Ch- Theory of Production

1 Production

→ Wider sense in Economics.

→ It is a process by which man Utilizes {Converts} the resources of nature so as to make them satisfy human wants.

→ Making of Chair (+) Services of Doctor.

BOTH are considered as PRODUCTION

→ Production can also be defined as Creation / Addition of Utility.

i.e, production is nothing but Creation of Utilities in form of GOODS and Services.

→ Production does not mean Creation of Matter.

(i.e, Man Cannot Create Matter)

Eg:- Man can create table, but not wood.*

{* Matter}

→ production is creation of Utility.

- form Utility
- Place Utility
- Time Utility
- personal Utility.

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② Factors of Production

→ Land
→ Labour
→ Capital → Produced factor
→ Entrepreneur.

] → Primary / original factor.

Ⓐ LAND

→ Wider Sense :- ALL FREE GIFTS OF NATURE (Soil, water, Air, Mountains, Rivers etc)

→ Cannot be created, nor destroyed

→ Its usefulness depends on HUMAN EFFORTS

→ Passive factor (ie, Not Active)

→ Heterogeneous (असमान : असमान)

→ Land cannot be shifted from one place to another.

→ Supply of LAND is PERFECTLY INELASTIC (i.e, fixed / constant)

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(B) LABOUR

Mental (+) Physical

Exertion

to produce goods & services.

→ It is an active factor.

→ It may "not be productive."

→ Work done for sake of pleasure or love.

NOT LABOUR
(House wife)

→ Work done for money → LABOUR
(House help)

→ Labour is *PERISHABLE* i.e, a labourer cannot store his labour for tommorow work.

→ Labour has poor Bargaining power.

→ Labour is MOBILE

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→ Supply of Labour & wage Rate Relation.

$W_R(\uparrow)$ $S_L(\uparrow)$ leisure time $(\downarrow)$

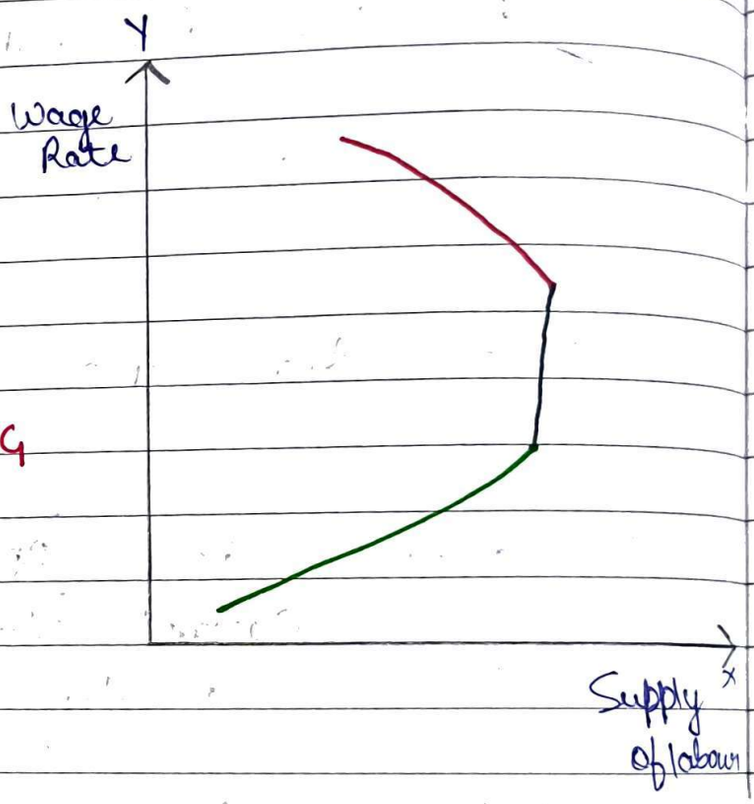
BUT after certain point Even if

$W_R(\uparrow)$ but S_L does not Increase & they prefer leisure time.

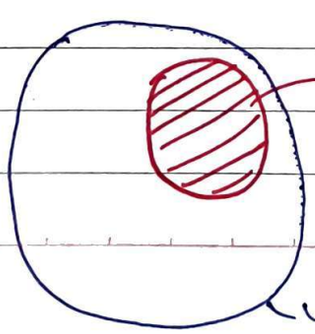
$S_L(\downarrow)$ leisure$(\uparrow)$

Backward Bending Curve

NOT UPWARD SLOPING



(C.) CAPITAL (Produced factor)

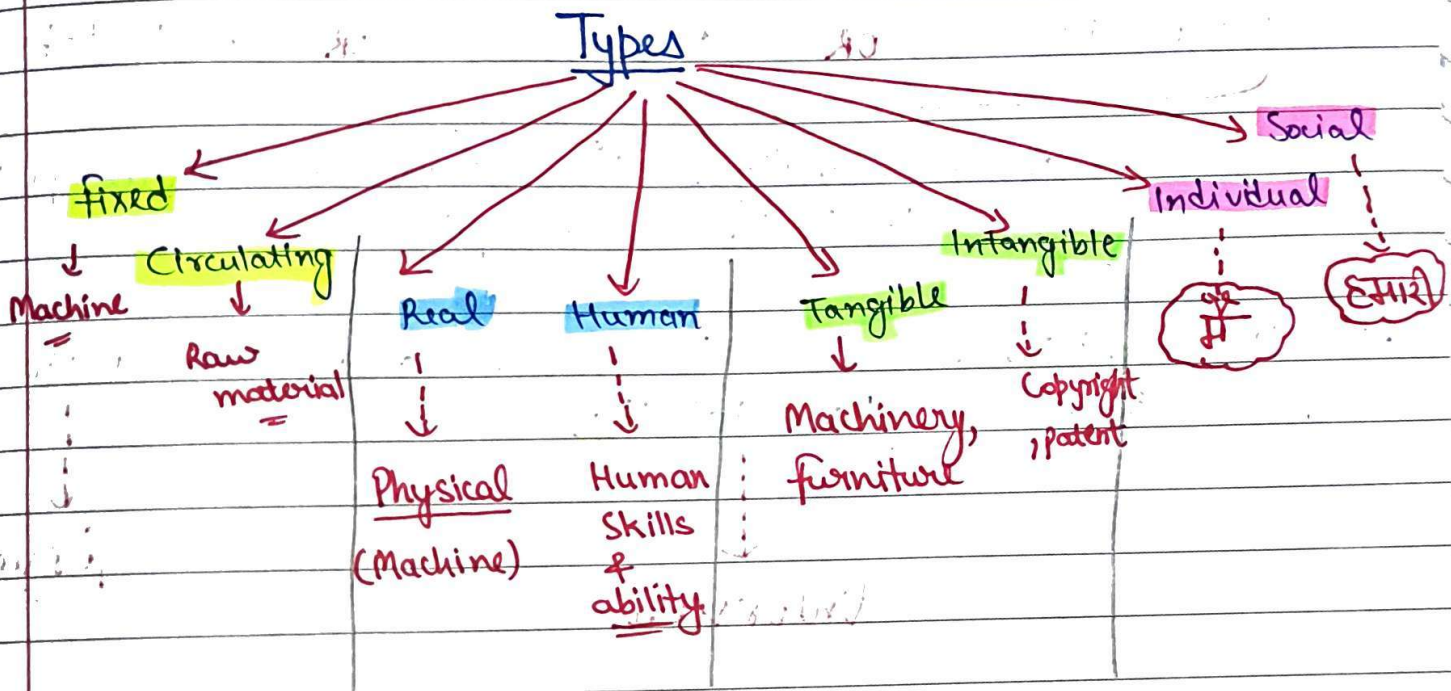


→ It is a result of **SAVINGS**.

→ It is a **STOCK** Concept.

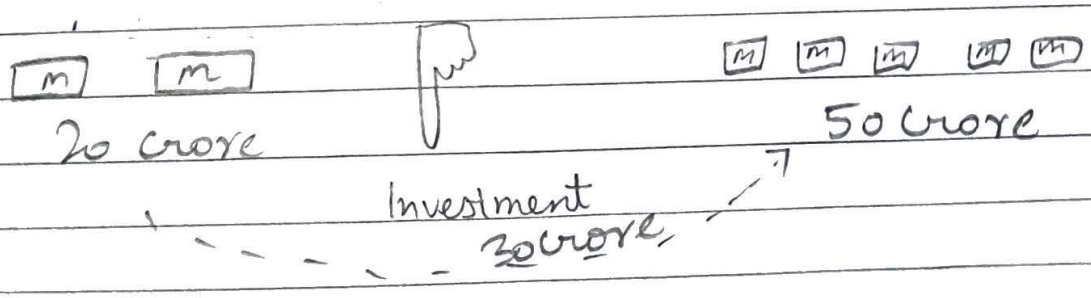
→ If Some resources (wealth) are lying idle; then these are **NOT** part of **Capital**.

→ Capital is **PRODUCED MEANS** of production.

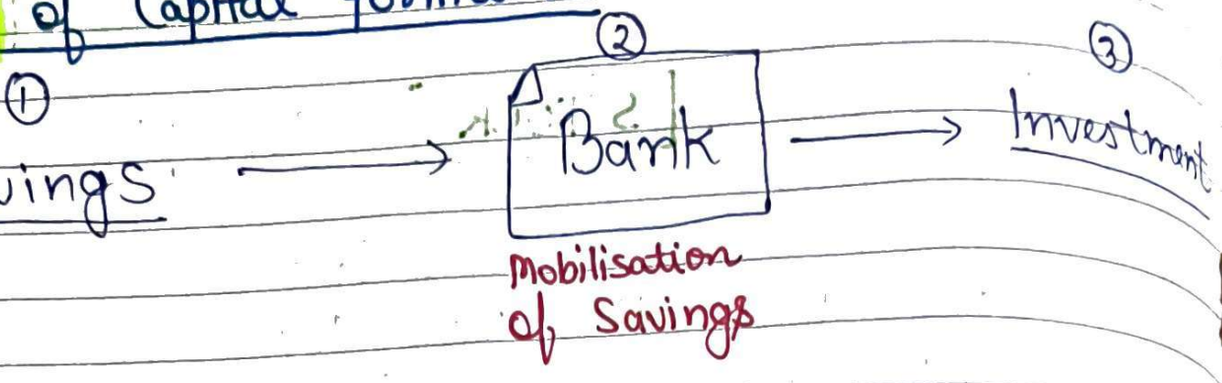


→ Capital formation = **INVESTMENT**

i.e, Sustained Increase in Stock of real Capital.



→ Stages of Capital formation.



⑤ ENTREPRENEUR

→ Organiser OR Manager OR Risk taker.

who mobilizes the above ~~the~~ three factor (land, labour & capital)

→ He Initiate the Business and takes Risk & Bears Uncertainity.

↓ Unforseen.

↓ forseen

→ Schumpeter – INNOVATION is the most important function of Entrepreneur.

→ Frank Knight – Profit is the reward of Bearing Uncertainities.

Enterprise objectives

(i) **Organic Objective**

→ Aim Survival and Growth & Expansion.

→ R.L Marris.
Utility function.

Owners
(profit, market share, Reputation)
↓
they want to maximise their utility function

Management
(Salary, Power, Status, job security)
↓
they want to maximise their utility function.

DIVERGENCE

GROWTH in the Size of FIRM.

CONVERGENCE

(ii) **Economic Objective**

PROFIT MAXIMISATION

Link with COST chapter

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Profit क्या है?

→ Accounting Sense :- Profit = Total Revenue (–) Explicit Cost

→ Economic Sense :- Profit = Total Revenue (–) Economic Cost.

HA SIMON	Baumol's theory	AA Berle & GC Means	Cyert & March
Only Reasonable profit	SALES maximisation.	Williamson's Theory: Managers want to Enjoy discretionary powers.	profit (t) production goals (t) Inventory goals (t) Sales goals (t) Market share goals.

(iii) **Social Objectives**

→ Unadulterated goods!
→ Avoid anti Social practices.

(iv) **Human objectives.**

→ Provide fair deals to Employees
→ develop new skills & abilities.

(v) National Objectives

→ Remove Inequality.
→ help the country to become Self-reliant

* Various objectives may conflict with Each other.

* Enterprise Constraints *

→ lack of Knowledge & Information
→ Restrictions Imposed by State in public interest.
→ Infrastructural Inadequacies.
→ changes in Business & Economic Conditions.
→ Events - Eg. Inflation, Interest Rates.

* Enterprise problems *

→ problems relating to objectives — objectives are multifarious.
i.e, Conflicting.

→ problems relating to location & Size of plant.

→ problems relating to Selecting & Organising physical facilities.

→ problems relating to FINANCE.

→ oblems relating to Organisation Structure.

→ Problems relating to Marketing.

↓

4Ps (Price, product, place, promotion.)

→ Problems relating to legal formalities.

→ problems relating to Industry Relations.

* Production function *

Dependent = f (Independents)

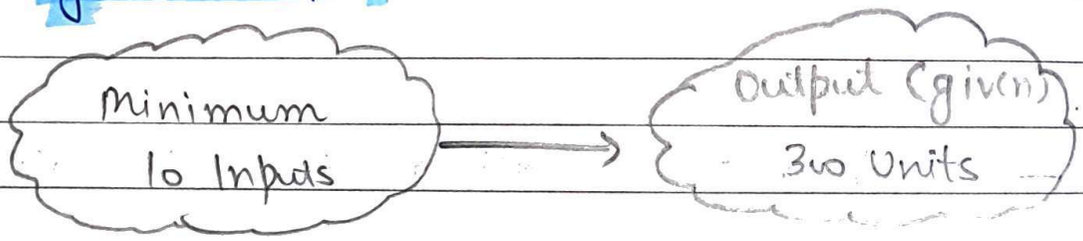
$$Q = f(F_1, f_2, f_3 \_\_\_\_)$$

Q ↓ desired Output

F_1, f_2, f_3 ... factor Inputs.

→ It is a relationship between Inputs and Output.

→ Basically it can be defined as minimum quantities of various Inputs that are required to yield given Output.

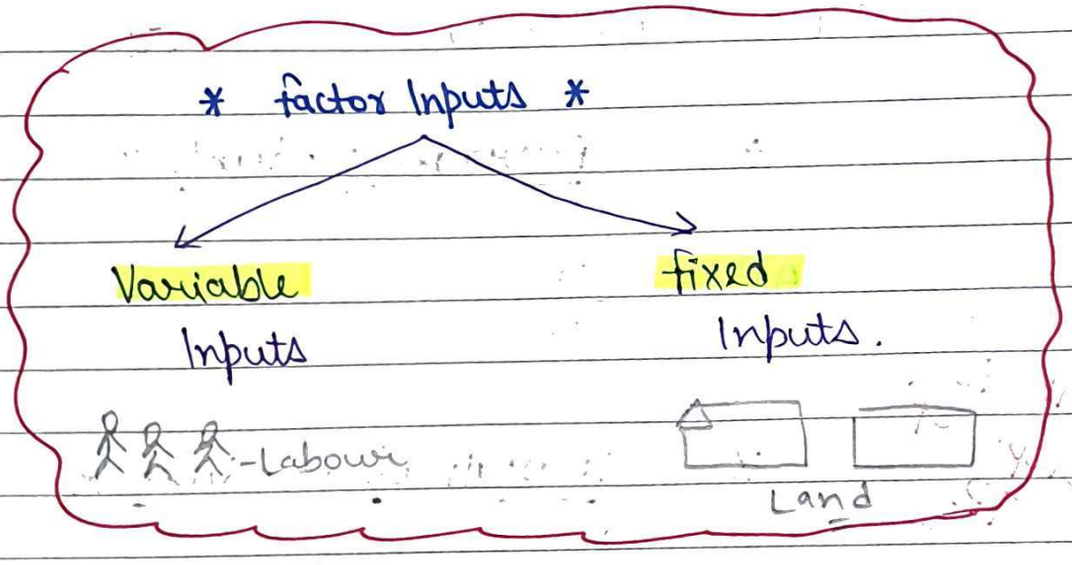


→ **Assumptions :-**

- Above relationship is for Specific Time period only.
- Technology remains Constant.
- In production function we assume that the given

output is always maximum.

Short period or short Run	long period or long Run.
• Atleast 1 Input (factor) is FIXED.	• All the factors (Inputs) are VARIABLE
• Other factors are Variable	
Returns to factor	Returns to Scale.



→ Paul H Douglas and C.W Cobb.

- Studied the production function of manufacturing industries.
- production function (Cobb-Douglas)

$$Q = k \cdot L^{a} \cdot C^{(1-a)}$$

Q → Output
L → Labour Quantity → variable
C → Capital Quantity. → fixed

k, a are positive Constants.

- Labour – 75% (3/4th)
- Capital – 25% (1/4th)

* Total product *

→ Total Output produced with use of given Inputs.

→ TP = Σ MP

→ TP = AP × N

* Average product *

$$AP = \frac{TP}{N}$$

MP is slope of TP.

* Marginal product *

→ It is the additional product with Every additional unit of variable Input.

→ $$MP = \frac{\Delta TP}{\Delta N}$$ or $$MP_N = TP_N - TP_{N-1}$$

* N = No. of Variable Inputs.

→ **Short Run**

	LAND (fixed factor)	LABOUR (variable factor)	TP	AP	MP	
Stage 1	1	0	0	—	—	
	1	1	4	4	4	Increasing = RTF
	1	2	10	5	6	
	1	3	10	6	8	
Stage 2	1	4	24	6	6	Diminishing = RTF
	1	5	20	5.6	4	
	1	6	30	5	2	
	1	7	Max 30	4.2	0	
Stage 3	1	8	20	3.5	-2	negative RTF
	1	9	24	2.6	-4	

LAW of VARIABLE PROPORTION.

Stage 1 Increasing Returns to factor.

- TP increases at increasing Rate.
- MP increases & reaches Maximum (point of Inflexion)

(R)
- Indivisibility of factors.
- Specialisation.
- Efficiency of fixed factors.

Stage II

Diminishing Returns to factor.

- TP increases at diminishing rate & reaches maximum.
- MP falls and reaches 0.
- After point of Inflexion fixed factors become inadequate i.e, loss of Efficiency.

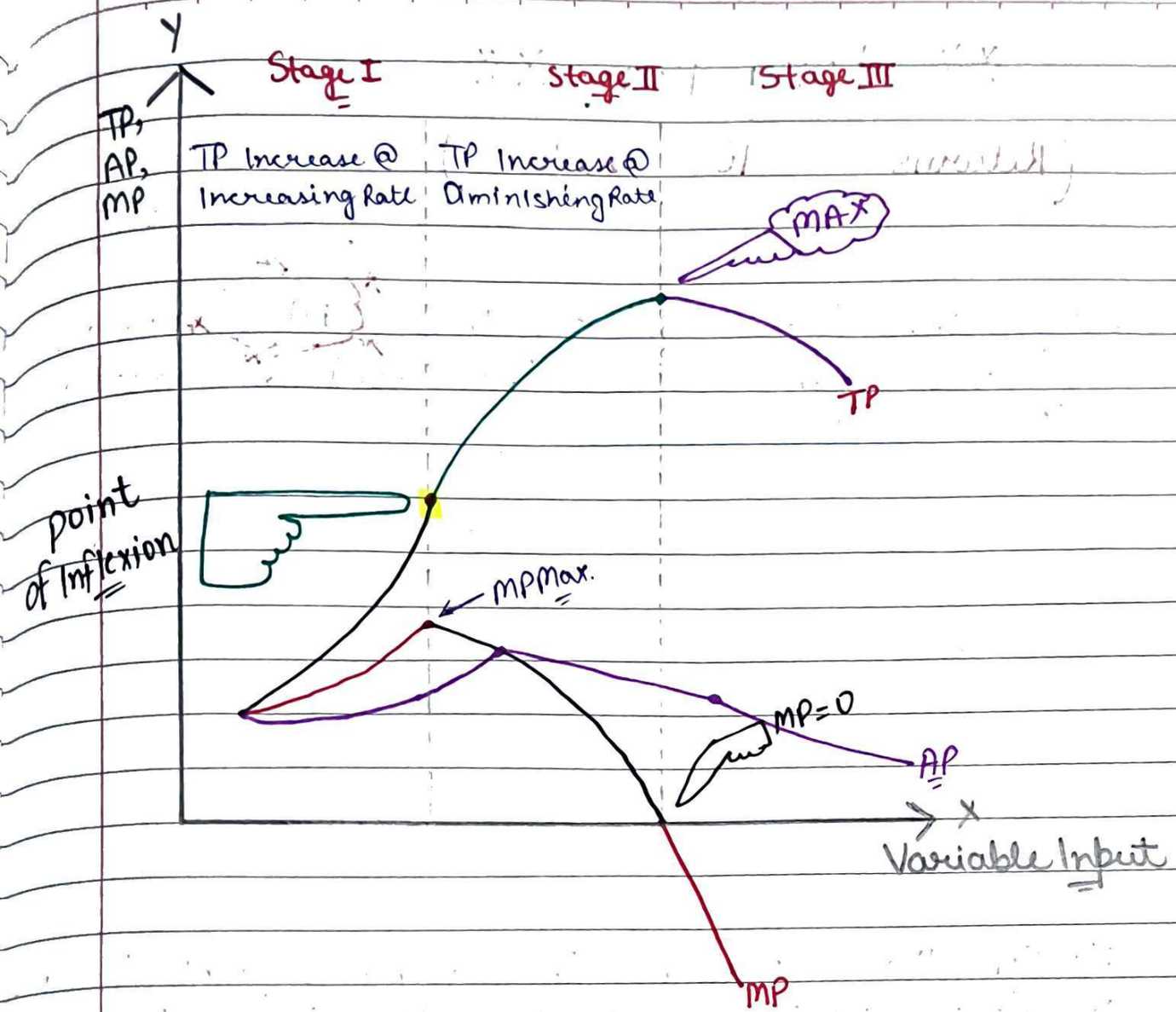
Stage III

Negative Returns to factor.

- TP falls
- MP becomes negative.
- Quantity of variable factor becomes too Excessive relative to fixed factor. (poor Coordination)

(*) Stage I & Stage III are Stages of Economic Absurdity / Non-Sense

Rational producer will always produce in Stage II.



Relationship of AP & MP

- when MP > AP ; then AP Increases.
- when MP = AP ; then AP is Maximum.
- when MP < AP ; then AP falls.

** Long Run **

(Returns To Scale)

Scale of production ↑

→ Change in scale means that ALL factors of production are Increased / decreased in SAME PROPORTION.

Eg

Inputs	Output	
1L + 2K	100 Units	120 Units
2L + 4K	220 Units	260 Units
4L + 8K	480 Units	260 Units
8L + 16K	740 Units	120 Units
16L + 32K	860 Units	

→ Initially there will be Increasing returns to scale, then constant returns to scale and finally decreasing returns to scale.

[No negative returns to Scale]

→ **Cobb & Douglas**

$$Q = K L^a . C^b$$

Q → Output, L → Labour, C → Capital

K, a, b are positive Constants.

→ Increasing Returns to Scale :- % change in Output > % change in all Inputs

$a + b > 1$

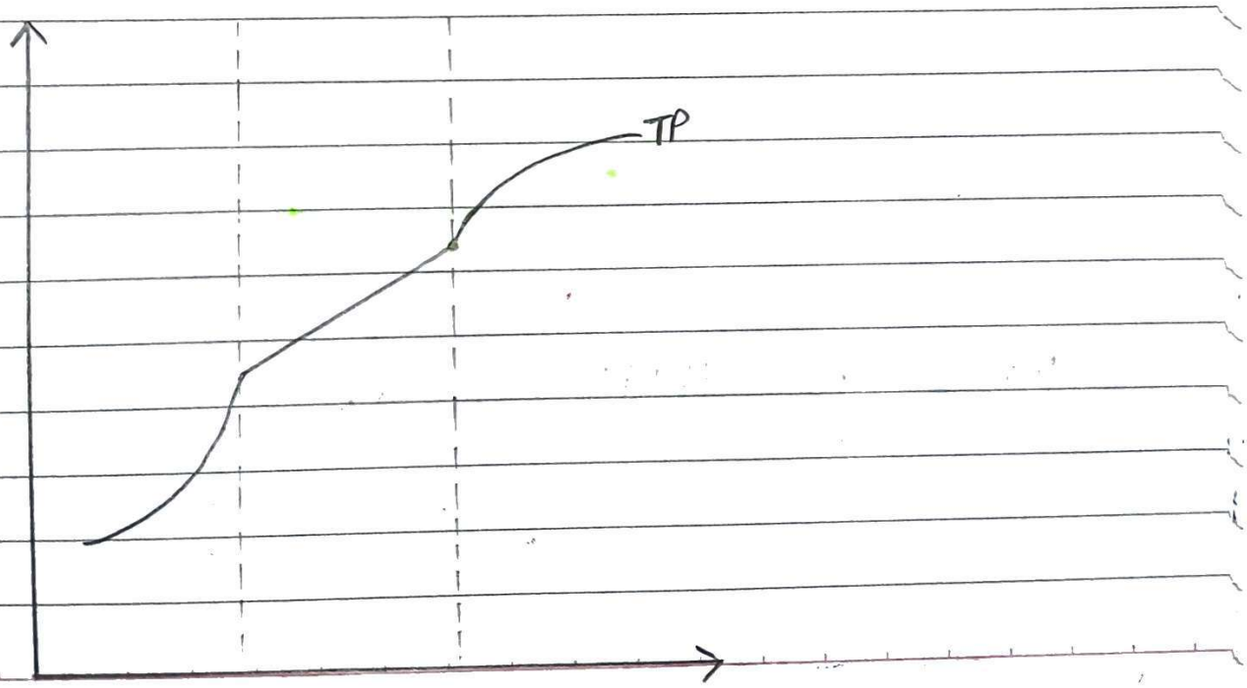
→ Constant Returns to Scale :- % change in Output = % change in all Inputs.

$a + b = 1$

→ Decreasing Returns to Scale :- % change in Output < % change in all Inputs.

$a + b < 1$

* Constant Returns to Scale is also known as Linear Homogeneous production function.



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** PRODUCT OPTIMISATION **

① Equal product Curve

(or)

Production Indifference Curve

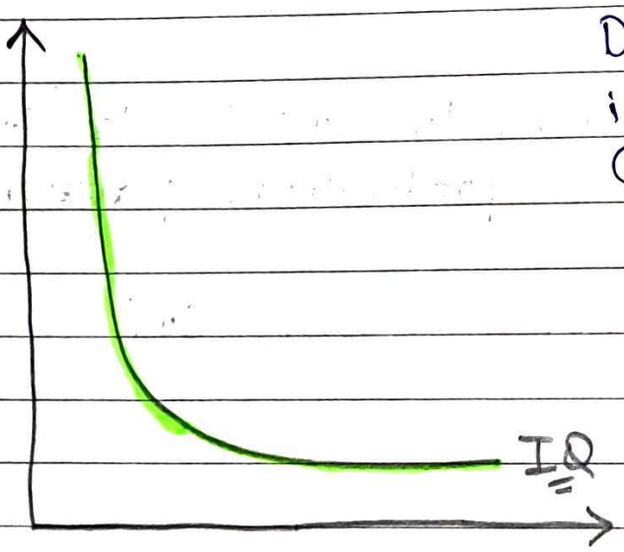
(or)

Iso product Curve

Input A	Input B	Output	Marginal Rate of Technical Substitution
1	12	100 Units	N.A
2	8	100 Units	4
3	5	100 Units	3
4	3	100 Units	2
5	2	100 Units	1

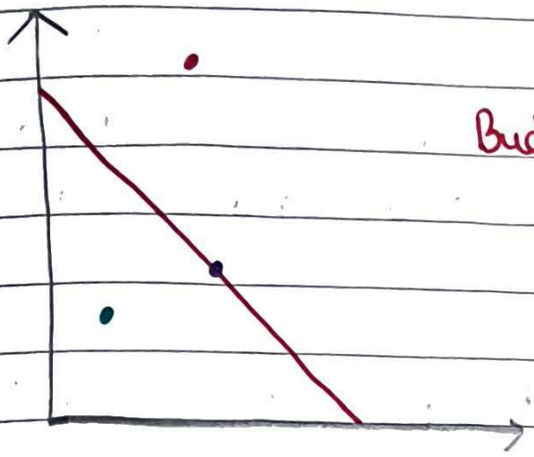
Diminishing MRTS is the reason of Convexity.

Convex

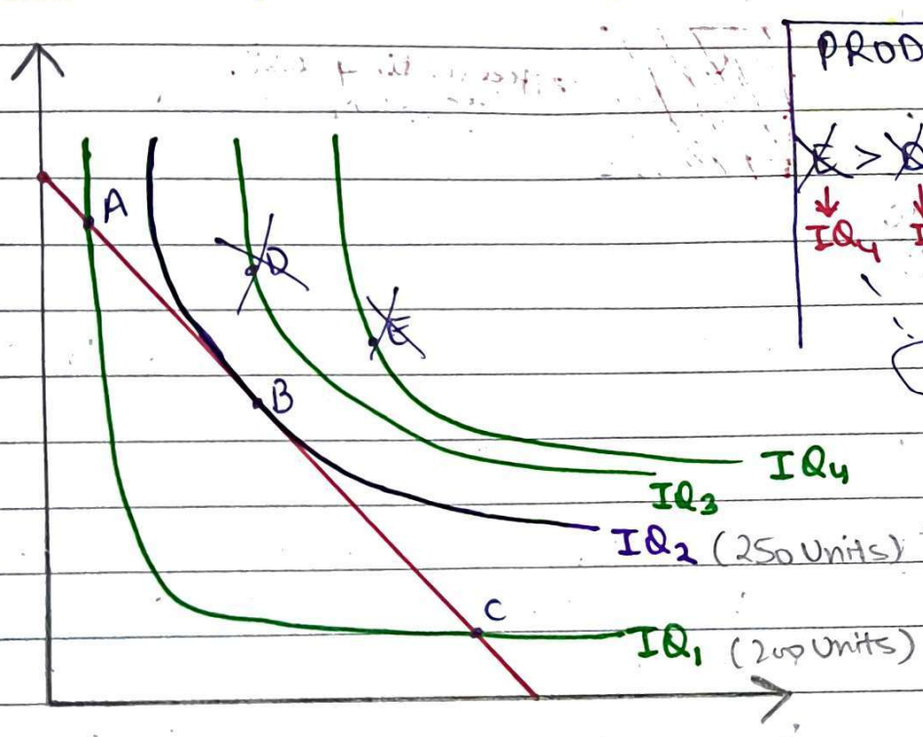


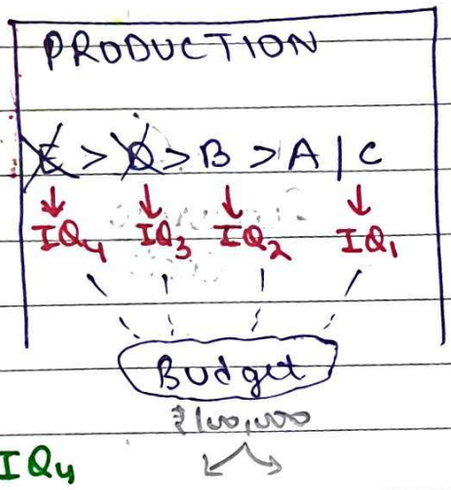
* MRTS is SLOPE of IQ.

(2) Iso-Cost OR Equal Cost lines.



(3) Product Optimisation.





Point B is product Optimisation point.

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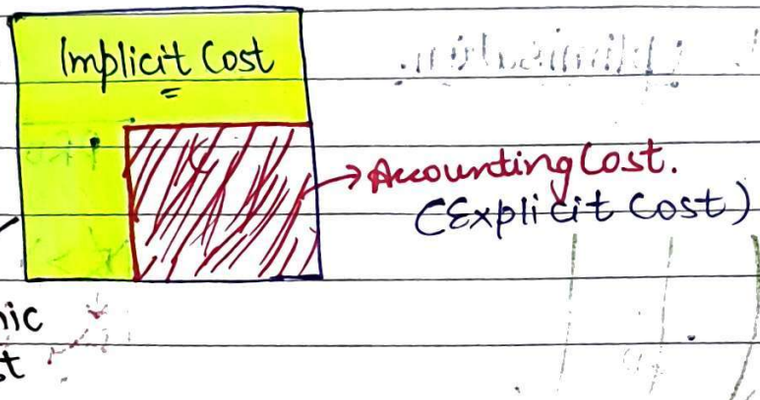
Ch:- Theory of Cost

① Economic Cost & Accounting Cost

→ Accounting Cost is the Cost which is accounted for i.e, recorded in books of Account, Eg. all payments. It is also known as Explicit Cost.

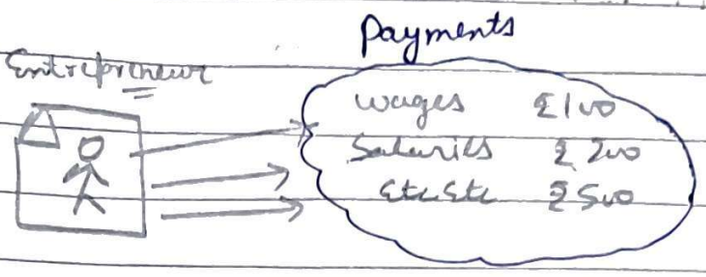
→ Economic cost (Includes) not only Accounting Cost but also Implicit Cost.



∴ Economic Cost = Explicit Cost (+) Implicit Cost

→ Implicit Cost:- Amt. of money the Entrepreneur Could have been Earned if he had Invested his money and Sold his money Services in the next best alternative use. It Includes normal profit also.

for own. understanding.

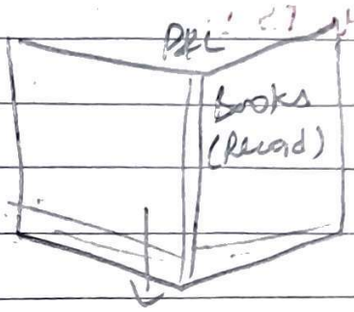


Land ₹100 (Rent)

Labour ₹50 (wages)

Capital ₹10 (Int.)

Entrepreneur ₹60 (Profit)



Accounting Cost (Explicit Cost)
₹800

• Implicit Cost ₹220

अपना Business करने के लिए मैंने (220) कमाई की opportunity sacrifice कर दी।

∴ Economic Cost = Implicit Cost (+) Explicit Cost
= 220 + 800
= ₹1020

* Accounting profit = Total Revenue − Accounting Cost
= ₹1200 (−1800
= ₹400

* Economic profit = Total Revenue − Economic cost.
= 1200 − 1020
= ₹180

HOTS:- Can Accounting profit be greater than Economic profit?

Sol:- Yes

HOTS :- Can Economic profit be greater than Accounting profit??

Sol. No

→ **Normal profit** (no profit no loss situation)

Revenue = Economic Cost

Let us assume

Revenue = ₹1020

Economic Cost = ₹1020

EC	IC
800	220

* When Economic profit is Zero then it is point of Normal profit.

(2) Abnormal profit = Revenue > Economic Cost.

(3) Outlay Cost & Opportunity Cost

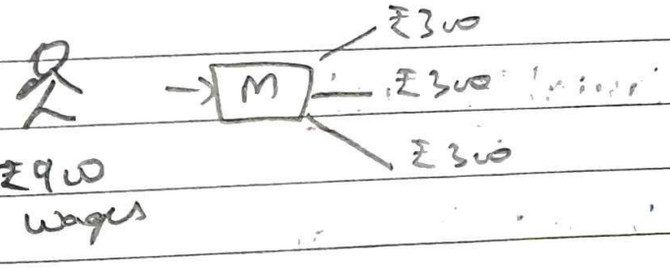
↓ actual Cost i.e, recorded in Books. — Explicit

↓ Cost of next best alternative foregone i.e, not recorded in Books. — Implicit

(4) Direct Cost & Indirect Cost

↓ Traceable

↓ Which are easily Identified and traceable to particular good or Service Eg:- Manufacturing Cost.

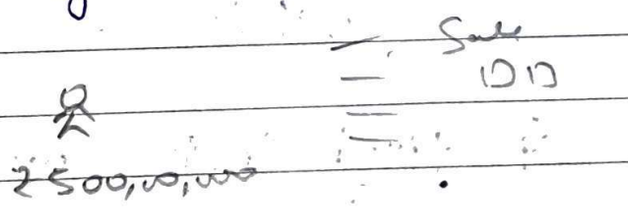


↓ Indirect Cost

↓ Non-Traceable

↓ NOT Easily Traceable & Identified to particular Good or Service.

Eg:- Advertisement.



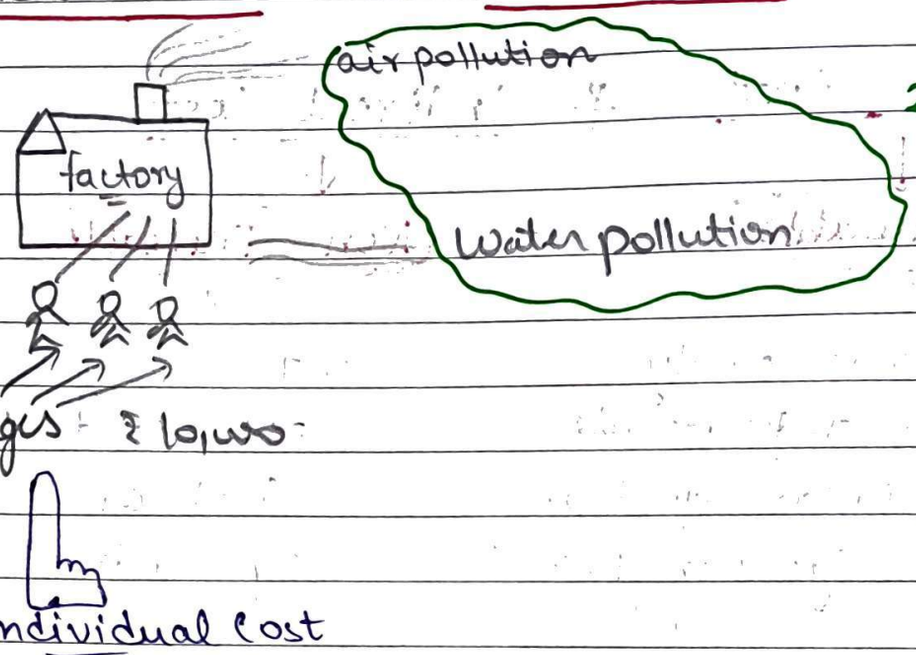
⑤ Historical Cost or Replacement Cost

Car purchased for ₹10,00,00,000 on 1 Jan 2009

Today 1 Jan 2025 =

Historical cost

⑥ Individual Cost or Social Cost



⑦ Fixed Cost or Variable Cost

does not change with change in Output

Overheads

vary with change in output.

SUNK COST

or Inescapable cost, Uncontrollable cost

INCREMENTAL COST

** COST FUNCTION **

→ It is a relation between cost of product and various determinants.

→ $C = f(a, b, c, d - - - -)$

C ↓ COST

Various factors.

- Price of factor Input
- Size of Output.
- Technology
- Taxes
- (*) production function.

Kinds of Cost function.

Short Run Cost function.

↓

TC, TVC, TFC, AC, MC, AFC AVC.

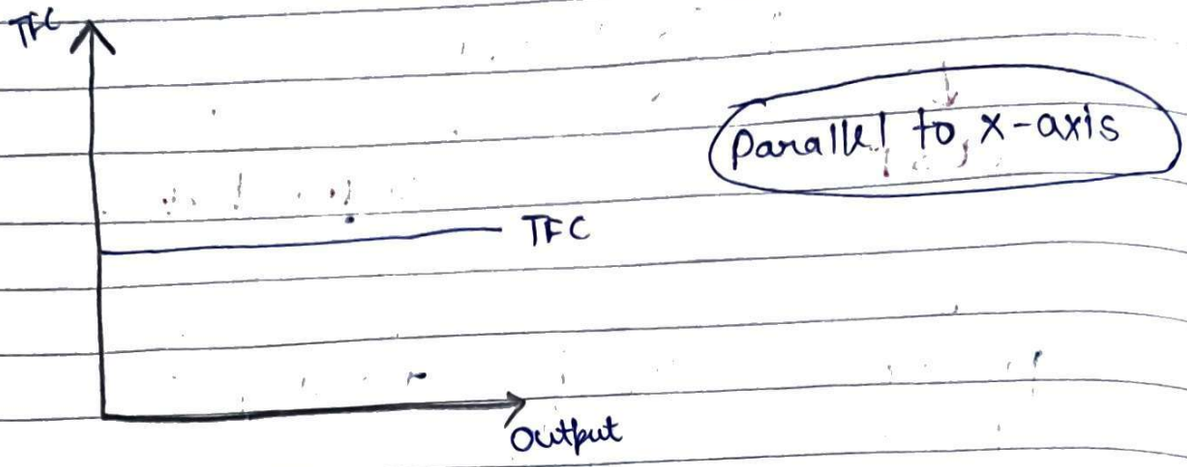
Long Run. Cost function.

↓

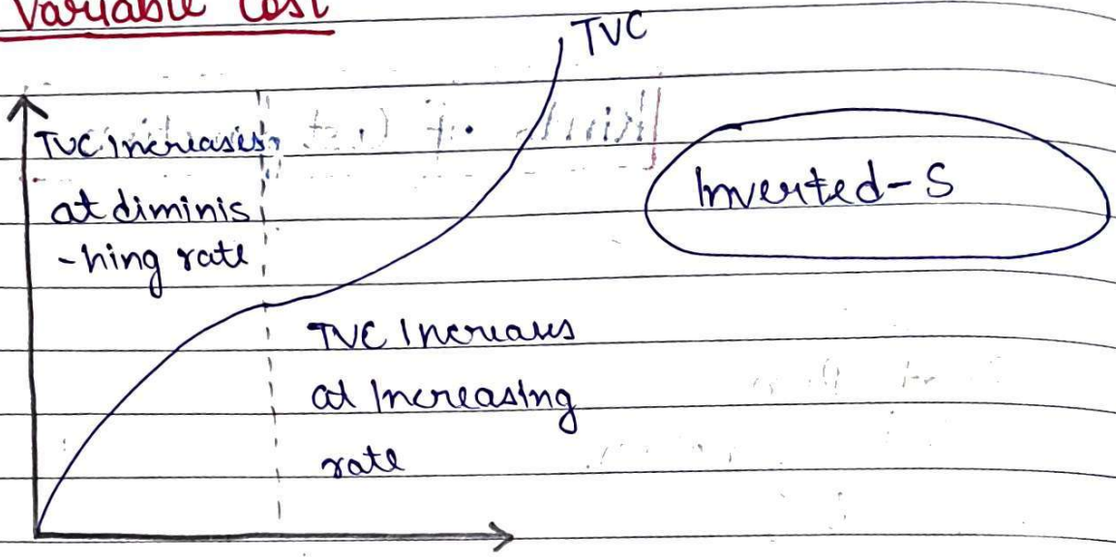
We will study only LAC (In long Run. there are no fixed Cost)

** Short Run Cost **

① Total fixed Cost



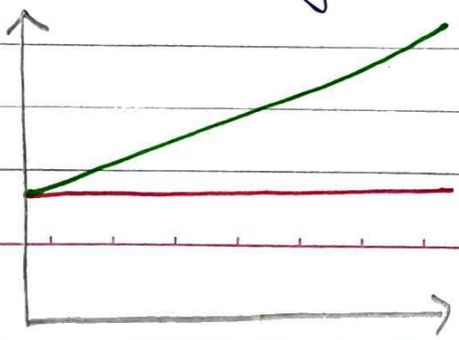
② Total Variable Cost



⊛ Semi-Variable Cost

→ neither perfectly variable nor fixed.

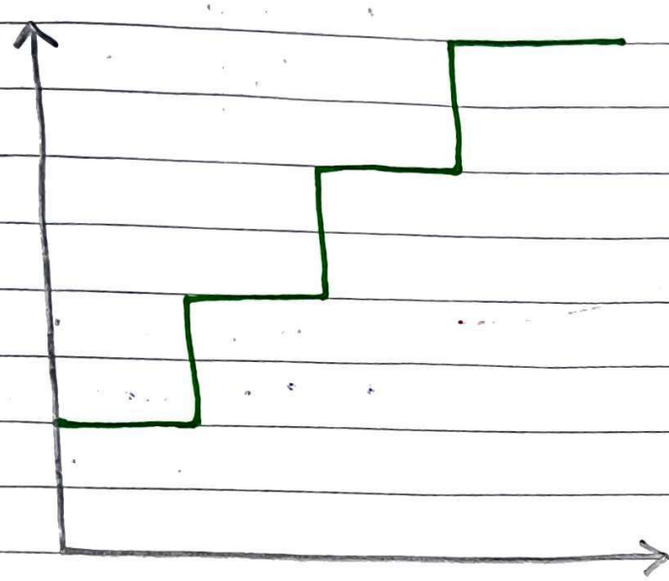
→ Eg:- Electricity charges.



⑧ Stair Step Variable Cost

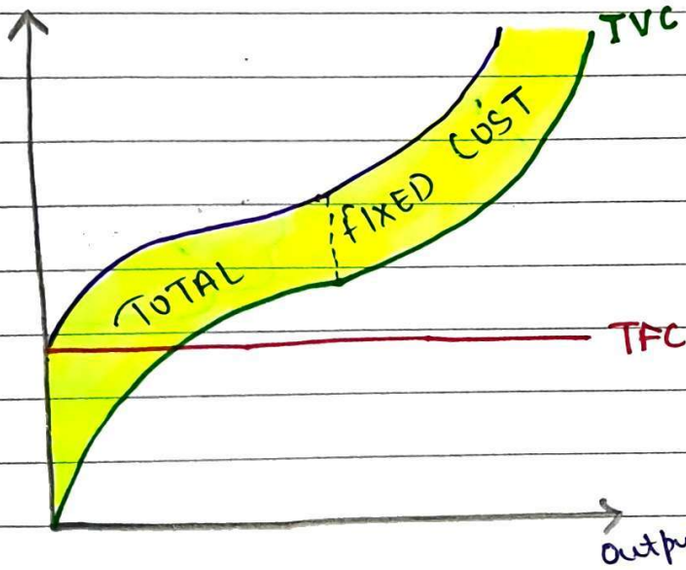
→ Eg:- Salary of foreman

→ fixed over certain range of output, but suddenly jump with Increase in output.



③ Total Cost

TC = TFC + TVC



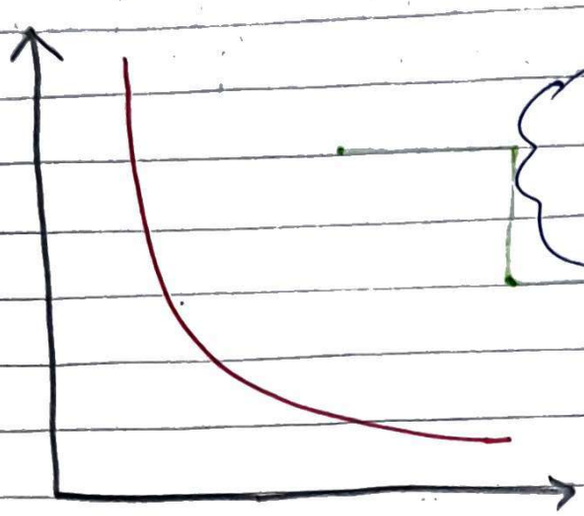
At output = 0

TC = TFC

Inverted-S

(4) Average fixed Cost

Total fixed cost
Output.

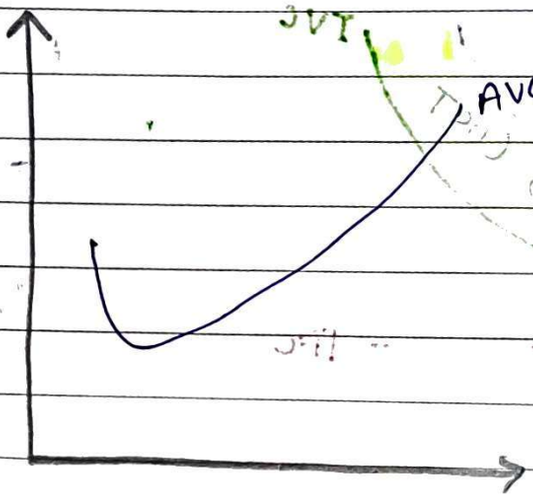


Rectangular hyperbola

It never touches X-axis because it is never zero.

(5) Average variable Cost

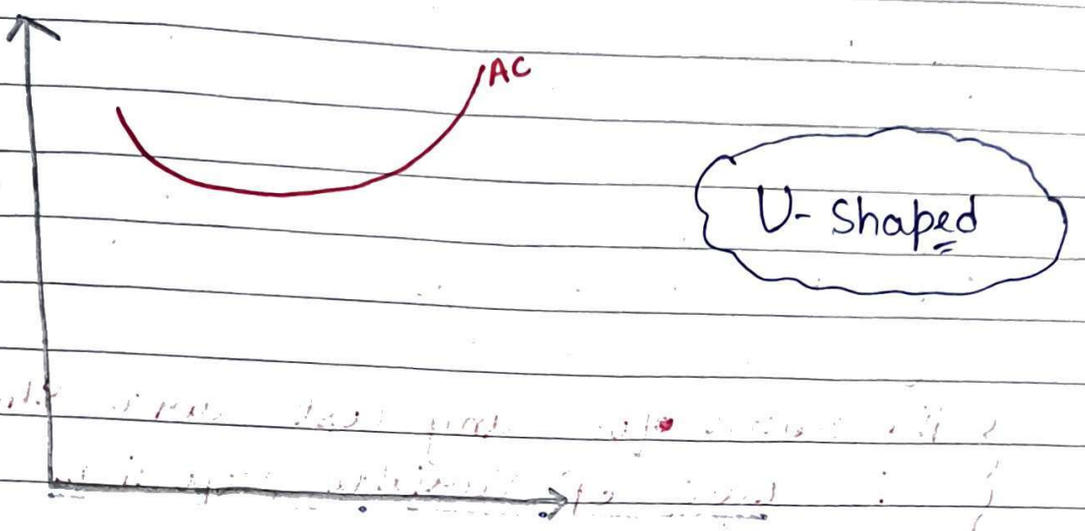
Total variable cost
Output.



U-shaped

(6) Average Cost

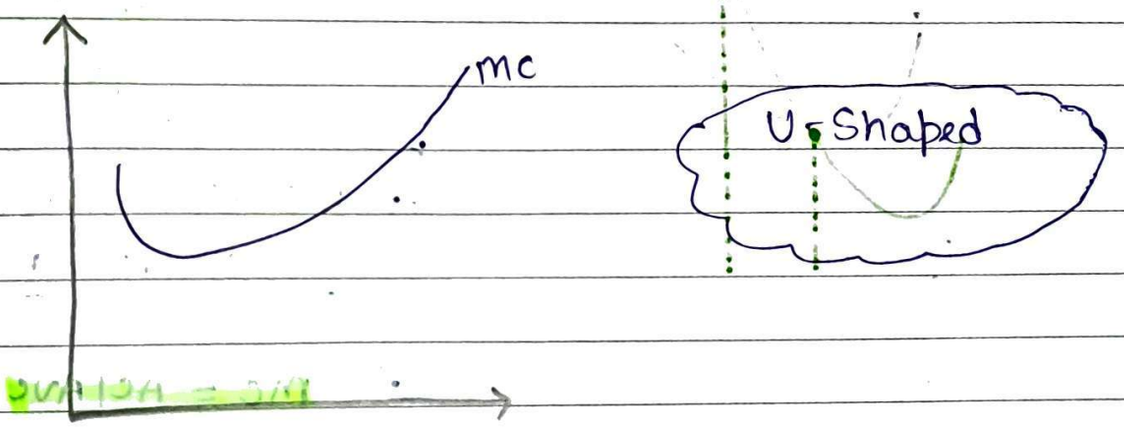
$$AC = \frac{TC}{Output} \quad (Or) \quad AC = AVC + AFC$$



(7) Marginal Cost

$$MC = \frac{\Delta TVC}{\Delta Output} \quad (Or) \quad \frac{\Delta TC}{\Delta output}$$

$$MC_N = TVC_N - TVC_{n-1} \quad (Or) \quad MC_N = TC_n - TC_{n-1}$$



- → MC is slope of TVC.
- → Area Under MC Curve is TVC.
- → MC changes due to change in Variable Cost. ~~Total Cost~~
- → Rising portion of MC Curve is also the SUPPLY CURVE

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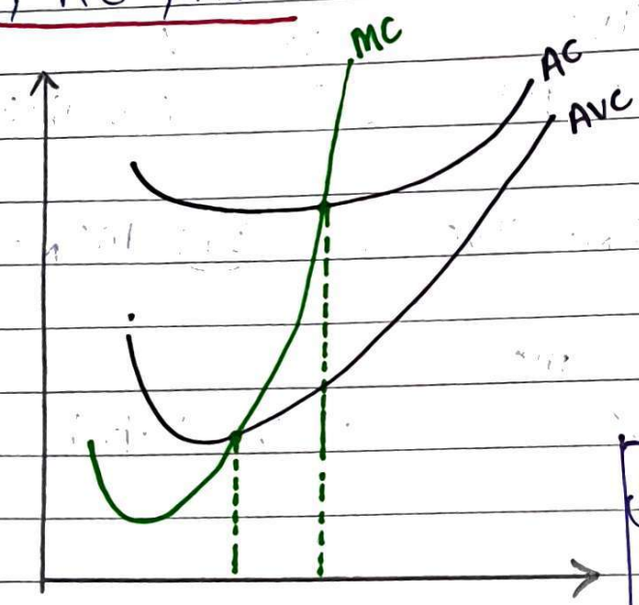
* TVC & TC is Inverted-S
AC, AVC & MC is U-shaped

why??

- When returns are Increasing (Stage 1) then Cost is diminishing.
- When returns are diminishing (Stage 2) then Cost is Increasing.

The reason for any Cost Curve shape is Law of Variable proportion.

* MC, AC, AVC



MC cuts AC & AVC from their minimum points.

(i) MC < AC/AVC then AC/AVC falls.

(ii) MC = AC/AVC then AC/AVC is Minimum

(iii) MC > AC/AVC then AC/AVC rises.

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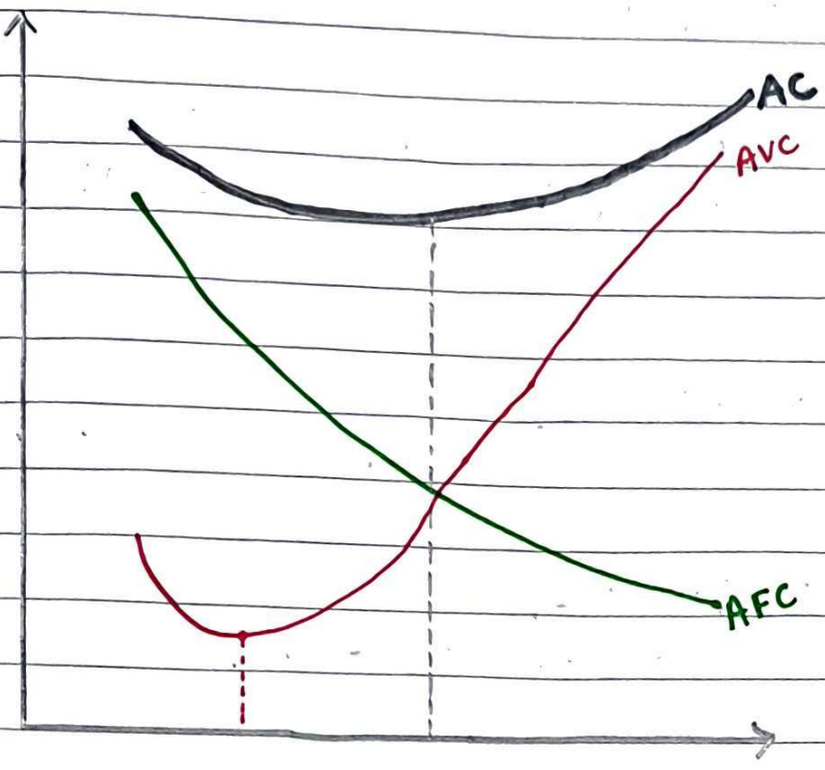
* AC, AVC and AFC



AC − AVC = AFC

This gap continously falls. but they never intersect.

Summary formulae.

(i) TC = TVC + TFC (or) TC = AC × Output

(ii) TVC = TC − TFC (or) TVC = AVC × Output (or) TVC = ΣMC_s.

(iii) TFC = TC − TVC (or) TFC = AFC × Output.

(iv) AFC = $\frac{TFC}{Output}$ (or) AFC = AC − AVC

(v) AVC = $\frac{TVC}{Output}$ (or) AVC = AC − AFC

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(vi) $AC = \frac{TC}{\text{output}}$ (or) $AC = AFC + AVC$

(vii) $MC = \frac{\Delta TVC}{\Delta \text{output}}$ or $\frac{\Delta TC}{\Delta \text{output}}$.

(*) when **Output = 0**

$TC = TFC$

(*) when **Output = 1**

$TVC = AVC = MC$

Eg1

Output	TVC	MC
1	10	10
2	18	8
3	24	6
4	40	16

Eg2

Output	MC	TVC
1	8	8
2	9	17
3	10	27
4	14	41

Eg3

Output	TVC	MC	AVC
1	10	10	10
5	38	7	7.6

DOMS

Q4

Output	AFC	TFC
1	60	60
2	30	60
3	20	60
4	15	60
5	12	60
6	10	60

Q5

Output	MC	TFC	TVC	TC	AVC	AC
0	–	100	0	100	0	0
1	500	100	500	600	500	500
2	300	100	800	900	400	450
3	200	100	1000	1100	333.33	366.66
4	300	100	1300	1400	325	350
5	500	100	1800	1900	360	380
6	800	100	2600	2700	433.33	450

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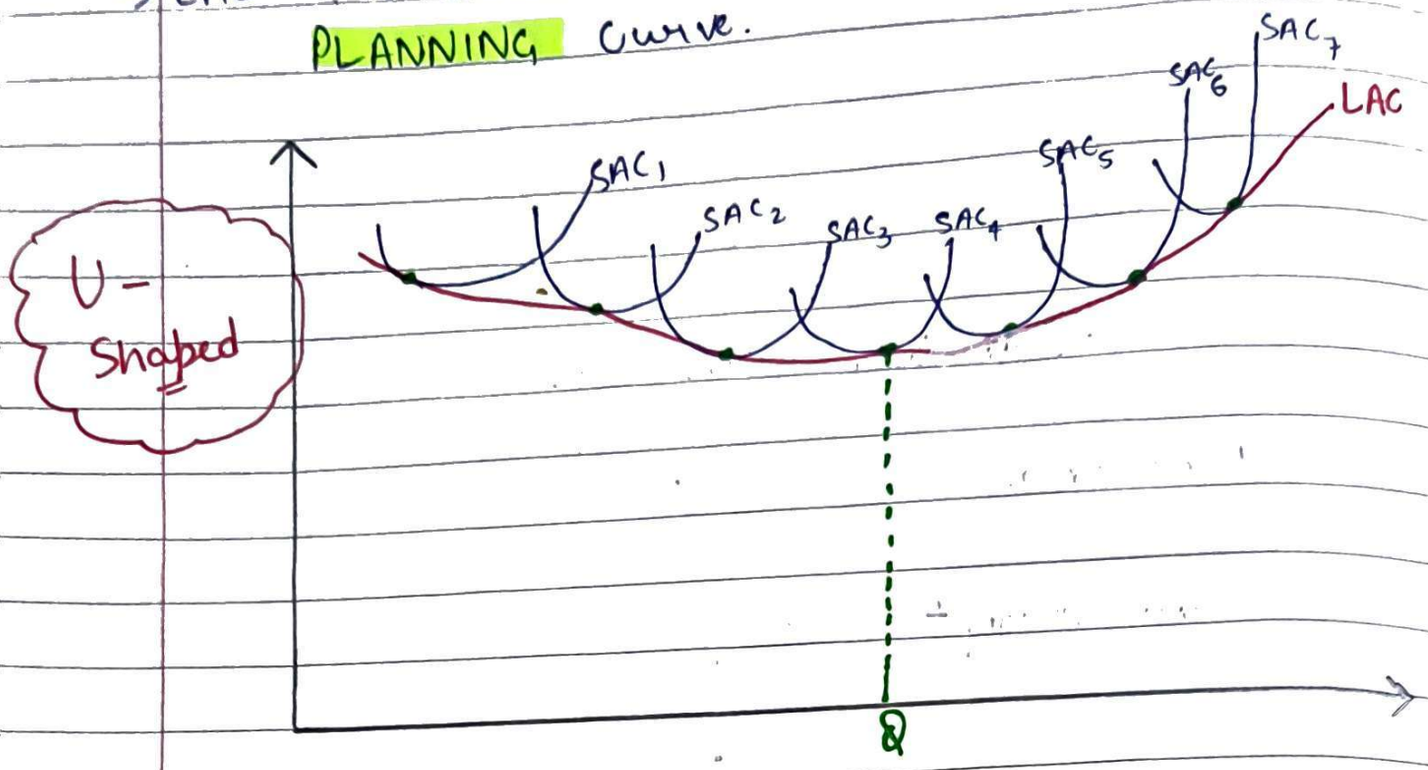
** Long Run Average Cost Curve **
(LAC)

→ LAC is known as ENVELOPE Curve or PLANNING Curve.



→ All the SACs are known as Plant Curves.

→ In the long Run, the firm examines on which SAC, it should operate to produce given level of output so that total cost is minimum.

→ LAC is (Tangent) to Each SAC.

→ BUT it is not tangent to minimum points of SACs.

→ LAC is U-shaped because of Law of Returns to SCALE.

- → Increasing Returns = Decreasing cost.
- → Decreasing Returns = Increasing Cost

→ LAC is **L shaped** if technology changes.
LAC is **U shaped** if technology do not change.

→ **General funda.**

Decreasing Cost ☞ Increasing Returns
Increasing Cost ☞ Decreasing Returns.

Eg :- TP :- 10, 18, 30, 50, 62, 70, 75

find **Decreasing Cost** level.

Sol :-

Total Product	MP	
10	-	
18	8	Increasing Returns
30	12	
50	20	
62	12	Decreasing Returns
70	8	
75	5	

(✓)

* SHUT DOWN POINT *

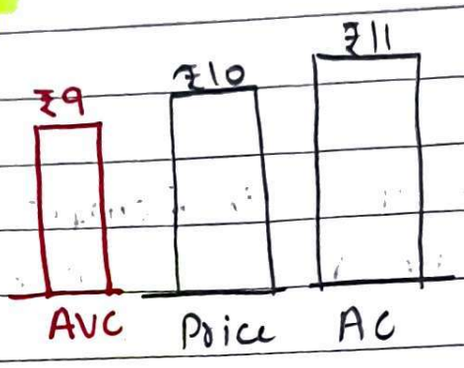
Short-Run.

(i) Price = ₹10
Average fixed cost = ₹2
Average variable cost = ₹9
Average cost = ₹2 + ₹9
= ₹11

Should the firm shut down??

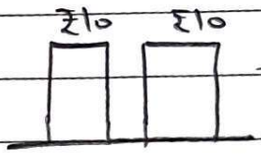
Answer

NO



(ii) Price ₹10
Average variable cost ₹10

YES



$P_{xQ} = AVC_{xQ}$

TR = TVC

LONG-RUN

Shut down point → P = AC

TR = TC

long Run

** Economies of Scale **

Advantages due to large scale production.

Output ↑↑↑ Cost of production ↓↓↓

₹100 ₹ wages → 5 output — per unit Cost = 20/-

₹200 ₹ wages → 12 output — per unit Cost = 16.66/-

Increasing Returns to Scale is a result of this.

- **Internal**
  - Benefits which accrue to firm only.
- **External**
  - Benefit (general advantage) to all firms as a result of growth of Industry.

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→ **Technical**:- deals with labour, machines etc.

→ **Managerial**:- deal with Management

→ **Commercial**:- deals with Advertising / selling cost.

→ **financial**:- deals with finance cost.

→ **Risk bearing**:- deals with diversification.

→ cheaper Raw materials

→ Technological

→ Development of skilled labour.

→ Growth of ancilliary (Supporting) Industries.

→ Better transportation & marketing facilities

→ Information.

** Diseconomies of Scale **

→ Disadvantages caused when scale of production Expands beyond optimum capacity.

Decreasing Returns to Scale is a Result of this.

Economies of Scale (Increasing Returns)	Diseconomies of Scale (Decreasing Returns)

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Internal → Same

External → Same

बेकार हो गये sab points.