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THEORY OF PRODUCTION AND COST

Production → Goods and services

Economic activity → Monetary value

Converting

- Transformation of Goods & Services to satisfy
- Creation of utility
- Man cannot create matter → True.

Production

Land	Labour	Capital	Entrepreneur.

- Land

1) From Economy point of view: Perfectly Inelastic supply

2) From Firm's point of view: Relatively Elastic supply.

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* PRODUCTION FUNCTION

1) Functional Relationship between Inputs and outputs.

2) Physical Relationship between Input and output.

3) Technical Relationship between Input and output

Production Function.

→ Short Run Production function.
It is that production function where atleast one factor should be fixed others are variable.

→ Long Run Production Function.
It is that production function where all factors can be variable.
(No fixed factor in long-Run)

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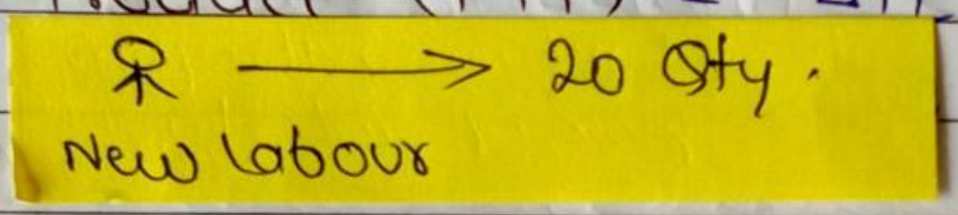
TYPES OF PRODUCTION

No. of workers (100) ↓ 1000 Qty

1) Total Product (T.P) :
Total output coming out of the factory.

2) Average Product (A.P) = TP / (No. of workers) → Labour
= 1000/100 = 10 unit

3) Marginal Product (M.P) = ΔTP
10 → 100
1 → 20



Law of Variable Proportion

- Short Run Production Function
- Law of Diminishing Return
- Returns to Factor cost

* Law of Increasing Returns I
* Law of Diminishing Returns II
* Law of Negative Returns III

TYPES OF PRODUCTION

No. of workers (100)

↓ 1) Total Product (T.P) :

1000 Qty Total output coming out of the factory.

2) Average Product (A.P) = TP / → Labour = 1000/100 = 10 unit

10 unit 10 10

3) Marginal Product (m.P) = ΔTP

10 → 100

1 → 20

→ 20 Qty.

New labour

Law of Variable Proportion

- Short Run Production Function
- law of Diminishing Retum
- Retums to Factor cost

Increasing Returns I

Diminishing Returns II

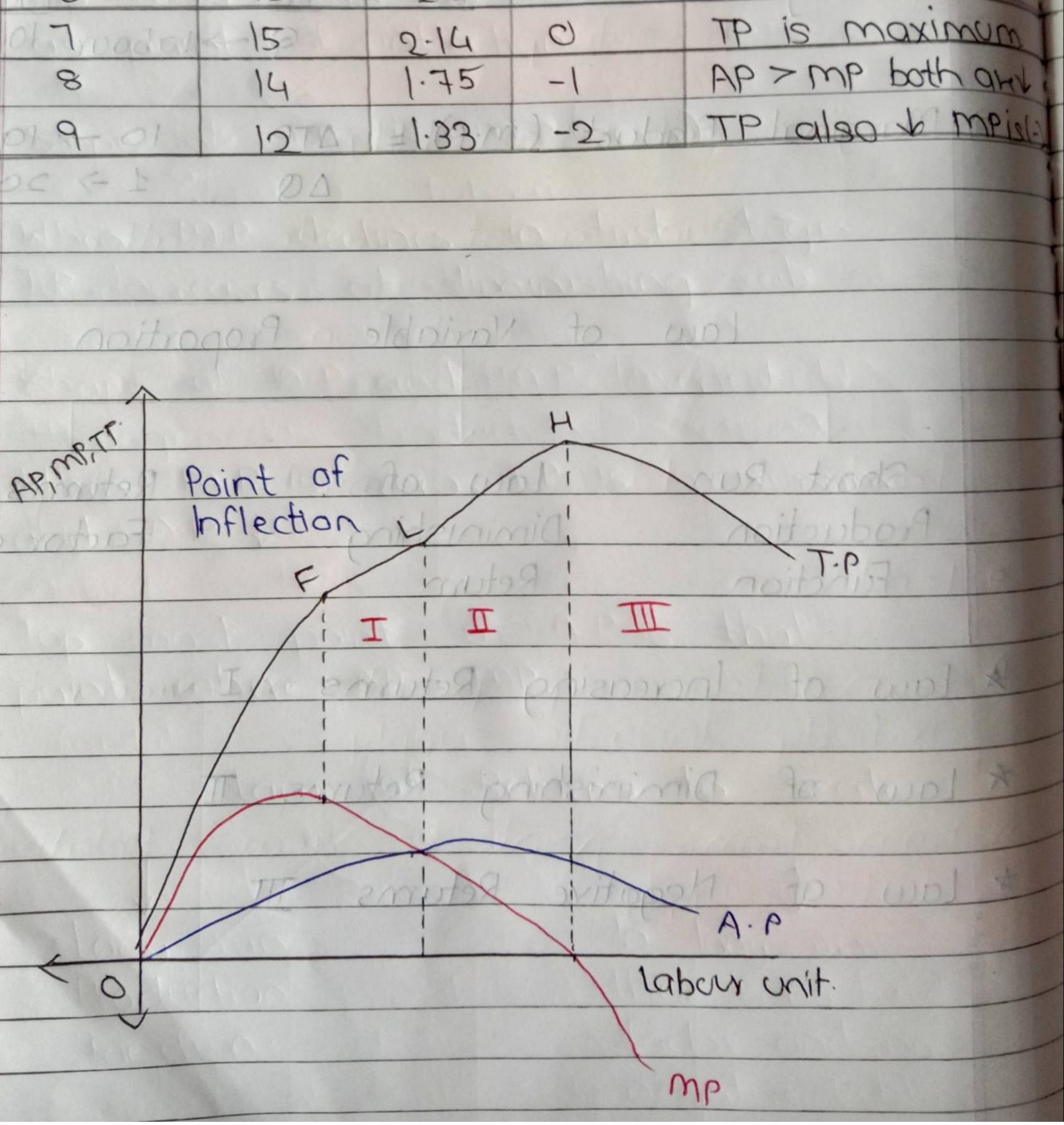
Negative Returns III

MP↑ AP↑ TP↑
MP>AP

MP↓ AP↓ TP↑

MP(-)
AP↓ TP↓

	Labour	TP	AP	MP	Analysis
I	1	2	2	2	A·P & M·P both ↑
	2	5	2·5	3	MP > A·P
	3	9	3	4	TP also Increases
	4	12	3	3	A·P = M·P both ↓
II	5	14	2·8	2	MP < A·P, TP ↑
	6	15	2·5	1	When MP = 0
	7	15	2·14	0	TP is maximum
III	8	14	1·75	-1	AP > MP both are ↓
	9	12	1·33	-2	TP also ↓ MP is (-)



Fixed factor - Machine
Varaible factor - labour.

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* Reasons for Increasing Returns

(1) Optimum utilization of Fixed Machine Factor

(2) Division and Speciliazation of labour.

II Reasons for Diminshing Returns

(1) More variable factor compare to fixed factor.

(2) Imperfect substitution and lack of coordination among variable factor.

III Reasons for Negative Retums.

1) Too excessive increase in variable factor.

2) Variable factor comes in eachother's way leading to wastage.

3) Overutilization of fixed factor.

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POINTS TO REMEMBER (LAW OF PROPORTINATE)

* In 1st step T.P increases at increasing rate till point F and from F to L it increases at diminishing rate.

* Top most point of MP is called as point of inflection.

* Slope of T.P is M.P (zero)

* When M.P declines in first stage, T.P increases at diminishing rate.

* Shape of A.P and M.P 'Inverted U'

* When M.P is zero, T.P is maximum and A.P ↓.

* Top most point of A.P is that point where AP = MP.

Law of Retums to scale.

Long run Production Function.

In long run there is no fixed factor and no negative Retums.

In long run capital and labour Both are variable.

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* Increasing ~~Law~~ returns to scale I
* Constant Returns to scale II
* Diminishing returns to scale III

* Behaviour of output in response to change in the scale.
* Effect of scale on the level of output.
* All factor inputs will be changed in some propation.

Economics of scale (Advantage)

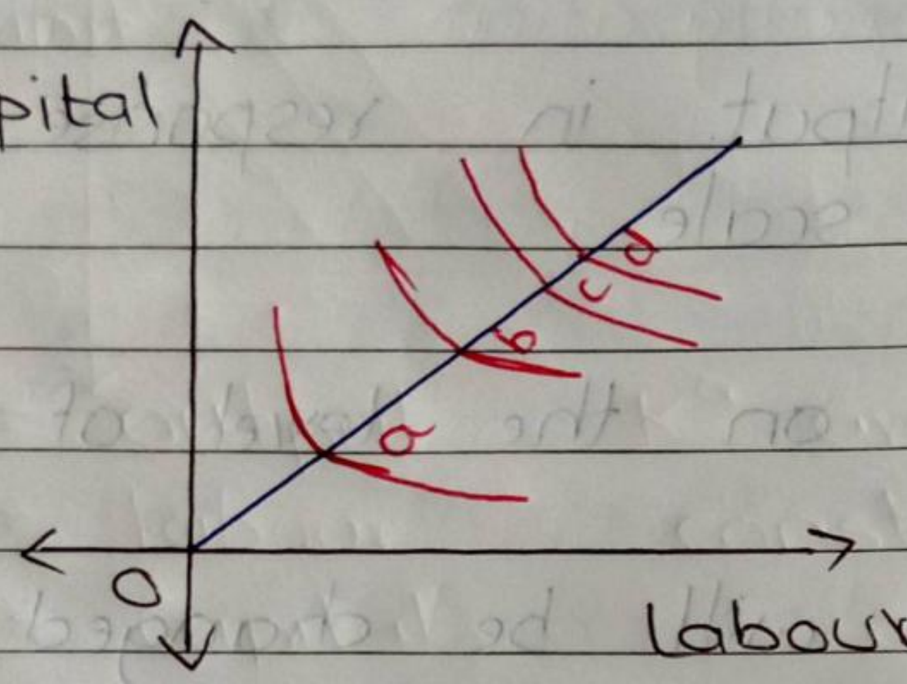
→ Internal → (Impact only firms)
→ External → (Impact whole Industry)

Diseconomics of Scale (Disadv)

→ Internal
→ External

1) Increasing Returns to Scale

Inputs : 10%
Outputs : 50%

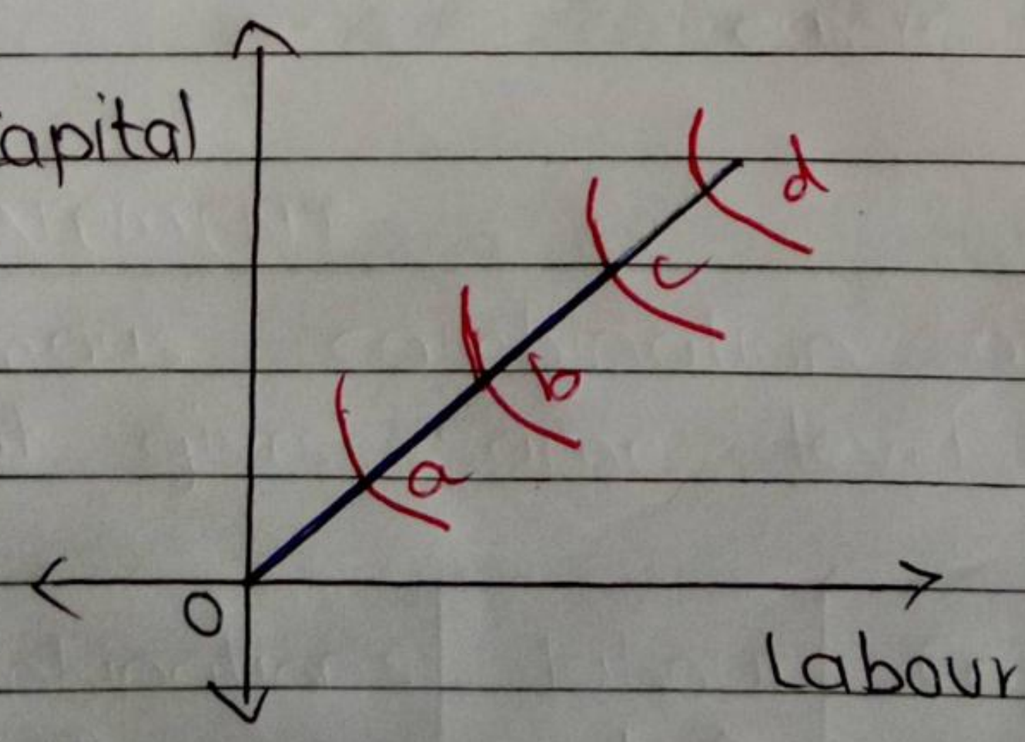


- Production line
- Cost lines/ curves

Economics of scale > Diseconomics of scale

2) Constant Returns to scale (Linear Homogeneous Production Function)

Inputs = 10%
Outputs = 10%



Economics of scale = Diseconomics of scale.

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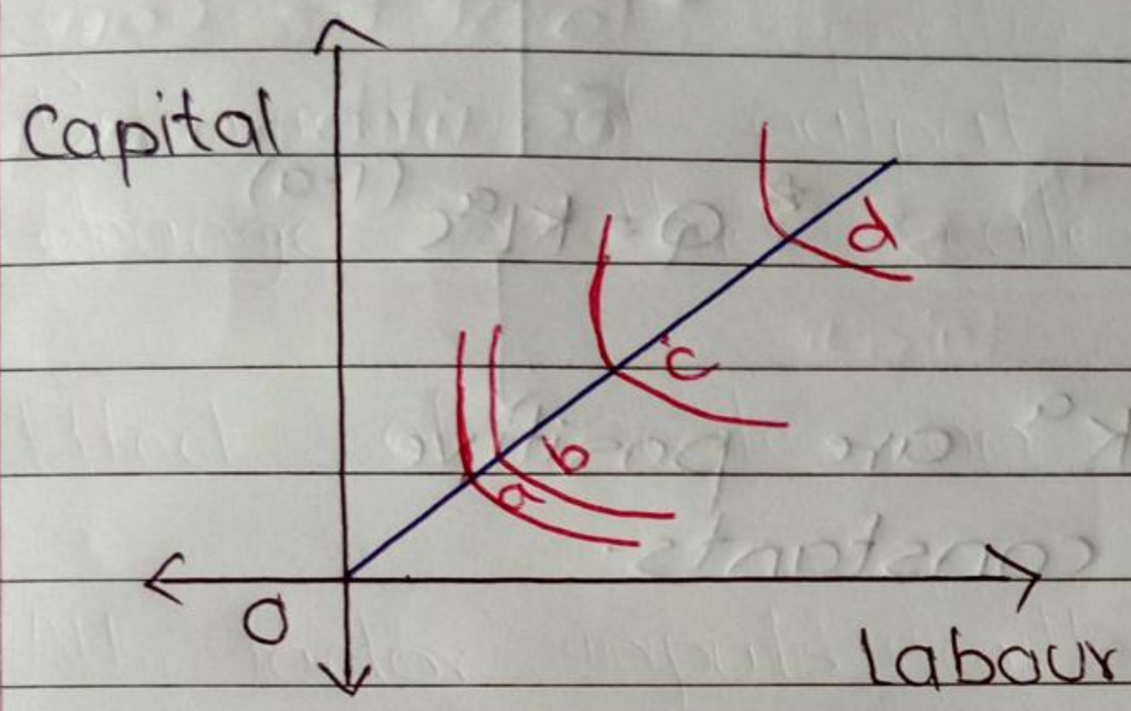
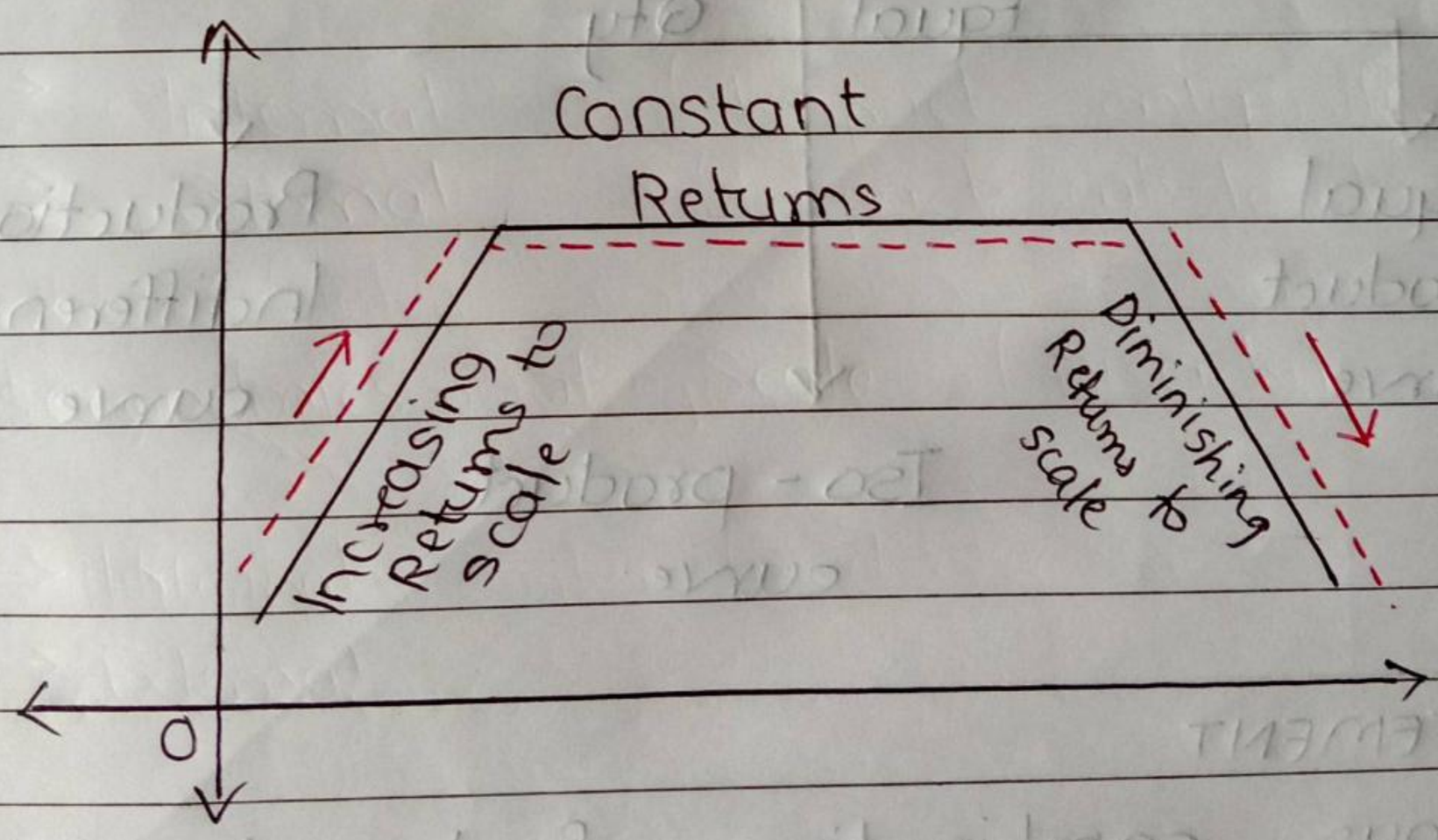
3) Diminishing Return to scale

Input = 10%.
output = 5%.



Diseconomics of scale > Economics of scale.

Input Increases by 10% output also increases but less than 10%



Law of Increasing Returns:
Short Run
Increasing Return to Scale: long Run

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COBB - DOUGLAS PRODUCTION FUNCTION

American Manufacturing unit	1/4th capital 3/4th labour	constant return to scale.

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

Q = output
L = labour
C = Capital
K^a are positive constants.

Iso - quant

↓ Equal ↓ Qty

Equal Product Curve

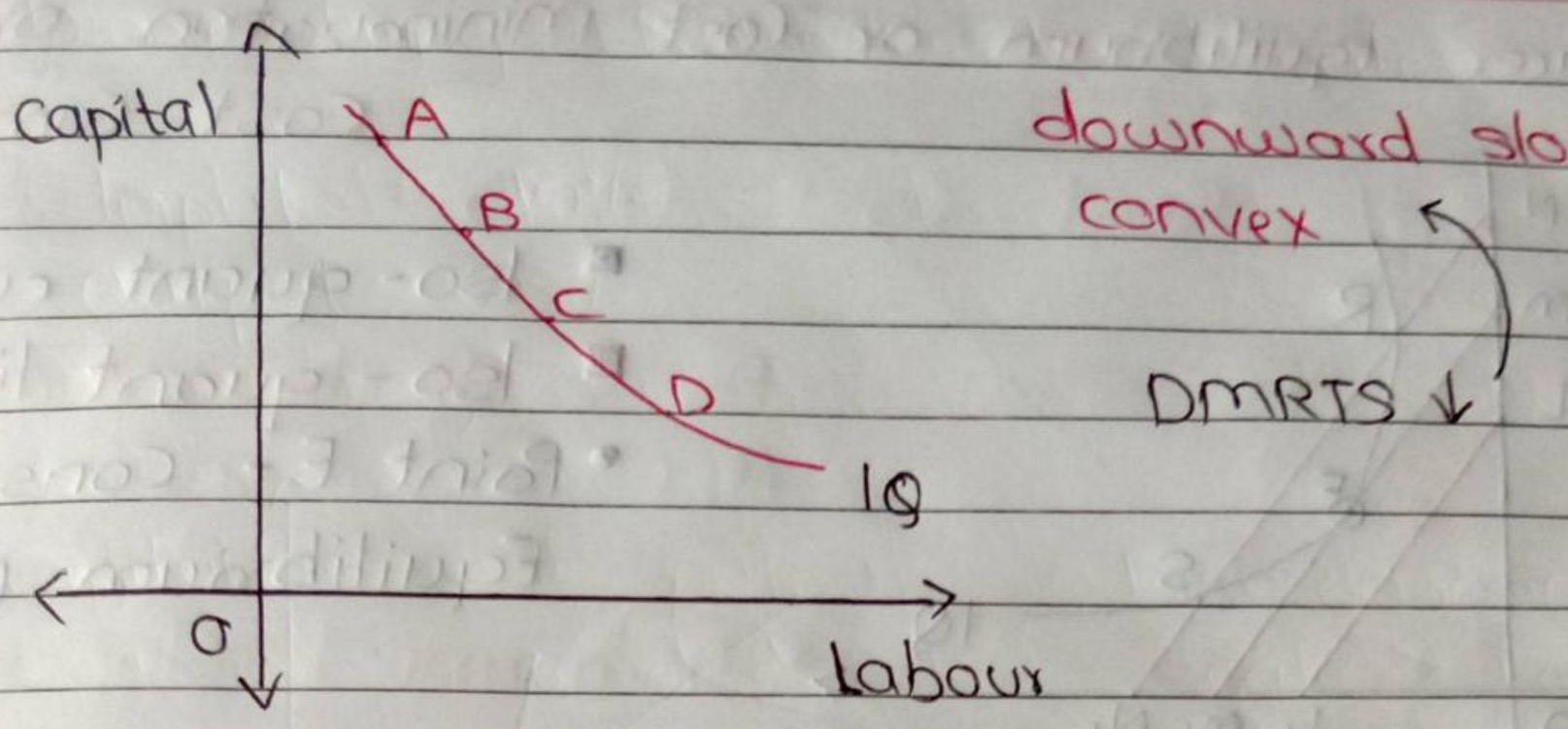
Production Indifference curve

Iso - product curve.

* STATEMENT

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

Combinations	labour	Capital	DMRTS (L,K)
A	1	12	-
B	2	6	6
C	3	4	2
D	4	3	1



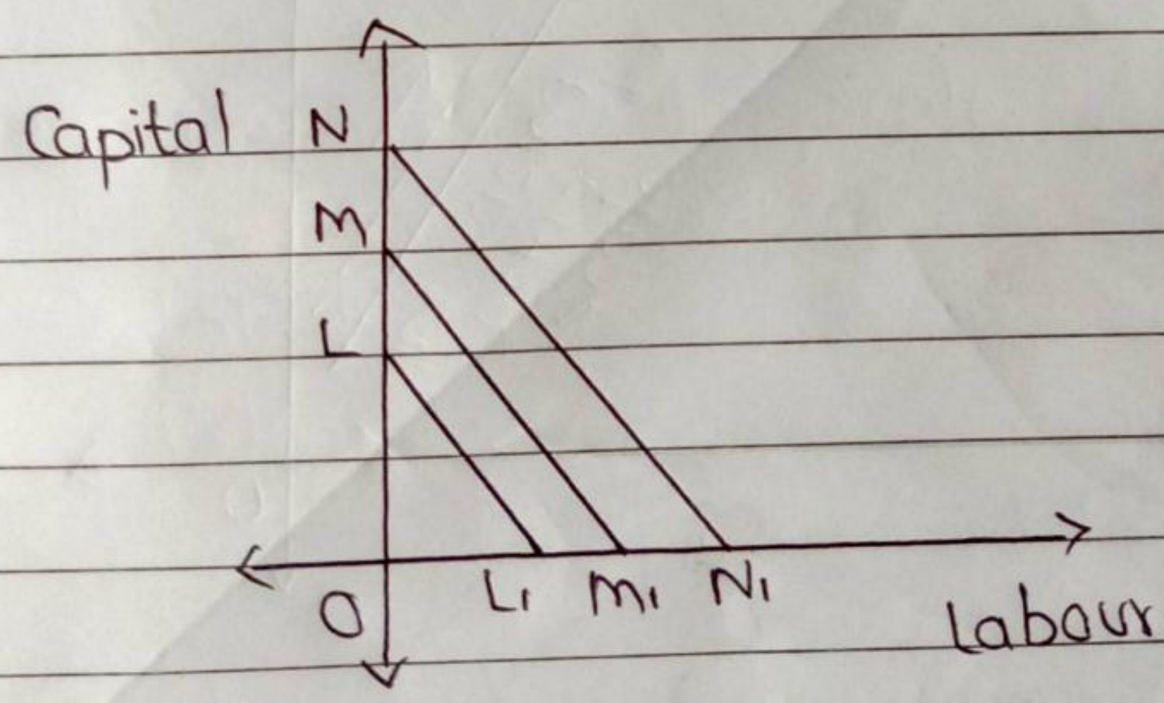
downward slope
convex

DMRTS ↓

Slope of iso-quant $= \frac{MPL}{MPK}$

ISO - COST

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



Slope of Iso-cost

$\frac{W}{r}$

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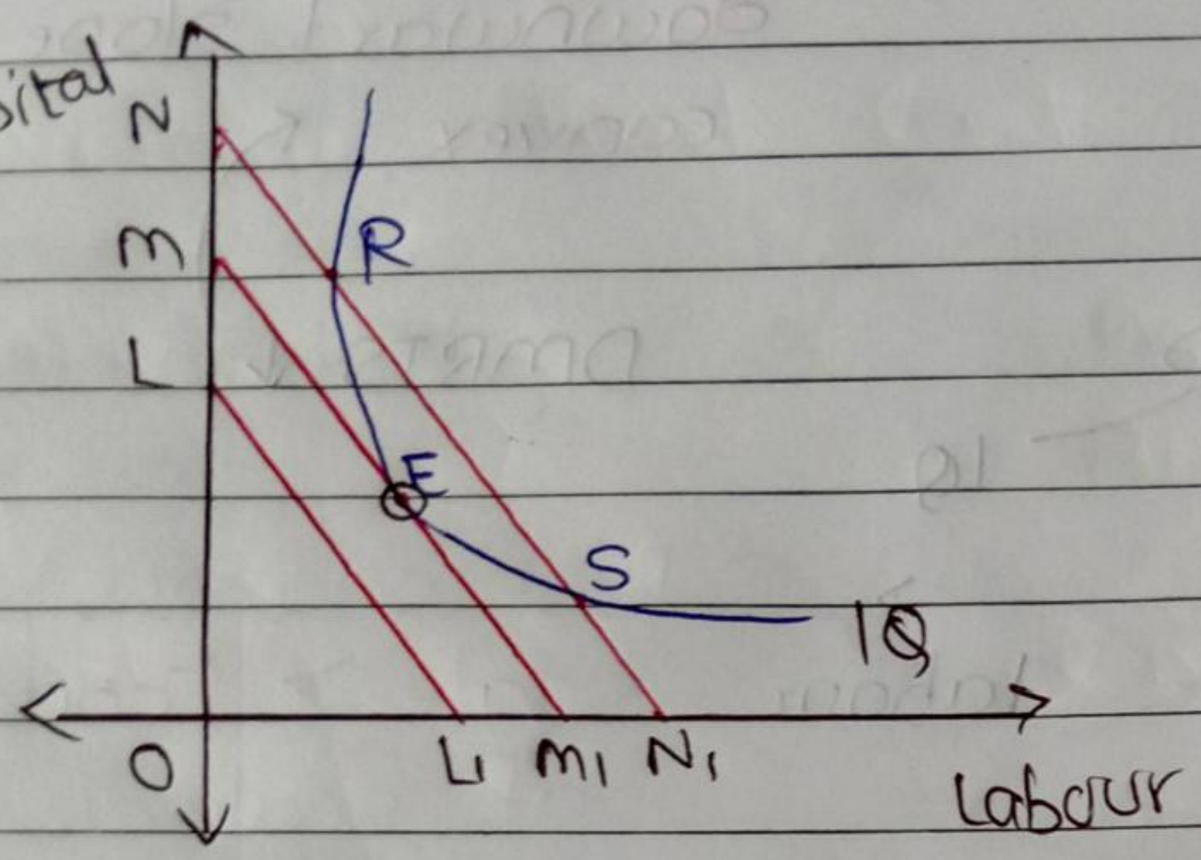
* Producer Equilibrium or Cost Minimization or lea
Cost Combina



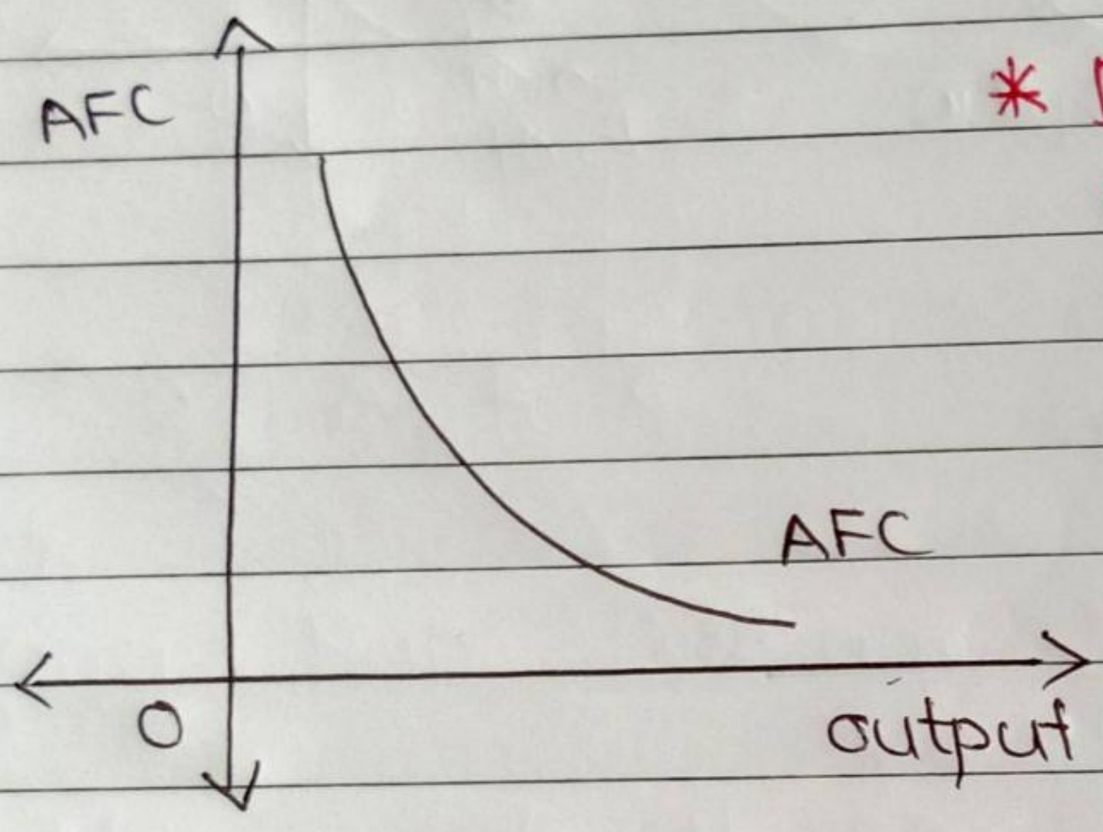
- Iso-quant curves
- Iso-quant line
- Point E - Consume
Equilibrium poin

SHORT RUN AVERAGE COST CURVES

(1) Average Fixed Cost (AFC)

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

As output increase AFC decreases

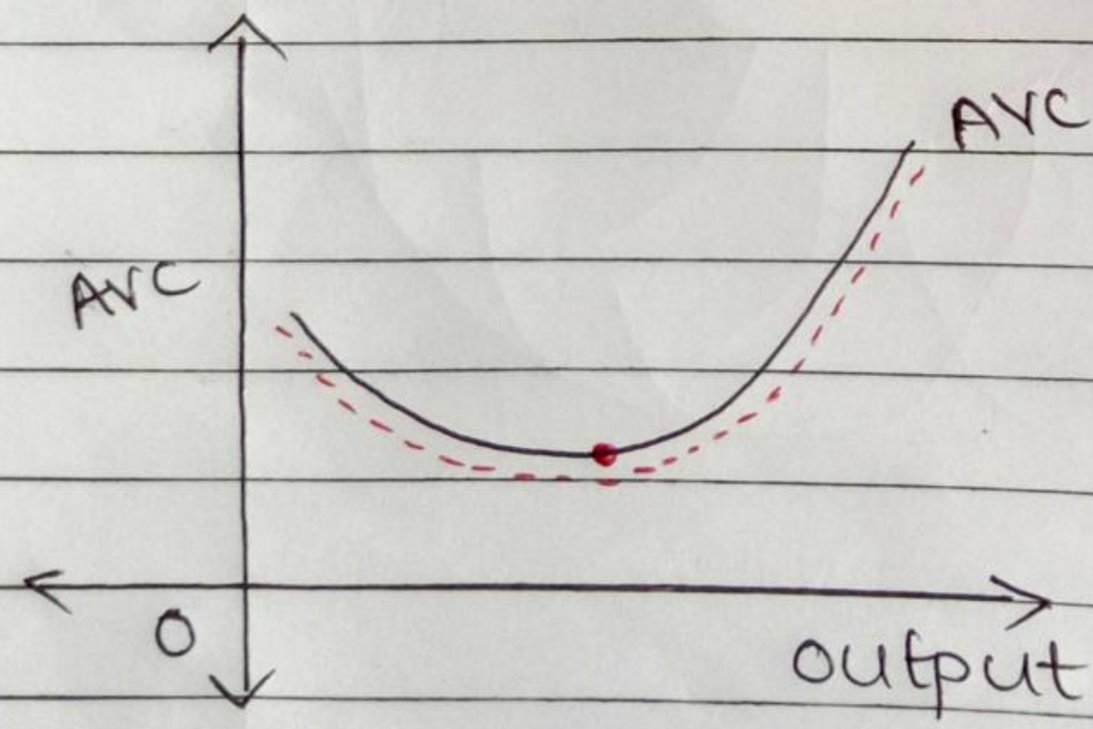


* Downward sloping, convex, Rectangular Hyperbola.

(2) Average Variable cost (AVC)

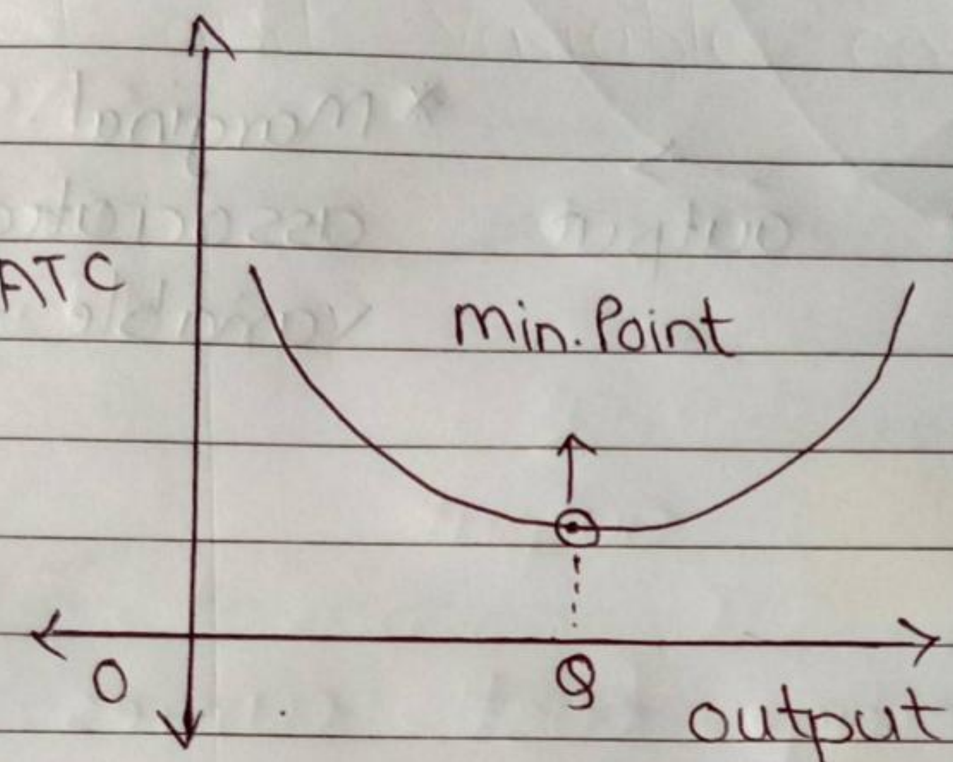
$$AVC = \frac{TVC}{Q}$$

'U' shape cost curve.



3) Average Total cost / Average cost (AC)
(ATC)

$ATC = \frac{TC}{Q}$ or $ATC = AVC + AFC$



U shape derived from law of Variable Proportion and Technology Remains constant

Min. Point concept is only applicable to Average cost curve.

4) Marginal cost (MC):

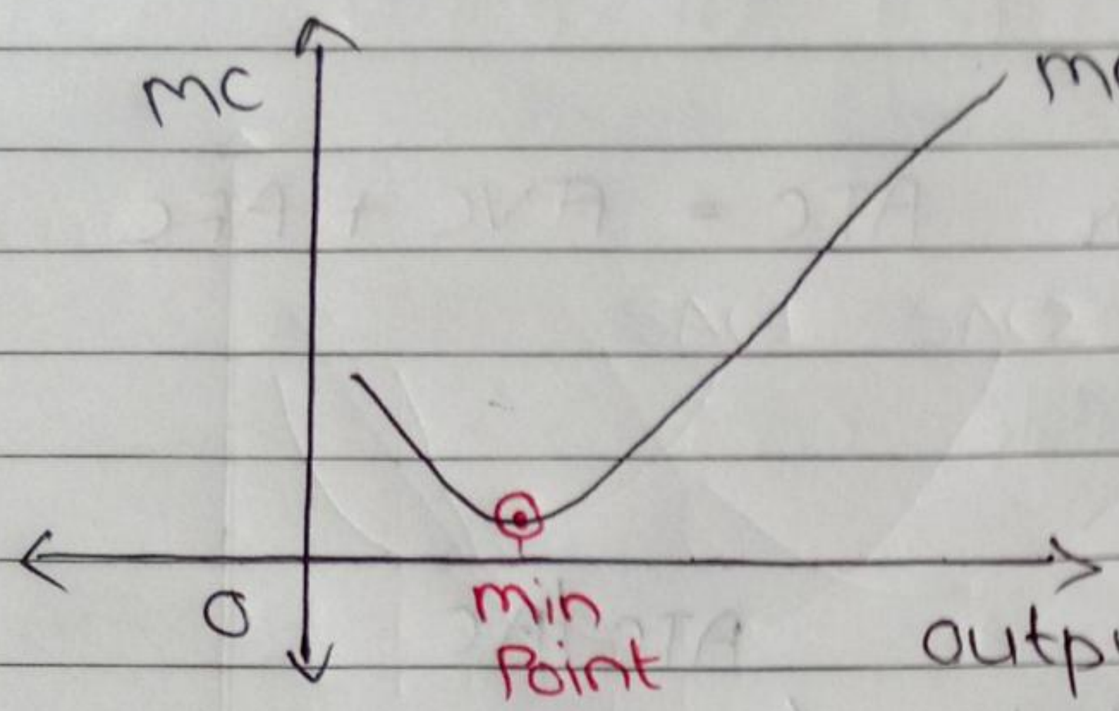
$MC_n = TC_n - TC_{n-1}$

OR

$MC = \frac{\Delta TC}{\Delta Q} \rightarrow$ ⁂

Marginal cost changes due to Total cost.

Eg: Bat → 1 = 1000
2 = 9800
800 → Marginal cost



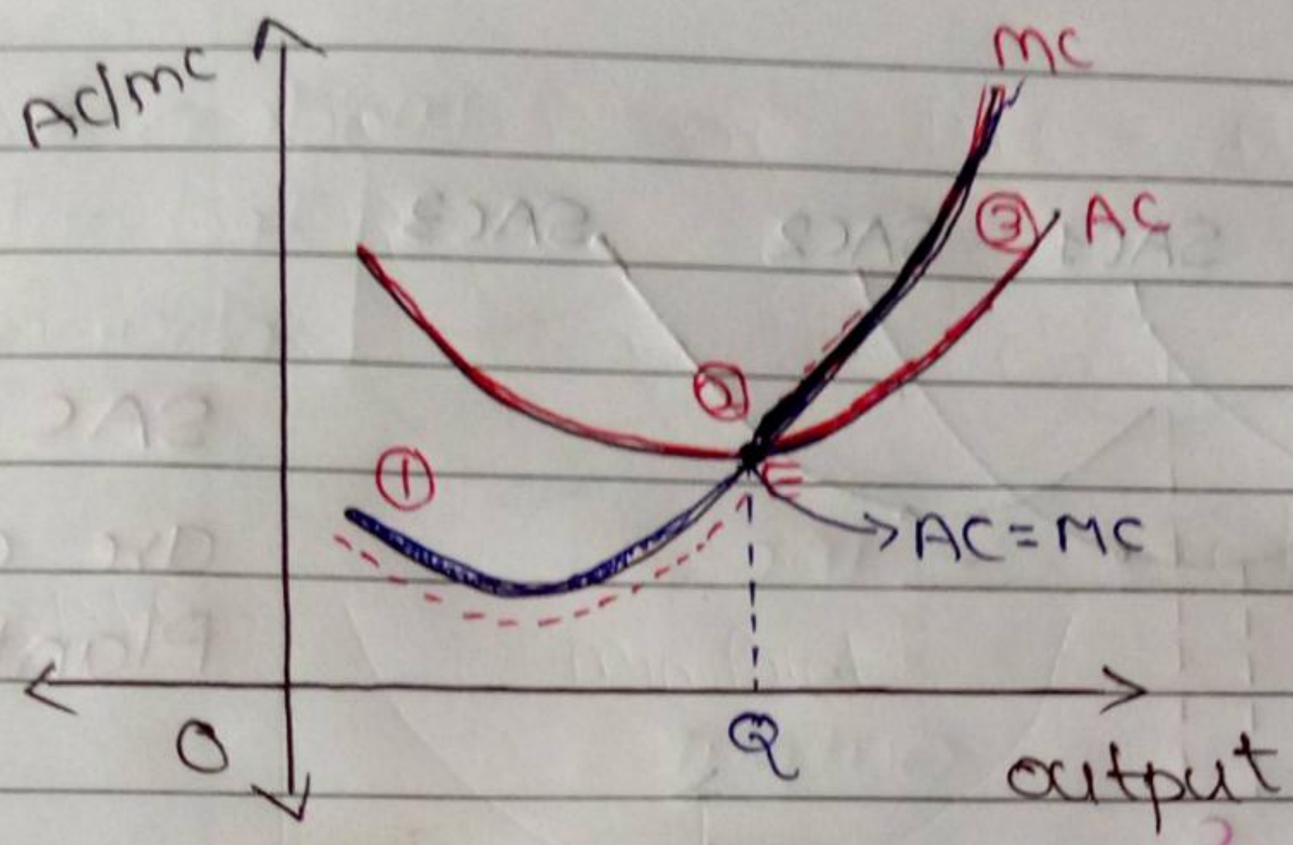
U shaped cost curve.

* Marginal cost Product is associated with variable cost.

Mirror image of MP is MC

vertical distance TVC and TC → TFC

* Relationship Between AC and MC



* Both AC and MC can be derived from TC

* When average cost declines due to increase in output MC < AC
(MC is either falling or rising)

* As output increases AC = MC
MC curve cuts AC curve at its minimum point from below
(Minimum point → Optimum output)

* When AC rises due to increase in output.
MC > AC and both are rising.

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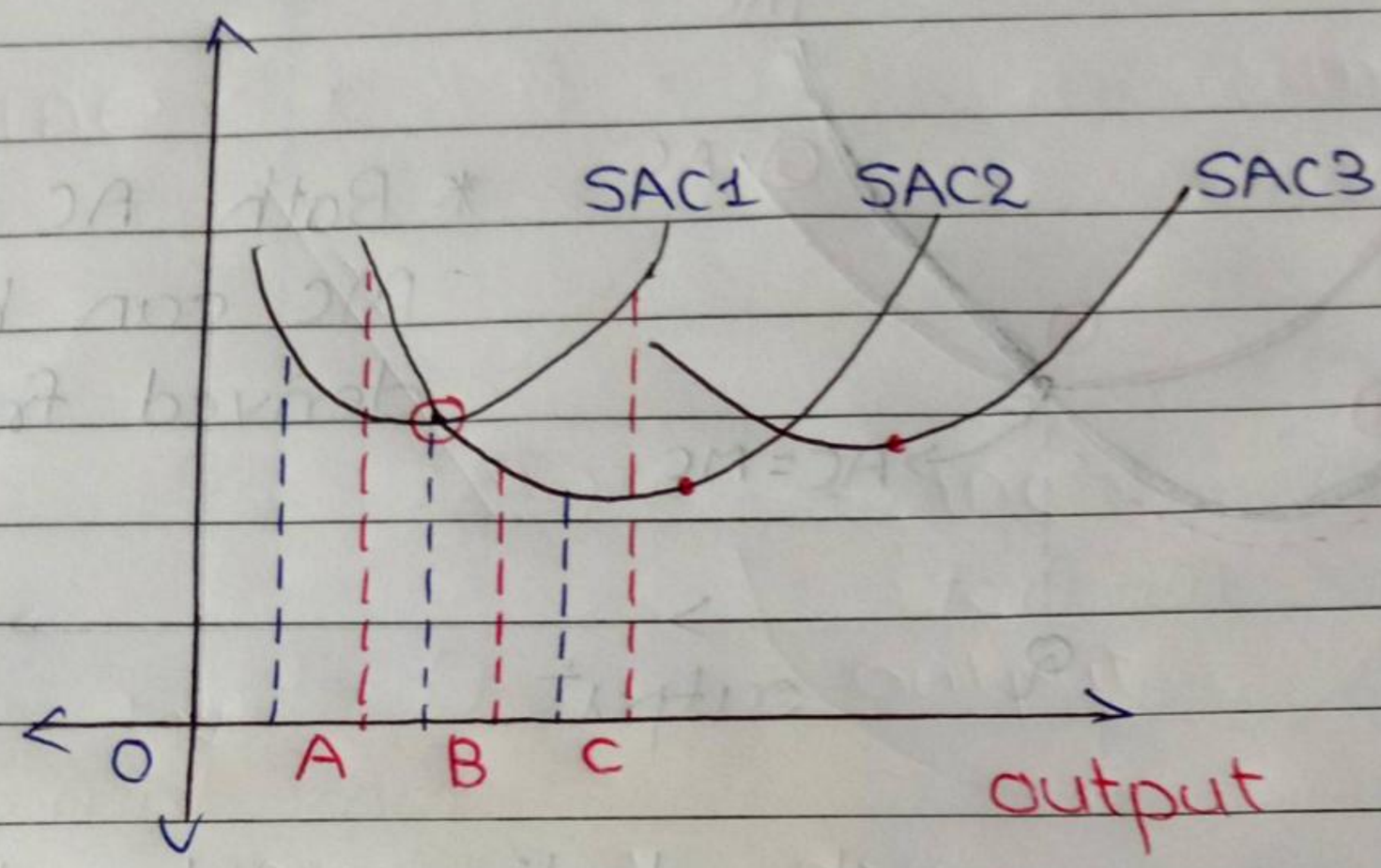
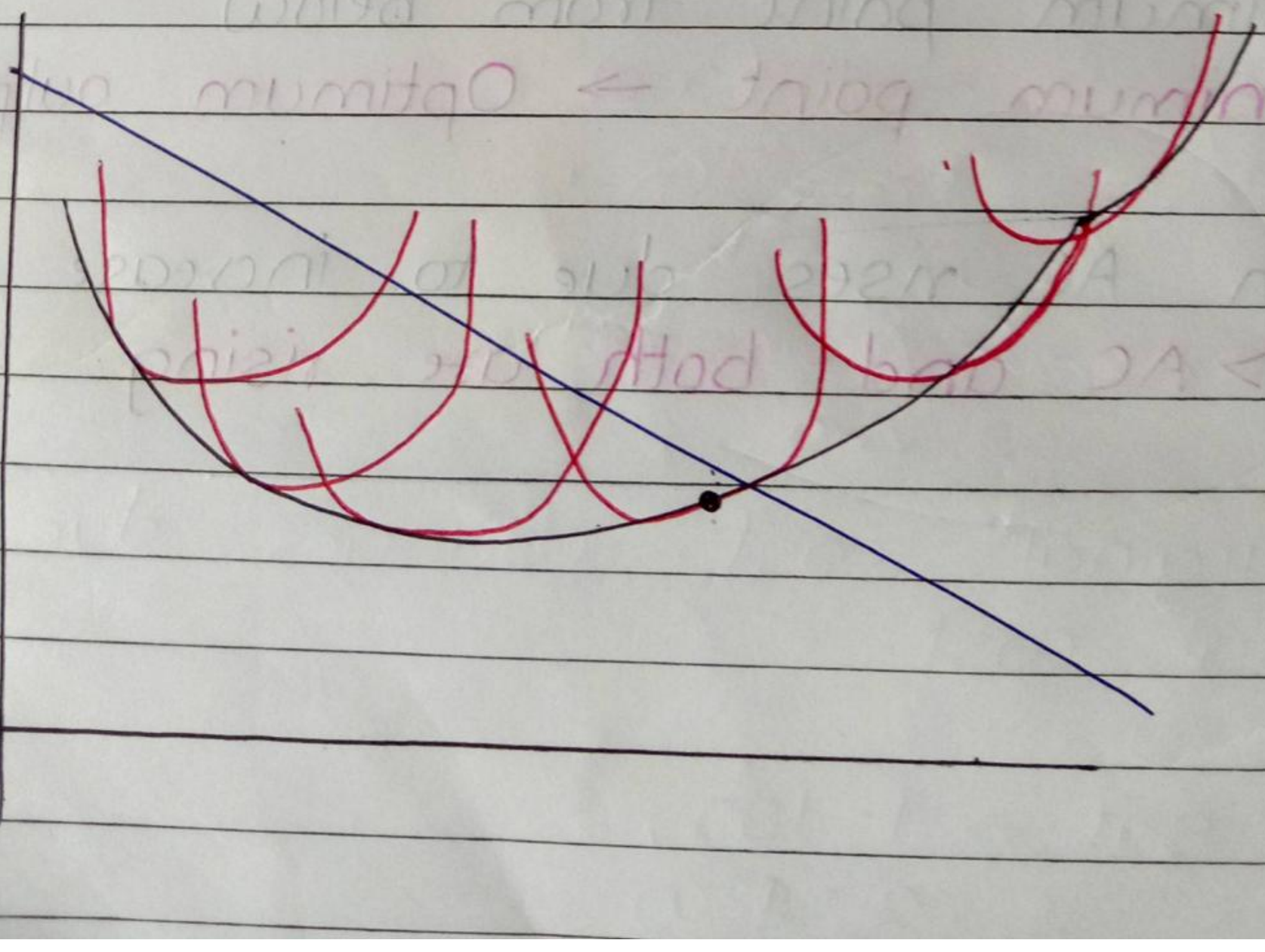
* Short Run Average cost curves.

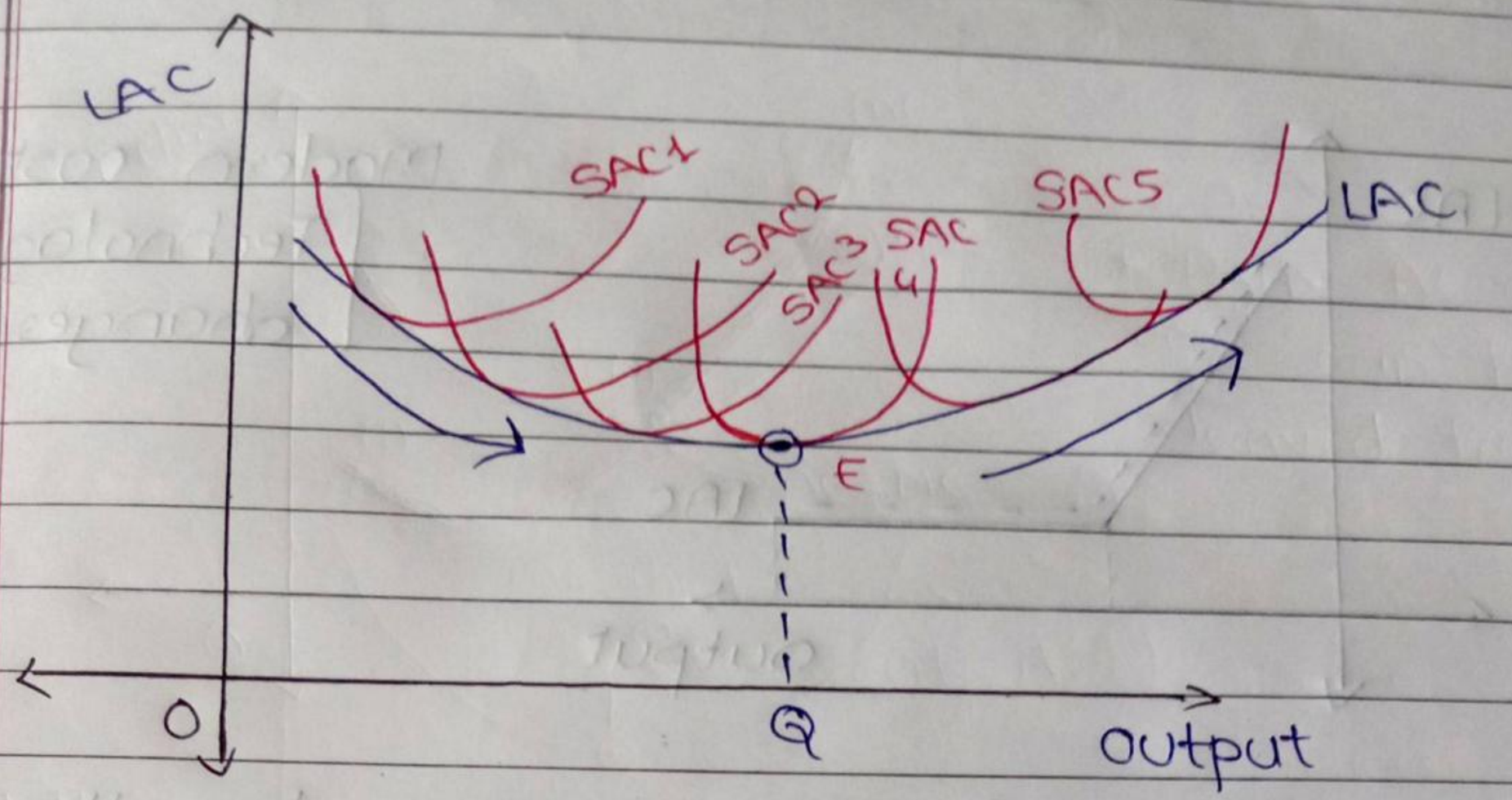


SAC curves are called as Plant curves

* Long Run Average cost curves

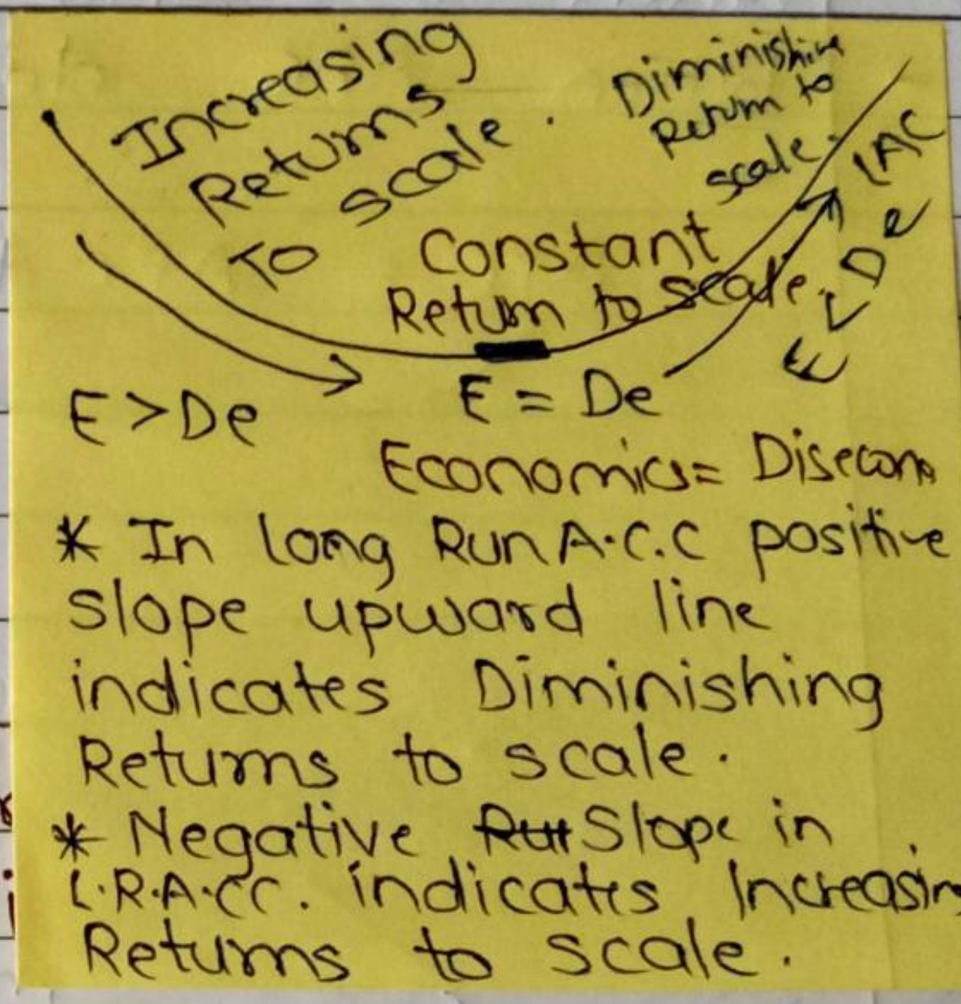
Addition of all SAC curve gives long Run. A.C.C.





* Other names

(1) Planning curve
(2) Envelope curve
(3) Boat shape curve
(4) Saucer shape curve.



* In long Run A.C.C positive slope upward line indicates Diminishing Returns to scale.
* Negative ~~Ret~~ Slope in L.R.A.C.C. indicates Increasing Returns to scale.

* Long run is a per
firms can vary all i

* Thus in long run firm moves from one point/plant size to another.

* It can increase the size of plant to increase its output or can have smaller plant if it has to reduce the output.

* Larger output → Bigger Plant
* Smaller output → Smaller Plant

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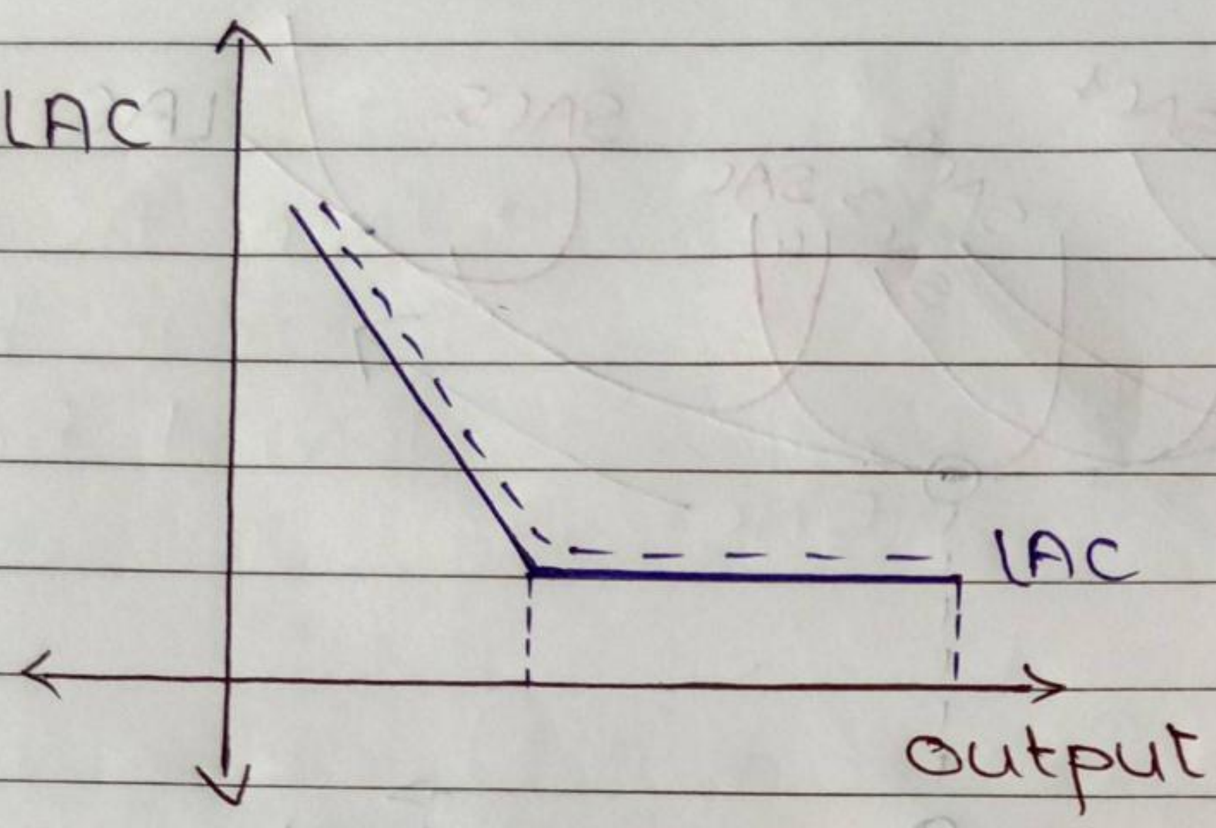
L shape cost curve



Modern cost curve
[Technology changes]

When ATC and AVC comes together?
- When AFC declines / falls

ATC = AFC + AVC