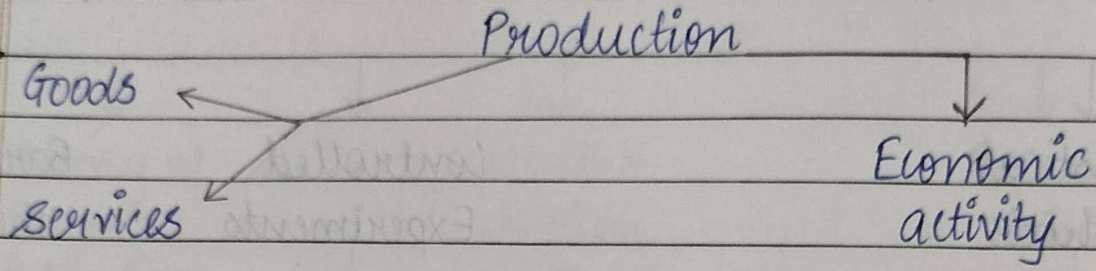


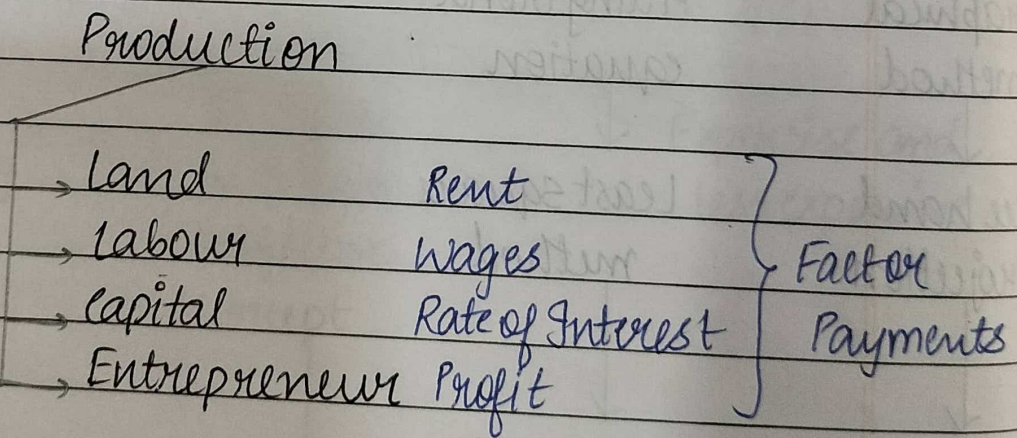


Ch 3 Theory (of) Production and Cost



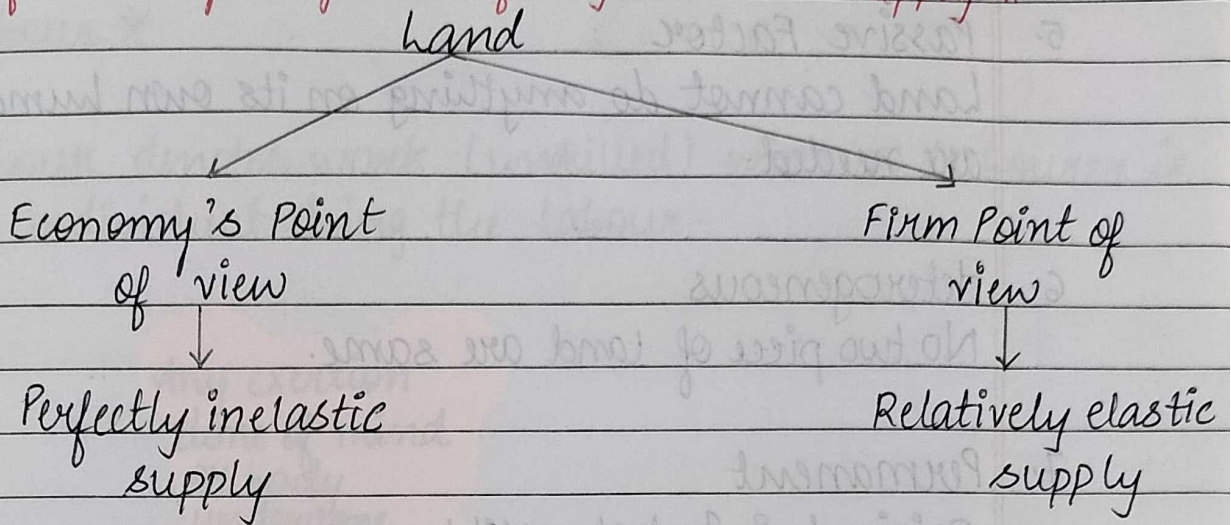
- Converting inputs → outputs (Exchange value)
- Transformation of Raw material → Final goods
- Creation Utility

** Man cannot create or destroy Matter **





** If nothing is given Perfectly inelastic supply **



** Factors of Production*

** Land **

Land includes natural resources:-

1. on the surface of earth ; Eg: soil, forest, plots of land, etc.
2. Below the surface of earth, Eg: mineral deposits, etc, and
3. Above the surface of earth, Eg: climate, sunshine, rain, etc.

Land has the following characteristics:-

1. Primary Factor
Original and primary or natural factor of production.
2. Free Gift of Nature
Creation of nature and not man made.
3. Inelastic Supply
4. Lacks Geographical Mobility

Zero Mobile Factor
It has occupational mobility.



- 5. Passive Factor
Land cannot do anything on its own human efforts are needed.
- 6. Heterogeneous
No two piece of land are same.
- 7. Permanent
Original & Indestructible
DAVID RICARDO → Classical economist
- 8. Diminishing Marginal Returns
 - * Only applicable for agricultural.
 - * Output will increase at a diminishing rate.

1 st year	100 Q	
2 nd year	150 Q	50
3 rd year	180 Q	30
4 th year	200 Q	20

Total output ↑ Marginal ↑
but at diminishing rate



* Labour *

Labour denotes work (unskilled) whereas Labourer is the individual doing the labour.

Any exertion
 done of mind
 or body
 undergone
 partly or wholly
 with a view of
 earning some π in return
 in economics it is called
LABOUR.

Labour has the following peculiarities which makes it different from other factors:

1. Labour is inseparable from labourer
- * Imp. 2. Human factors.
 Surroundings, working conditions, motivation, leisure, recreation, working hours, etc all the things will matter.
3. Highly perishable
 * A day lost without work means a day's work gone forever.
- * * Labourer has weak bargaining power.
4. The labourer sells his services and not himself.



5. Heterogeneous
 - * Power depends upon physical strength, education, skill, training, efficiency, etc.
 - * Labour can be classified as unskilled, semi-skilled and skilled labour.
 - * The skilled labour is called as human capital.

6. Restricted Mobility
 - * Labour is much less mobile than capital.

7. Active Factor

8. Labour has sociological characteristics
Eg: Social security like provident fund, gratuity, medical benefits, pension, etc.

9. Supply curve of labour is backward sloping.

10. The supply of labour is relatively inelastic in short run



* Capital *

Anything which is used in the business is called as capital.

Capital has therefore, been rightly defined as "produced means of production" and as "man made instrument of production".

Following are the main characteristics of capital:-

1. Capital is man-made
2. Capital is productive
3. Supply of capital is elastic
- * savings and investments
4. All capital is wealth but all wealth is not capital
5. Capital is a passive factor
6. Capital is the most mobile factor
- * Capital has highest mobility
7. Capital is durable (can be used again and again)
8. Capital involves social cost (kind of opportunity cost)
- * Sacrifice of present consumption and enjoyment of the people is treated as a social cost.



* Types of Capital

1. Fixed Capital
* Used in production process repeatedly.
2. Circulating or working Capital
* Used in production process only once.
3. Sunk Capital
* Used for one purpose.
4. Floating Capital
* Used for many/several uses.
5. Real Capital
6. Human Capital
* Only skilled in human capital
7. Tangible Capital
8. Intangible Capital
* Goodwill, patent, trademark & lopyright **TNTANGIBLE**
9. Money Capital
* Money capital is used to purchase Real Capital.
* Cash ~~at~~ Bank, cash in hand, shares, debentures, bonds.



10. Individual capital

- * Owned by one firm
- * Personal or private ownership

11. social capital

- * Owned by government used by all
- * Non excludable in nature

* Capital Formation

* Creation of any physical asset

* Capital formation means a sustained increase in the stock of real capital in a country.

* It is thus, an addition of capital goods like machines, tools, factories, transport, facilities, power plant, etc in the country.

* Capital formation is also known as investment.

~~***~~ * These are mainly three stages of capital formation which are as follows:

- a) Savings
- b) Mobilization of savings
- c) Investments

* Entrepreneurship

Functions of an entrepreneur

1. Initiating a business enterprise and coordination

2. Risk bearing and uncertainty

* F.H. Knight

*** 3. Innovation

* Schumpeter → Peter Peter = Schumpeter ;)

* Electronic and automobiles

* Enterprise's objectives and constraints:

The objectives of an enterprise may be broadly categorised under the following heads:

1. Organic Objectives:

To survive or to stay alive.

2. Social Objectives

3. Human Objectives

4. National objectives



* Enterprise's problems

An enterprise faces a number of problems from its inception, through its lifetime and till its closure, following are a few problems relating to:

1. Objectives
2. Location and size of the plant
3. selecting and organising physical facilities
4. Finance
5. Organisation structure
6. Marketing
7. legal formalities
8. Industrial relations



* Production Function

* **Technical / Physical / Functional** relationship between inputs and outputs

* An amount of **Output** that can be produced with given level of **inputs** and **technology**.

* Types of Production Function

1. Short Run Production Function

It is that production function where at least one factor is fixed and others are variable

$$Q = F(\bar{L}, L, \bar{K})$$

↓
Quantity

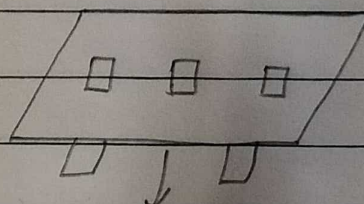
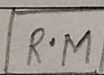
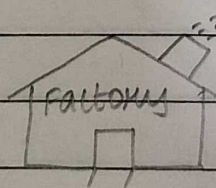
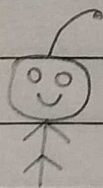
Bar indicates fixed

2. Long Run Production Function

It is that Production function where all the factors are variable.

$$Q = F(L, L, K)$$

↓ ↓
Land Capital



Capital



Example for short Run Production Function

If a gifts maker has to manufacture set units of goods for Halloween in six days, it needs to increase labourers and raw materials but not the machinery. In this case, labourers and raw materials become variable inputs while the machinery remains fixed.

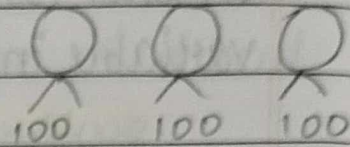
Example for long Run Production Function

A long run can be of the same company ABC, permanently looking to expand production capacity of cars instead of only during the seasons. It requires new land, labour, and equipment in addition ^{to} the existing infrastructure.



* Types of Production labourers = 100

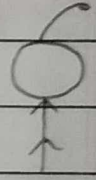
1. Total Product [TP] 10,000 units
Total Production / Total Output produced

2. Average Product [AP] 
Average Production / Average Output 100 100 100
(Andha takla)

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

Q ↘ labour (variable input)

$$= \frac{10,000}{100}$$
$$= 100 \text{ units}$$

3. Marginal Product [MP] 
Marginal Production / Marginal Output ↑
(Choti wala takla)

Additional output produced by one additional labourer

$$MP = \frac{\Delta TP}{\Delta Q}$$



Law of Variable Proportion (7 Marks)

Short run
Production
Function

Law of
Diminishing
Returns

Returns
to factor
cost

Stage 1: Law of increasing returns

Stage 2: Law of Diminishing returns

Stage 3: Law of Negative returns

All 3 stages belong
to one company
only

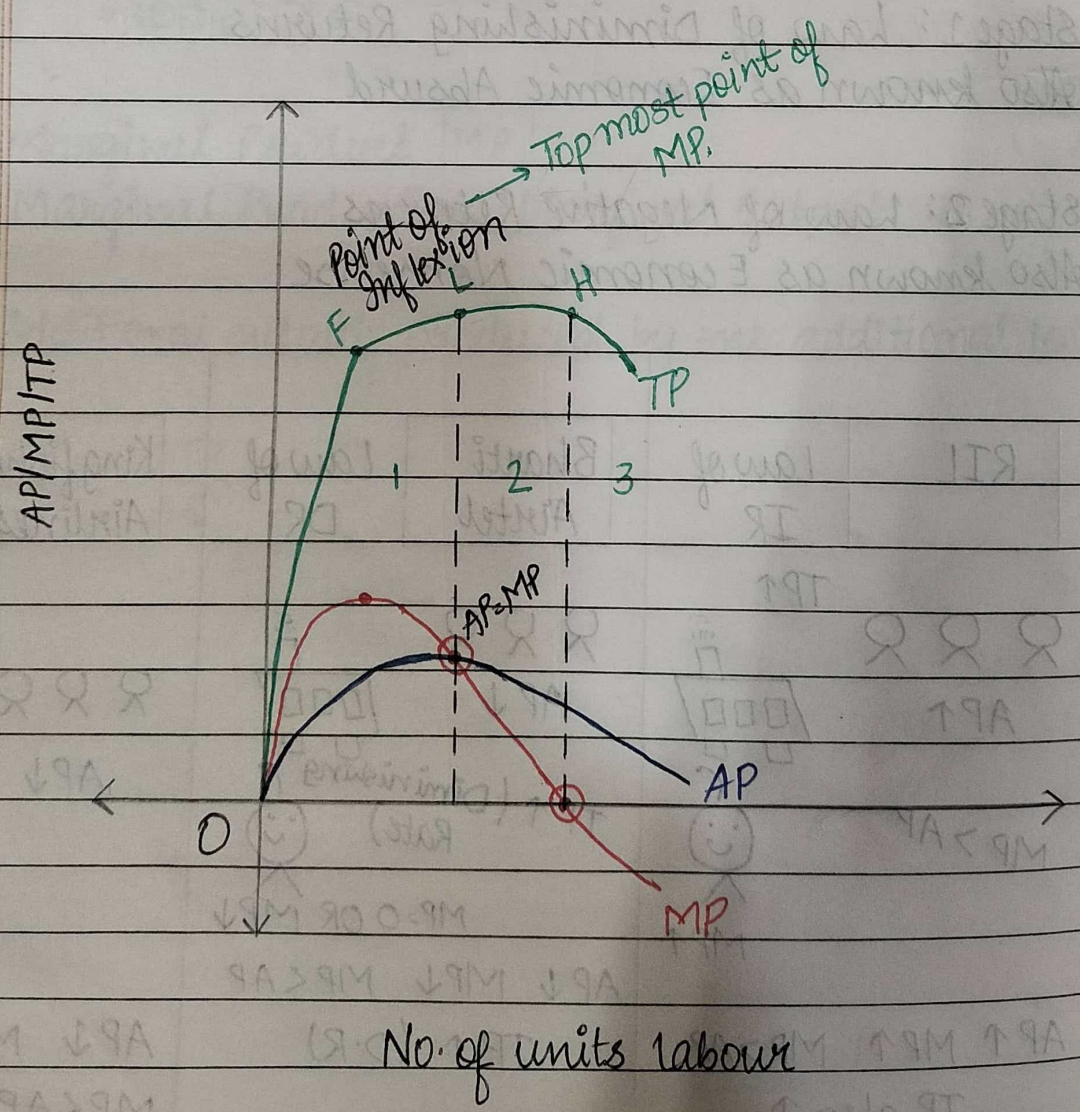
Stage 1: Law of Diminishing Returns
Also known as Economic Absurd

Stage 3: Law of Negative Returns
Also known as Economic Nonsense

RIL	Law of IR	Bharti Airtel	Law of DR	Kingfisher Airlines	Law of NR
<p>AP ↑ MP ↑ MP > AP TP also ↑</p>		<p>TP ↑ (D-R)</p>		<p>AP ↓ MP ↓ (-) MP < AP TP ↓</p>	



	Labour	TP	AP	MP	Analysis
I	1	2	2	2	AP ↑ MP ↑
	2	5	$5/2 = 2.5$	3	MP > AP
	3	9	3	4	TP also ↑
	4	12	3	3	AP = MP both ↓
II	5	14	$14/5 = 2.8$	2	MP < AP
	6	15	$15/6 = 2.5$	1	TP ↑ (Diminishing Rate)
	7	15	$15/7 = 2.14$	0	MP = 0 TP MAX
III	8	14	$14/8 = 1.75$	-1	AP ↓ MP ↓ (-)
	9	12	$12/9 = 1.33$	-2	MP < AP TP ↓





* Reasons for Law of Increasing Returns

1. Optimum utilization of fixed factor.
2. Division and specialization of labour.

* Reason for Law of Diminishing Returns

1. More variable factor compared to fixed factor.
2. Imperfect substitution and lack of co-ordination among variable factors.

* Reasons for Law of Negative Returns

1. Too excessive increase in variable factor.
2. Variable factor comes in each others way leading to wastages.
3. Over utilization of fixed factor.



Points To Remember

In first stage TP increases at increasing rate till point F but from F to L it increases at diminishing rate.

Top most point of MP is called as Point of Inflexion.

Slope of TP when TP is max 0.

When MP declines in first stage TP increases at diminishing rate.

When $AP > MP$ TP increases at diminishing rate and then falls.

When MP is zero TP is maximum and AP falls.

Second stage starts where AP is maximum.



Reduction:
Internal economies of scale measures efficiency of production & occur b/c of factors controlled by its management team.

External economies of scale happen b/c of larger changes within the industry, so when the industry grows, the average costs of business drop.

Internal diseconomies of scale can arise from technical issues of production or organizational issues within the structure of a firm or industry.

External diseconomies of scale can arise due to constraints imposed by the environment within which a firm or industry operates.

per unit cost = Economies of Scale

→ internal Goes with size

→ external Goes with location

→ internal Goes with size

→ external Goes with location

Law of Returns to Scale (inputs)

Long Run
Production
Function

In long run (Na Nature there are no return na fixed factor & loss hota hai No negative in long run) returns

Stage 1: Increasing returns to scale

Stage 2: Constant returns to scale

Stage 3: Diminishing returns to scale

Reduction in per unit cost = Economies of Scale

Economies of scale

- internal Goes with size
- external Goes with location

Diseconomies of scale

- internal Goes with size
- external Goes with location

Law of Returns to scale (inputs)

Long Run
Production
Function

In long run (Na Nature
there are no return na
fixed factor & less hota hai
No negative in long run)
returns

Stage 1: Increasing returns to scale

Stage 2: Constant returns to scale

Stage 3: Diminishing returns to scale



* Behaviour of output in response to change in scale.

* Effect of scale on the level of output.

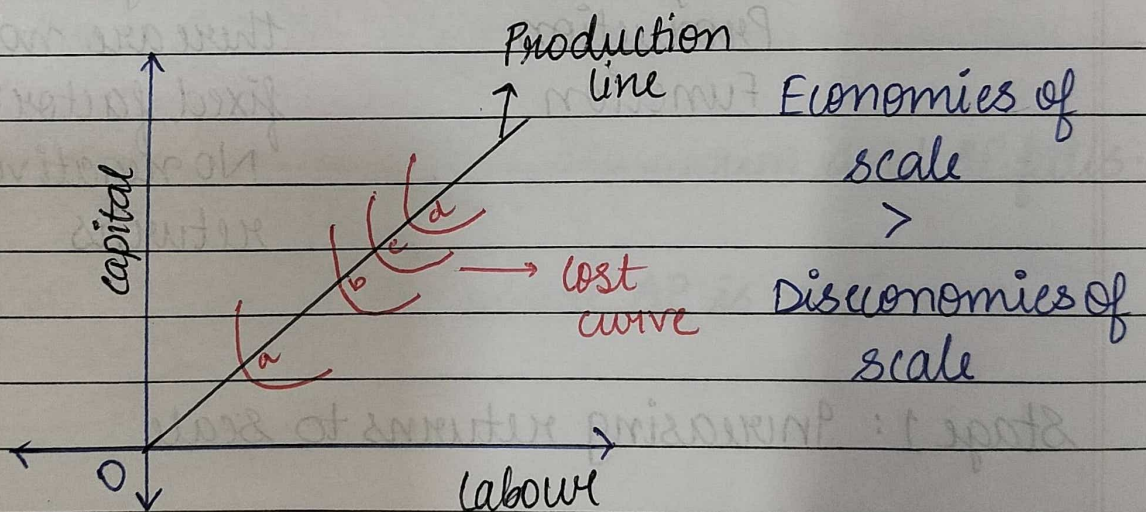
* All factor inputs are changed in same established proportion.

Eg:- If you are taking inputs as 10% then in all the three cases you should take it as 10%

* Increasing returns to scale

Inputs 10%
Outputs 50%

Cost ↓ Returns ↑

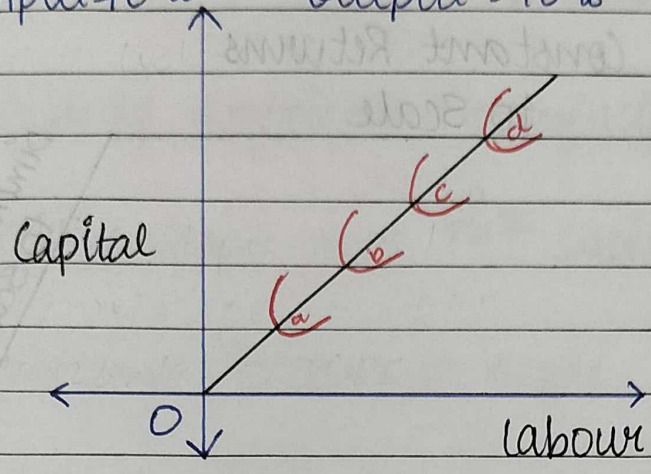


Increasing returns to scale occur when a simultaneous increase in all the inputs in the same given proportion result in a more than proportionate increase in the output.

For example:- If input is increased by 10% then the output increases by 50%.



* **Constant Returns to Scale (Linear Homogenous Production Function)**
 Input = 10% Output = 10%



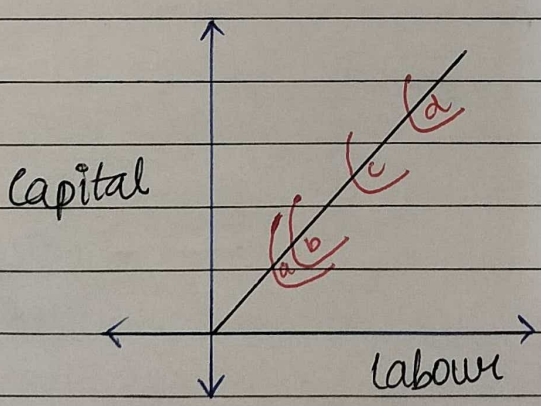
Economies of scale
 =
 Diseconomies of scale

Constant returns to scale are said to be constant when a proportionate increase in all the inputs results in proportionate increase in output.

For example:- If inputs is increased by 10% then the output also increases by 10%.

* **Diminishing Returns to Scale**

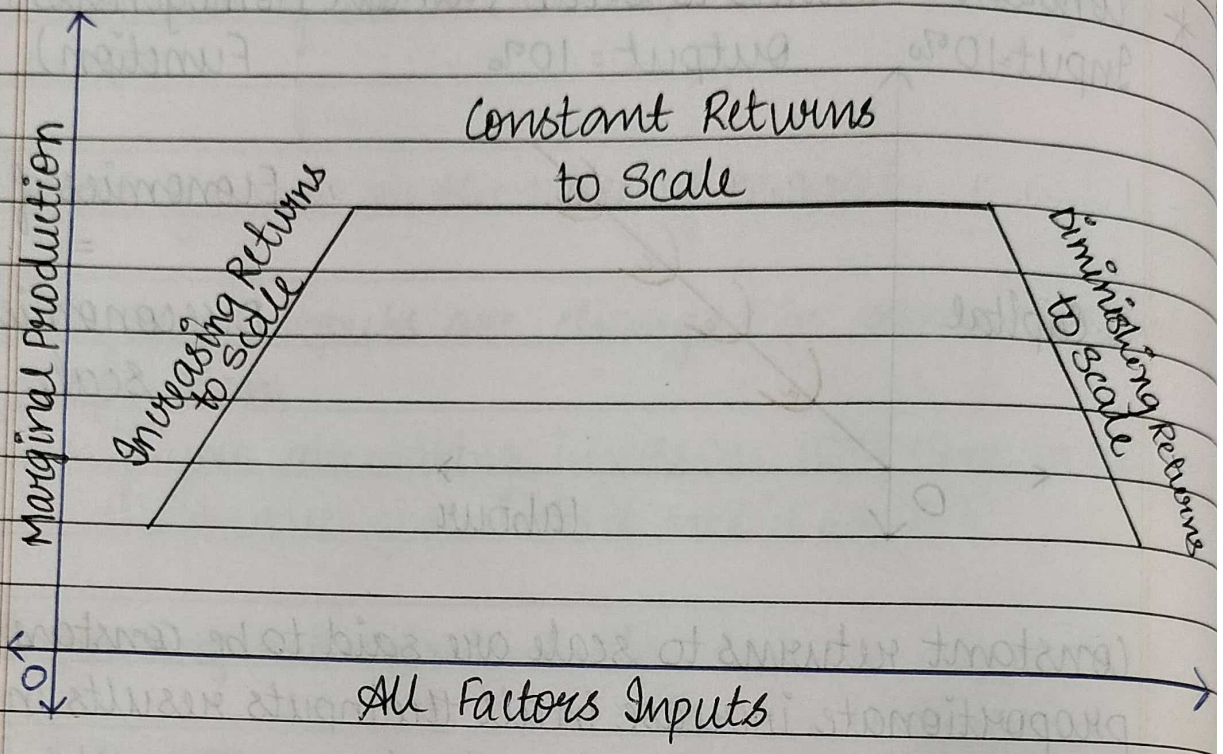
Inputs = 10% Output = 05% (Input increases by 10% output also increases by 5% but less than 10%)



Cost ↑ Returns ↓
 Economies of scale
 <
 Diseconomies of scale

Diminishing returns to scale occur when simultaneous increase in all inputs in the same given proportion result in a less than proportionate increase in the output.

For example:- if inputs is increased by 10% then the output also increases by 5% but less than 10%.



- Positive slope \rightarrow IRS
- Horizontal slope \rightarrow CRS
- Negative slope \rightarrow DRS



Cobb - Douglas Production Function

* Whole of American Manufacturing Unit

* 3/4th Labour and 1/4th Capital

* Constant Returns to Scale

* $Q = KL^a C^{(1-a)}$

Q = Output

C = Capital

L = Labour

K & a = Positive constants

→ Labour → Capital

* $a + b = 1 \rightarrow$ CRS

$a + b > 1 \rightarrow$ IRS

$a + b < 1 \rightarrow$ DRS



(Equal) (Quantity)

Iso-quant (Producer Point of view)

Equal Product Curve

Iso-product Curve

Production Indifference Curve

Statement :-

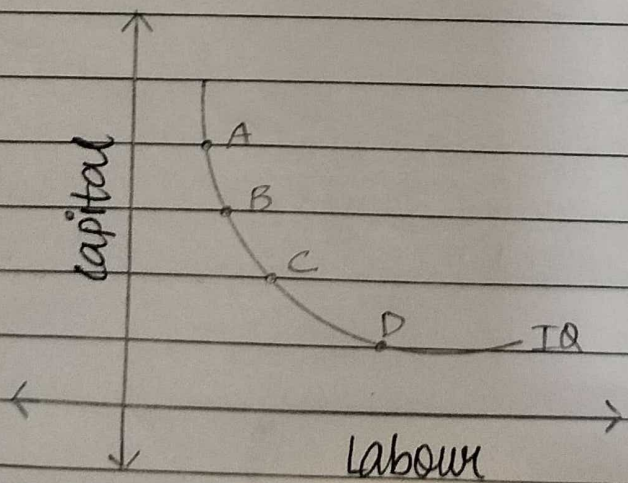
Various combinations of two inputs that gives same level of output.

Assumption :-

MRTS \rightarrow sacrifice

- Only two inputs
- MRTS is diminishing (Marginal Rate of Technical Substitution)

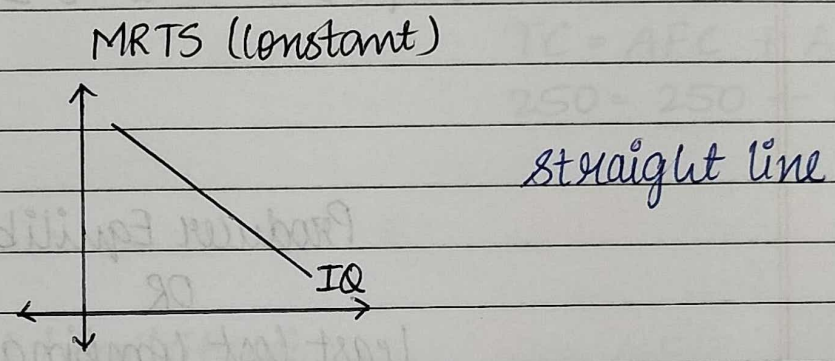
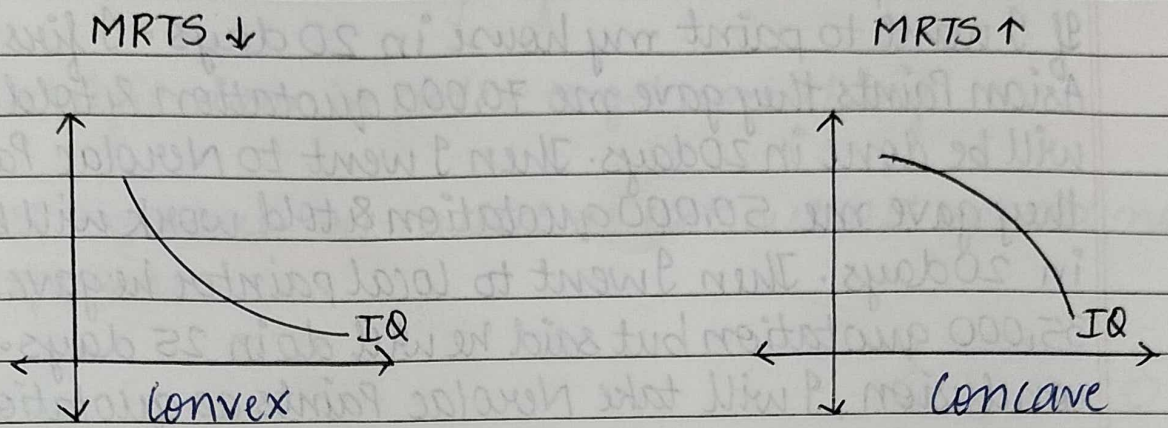
Combinations	Labour	Capital	MRTS
A	1 \uparrow	12 \downarrow	-
B	2 \uparrow	6 \downarrow	6
C	3 \uparrow	4 \downarrow	2
D	4 \uparrow	3 \downarrow	1



Slope of TQ \rightarrow - MPL / MPK

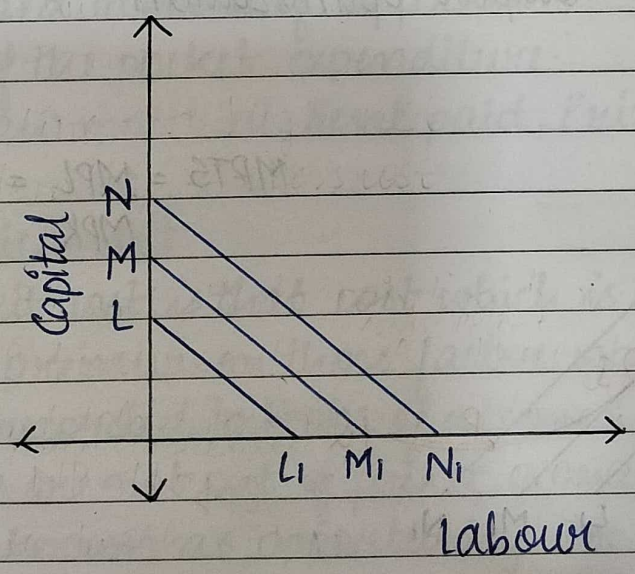
Points on the curve is called locus

Resources are scarce so the relation will be inverse.



ISO-cost lines

Various combinations of two inputs which a firm can buy with its money income.



Slope of iso-cost

$\frac{w}{r}$ → wages
 r → rate of interest

Top line → High cost
 Bottom line → Low cost

* cost should be less output should be same:



* For example

If I want to paint my house in 20 days. I first went to Asian Paints they gave me 70,000 quotation & told work will be done in 20 days. Then I went to Nerolac Paints they gave me 50,000 quotation & told work will be done in 20 days. Then I went to local painter he gave me 35,000 quotation but said he will do in 25 days. So conclusion, I will take Nerolac Paints as quotation is less and the output is same i.e 20 days.

Producer Equilibrium

OR

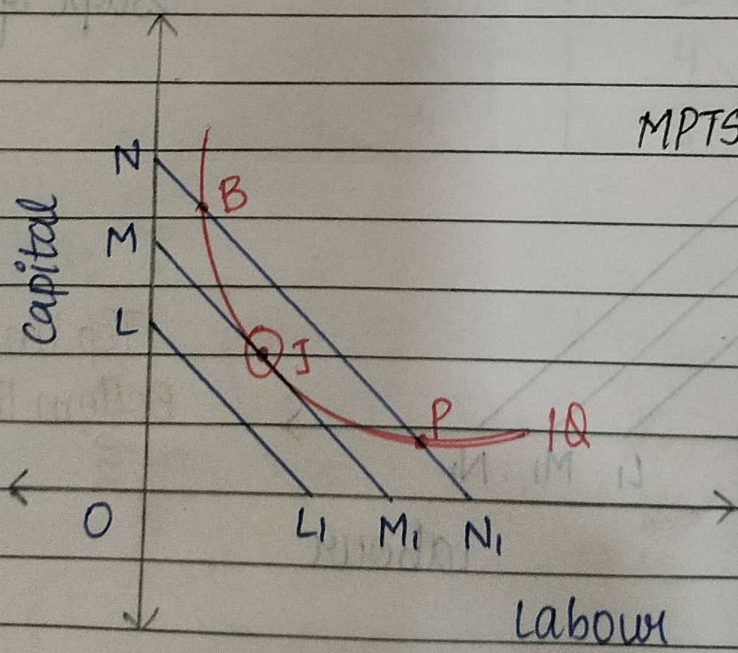
Least Cost Combination

OR

Cost Minimization

OR

Output Optimization



$$MPTS = \frac{MPL}{MPK} = \frac{w}{r}$$



When you're spending which is going to generate income is called as cost.

Theory of cost

- * Sacrifice done in order to get something.
- * All expenses are called as cost but all cost are not expenses.

$$\text{Output} = 0$$

$$TC = AFC + AVC$$

$$250 = \underline{250} + \underline{0}$$

Types of costs

1. Accounting cost / explicit cost

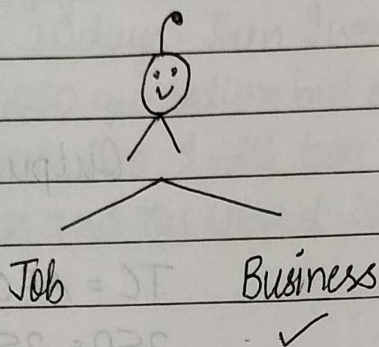
- a. Accounting cost / explicit cost are that cost which is incurred on those factors that are not owned by an entrepreneur. He has to purchase from outside.
- b. Recorded in books of account.
- c. Out of the pocket expenditure.
eg:- Raw material, Rent paid, Printing & stationery cost.

2. Implicit cost

- a. Implicit cost is that cost which is incurred by an entrepreneur on those factor which are owned by him.
- b. Not recorded in books of account.
- c. They are not out of pocket expenditure.
- d. Also known as opportunity cost.
Eg: owned property, owned capital.

3. Economic Cost

$$\begin{aligned} \text{Explicit cost} + \text{Implicit cost} &= \text{Economic cost} \\ 70,000 + 70,000 &= 1,40,000 \end{aligned}$$



Revenue = 1,00,000
 Cost = 70,000
 A. Profit → 30,000

40,000
 70,000 for job X
 Implicit cost

Economic loss

4. Outlay Cost

It involves actual outlay of funds on wages material, rent known as "Financial expenditure."

5. Opportunity Cost

- a. Opportunity cost is a sacrifice or loss of alternative
- * b. value of next best alternative
- c. known as Trade off, Forgone cost, Implicit cost.
sacrific

6. Direct Cost

- a. Direct cost is also known as "Traceable cost."
- b. cost which can be easily identified called as direct cost.
 Eg: In production of shoes cost of leather is a direct cost.



7. Indirect cost

- a. Indirect cost is also known as non-traceable cost.
- b. Cost which cannot be easily identified called non-traceable/indirect cost.
Eg: Electricity, Power charges

8. Incremental cost

- a. Incremental cost is related to concept of marginal cost.
- b. It refers to the total additional cost incurred by the business.
Eg: purchase of new equipment, expansion of production capacity.

9. Sunk cost

Sunk cost refers to that cost which has been already incurred for one purpose in the past & cannot be recovered.
Eg: Expense on advertisement

10. Historical cost

Historical cost are those cost which are incurred on the purchase of an asset in the past, may or may not be recovered.
Eg: Machinery, Tools.

11. Replacement cost

Replacement cost refers to expenditure to be made for replacing an old asset.

Purana do naya ko \rightarrow Difference \rightarrow Replacement cost



12. Private cost

Private cost are those cost which are incurred or provided by the firm or organisation.

Eg: cost of manufacturing a product

MRF 1 tyre \rightarrow ₹5000



Private cost

13. Social Cost

Social cost refers to the total cost to the society due to business activities it includes both private & external cost.

Eg: Pollution of all types

Private cost + External cost = Social cost

14. Fixed cost

a. Fixed cost do not change with output

b. It is independent of output

c. It cannot become zero also known as supplementary cost or overhead cost.

Eg: Rent, Property tax, Interest on Capital, Depreciation

15. Variable cost

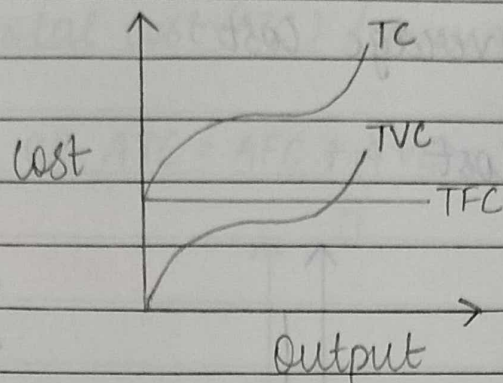
a. Variable cost changes with change in output

b. Dependent on output

c. It can become zero also known as prime cost. very imp.

Eg: Wages, Raw Material etc.

* If business will not be able to recover the variable cost the business will shut down.



16. Semi variable cost

It is a mixture of fixed cost & variable cost.

Eg: Electricity charges, Post paid mobile connection.

17. Stair step cost

A salary or Remuneration give to a foreman or extra helper represent stair step cost.

* Accounting profit = Revenue - Accounting cost

* Economic loss = Accounting profit is less than implicit cost.



AFC/ATC shape → Technology remains constant

(main reason) → Law of variable Proportion

AFC → Output ↑ AFC ↓
cannot touch x-axis

Minimum point will only come in AC curve

Short Run Average Cost

1. Average Fixed Cost

• downward slope

$$AFC = \frac{TFC}{Q}$$

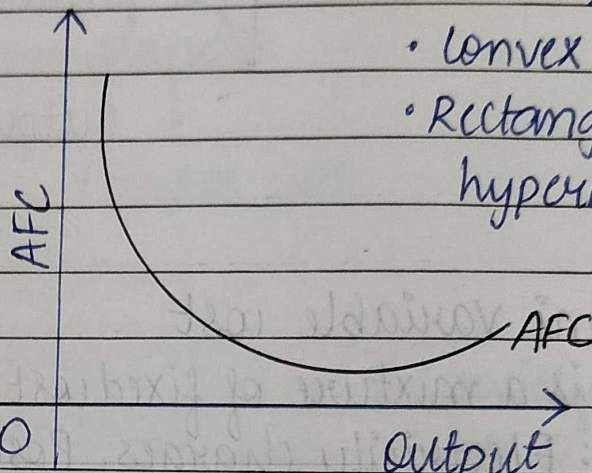
↓
Output

- convex
- Rectangular hyperbola

Rent : 50,000

100

= 500 AFC



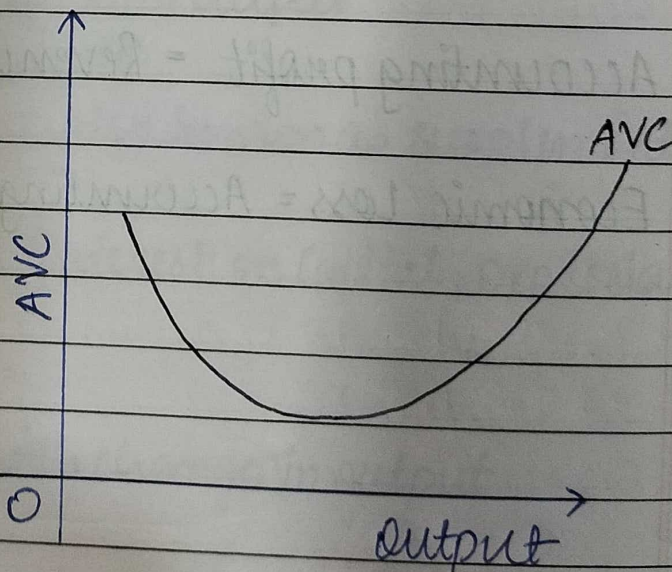
Output ↑ AFC ↓

cannot touch the x-axis as fixed cost cannot be 0

2. Average Variable Cost

$$AVC = \frac{TVC}{Q}$$

Q

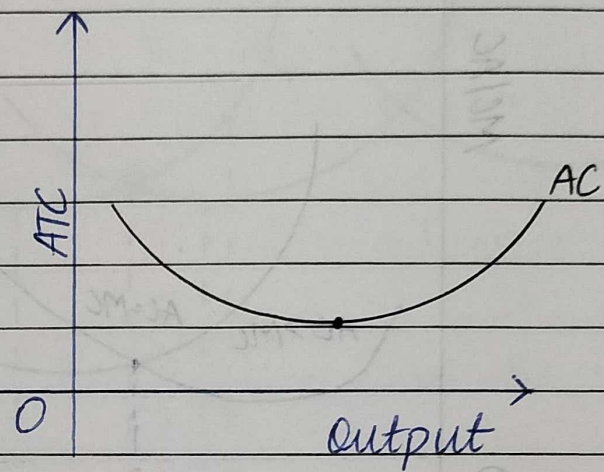


U-Shape



3. Average total cost (ATC) / Average cost (AC)

$$AC = \frac{TC}{Q} \quad \text{OR} \quad ATC = AFC + AVC$$



U-Shape

4. Marginal cost (MC)

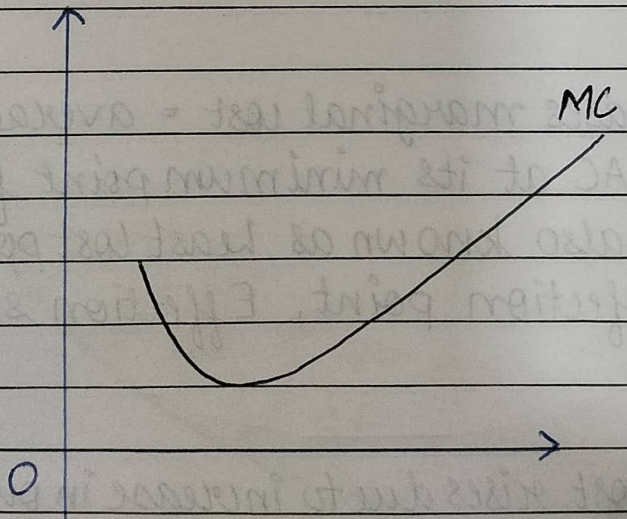
Additional cost incurred for producing one additional unit of output.

1 - 200
2 - 350

$$MC_n = TC_n - TC_{n-1}$$

OR

$$MC = \frac{\Delta TC}{\Delta Q} = \frac{300 - 200}{2 - 1} = 100$$

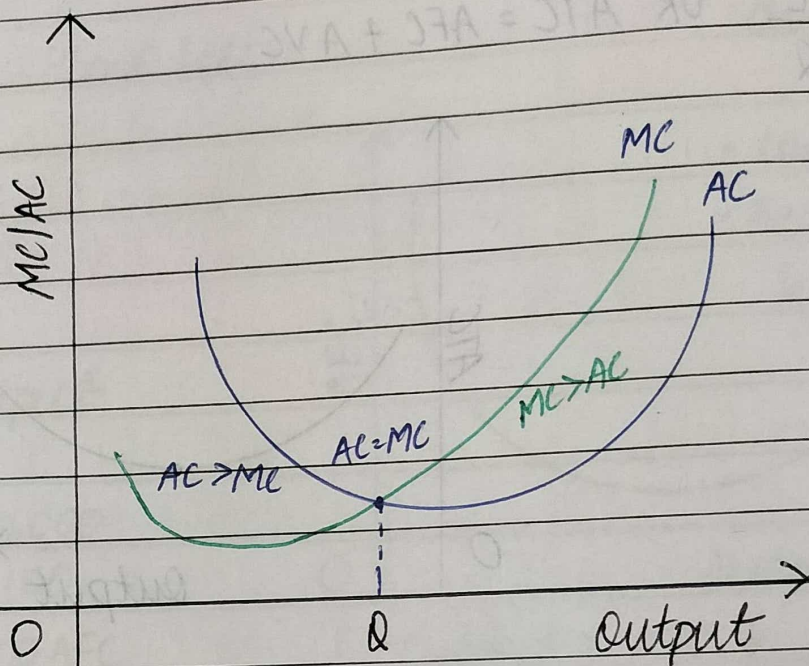


U-Shape

* Marginal cost is related to variable cost

* MC can be calculated either with 'TC' or 'TVC'.

* Relationship between AC & MC



Stage 1

$AC > MC$

When Average cost declines due to increase in output marginal cost is below average cost. (When AC falls MC is falling as well as rising)

Stage 2

$AC = MC$

As output increases marginal cost = average cost MC curve cuts AC at its minimum point from below. Minimum point also known as Least cost point, Productively effecton point, Effecton scale.

Stage 3

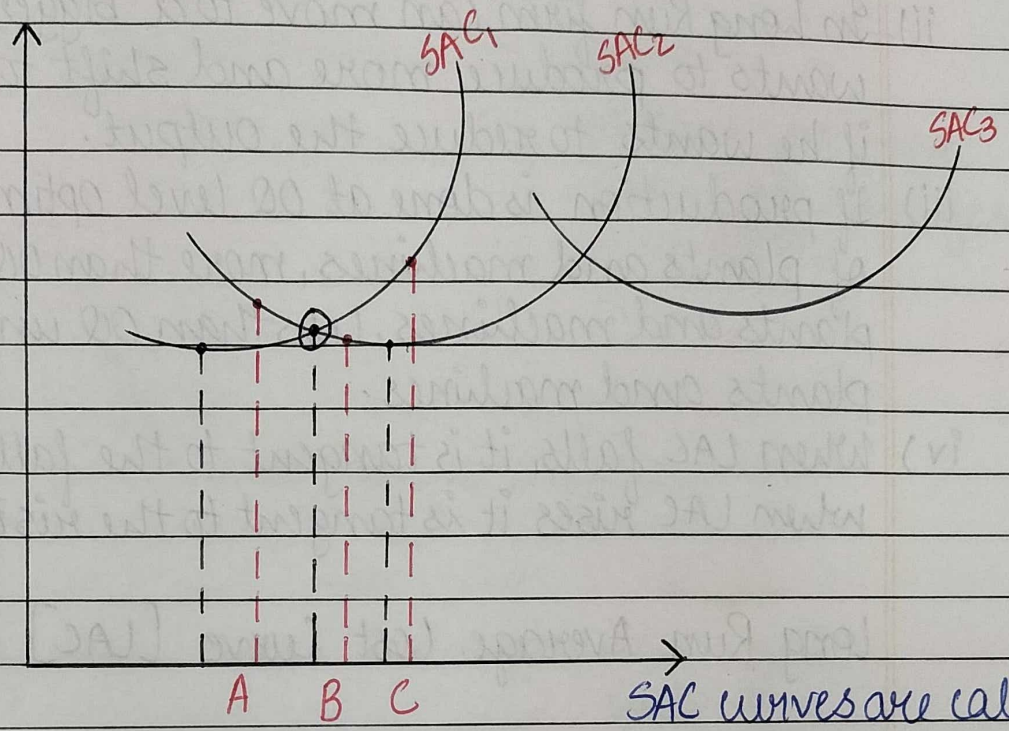
$MC > AC$

When average cost rises due to increase in output marginal cost is greater then average cost. Both AC and MC are rising.



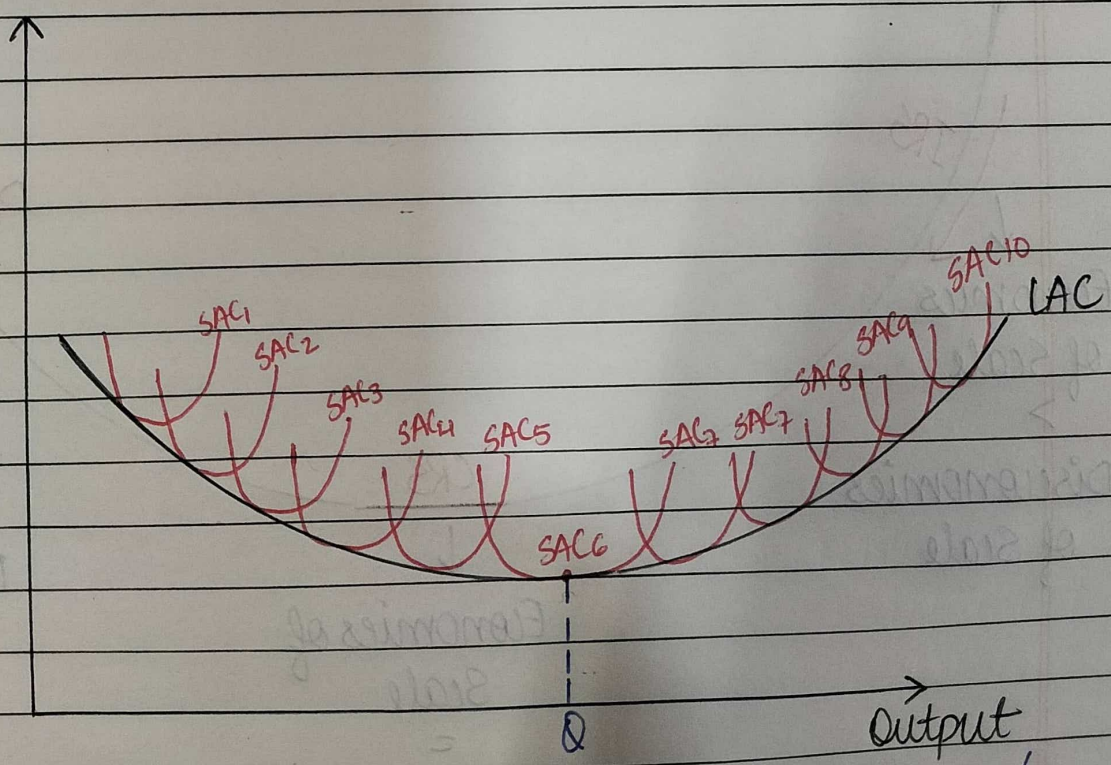
* Reason behind U-shape LAC \rightarrow Returns to scale Law of

Short Run Average Cost Curve [SAC]



SAC curves are called as 'Plant Curves'

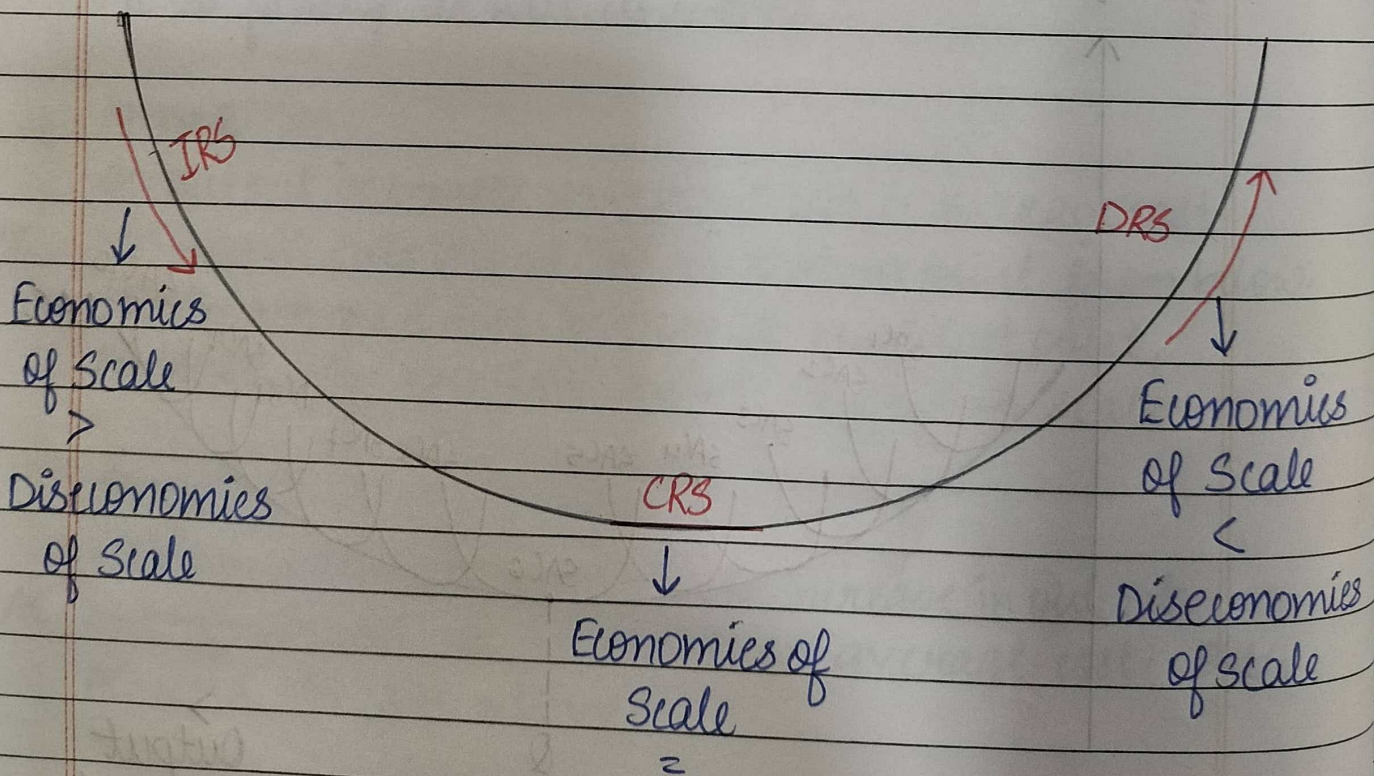
Long Run Average Cost Curve [LAC]



- Planning Curve / Envelope Curve / Boat Shaped Curve / Saucer Shaped Curve

- i) Short Run is that period where some factors are fixed whereas in Long Run all factors are variable
- ii) In Long Run firm can move to a bigger plant if he wants to produce more and shift to a smaller plant if he wants to reduce the output.
- iii) If production is done at OQ level optimum utilization of plants and machines, more than OQ over utilization of plants and machines, less than OQ under utilization of plants and machines.
- iv) When LAC falls, it is tangent to the falling SAC and when LAC rises it is tangent to the rising part of SAC

Long Run Average Cost Curve [LAC]

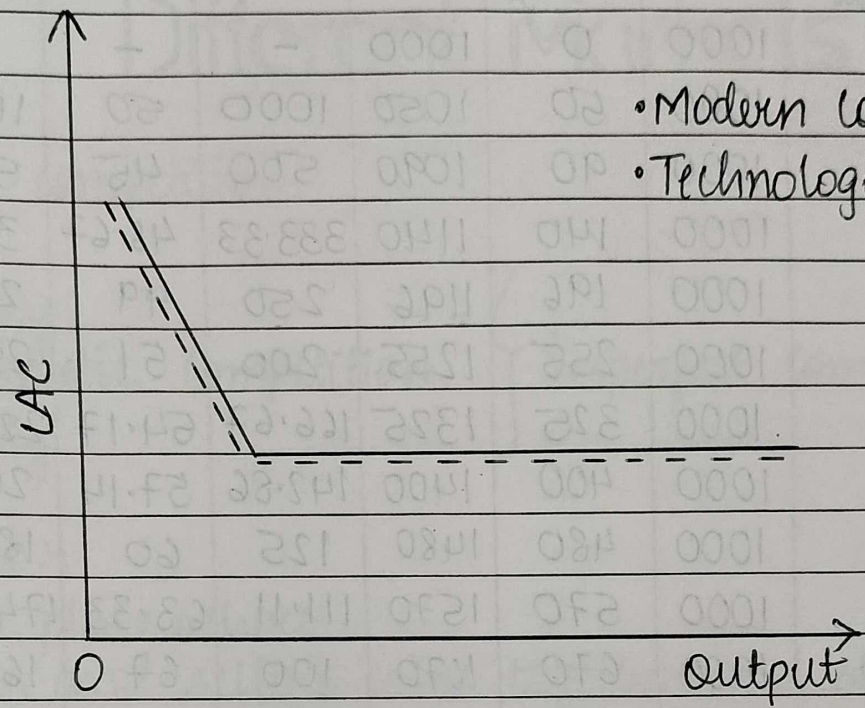


Diseconomies of scale

Negative slope falling part of LAC denotes IRS.
 Positive slope rising part of LAC denotes DRS.



'L' Shaped cost curve



- Modern Cost Curve
- Technology Changes



Unit of output	TFC	TVC	TC	AFC	AVC	ATC	MC
0	1000	0	1000	-	-	-	-
1	1000	50	1050	1000	50	1050	50
2	1000	90	1090	500	45	545	40
3	1000	140	1140	333.33	46.67	380	50
4	1000	196	1196	250	49	299	56
5	1000	255	1255	200	51	251	59
6	1000	325	1325	166.67	54.17	220.84	70
7	1000	400	1400	142.86	57.14	200	75
8	1000	480	1480	125	60	185	80
9	1000	570	1570	111.11	63.33	174.44	90
10	1000	670	1670	100	67	167	100
11	1000	780	1780	90.91	70.91	161.82	110
12	1000	1080	2080	83.33	90	173.33	300