UNIT – III

Production function

The Production function Expreses a functional relationship b/n physical input and physical output of a firm at any particular time period.

heare the mathemetically production function are their.

$$Q = F(L_1, L_2, C, O, T)$$

where Q is the quantity of production,

F = Explain the function

L_1 = land

L_2 = Lebor

C = capital

O = organaization.

T = Technology.

Land:- can you prodused with out Land - no, The Land is defferent size are their in produced the goods and servises.

Labor:- Labor is main veriable factor in this production proses. If the organoization wants profit or loss the total defends up on the Laber to do the work.

[∴ key role for the production function]

Capital :- Most important to produced the goods and servises - without capital we can't producede the goods and servises.

organaization :- To Established the industry and run the industry - should be need to the organaization.

Technology :- Technology help of the use more product produced. can we wed with out this factors free of cost ? no, this facter pay of some amount.

⟹ [Land → Rent, Labor → wages, capital → interest - organaization → profit/ losses, Technology → Rayality.]

clasification of time :-
on the basis of the time used in the production function their are three types.

① very shot run :- If you want increased the production factor's of produced also increased. change the variable not change on their facter. The factors are no one soport and fixed price.

② short run :-
[variable + fixed] → change the few factors only. fixed the land, capital and Technology. in short time.

③ Long run :- variable and fixed factors also change why becase time is very long. and total changed the facters.

⇒ Production function with one variable Input :=

Production function withe one variable Input outher name short run production function with one variable Input.

* This laws states that when increasing humbers of units of a variable factors is applied to fixed factors.

* The total out put first increases at an increasing rate, then at a diminishing rate and eventually (complited) decreased. This law also know as "Low of diminishing returns".

* Increased the variable factors (Labors), production also increased.

Definition According to f. benham

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

Assumptions :=

① operating short run.

② The product mesuring phisical term quantity.

③ All units of variable factors (Labors) are humoginias. (are equal work doing).

④ Techniques of production remain constent.

labour	Total production	Average Product	Marginal production	stages
0	0	0	0	
1	10 — TP_n	10	10	stage-I
2	22 — TP_{n-1}	11	12	
3	33	11	11	
4	40	10	7	stage-II
5	45	9	5	
6	48	8	3	
7	48	6.85	0	stage-III
8	45	5.62	-3	

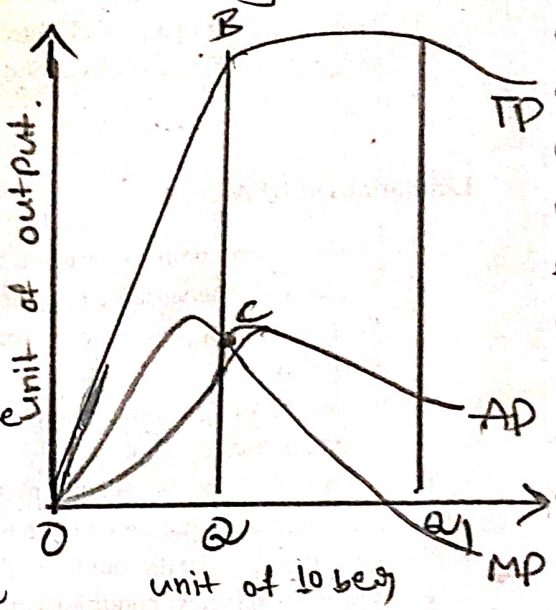
[AP = TP/L] [MP = $TP_n - TP_{n-1}$]

The graph, table shows the stages:—

① stage := (Increasing returns)

② stage := (diminishing returns)

③ stage := (negetive return)



stage①:— Explane TP increasing rate AP and mp also increased

stage ②:— TP increased rate AP, mp diminishing.

stage ③:= TP, AP decline values. mp entering the negative.

The production function with one veriable explain the marginal production become nagative in 3rd stage. and TP and AP declain. so. Factors of productioy defends up on the Techniqus also, no cheng and high the rameterials and Labors. Techiniques als high in the in the expected returns in time of output

② Cobb- Douglas Production function

It is the matheme tical function the Relation ship b/n out put and in put.

by Explene Cobb C.W and P.H douglas in 1928 Explene formula.

$$y = (AK^{x} L^{1-x})$$

y = out put variable

A = positive constent

K = capital.

L = Labour.

X = variable the chenge y value.

Assumes :=

① out put funcation is two variable

Ex:= (Laber and capital).

② All Labors are homoginious kind the sm work.

③ All in put are homoginious

④ No change in the technology

⑤ [Ex:= suppouse machine ugot are Robouts)

⑤ perfect compitition of the price of one comodity fixed- entired marlcet following the same.

Production function with two variable Inputs :=

* Production process that requires two input. capital (C) and Labor (L) to produce a given output (Q).
* There could be more than two inputs in real life situations, but for a simple analysis,
* we restrict the number of input to two only.
* In other words the production function based on two inputs can be expressed as

$$Q = f(C, L)$$

where Q = Quantity output

C = capital, L = Lebour.

* The both capital and labour are required to product. To some extent, these two inputs can be substituted. for each other.
* The producer may choose any combination of labour and capital that gives him the required number of units of out put.
* The alternative combinations of labor and capital yielding a given level of output are such that if the use of one factor input is increased, that onother will decrese and vice versa.

two variable Explane the input two types.

⇒ Iso quants, Iso-Cost.

Iso - quants

The term of Isoquants is derived from the word's iso - equal, quants means - quantity. Isoquant are also called isopriduct curv.

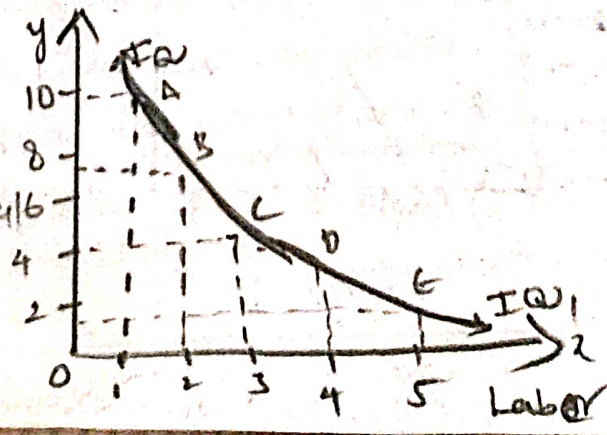
The Isoquant curve show various combinations of two input factors such as capital and labour, which yield the same level of output.

As an isoquant curve represents all such combinations which yield equal quantity of output any or every combination is a good combination for the manufacture. all combinations are equal.

Explan bellow table.

combination	Labour (units)	capital (units)	output (units)
A	1	10	50
B	2	7	50
C	3	4	50
D	4	4	50
E	5	1	50

combination A represent 1 unit of labor and 10 units of capital and product 50/- . hear the alter native combinations of B, C, D, E, (2,7), (3,4), (4,4) and (5,1) showing the graph. we will get and smoth curve product.



Features of Isoquant

features of Isoquant Explane 4 Levels

① Down ward sloping :- isoquant are alway down ward sloping.

② Convex to origin :- It is because the input factor are not. perfect substitutes.

③ Do not intersect :- two isoquant do not inter -sect with each other.

④ Do not axes :- the isoquant touches nether x-axis nor y-axis, as bothe input are required to produce a given product.

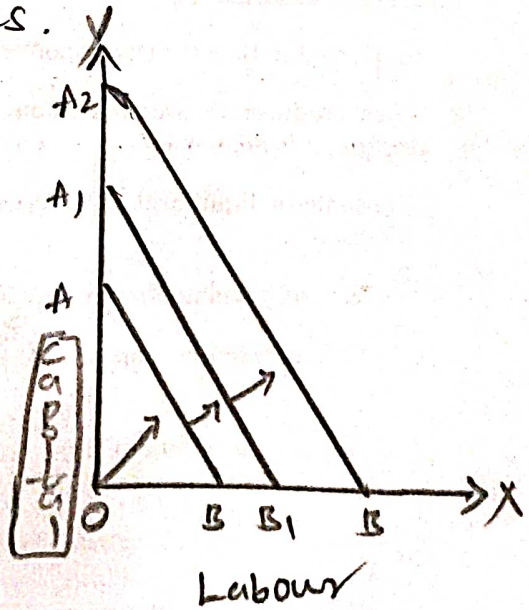
Iso-cost :-

Iso cost refers to that cost curve that represent the combination of inputs that will cost the producer the same amount of money In other words, each isocost denotes a particular level of total cost. for a given level of production is cost curve moves upwads.

isocost line = PL + PK

L = Labor, K = capital, P = price

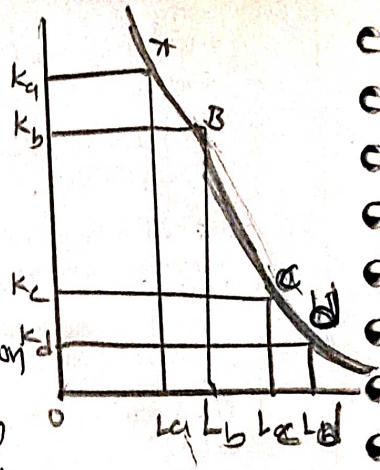
where, price chenge in the slope of Iso cost also change. labour falls the firm could buy more of labour the line will be shipting away from the origin.



* Marginal Rate of Technical Substitution := (MRTS)

⇒ The marginal rate of technical substitution (MRTS) refers to the rate at which one input factor is substited with the other to attain a given levels of output. In other words the lesser units of one input must be compensated by increasing amounts of another input to produce the same level of output.

⇒ Isoquants are typically convex to the origin reflecting the fact that the two factors are substitutable for each other at varying rates. This rate of substitutability is called the marginal rate of technical substitution (MRTS). It measuring the reduction in one input per unit increase in the other input that is just sufficient to maintain a constant level of production.



⇒ see the diagram L_A point L_B is the Labor capital K_a, K_b while amount labour is increased from L_a, L_b. To move of point C to poin D the amount of capital is reduced from K_c to K_d while the amount of labour is incresed from to the Labour L_c, L_D

Marginal Rate of Technical substitution replaced the onaten factor's of AB to CD. factors proportions would be fixed, and these zero-substitutability isoquant would be shown as horizontal or vertical lines.

Low of Returns to scale :=

There are three laws of return governing production function. They are.

① Law of increasing returns
② Law of constant returns
③ Law of decreasing returns.

The above ③ Levels describe same one veriabul proses.

These laws can be illustrated with an example of agricultural land. Take one acre of land. If you till the land well with adequant bage of fertilizer and sow good quality seeds. the volume of output increases the following table illustrates further.

capital (in units)	Labor (in units)	% of increase in both inputs	output (in) units	% increase output	Law applicable
1	3	—	—	—	—
2	6	100	120	140	Low of increase
4	12	100	240	100	Low of constant
8	24	100	360	50	Low of decrease

⇒ There are Return scale Explain :—

① Internal and ② External Economies of scale

Internal Economies refers to the economies introduction costs which accrue to the firm alone when it expands its output.

Explene with 7 types of Return scale.

=> a) marginal Economics:= As the firm expands. the firm needs qualified managerial personnel to handle each of its function marketing, finance. production, human resources and others in a professional way.

=> b) commercial Economics:=
The comercial Economics transaction of buying and selling raw meterial and other operating functions.

=> c) Financial Economics:= It can barrow from the public, banks and other financial institutions at relavily cheaper rates.

=> d) Technical Economies:= Techiniques also used in the Improved the Interanal economies.
Ex:= plant and equipment, small firm.

=> e) Marketing Economies:= ME explain buying it's require -ment and in selling it's final products.

=> f) Risk Bearing Economies:=
The large produces many commodities and servel wider areas. It is therefor, able to absorb any stock for its existence.

=> g) Economics of Large dimension:=
Advantage of bigger size plant and equipment

=> h) Economics of Research and development:=
only such firms with a stong research and development base cape with competition globally.

External Economics :=

External economics refers to all the firms the industry, because of growth of the idustory as a whole or because of growth of ancillary industrie external economics benefit all the firms. in the indu as the industry Expands. External economics can be group under three types.

A) Economies of Concentration.
B) Economics of Research And develpment.
C) Economics of welfare.

The Above factors explene the total organoizeA improved the Rate of the schle economics.

⟹ Cost Analysis ⟸

"In economics the cost Analysis refers to the measuring of the cost-output relationship."

The economists are concerned with determining the cost incured in hiring the input and how well these can be re-arrange to increase the productivity (out put) of the firm.

Cost Concepts

Their are 7 types. relevent concepts are.

① Money cost :=

The organoizer should be pay the factors pricing turns is called Money cost. Cash directly pay the each factors. liquidity of pay cash only.

* Real cost :=

cost as measured by the physical labor and materials consumed in production.

'[deducation of the labor, sacrificing of the labor Land - Rent pay, working, effort pay the Real cost]

* opportunity cost :=

It's simple terms, it is earning from the second is alternative. It represents the maximum possible alternative income that was have been earned if the resource were put to alternative use. other words Alternative cost are sacrifice the onther one.

Ex:- paddy and ~~wheat~~ (cotton).

Explicity and Implicity :=

⇒ Explicity costs are those expenses that involve cash payments. These are the actual or business costs that appear in the books of acounts. These costs include payment of wages and salaries. payment for raw materials. Ex:= power, water, furniture, etc---

⇒ Implicity :=

Implicity costs are the costs of the factor units that are owned by the employer himself. These costs are not actually incured but would have been incured in the absence of employment of self - owned factors.

Ex:= free of cost soler system, sunlight, air etc

Fixed cost Vs Variable cost :=

fixed cost alway fixed. product increse or Product dicrese and product constent no chenge the fixed cost.

Ex :- P1 - P2 - P(0) — Fixed cost fix

Variable cost :=

variable cost depends on the inputs products increase = cost is incresed; products decresed = cost decreated. No production = No cost (No output) This called variable cost.

* Market structures :=

Market is the place where purches of goods and selling of goods.

Ex :- fruitmarket, Bullion market, shere market.

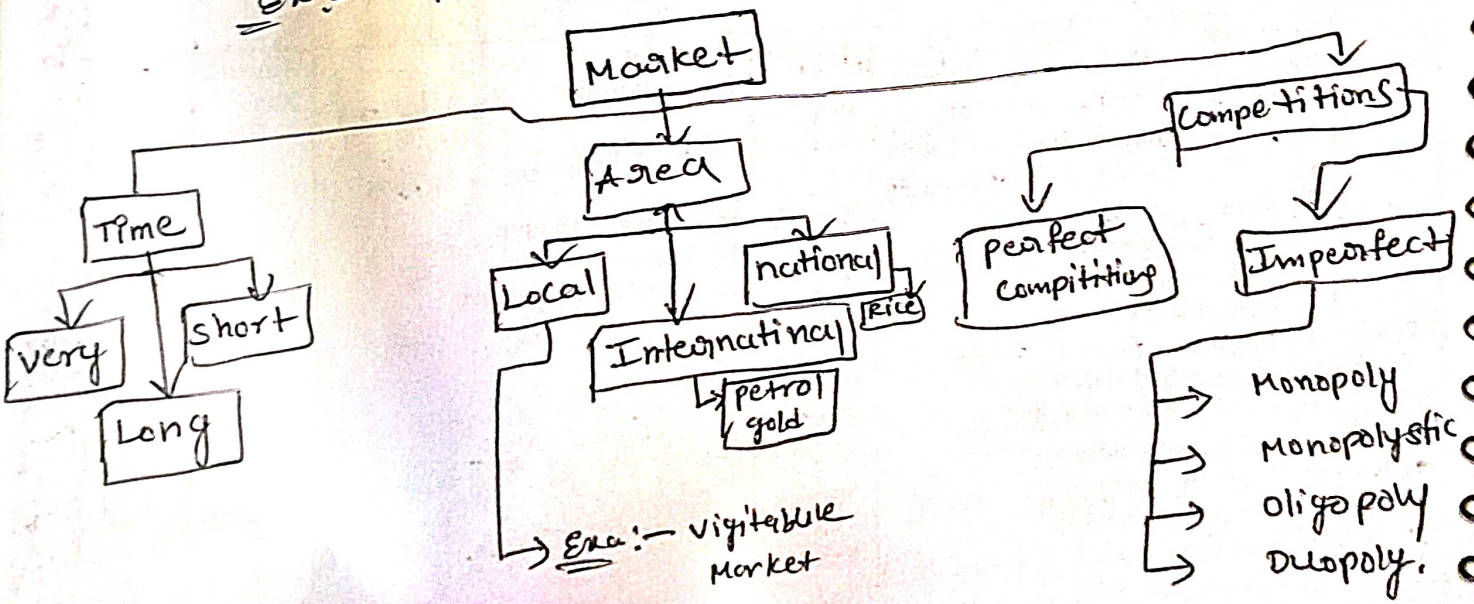


fig :- Market structures

⇒ Perfect Competitions :=

Perfect competition refers to a market structure where competition among the sellers and buyers prevails in its most perfect form. In a perfectly competitive market, a single market price prevails for the commodity, which is determined by the forces of total demand and total supply in the market.

Features of perfect competition

* ① A large number of buyers and sellers

The number of buyers and sellers is large and the share of each one of them in the market is so small that none has any influence on the market price.

* ② Homogenous product or services :- The products and services of each seller should be homogeneous. They cannot be differentiated from that of one another. freedom to enter or exit the market.

* ③ Perfect information available to the buyers and seller :- Perfect compitition market each buyer & seller has total knowledge of the prices prevailing in the market at every given point of time. quantity supplied, costs, demand, nature of products and other relavant information.

* ④ perfect mobility of factors of production :- There should not be any restrictions on the utilization of factors of production such as land, lobour etc.

* Imperfect compitistions

[Money buyers and selling heterogenious products]

is nothing but different type of products.

Imperfect compitistions there are three types.

① Monopoly. ② Monopolystics. ③ oligopoly.

⇒ Monopoly := Monopoly is the type of market.

Mono is single, poly is selling. one seller from single good and it does not have anay substitutes.

features of monopoly :=

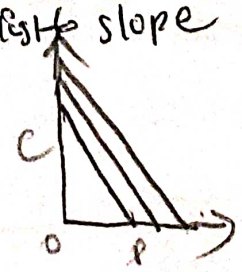
* single peerson or a firms := A single peerson or a firm controls the total supply of the comodity. There will be no competitions for monopoly firm. The monopolist firm is the only firm in the whole industory.

* No close substitute := The goods sold by the monopolist shal not have closelly competition substitutes. even if price of monopoly product incorease people will not go in for substitute, for example: If the price of electric bulb incorese slightly. consumer will not go in for kerosene lamp.

* Large number of buyers := under monopoly, there may be a large number of buyer in the market who compete among themselves.

Downward sloping demand curve :=

The demand curve of monopolist slope downward from left to right.



(2) Monopolistic competition :=

Monopolistic compitition combination b/n perfect compitition + Monopoly. we have many firms which offer produ cted seervises that are similer but not perfect substitues. when large number of sellers produce differentiated products.

Features of Monopolistic competition :-

There are 7 types.

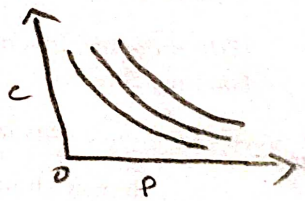
① Existence of many firms :- Industry consistance number of sellers. each one of whom does not feel dependent upon others.

② product differentitions :=

Product differentitions means some way, but not altogether so. The product are not identical but the same time they will not be entirely different from each other.

③ Large Number of buyers :=

There are large number of buyers in the market. but the buyers have their own brand preferences. so the sellers are able to exercise a certain degree of monopoly over them.



④ selling cost.

⑤ free entry and exist.

⑥ Imperfect knowledge := Advertisement.

⑦ The Group.

* oligopoly :- oligopoly means oligo - few, poly means sellers.

⇒ oligopoly is a market structure with a small number of firms. none of which can keep the others from having significant influence. The concentration ratio measures the market share of the largest firms. oligopoly means two or more firms.

features of oligopoly :-

* few sellers :- There are just several sellers who control all or most of the sales in the industry.
* Inter - dependence :- The behaviour of oligopoly firms in the industry resemble the game of chess and oligopoly firms are like the chess players.
* price rigidity :- Generally, prices once established. in an oligopoly industry, remain relavely stable unlike in the case of perfect competitions,
* price leadership.
* Advertising and selling costs
* Brand proliferations.

Pricing Methods

[Cost - Based] pricing Methods are 4 types are their.

① Cost - Based Pricing ② competition - oriented

③ demand based ④ stategy pricing Methods.

⇒ Cost - Based pricing methods

Cost - based pricing is the practice of setting price based on the cost of the goods or service being sold. A profit percentage or fixed profit figure is added to the cost of aitems, which result in the price at which it will be sold.

(a) cost plus pricing :=

cost plus pricing also called as markup pricing. is the practice by a company of determining the cost of the produce to the company and then adding a percentage on top of that price to determine the selling price to the customer.

P = average cost + markup (10%.)

Ex := 100 average price 10%. markup price

(b) Marginal cost :=

In marginal cost pricing, selling price is fixed in such a way that it covers fully the variable or marginal cost and contributes towards recovery of fixed cost fully or partly, depending upon the market situvation.

P = marginal cost

(2) Competition -oriented Pricing

Some commodities are priced according to the competition in their markets.

(a) Sealed bid pricing :- This method is more popular in tenders and contracts. each contracting firm quotes its price in a sealed cover called tender. is awarded the contract.

Ex:- [Tender and contractors]

(b) Going rate pricing :- price chenge in the whole industry

(3) Demand :- * higher the demand. and higher the price.

* The value as perceived by the consumer.

* This is a relatively modern marketing price.

* Price discrimination

It is refer to the practice of changing different prices to customers for the same good. The firm uses its discretion to charge differently the different customer.

* Perceived value pricing :-

Perceived value pricing refers to where the price is fixed on the basis of the perception of the buyer of the value of the product.

Ex:- defends up on the living style of people.

Strategy - based pricing :-

Strategy - based two types are their.

(a) Market skimming :-

* when the product is introduced for the first time.

* The company following this methods.

* under this method, the company fixes a very high price for the product.

(b) Market penetration :-

* Market penetration price of the product is fixed.

* The company increased the market share.

* slowly incresed the valuem. ~~slowly~~ or price

① ⟹ Breakeven Analysis ⟸
(or)
cost - valume - Profit - Analysis.

→ A business is said to break even whe it total sales are equal to total costs.
It is a point of No profit No Loss.

→ B-even analy is defined as analysis of costs and their possible impact on revenues and volume of the firm.
Hence, it is called cost value profit Analysis.

(i) Determination of BEP units

$$BEP = \frac{\text{fixed costs}}{\text{contribution margin per unit}}$$

where contribution margin per unit

= CSP per unit − VC per unit)

(ii) Determination of BEP value.

$$BEP = \frac{\text{fixed cost}}{\text{Contribution margin ratio}}$$

where contributions ratio is called selling price per unit.

in units Ex':- fc = 40,000, purchas price per unit = 250

variable cost per unit = 50

$$BEP = \frac{40,000}{PP\,units - vc\,per\,unit} = \frac{40,000}{250-50} = 200\,units$$

*

Ex!- BEP ratio $= \frac{fc}{\text{Contribution margin ratio}}$

$= \frac{\text{selling price} - VC}{\text{selling price.}}$

SP = 5 VC = 3 fc = 40,000

SP − VC = 5 − 3 = 2

$= \frac{5-3}{5} = 2/5$

$= \frac{40,000}{2/5} = 25,000$ Rs

⇒ b) variable costs :=

The variable cost per unit vary with the volume of production. E:= direct meterial, labour, expenses. oil, and so on.

⇒ c) Total cost := The total cost = FC + VC

⇒ d) (TR) Total revenue :=

The sales proceeds [(selling price per unit) × (number of units sold)]

⇒ e) Profit = contribution − fixed cost

⇒ (f) contribution margin

contribution is the difference b/n sales and variable costs and it contributed towards fixed costs and profit.

contribution = sales − variable cost

contribution = fixed cost + Profit

⇒ (g) P/V ratio := The ratio b/n. contribution and sales

⇒ (h) Angle of incidence := The angle formed where total cost curve cuts the toted revenue curve (see the diagram)

where. two formulas are their in BEP.

selling price = FC + VC + Profit

selling price − VC = fixed cost + profit.

= contribution

SP − VC

significance of BEP

* The profit on a particular level of sales volume or a given capacity of production.
* To compare the efficiency of the different firms.
* To compare the product lines, sales area, method of sales for individual company.
* To decied to "make or buy" a given component or spare part.
* Yield optimum sales.
* impact changes in the fixed cost, variable cost or selling price on BEP. and profit doing the given period.

Limitation of BEP

* BEP is based on fixed cost, variable cost and TR
* A change in one variable is going to effect the BEP.
* All cost are cannot be classified into fc, and vc we have semi-variable cost also.
* It is short-run.
* where the business conditions are volatile, BEP cannot give stable results.

Determination of Break even points

① fixed cost :=

fixed costs remain fixed in the short run. Eg:- rent, insurence, depreciation. directly salaries and so on.

⇒ Assumptions :-

① All costs are clasified in to two - fixed and variable

② fixed cost is fixed. and constent.

③ selling price also constent in spite of competition. or change in the volume of production.

Ex:- 1 product = 10 Rs. 100 P = 100×10 = 1000 Rs.

each product equal cost.

④ Volume of production is the only factor effecting the cost.

⑤ All goods produced are sold. There is no closing stock.

TR- Total Revenue

TC = total cost

VC = variable cost

FC = fixed cost

▭ = profit Zone.

▭ = Loss Zone

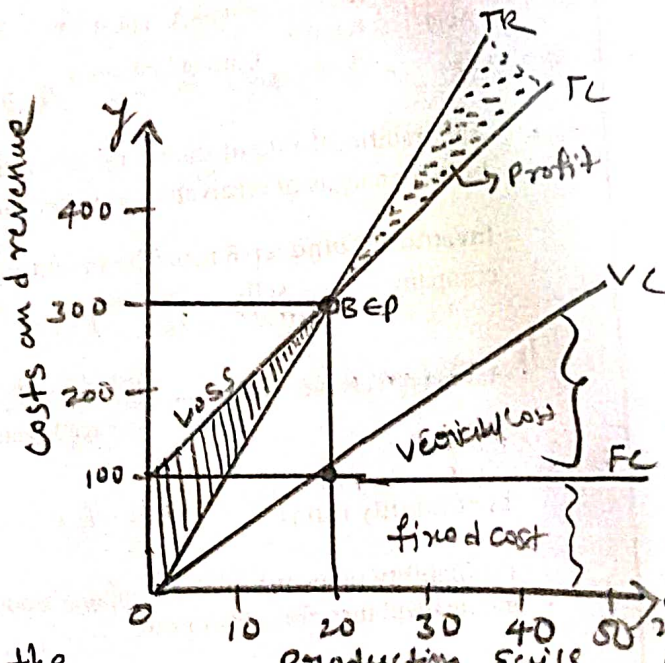


fig :- BEP Analysis.

⇒ The larger the angle of incidence. the higher is the quantum of profit once the fixed costs are absorved.

Margin of safety refers to the excess of produced or sales over and above the BEP of production sales. Where is the intersec the TR = TC that poin is BEP. BEP below Loss Zone. BEP above profit Zone. fixed cost every time fixed.

Ex:- Lemon Juce above diagram or graph.