

Q: Why economics is necessary in engineering?

Ans → Actually economics & engineering are very closely related. It will help to develop the very valuable habit of thinking in terms of groups rather than of individuals, especially in matters of service. In other words we can say that Economic has been defined as the social science of earning a living. & "Engineering is the art of directing the great sources of power in nature for the use & convenience of man". It will help the engineering student to see the real ultimate purposes of engineering.

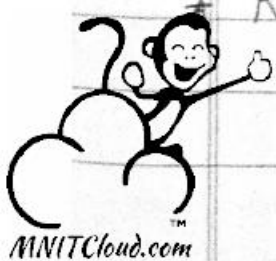
* Engineering → It is the application in which scientific & mathematical knowledge is used to study, experiment & practice in a judicious way, by using forces of nature & resources, economically to help mankind and benefit.

Physical efficiency = $\frac{\text{System's output}}{\text{System's input}}$

Economic efficiency = $\frac{\text{System's benefit}}{\text{System's Cost}}$

Economics → It is a social science which solves the problem of choosing the best possible alternative to fulfill unlimited human wants from limited resources of multiple uses, optimally efficiently.

Rationality is the biggest assumption of economics.



Law of demand -

$$P_x \uparrow / \downarrow$$

$$Q_x \downarrow / \uparrow$$

$$\text{Price effect } \begin{matrix} P \downarrow \\ \uparrow Q \end{matrix} = \text{Income effect } \begin{matrix} \text{(change in purchasing power)} \\ \uparrow Q \end{matrix} + \text{Substitution effect } \begin{matrix} \uparrow Q \end{matrix}$$

Exception of law of Demand -

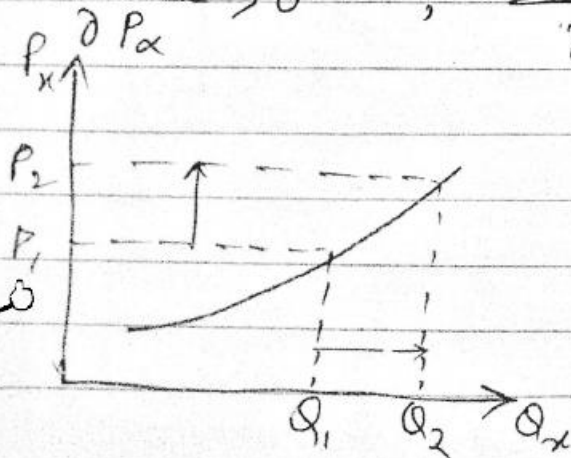
- I Veblen effect — (buy jewellery & gems) $P_x \propto \frac{1}{Q_x}$
- II Snob effect (for backward) $P_x \propto \frac{1}{Q_x}$
- III Demonstration effect - (Show off) $P_x \propto Q_x$ (Exception)



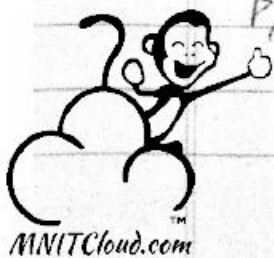
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$$\text{Supply } SS_x = f \left(P_x, P_{\text{raw material}}, \text{Cost of prod}^{(<0)}, \text{Tech.}^{(>0)}, \text{govt. policies}^{(>0)}, \text{weather}^{(>0)} \right)$$

$$\frac{\partial S_x}{\partial P_x} > 0, \quad \frac{\partial S_x}{\partial P_{\text{raw}}} < 0$$



$$\text{At eq}^m \quad DD = SS$$



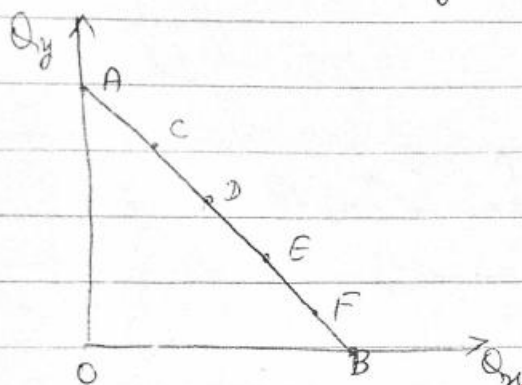
Teacher's Signature

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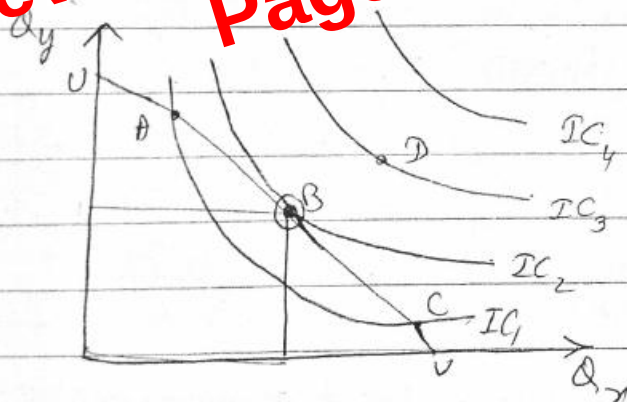
Income line / Budget line -

$$M = Q_x \cdot P_x + Q_y \cdot P_y$$

$$y = \frac{M}{P_y} - \frac{P_x}{P_y} x$$



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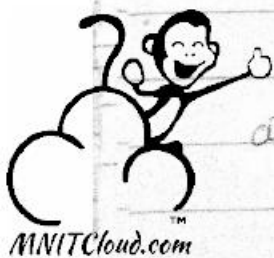


Slope of IC = Slope of BL

$$MRS_x = P_x / P_y$$

Max^m satisfaction at B.at eq^m -

$$MRS_{xy} = \frac{P_x}{P_y}$$



Q: Why 2nd stage is important from producer point of view? Ans - Because both of them give productive returns.

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Three stages of production

($MP = dP/dL$)
Marginal Product

0

5

7

8

11

9

8

6

4

2

0

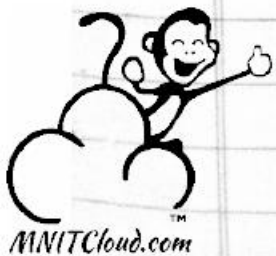
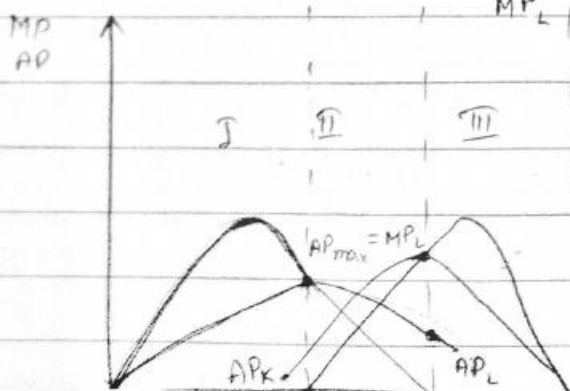
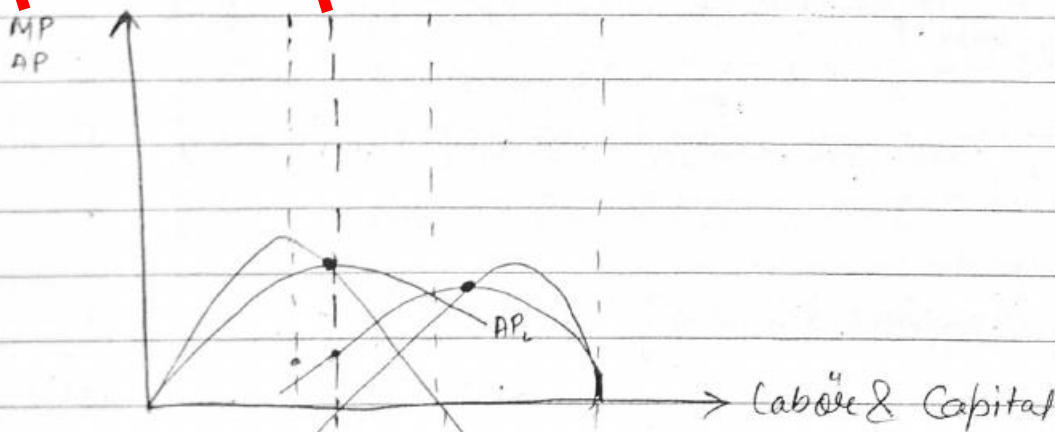
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(i) first stage $\Rightarrow$ Stage of increasing return
(capital employed) Total prod. $\uparrow$ sing. (fixed input: (-ve return)
 $AP \uparrow, MP \uparrow$

(ii) Second stage $\Rightarrow$ Stage of diminishing returns.
(+ve return) $AP \downarrow, MP \downarrow$

(iii) 3rd stage $\Rightarrow$ Stage of negative returns
(input is fully consumed) (variable input) (-ve return)

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normal profit) normal profit is defined as the min rewarded that is just sufficient to keep the entrepreneur supplying their enterprises.

Theory of Cost

If the firm makes more than normal profit then it called super normal profit

Cost $\neq$ Price

this is not by profit

normal (cost) Supernormal

Cost $\Rightarrow$ Expenditure on inputs during the process of production (FOP)

Theory of Cost

Social
V/S
Private

Explicit
V/S
Implicit

Short Run Cost
V/S
Long Run cost

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Shows rising rate of sacrifice.

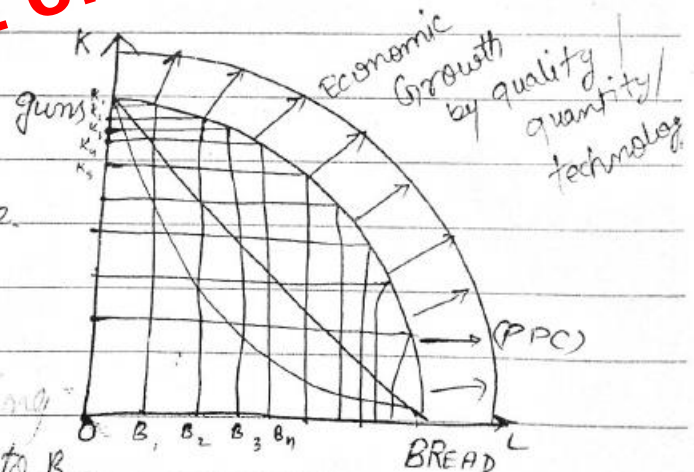
Sacrifice for $B_4 \Rightarrow K_4 - K_5$

$\Rightarrow$ Concave to origin because due to falling marginal rate of transforming A into B.

Opportunity Cost $\Rightarrow$ Sacrifice to gain something is called opportunity cost.

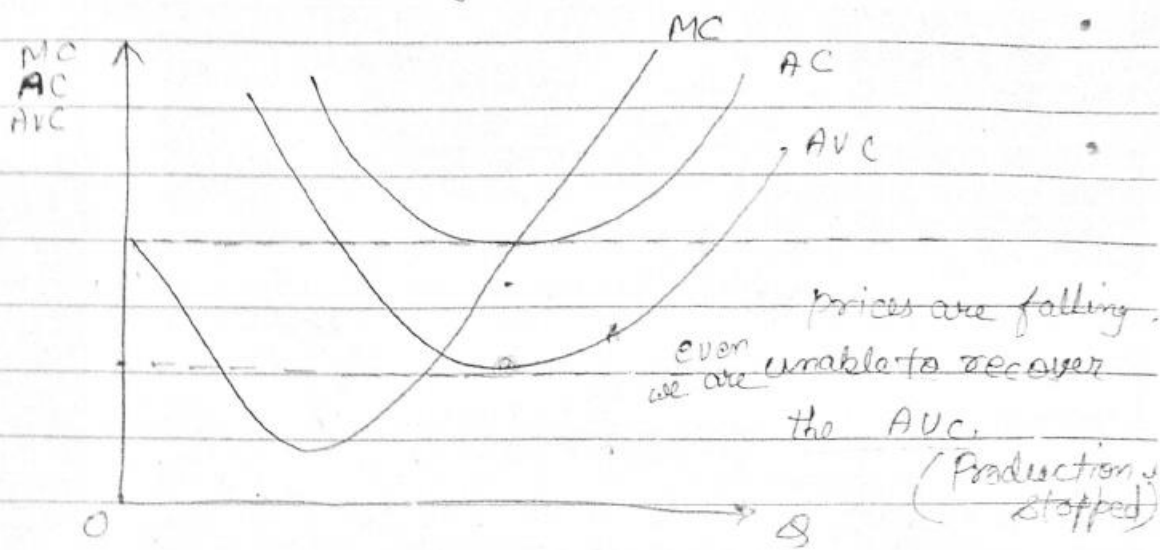
Social Cost = Private + Opportunity

Social Cost $\Rightarrow$ If we are producing industrial goods for society, we sacrifice production of food grains. Hence to produce one thing for society, we are sacrificing some other thing, this is social cost of that thing.



Q: why ~~cost~~ ^{product} curves are inverted u-shaped?
 Q: what is relation b/w cost curve & product curve?
 Q: why cost is inversely related to product curve?

(A)

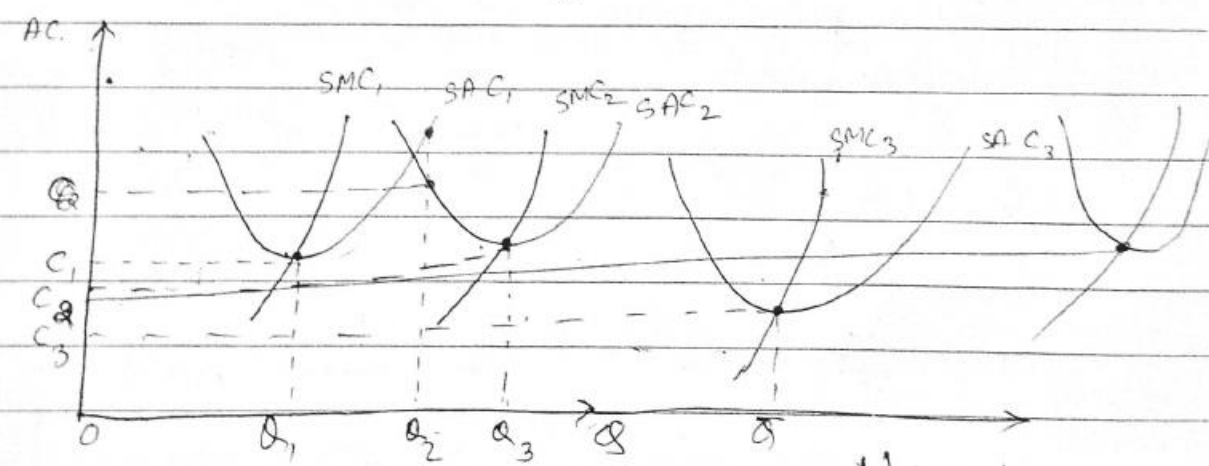


Long Run Cost

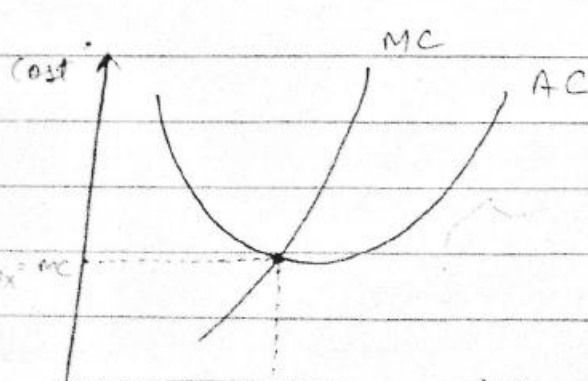
$AC > MC$

All inputs are variable.

Planting for different plants
 Cost curves → different



3rd plant is optimum



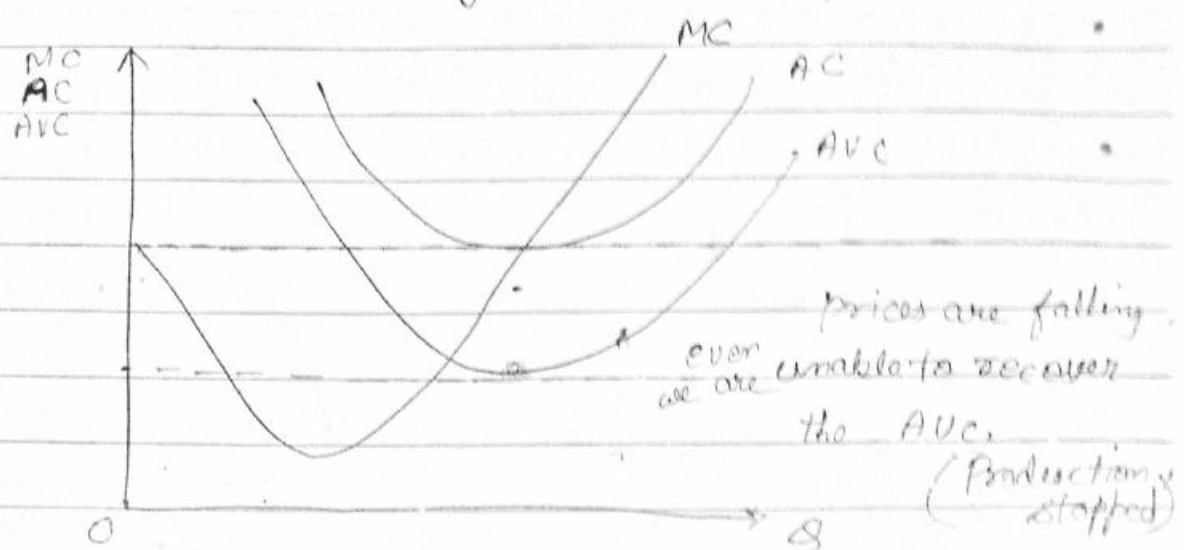
Optimum firm (Plant 1+2+3)

The firm is producing opt plant output



Q: why ~~by~~ ^{product are} cost curves inverted u-shaped?
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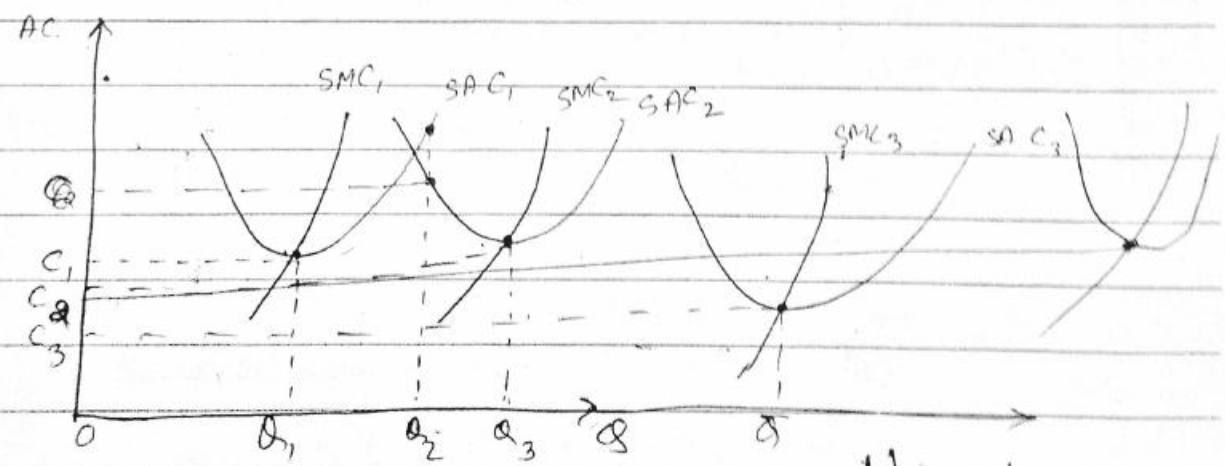
(A)



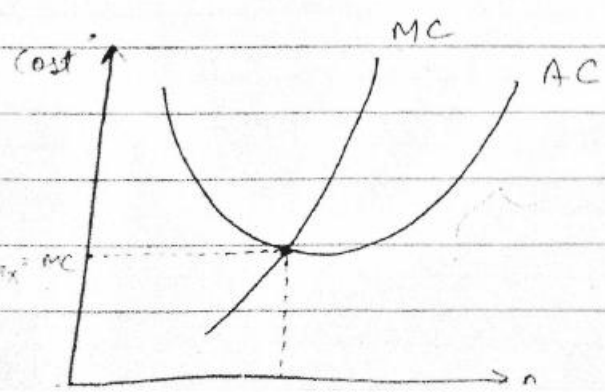
Long Run Cost

All inputs are variable.

Planning for multiple plants
 Cost curves → different



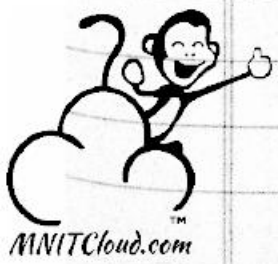
3rd sub plant is optimum



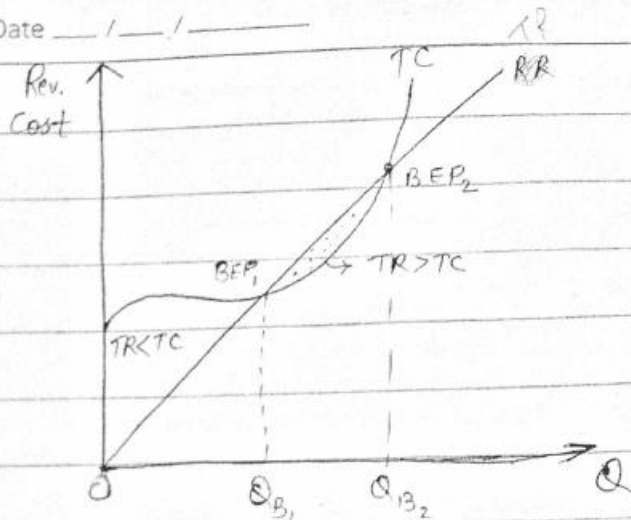
Optimum from Plant 1 + 2 + 3

The firm is producing opt plant output opt plant

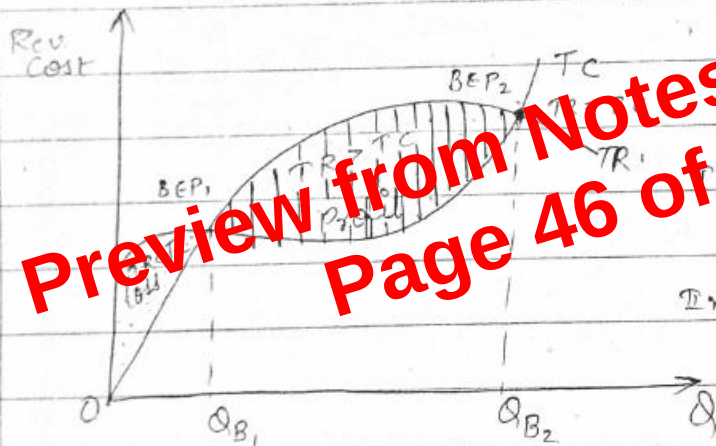
Optimum output



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$$TC = 20 + 30Q - Q^2 + 6Q^3$$



max profit $\Rightarrow$
1st order diffⁿ condition
 $MR = MC$
2nd order diffⁿ condition
 $\frac{d(MR - MC)}{dQ} > 0$

Vertical lines represents level of output profit.

App. of Break even analysis -

- (i) Production Planning $\Rightarrow$ It helps in planning the prodⁿ of items.
- (ii) Cost control $\Rightarrow$ Use to detect insidious upward ~~or~~ creep of cost.

Financial Structure $\Rightarrow$ Understanding behaviour of ~~company~~ projects in relation to output.

