n\right)}$$

Q A company wants to set up a reserve which will help it to have an annual equivalent amount of ₹1000000 for next 20 yrs. towards its employee welfare measures. The reserve is assumed to grow at rate of 15% compounded annually. find the single payment.

$$P = A \times \left(P/A, i, n\right) = 1000000 \times \left(P/A, 15, 10\right) = 1000000 \times 6.259$$

$$\Rightarrow \boxed{P = ₹62,59,000}$$

* Equal Payment Series Capital Recovery Amount



$$A = \frac{P \cdot i(1+i)^n}{(1+i)^n - 1} \Rightarrow \boxed{A = P \times \left(A/P, i, n\right)}$$

Q. A bank gives a loan to a company to pursue an equipment worth ₹1000000 at interest rate of 18% compounded annually. This amount should be repayed in 15 yrs in equal installments. find the installment amount that the company has to pay.

$$A = P \times (A/P, i, n) \Rightarrow A = 1000000 \times 0.1964$$

$$\Rightarrow \boxed{A = ₹\ 1,96,400}$$

* Uniform Gradient Series Factor

$$F = \frac{G}{i}\left[\frac{(1+i)^n - 1}{i}\right] - \frac{nG}{i}$$

$$\Rightarrow \boxed{F = G \times (A/G, i, n)}$$

Evaluation of Engg. Alternatives :

Present Worth Method :

It reveals the sum in today's rupee that is equivalent to a future cashflow stream.

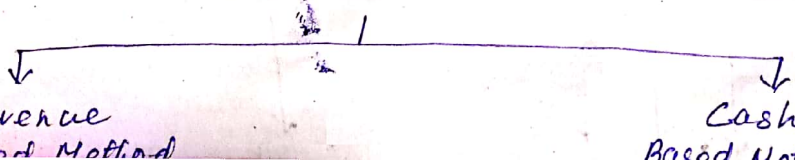
Steps to calculate present worth

→ Estimate interest rate that the firm wishes to earn on its investment.
→ Determine the service life of the project.
→ find out cash inflows over each service life.
→ find out cash outflows over each service period.
→ calculate net cashflows (inflows − outflows).

If PW > 0, then proposal will be selected
If PW < 0, then proposal will be rejected
If PW = 0, then one should remain indifferent to investment.

where PW = present worth

* There are two methods to calculate present worth



Revenue Based Method:

$$PW_{(i)} = -P + \frac{R_1}{(1+i)^1} + \frac{R_2}{(1+i)^2} + \cdots + \frac{R_n}{(1+i)^n} + \frac{S}{(1+i)^n}$$

where, $PW_{(i)}$ = present worth at a given interest rate 'i'.

P = initial investment.

S = salvage value.

$R_1, R_2, \cdots, R_n$ = intermediate revenues.

n = no. of years.

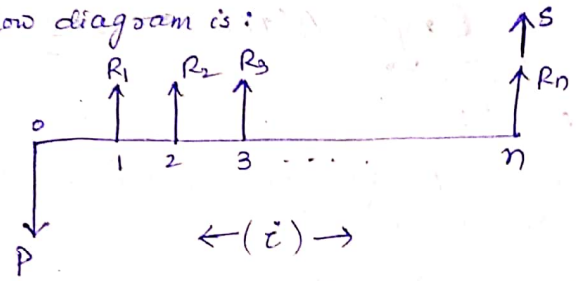
In case of equal payment series, i.e., $R_1 = R_2 = \cdots = R_n = R$

$$PW_{(i)} = -P + R\cdot(P/A, i, n) + S(P/F, i, n)$$

but in general we have

$$PW_{(i)} = -P + R_1(P/F, i, 1) + R_2(P/F, i, 2) + \cdots + R_n(P/F, i, n) + S(P/F, i, n)$$

cashflow diagram is:



(Salvage value is always added to inflows or the revenue.)

Cost Based Method:

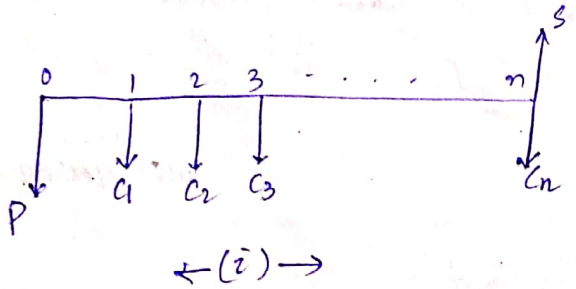
$$PW_{(i)} = P + \frac{C_1}{(1+i)^1} + \frac{C_2}{(1+i)^2} + \cdots + \frac{C_n}{(1+i)^n} - \frac{S}{(1+i)^n}$$

$$\Rightarrow PW_{(i)} = P + C_1(P/F, i, 1) + C_2(P/F, i, 2) + \cdots + C_n(P/F, i, 3) - S(P/F, i, n)$$

In case of equal payment series, i.e., $C_1 = C_2 = \cdots = C_n = C$

$$PW_{(i)} = P + C(P/A, i, n) - S(P/F, i, n)$$

*The cashflow diagram is



Q: Following table summerize a cashflow stream of an investment project

Yr (n)	Net cashflow (in Rs)
0	-650000
1	162500
2	162500
3	162500
4	162500
5	162500
6	162500
7	162500
8	162500

If firm's rate of interest is 15%, complete net PW (NPW) of this project.

It is a case of equal payment series revenue based method.

$P = ₹650000$, $R = ₹162500$, $i = 15\%$, $n = 8$, $S = 0$

So $PW_{(15)} = -P + R(P/A, i, n) + S(P/F, i, n)$

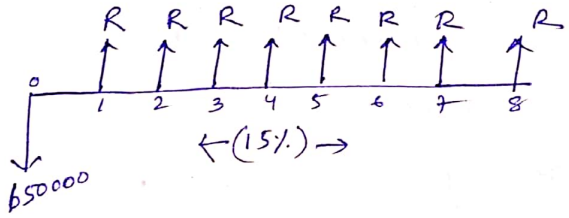
$= -650000 + 162500 \times (P/A, 15, 8)$

$= -650000 + 162500 \times 4.487$

$\Rightarrow \boxed{PW_{(15)} = ₹79137.5}$

Since $PW_{(15)} > 0$ so project should be selected.

The cashflow diagram is:

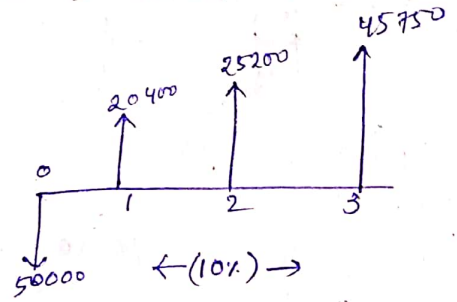


, $R = ₹162500$

Q The project cashflow of an investment proposal is given: if rate of interest = 10%

Yr (n)	Net cashflow (in Rs)
0	-50000
1	20400
2	25200
3	45750

Case of revenue based method with irregular payment series



$PW_{(10)} = -50000 + 20400(P/F, 10, 1) + 25200(P/F, 10, 2) + 45750(P/F, 10, 3)$

$\Rightarrow PW_{(10)} = -50000 + 20400 \times 0.9091 + 25200 \times 0.8264 + 45750 \times 0.7513$

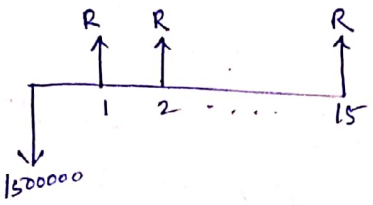
$\Rightarrow \boxed{PW_{(10)} = ₹23792.895}$

$PW_{(10)} > 0$ so project is selected.

Q: Given alternative methods, suggest best method to be implemented based on present worth method assuming 20% interest rate compounded annually.

Alt.	Initial Cost	Anual Revenue (AR)	Life
A	1500000	800000	15 yr.
B	2000000	600000	15 yr.
C	1600000	400000	15 yr.

for A



(equal payment series revenue method)

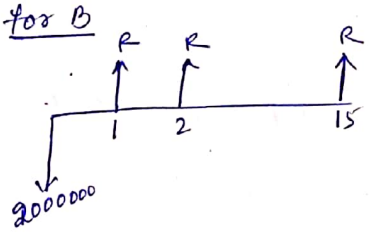
$R = 800000$

$PW_{(A)} = -1500000 + 800000 \times (P/A, 20, 15)$

$= -1500000 + 800000 \times 4.675$

$\Rightarrow \boxed{PW_A = 2240000}$

for B



(equal payment series revenue method)

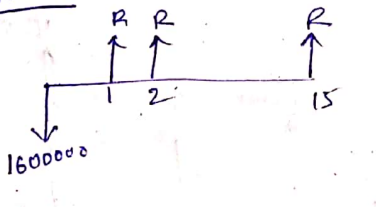
$R = 600000$

$PW_{(B)} = -2000000 + 600000 (P/A, 20, 15)$

$= -2000000 + 600000 \times 4.675$

$\Rightarrow \boxed{PW_{(B)} = 805000}$

for C



(equal payment series revenue method)

$R = 400000$

$\Rightarrow PW_{(C)} = -1600000 + 400000 (P/A, 20, 15)$

$\Rightarrow PW_{(C)} = -1600000 + 400000 \times 4.675$

$\Rightarrow \boxed{PW_{(C)} = 270000}$

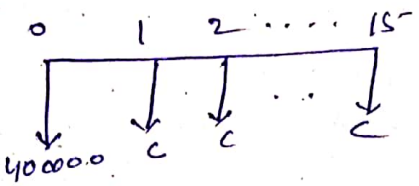
as $PW_{(A)} > PW_{(B)} > PW_{(C)}$

So A is the best alternative.

Q: Given following info., suggest which technology to be chosen based on present worth method assuming $i = 15\%$.

Technology	Initial Cost	Life (yrs)	Anual Operation & Management Cost
A	400000	15	25000
B	500000	15	29000

for A



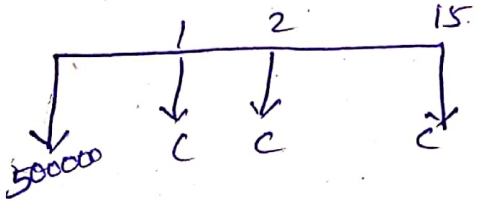
(equal payment series cost method)

$C = 25000$

$PW_{(A)} = 400000 + 25000 \times 5.847$

$\Rightarrow \boxed{PW_{(A)} = 546175}$

for B



(equal payment series cost method)

$C = 29000$

$\therefore PW_{(B)} = 500000 + 29000 \times 5.847$

$\Rightarrow \boxed{PW_{(B)} = 769563}$

as we see that $PW_{(A)} < PW_{(B)}$

so A is choosen as the best technology.

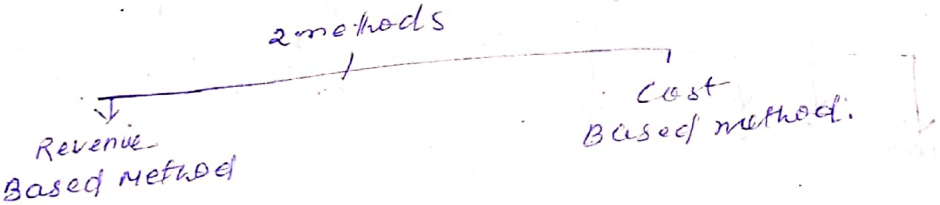
Future Worth Method

It is particularly useful in an investment situation where we need to calculate the worth of a project at end of its investment period rather that at its begining.

Steps for calculation

→ estimate interest rate that the firm wishes to earn in its investment.
→ determine the service life of the project.
→ find out net cash inflows over each service life
→ find out net cash outflows over each service period.
→ Calculate net cashflows (inflows - outflows).

If PW > 0 then proposal will be selected.
If PW < 0 then proposal will be rejected.
If PW = 0 then one should remain indifferent to investment



Revenue Based Method

$$FW_{(i)} = -P(1+i)^n + R_1(1+i)^{n-1} + R_2(1+i)^{n-2} + \cdots + R_n + S$$

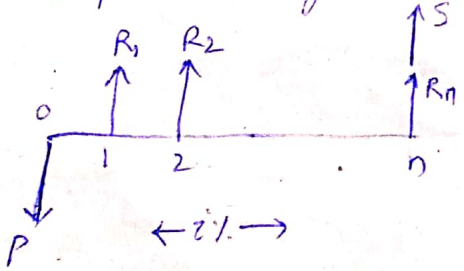
in general we write

$$\boxed{FW_{(i)} = -P\left(F/P, i, n\right) + R_1\left(F/P, i, n-1\right) + R_2\left(F/P, i, n-2\right) + \cdots + R_n + S}$$

In case of equal payment series

$$\boxed{FW_{(i)} = -P\left(F/P, i, n\right) + R\left(F/A, i, n\right) + S}$$

The cashflow diagram in general is



Cost Based Method:

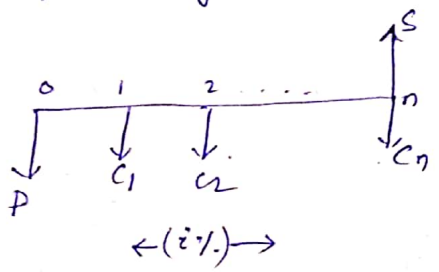
$$FW_{(i)} = P(1+i)^n + C_1(1+i)^{n-1} + C_2(1+i)^{n-2} + \cdots + C_n - S$$

$$\Rightarrow \boxed{FW_{(i)} = P(F/p, i, n) + C_1(F/p, i, n-1) + C_2(F/p, i, n-2) + \cdots + C_n - S}$$

In case of equal payment series:

$$\boxed{FW_{(i)} = P(F/p, i, n) + C(F/A, i, n) - S}$$

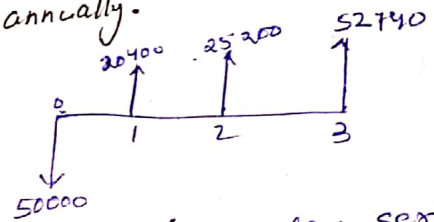
The cashflow diagram is



Q Project cashflow investment proposal is given in the table. Calculate the NFW (Net Future worth) at end of 3 yrs if interest is 15% compounded annually.

Yr	Net cashflow
0	-50000
1	20400
2	25200
3	52740

The cashflow diagram :



we follow Revenue based method (irregular series)

$$\therefore FW_{(15)} = -50000 \times 1.321 + 20400 \times 1.322 + 25200 \times 1.15 + 52740$$

$$\Rightarrow \boxed{FW_{(15)} = 32638.8}$$

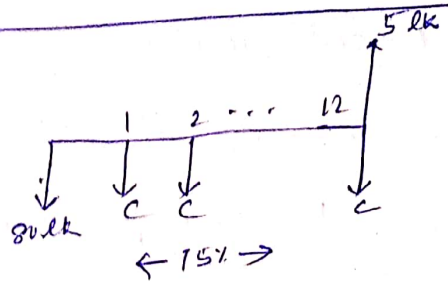
$\therefore$ as $FW_{(15)} > 0$ so project is selected.

Q Given following data, which machine should be selected is used with future worth method assuming an interest rate of 20% compounded annually.

Alternatives	Machine A	Machine B
Initial Cost	80,00,000	70,00,000
Life	12 yrs	12 yrs.
Annual operation & Maintenance cost	900000	900000
Salvage value	500000	400000

for A

cashflow diagram :



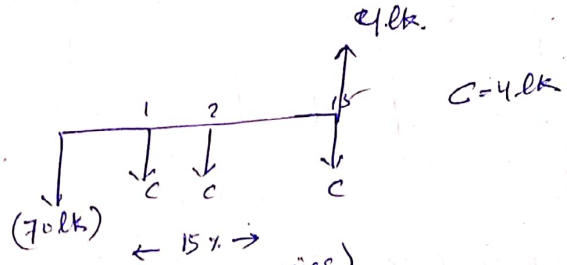
Cost based method (equal payment series)

$\therefore FW_{(A)} = (80\,lk) \times (F/P, 15, 12) + (9\,lk) \times (F/A, 15, 12) - (5\,lk)$

$\Rightarrow \boxed{FW_{(A)} = 10645090\,0}$

for B

cash flow diagram:



cost based method (equal payment series)

$FW_{(B)} = (70\,lk) \times (F/P, 15, 12) + (9\,lk) \times (F/A, 15, 12) - (4\,lk)$

$\Rightarrow \boxed{FW_{(B)} = 97634900}$

As $FW_{(B)} < FW_{(A)}$ so B is selected.

Equivalent Annual Worth (EAW) Method

steps:

→ estimate cashflows (inflows and outflows) over each service period.
→ calculate service life of project
→ Determine the interest rate
→ 1st calculate net present worth (NPW), multiply the amount of present worth by the capital recovery factor

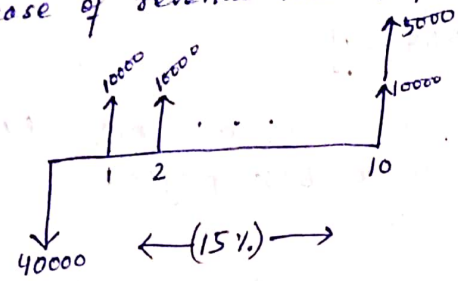
i.e, $\boxed{EAW = PW_{(i)} \times \left(\frac{A}{P}, i, n\right)}$

here $\left(\frac{A}{P}, i, n\right)$ = capital recovery factor in equal payment series.

If, $EAW > 0$, then it is accepted
If, $EAW < 0$, then it is rejected
If, $EAW = 0$, choice of project is indifferent.

Q Consider a machine that cost ₹40000 and 10 years of useful life at end of 10 years it can be sold for ₹5000 after tax adjustment. If the firm could earn an after tax revenue of ₹10000 per year. Should it be purchased at an interest rate of 15% compounded annually.

It is a case of revenue method for calculating present worth



$n = 10$ yrs
$P = 240000$
$R = 210000$
$i = 15\%$
$S = 25000$

equal payment series so

$PW_{(15)} = -P + R(P/A, i, n) + S(P/F, i, n)$

$\Rightarrow PW_{(15)} = -40000 + 1000 \times (P/A, 15, 10) + 5000 \times (P/F, 15, 10)$

$\Rightarrow \boxed{PW_{(15)} = ₹11,426}$

So $EAW = 11,426 \times (A/P, 15, 10)$

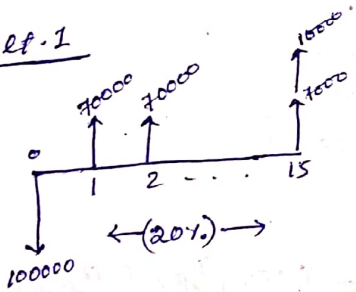
$\Rightarrow \boxed{EAW = ₹2277.2018}$

as $EAW > 0$ so project is rejected.

Q A company visits in one of two mutually exclusive alternatives. The life period of both alternatives is estimated to be 15 years. with followings:

Particulars	Alt. 1	Alt. 2	with 20% interest rate compounded annually.
First cost	100000	110000	
Annual Equal Returns	70000	80000	
Salvage value	10000	20000	

Alt. 1



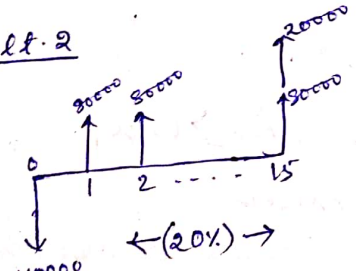
case of equal payment series revenue based.

$PW_1 = -100000 + 70000(P/A, 20, 15) + 10000(P/F, 20, 15)$

$\Rightarrow PW_1 = ₹227899$

$\therefore EAW_1 = PW_1 \times (A/P, 20, 15) \Rightarrow \boxed{EAW_1 = ₹48747.59}$

Alt. 2



case of equal payment series revenue based.

$PW_2 = -110000 + 80000\,(P/A, 20, 15) + 20000\,(P/F, 20, 15)$

$\Rightarrow \boxed{PW_2 = 226529.8}$

$\Rightarrow EAW_2 = PW_2 \times (A/P, 20, 15)$

$\Rightarrow \boxed{EAW_2 = 256747.24}$

BI is based on revenue, so as $EAW_2 > EAW_1$

Hence, Alternate 2 is best project.

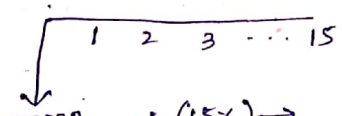
Q Choose best alternative for a firm if data is:

Particulars	Alt-1	Alt-2
First cost	150000	240000
Life	12 yrs	12 yrs
Salvage value	0	6000
AOMC	0	4500

Interest rate is 15% and AOMC means Annual Operational and management cost.

This is cost based

Alt. 1



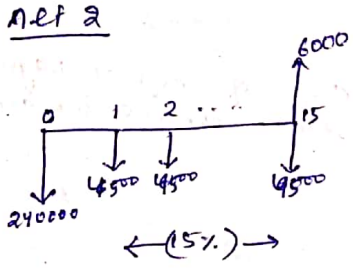
as $C = 0$ and $S = 0$

so $PW_1 = 150000$

$\Rightarrow EAW_1 = 150000 \times (A/P, 15, 12)$

$\Rightarrow \boxed{EAW_1 = 27675}$

Alt 2



$C = 4500$

$S = 6000$

$P = 240000$

$PW_2 = 240000 + 4500\,(P/A, 15, 12) - 6000\,(P/F, 15, 12)$

$\Rightarrow PW_2 = 263273.1$

$\therefore EAW_2 = PW_2 \times (A/P, 15, 12)$

$\Rightarrow \boxed{EAW_2 = 48573.88}$

It is based on cost method so as $EAW_2 > EAW_1$

So alternative 1 is chosen

Rates Of Return :

* There are three rates of return:

MARR ERR IRR.

MARR : It stands for minimum acceptable rate of return
: It is the rate set by the organisation to designate the lowest level of return that makes an investment acceptable.

ERR : It stands for external rate of return.
: It is the rate of return that is possible to obtain for an investment under the current economic cond

IRR

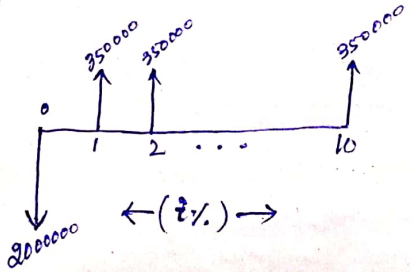
* It stands for internal rate of return
* It is the rate on the unrecovered balance of the investment in a situation where the terminal balance is zero.
* In other words, it is the discount rate at which the Net Present Worth (NPW) equals to zero.

mathematically, $\left(\text{Present worth inflows}\right) - \left(\text{Present worth outflows}\right) = 0$

* Use the hit and trial method to find a pair of interest values for which PW(i)'s +ve and -ve respectively. then apply the formula below to calculate IRR.

$$IRR = i_{(+ve)} + \frac{PW_{(+ve)} \cdot \left(i_{(-ve)} - i_{(+ve)}\right)}{PW_{(+ve)} - PW_{(-ve)}}$$

Q A company is trying to diversify its business a new product line. The life of project is 10 years with no salvage value at end of its life. The initial outlay of project is 20 lakh. The annual net profit of ₹ 350000. find the rate of return for new business.



case of equal payment series
Revenue based method.

$n = 10$, $R = 350000$, $P = 2000000$

$S = 0$

$\therefore PW_i = -P + R(P/A, i, n)$

$i = 10$

$PW_{10} = -2000000 + 350000 \times 6.145$

$\Rightarrow PW_{10} = 150750 \quad (+ve)$

$i = 12$

$PW_{12} = -2000000 + 350000 \times 5.65$

$\Rightarrow PW_{12} = -22500 \quad (-ve)$

$$\therefore IRR = i_{(+ve)} + \frac{PW_{(+ve)}\left[i_{(-ve)} - i_{(+ve)}\right]}{PW_{(+ve)} - PW_{(-ve)}}$$

$$\Rightarrow IRR = 10 + \frac{150750 \times (12-10)}{150750 - (-22500)}$$

$\Rightarrow IRR = 10 + 1.74$

$\Rightarrow \boxed{IRR = 11.74\ \%}$

INFLATION

* Inflation means a substantial and rapid increase in the general price level which causes a decline in purchasi power of money.
* Inflation is statistically measured in terms of percentage increase in the price index per unit of time.
* In other words too much money chasing too few goods is inflation.

features:

* It is a process of uninterrupted increase in prices.
* Generally caused by excessive money supply, hence is a monetary phenomenon.
* originates in the economic system and is a dynamic proces
* It may be demand-pull or cost-push.

Types Of Inflation:

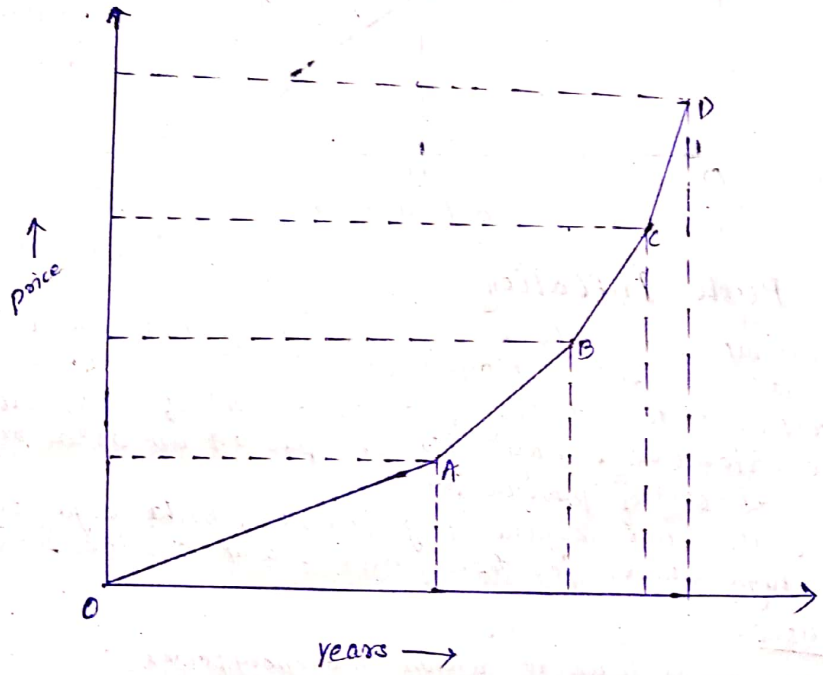
* On the Basis of Speed:

ⓐ Creeping Inflation: mildest form inflation which is generally regarded as conductive to the economic development because it keeps the economy away from stagnation.

ⓑ Walking Inflation: it occurs when price rise becomes more marked as compared to creeping inflati

ⓒ Running Inflation: here, prices increases at a still faster rate

ⓓ Galloping/Hyper-Inflation: it is case after full employment is reached and here price rises every moment and there is no upper limit to the price rise.



OA = creeping
AB = Walking
BC = Running
CD = Galloping.

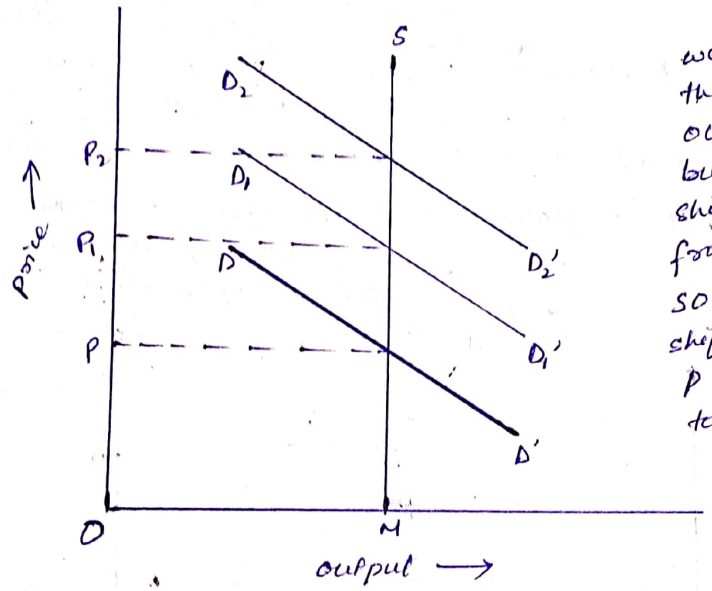
Demand-Pull & Cost-Push Inflation:

Broadly there are two main causes of inflation:
(a) increase in aggregate demand for goods & services.
(b) increase in cost of production.

former results in Demand pull & later results in cost push

Demand-Pull Inflation:

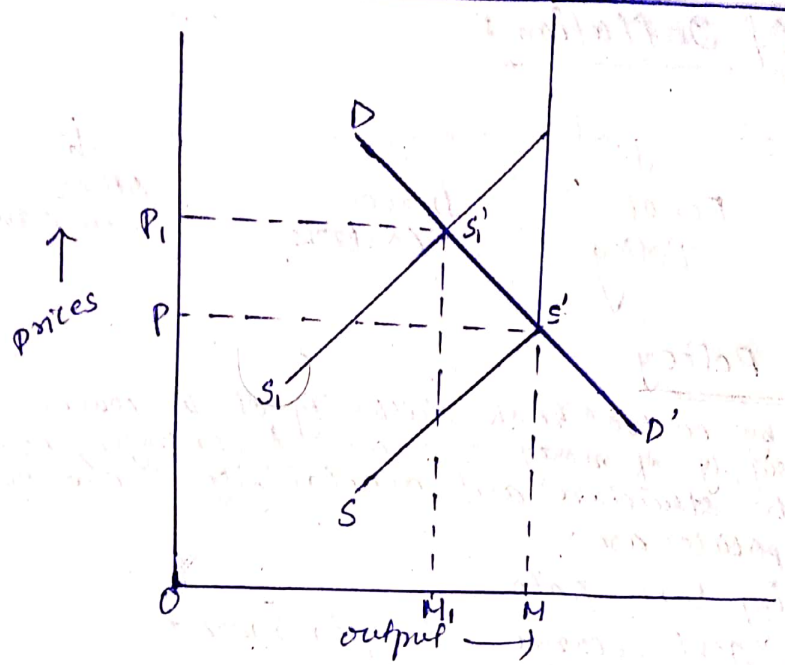
* As the name suggests, general price rises because the demand for goods and services exceeds the supply available at current prices.
* So demand pull inflation may be defined as a situation where the aggregate demand exceeds the economy's ability to supply goods and services at the current prices so that the prices are pulled upwards by upward shift of demand function.



we see that the quantity or output is fixed but the demand shifts upward from D to D_1 & D_2 so that the price shifts upward from P to P_1 and then to P_2 respectively.

Cost-Push Inflation:

* It attempts to explain the rise in prices when the economy is not at full employment.
* According to this theory; prices, instead of being pulled by excess demand, may also be pushed up as a result of rise in cost of production.
* The causes are organised groups, viz, both the organisers & labour fix high prices for their products and services.
* Causes:
  - ↳ wage-push due to union monopoly power
  - ↳ profit push due to business monopoly power
  - ↳ increasing prices of raw materials
* In one way we say that at a fixed demand, output is reduced, i.e, supply is decreased thereby increasing the price



nb: There is another category called as: Demand-cum-Cost Inflation which is directly linked with shifting of both demand and supply curves.

Causes Of Inflation

* Factors causing increase in Demand:
  - (a) Increase in money supply or increase in income.
  - (b) Increase in govt. expenditure
  - (c) Increase in private expenditure
  - (d) Reduction in taxation
  - (e) Increase in exports
  - (f) Increase in population
  - (g) Paying off debts by the govt. to public.
  - (h) black money.

* Factors causing decrease in supply:
  - (a) Scarcity of factors of production
  - (b) Hoarding of essential goods
  - (c) Trade union activities
  - (d) Natural calamities.
  - (e) Increase in exports.
  - (f) Law of diminishing returns.
  - (g) War alike conditions
  - (h) international imbalances.

Control of Inflation:

- Monetary Policy
- Fiscal Policy
- Direct Controls
- Other measures.

Monetary Policy

* It is done by central bank authority of the country to influence supply of money & credit by changing the interest rate structure and availability of credit.
* various policies are:
  - (a) Increasing bank rate
  - (b) sale of govt. securities in open market
  - (c) Higher reserve ratio
  - (d) selective credit control.
* disadvantages
  - ↳ excess reserves in banks enables to lend more credit thereby making inflation more effective
  - ↳ these methods are worthless when inflation is cost-pushed.
  - ↳ not workable in case of scarcity driven price rise
  - ↳ also not working with inflation due to deficit financing.

Fiscal Policy:

* It is the budgetary policy relating to taxes, public expenditure, public borrowing and deficit financing.
* Policies include:
  - (a) increase in taxation
  - (b) reduction in public expenditure
  - (c) increase in public borrowing
  - (d) control of deficit financing.

Direct Controls

* It refers to regulatory measures undertaken with an objective of converting an open inflation into suppressed one.
* Policies include:
  - (a) Direct control on prices, i.e, setting up the MRPs.
  - (b) Rationing, i.e, limiting the consumption of a kind of good.
* limitations:
  - ↳ suppresses individual initiative and enterprise.
  - ↳ They discourage innovations
  - ↳ They encourage large-scale hoardings.
  - ↳ These methods need honest & efficient administrative machi
  - ↳ Gives rise to great economic disturbances.
  - ↳ Limited applicability.
  - ↳ rationing involves great deal of waste

Other Measures:

* These include:
  - (a) Expansion of output
  - (b) Proper wage policy
  - (c) Encouragement to savings
  - (d) Overvaluation of domestic currencies
  - (e) population control
  - (f) Indexing, i.e, monetary corrections by adjusting money incomes of people