

## UNIT-1 DEMAND ANALYSIS

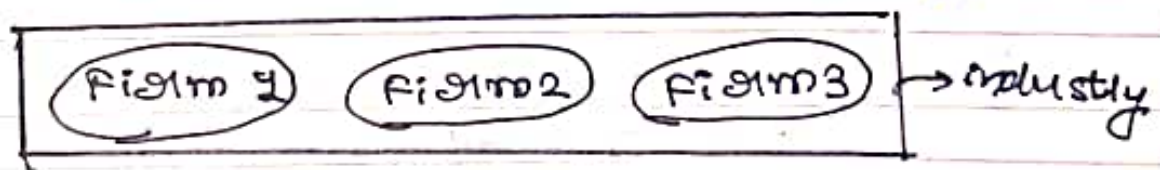
### ① Meaning of Demand

Desire + Ability + willingness  
to pay + willingness to pay  
= Demand

### ② Types of Demand

Individual
Market  
one individual
all customers

### ③ Demand for firm & industry



Demand for firm: quantity of one product

Demand for industry: sum of demand of products of all firms in industry

④

Autonomous and Derived demand  
natural desire arises from demand for other commodities [parent products]

Demand for food  
parent  $\Rightarrow$

Demand for land, fertilizers, and agricultural tools  
derived

⑤

Durable and non-durable goods  
total utility not exhaustible in short run frequent changes

⑥

short-term and long-term demand  
short-term demand long-term demand

⑦

Law of Demand  
 other things remaining constant,  
 $\text{price} \propto \frac{1}{\text{quantity demanded}}$



## ⑧ Demand schedule



Numerical tabulation



quantity demand @ different prices



Individual

market

★ income

★ prices of related goods

★ expectations

★ taste



Sum of all individual demands

## ⑨ Assumptions of Demand Analysis

★ no change in taste & preference

★ income of customer is constant

★ no change in customs, habit, quality of goods.

★ no change in substitute products, related products and product price

★ no complementary goods

⑩

## Demand Function

Individual Demand Function :

$$Q_d x = f(P_x, Y, P_1, P_2, \dots, P_{n-1}, T, E_y, E_p)$$

Market Demand Function :

$$Q_d x = f(P_x, Y, P_1, P_2, \dots, P_{n-1}, T, E_y, E_p, P, D)$$

$P \rightarrow$  population

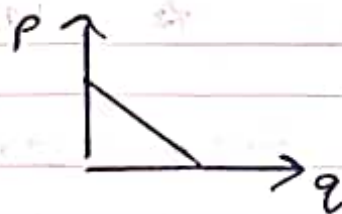
$D \rightarrow$  distribution of consumers

⑪

## Demand Analysis

$$P = a + bq$$

$$\frac{dp}{dq} < 0 \Rightarrow b < 0$$



Reasons for downward slope :

- ★ Law of diminishing marginal utility and Equi-marginal utility
- ★ price effect
- ★ income effect
- ★ substitution effect
- ★ Different uses (eg electricity)



## Factors determining demand

### General

- ★ price
- ★ taste
- ★ preference
- ★ income
- ★ price of related goods

### Additional Factors

- expectation of future
- ★ price
- ★ income

### Market Demand

- ★ population
- ★ social, economic, demographic distribution of consumers

(12)

## Exceptions to law of Demand

### ★ Giffen goods

Inferior goods  $\Rightarrow$  price  $\uparrow$  demand  $\uparrow$

### ★ Veblen Goods

higher price  $\rightarrow$  better

### ★ Expectation of price change in future

price likely to  $\uparrow \Rightarrow$  buy now  
 price likely to  $\downarrow \Rightarrow$  buy later

### ★ Ignorance

Higher priced commodities better than lower priced commodities

### ★ Emergencies

fear shortage  $\Rightarrow$  buy even at high prices

### ★ change in fashion and tastes and preference

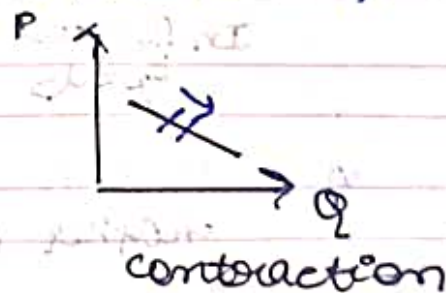
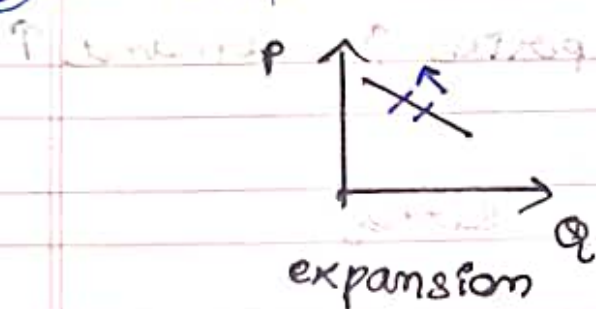
follow the trend  $\Rightarrow$  even if price is high

### ★ Bandwagon Effect

Buy what friends, neighbours or relatives have.

⑬

### Expansion and contraction of Demand



⑭

### Shift in Demand curves

★ no. of buyers : increase, shifts right

★ normal good  $\propto$  income

inferior good  $\propto \frac{1}{\text{income}}$



(15)

Elasticity of Demand

measure of responsiveness

(16)

Price Elasticity:

Measures how much quantity demanded responds to a change in price.

$$\text{Price elasticity of demand} = \frac{\% \text{ change in } Q}{\% \text{ change in } P}$$



though always -ve, we report it as +ve.

calculating %

$$\% \text{ change} = \frac{\text{final} - \text{initial}}{\text{initial}} \times 100\%$$

[ initial & final may change A → B  
B → A ]midpoint method

$$\% \text{ change} = \frac{\text{final} - \text{initial}}{\text{midpoint}} \times 100\%$$

now initial / final doesn't matter

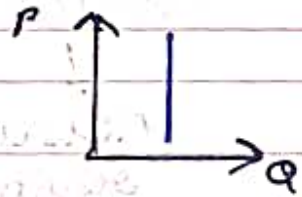
## Types of Price Elasticity of Demand

(a)

Perfectly Inelastic Demand

$$e = 0 \quad \frac{\Delta \% Q}{\% P} = 0 \quad Q = \text{constant}$$

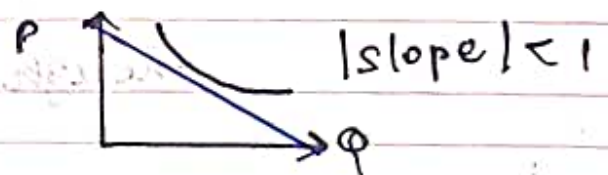
Quantity Demanded  
is constant.



(b)

Inelastic Demand

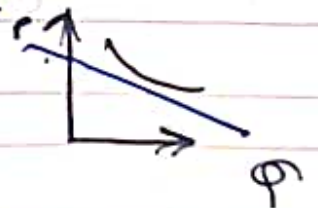
$$0 < e < 1 \quad \% Q < \% P$$



(c)

Unitary Elastic Demand

$$e = 1 \quad \% Q = \% P \quad |\text{slope}| = 1$$

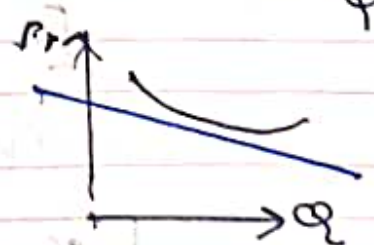


(d)

Elastic Demand

$$e > 1 \quad |\text{slope}| > 1$$

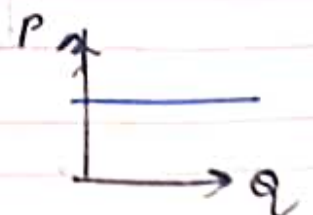
$$\% Q > \% P$$



(e)

Perfectly Elastic Demand

$$e = \infty \quad \% P = \text{constant}$$





## Determinants of Price Elasticity of Demand:

### Inelastic

- \* necessity
- \* short time
- \* smaller close substitutes

### Elastic

- \* luxury
- \* longer time
- \* larger close substitutes

(17)

## Elasticity and Total Revenue

$$TR = P \times Q$$

Amount paid by buyers and received by sellers.

"Area under PQ curve."

Eg:  $e > 1$  %change in  $Q >$  %change in  $P$   
 fall in revenue from lower  $Q >$  increase in rev. from higher  $P$

so revenue falls ↓

[similar analysis done]

### 13) Income Elasticity of Demand

$$\text{Income Elasticity of Demand} = \frac{\% \text{ change in } Q}{\% \text{ change in } I}$$

#### types of Goods

Normal Goods

\*  $IE > 0$

\* Income  $\uparrow$   
Quantity Demand  $\uparrow$

Inferior Goods

\*  $IE < 0$

\* Income  $\uparrow$   
Quantity Demand  $\downarrow$

### 14) Cross Price Elasticity of Demand

$$\text{Cross - Price Elasticity of Demand} = \frac{\% \text{ change } Q \text{ for } G_1}{\% \text{ change } P \text{ for } G_2}$$

substitutes

$CE > 0$

Tea price  $\uparrow \Rightarrow$   
coffee demand  $\uparrow$

complements

$CE < 0$

computer price  $\uparrow \Rightarrow$   
Demand software  $\downarrow$

## ⑮ Promotional Elasticity of Demand. (Advertisement elasticity)

$$\text{Promotional elasticity of demand} = \frac{\% \text{ change in } Q}{\% \text{ change in advertisement expenditure}}$$

## DEMAND FORECASTING

### ① Forecasting

↓  
Use past demand information  $\Rightarrow$  predict future demand

### ② why is forecasting important?

Demand  $\Rightarrow$  uncertain  
uses :

- ★ strategic planning
- ★ finance and accounting
- ★ marketing
- ★ Production and operations



### ③ General characteristics :

- \* Accuracy → groups / families  
→ shorter time period
- \* error estimate
- \* calculated demand is better

### ④ classification of demand forecasts

Active vs Passive.

changes like  
quality, size,  
price

no change in product

short-run vs long-run

1 year

more than 1 year

company vs industry

products of  
certain firm

[firm specific]

products of all  
firms in industry

Durable

vs

Perishable

durable

goods

perishable

goods

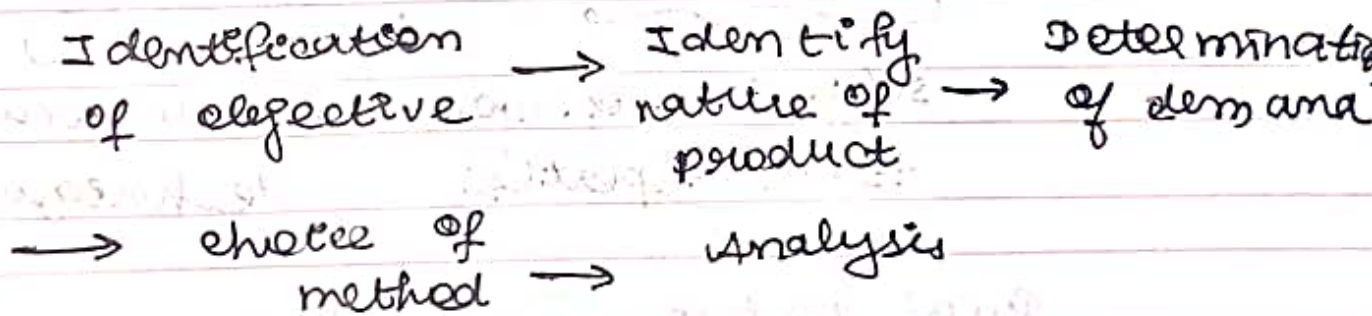
Micro-level

vs

Macro-levelcompany or  
industry  
forecastingeconomic environment  
business condition  
in the country  
as a whole

⑤

Steps in Demand Forecasting



⑥

key issues in forecasting

↓

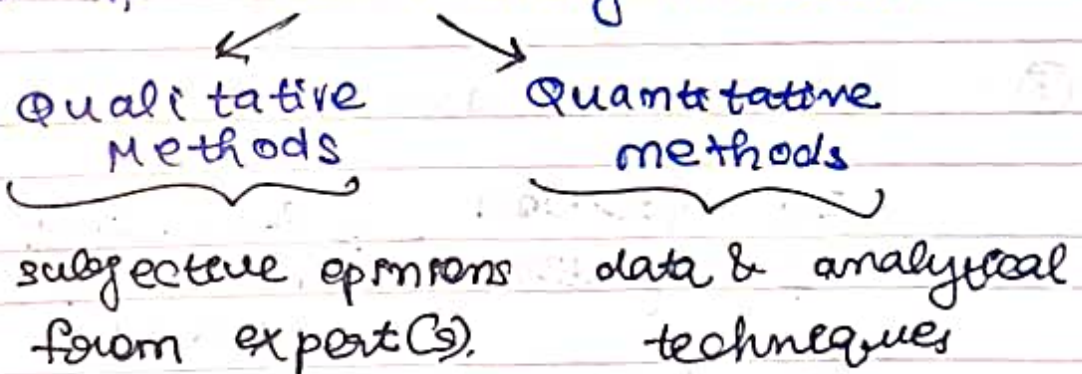
History is not a perfect predictor  
of the future → past predicts  
the future is not always true

what to consider when looking at past demand data?

Data = Historic Pattern + Random variation

✓ Trends    ✓ seasonality    ✓ cyclical elements  
✓ Autocorrelation    ✓ Random variation

## ⑦ Types of Forecasting Methods



Qualitative methods :

### (a) consumer's opinion survey

census : limited buyers

sample survey : large no. of buyers

purposeful sampling → random sampling



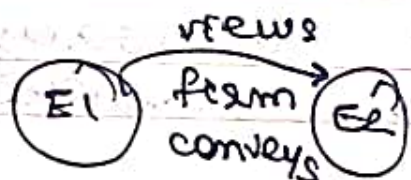
Limitations :

- \* customer opinion surveys are not perfectly reliable
- \* expensive and time-taking

(b) Expert opinion method (Delphi method)

Experts' opinion taken.

✓ Anonymity



continued till a common line of thinking emerges.

(c) collective opinion survey (sales force opinion survey method)

opinions of sales team taken

Less expensive, but more reliable

Limitations :

- \* ambitious salesman overestimate
- \* sceptic salesman underestimate

End-use method:

Demand for final goods  $\Rightarrow$  demand for intermediate goods

⑧

Pick forecasting model

- \* data availability
- \* time horizon for forecast
- \* accuracy
- \* resources

⑨

Time series: Moving average

Use last  $t$  periods  $\Rightarrow$  predict demand @  $t+1$

simple  $\swarrow \searrow$  weighted

demand @  $(t+1) \Rightarrow$  simple linear combination of past demands

Simple Moving Average

$$F_{t+1} = \frac{A_t + A_{t-1} + \dots + A_{t-n}}{n}$$



## weighted Moving Average

$$F_{t+1} = w_t A_t + w_{t-1} A_{t-1} + \dots + w_{t-n} A_{t-n}$$

$$w_t + w_{t-1} + \dots + w_{t-n} = 1$$

$w \rightarrow$  importance given to each period

### Importance of WMA

$\hookrightarrow$  ability to give more importance to recent, without losing past

How to choose weights

- \* importance of past data
- \* known seasonality

⑩

### Trend

$\hookrightarrow$  sufficient past data available

### linear regression

- \* fitting a straight line to data
- \* explaining change



$$\text{dependent variable} = a + b \times \text{independent variable}$$



Best line

→ minimizes

Predicted line:  $Y = a + bx$ error:  $e_i = y_i - \hat{y}_i$ 

observed

predicted

Least squares Method of linear Regression

↓  
min  $\sum e_i^2$ 

(12)

Mean Forecast Error (Bias)

↓

measures accuracy

$$MFE = \frac{\sum_{i=1}^n A_i - F_i}{n}$$

more +ve / -ve MFE  
 ⇒ worst performance  
 [biased forecast]

[A → actual  
 F → forecasted]

Mean Absolute Deviation

↓

measures accuracy

$$MAD = \frac{\sum_{i=1}^n |A_i - F_i|}{n}$$

higher MAD ⇒  
 worse performance

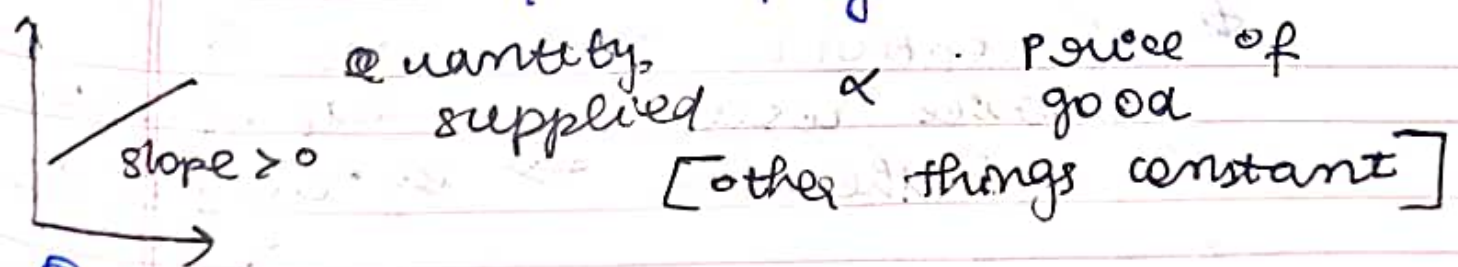
$\sigma_e = 1.25 \text{ MAD}$   
 (normal distribution)

## ⑬ criteria for good demand forecasting

- ★ time frame
- ★ pattern of data
- ★ cost of economy of forecasting
- ★ accuracy desired
- ★ availability of data
- ★ plausibility/ease of understanding
- ★ durability
- ★ flexibility

## SUPPLY

### ① Law of supply



### ② supply schedule

↓  
relationship between  
price of good & quantity supplied  
[ ↑ ↑ ]



③ Individual vs Market supply  
 one seller sum of supplies of all sellers in the market

④ Determinants of supply

★ price.

★ cost of production, including inputs like labour, capital and land and technology

★ prices of related products

⑤ Exceptions to the law of supply

★ Exceptions of price fall  
 price will clear off stock further fall  $\Rightarrow$  by selling it at  $<$  current market price

★ sellers in need of cash.

seller needs cash  $\Rightarrow$  may sell at a price below the market price



★ whole leaving the industry  
firms want to shut down  $\Rightarrow$  may sell below  
average cost of production

★ Agricultural output  
natural & seasonal factors

★ Backward sloping supply curve  
of labour

Higher wage rate.

↓  
Reduce work & retain salary THAN Increasing work & increase salary

⑥ change in supply vs change in  
Quantity supplied.

change in price  $\Rightarrow$  change in quantity  
(movement along the curve)

change in costs, input prices,  
technology, prices of related goods  
 $\Rightarrow$  change in supply  
(shift of curve)

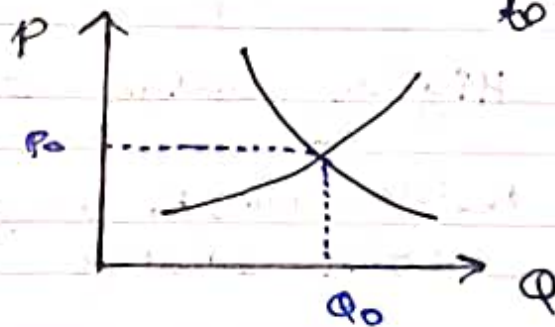
## ⑦ Market Equilibrium

↓  
interaction b/w buyers and sellers

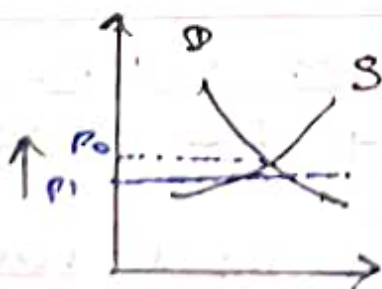
Equilibrium

\* Quantity supplied = Quantity demanded

\* no tendency for market price to change

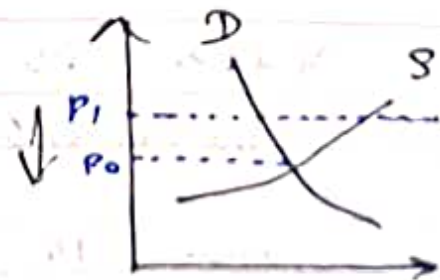


## ⑧ Market Disequilibrium



excess demand

$P \uparrow$  till eqbm



excess supply

$P \downarrow$  till eqbm



## ⑨ Increases in Demand & Supply

Higher demand  $\rightarrow$  \* higher  $E_P$   
 \* higher  $E_Q$

Lower demand  $\rightarrow$  reverse

Higher supply  $\rightarrow$  \* lower  $E_P$   
 \* higher  $E_Q$

Lower supply  $\rightarrow$  reverse

## Decreases in Demand & Supply

reverse case scenarios

## UNIT-2, PART I THEORY OF PRODUCTION

①

### Theory of Production

- ★ Production: process, creates / adds value or utility.
- ★ Inputs converted outputs  
[Land, Labour, capital, technology] [soap, cement, car, etc]

②

### Production Function

$$Q = f(\text{Land, Labour, capital, organization, technology, etc.})$$

③

### Factors of Production

- ★ Land: surface, mineral, air, rivers, sea.
- ★ Labour: mental / physical effort
- ★ capital: man-made goods used
- ★ organization: Entrepreneur / coordinator of all factors



## ④ Inputs : Fixed vs variable

### FIXED

- \* same in short period
- \* same amount @ any output level
- \* fixed cost

### VARIABLE

- \* factors of production vary acc. to output volume
- \* variable cost

(In long run, fixed inputs become variable)

## ⑤ various concepts of Production

Total Product : Total quantity of output produced

Average Product :  $\frac{\text{Total Product}}{\text{unit of variable factor input}}$

Marginal Product :  $\frac{\text{change in output}}{\text{change in input}}$

(TP), (AP), (MP)

## ⑥ Laws of Production Function

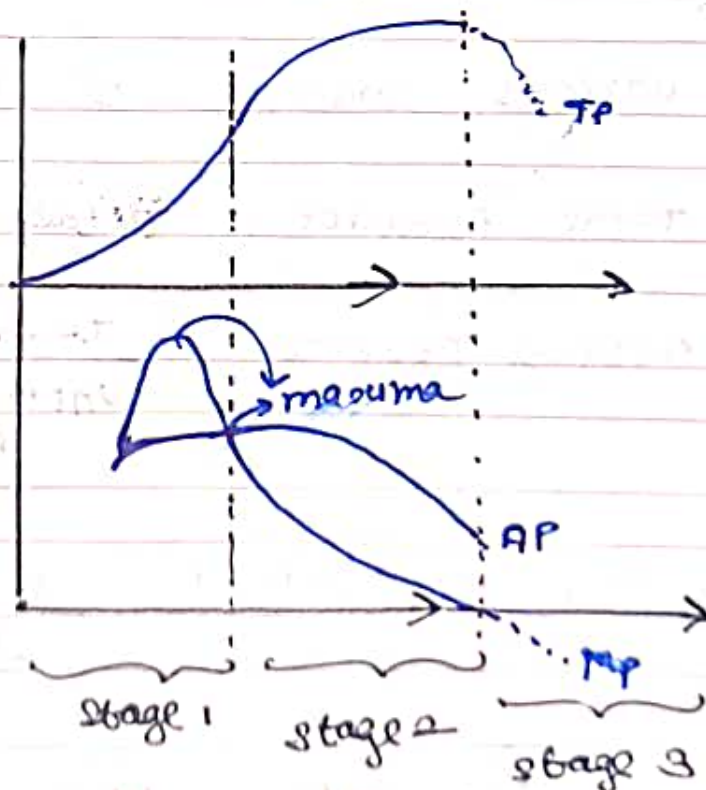
### (a) Law of variable proportion [short run production function]

short run production function with at least one input variable is variable

Stage I : Increasing Return

Stage II : Diminishing Return

Stage III : Negative Return



[various stages in law of variable proportion]



Rational Firm: stage 2

X Stage 1:  $MP > AP \rightarrow$  increase in output  $\rightarrow$  increase in output in greater proportion underutilization of fixed capacity.

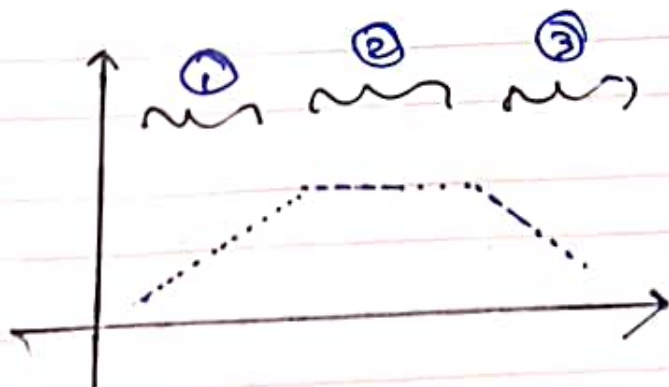
X Stage 3:  $MP < 0 \rightarrow$  more labour, negative effect  $\rightarrow$  total output decreases  
more inputs  $\rightarrow$  lesser outputs

Stage 2:  $MP < AP \rightarrow$  increase in input  $\rightarrow$  increase in output in lesser proportion.

(b)

Law of return to scales: Long Run  
Production Function

$\downarrow$   
relationship b/w changes in output and proportionate changes in all factors of production.



- ① increasing returns to scale
- ② constant
- ③ diminishing

### ⑤ Homogeneous Production Function.

↓  
If inputs are increased in the same proportion to change the output

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

## UNIT-2, PART-2 COSTS OF PRODUCTION

- ① what are costs?  
 ↓  
 different costs a firm incurs while producing a good / service.
- ② Total Revenue  
 ↳ amount received for sale of output.  
 Total cost  
 ↳ market value of inputs.  
 Profit  
 ↳  $TR - TC$
- ③ Explicit and Implicit costs  
 ↳ direct outlay of money ( $E_c$ )      ↳ not needed ( $I_c$ )
- ④ Economic Profit vs Accounting Profit  
 $TR - TC$   
 $= TR - (E_c + I_c)$   
 $EP < AP$



⑤

Fixed costs

vs

variable costs

do not vary  
with quantity  
of output produced

vary with  
quantity of output  
produced

⑥

Internal costs

vs

External costs

direct monetised  
costs

economic concept  
of uncompensated  
social/environmental  
effects

eg fuel of car → internal cost  
air pollution → external cost

⑦

Private costs

vs

social cost

individual  
specific

private  
costs + externalities

⑧

Negative

vs

positive Externality

eg: air pollution  
from motor  
vehicle

eg: education, health,  
labour training  
in firms

⑨

Fixed<sup>F</sup> and variable<sup>V</sup> costs  
 $T \rightarrow$  Total.  $A \rightarrow$  Average

$$\begin{aligned}
 TC &= TFC + TVC \\
 \frac{TC}{Q} &= \frac{TFC}{Q} + \frac{TVC}{Q} \\
 ATC &= AFC + AVC
 \end{aligned}$$

⑩

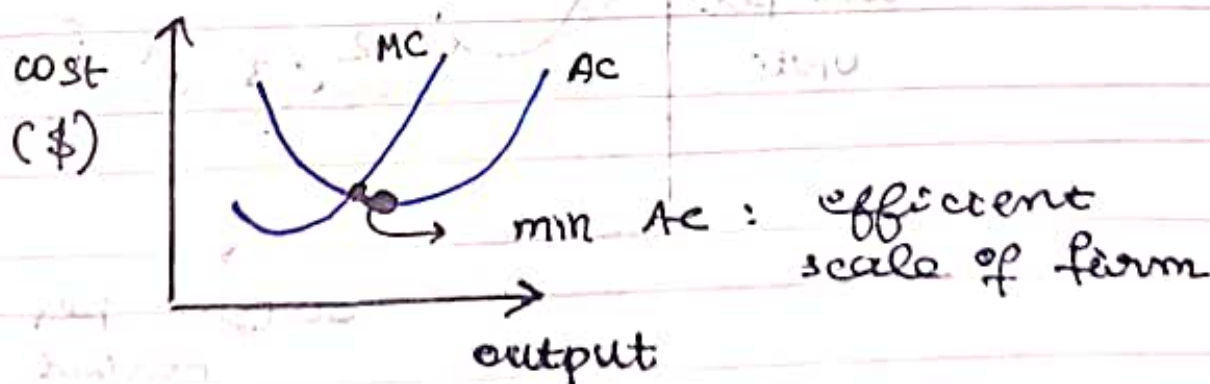
Marginal cost

$\hookrightarrow$  Increase in total cost arising from one extra unit of production

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

⑪

cost curves and their shapes



@ low outputs  $\rightarrow$  low AC  $\rightarrow$  spread only over few units

$$MC - AC \neq ATC$$

(12)

short run costs (SR)

↳ some costs are fixed

Long run costs (LR)

↳ all fixed costs become variable costs

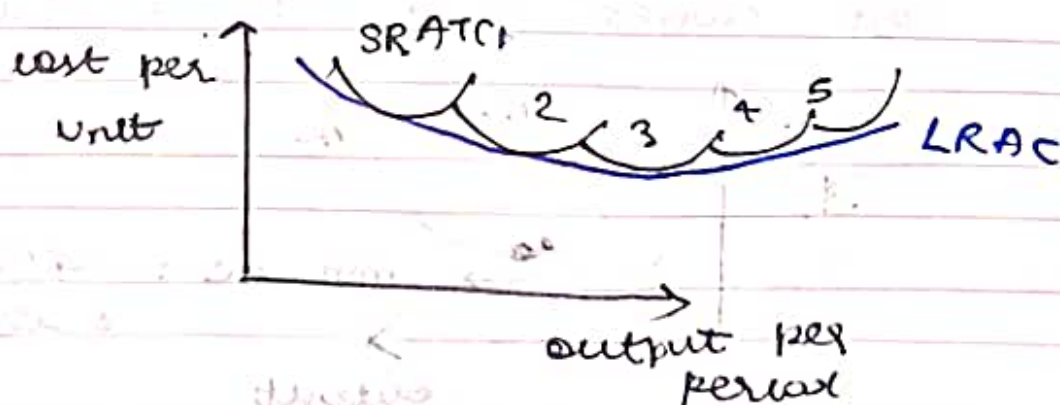
Long run cost curves ← DIFFER → short run cost curves

Long Run Average cost

↓  
Measures the long-run cost of producing one unit of output.

$$LRAC = \frac{LRTC}{Q}$$

Q → output



LRAC → minimum average cost of producing any level of output when all inputs are available.



### 13 Economies and Diseconomies of scale

#### ★ Economies of scale

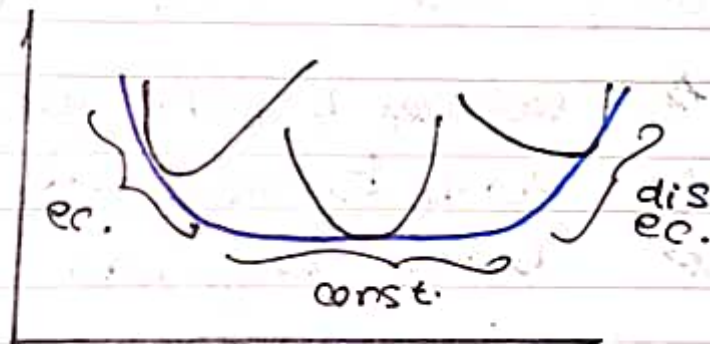
LRAC falls as quantity of o/p increases

#### ★ Diseconomies of scale

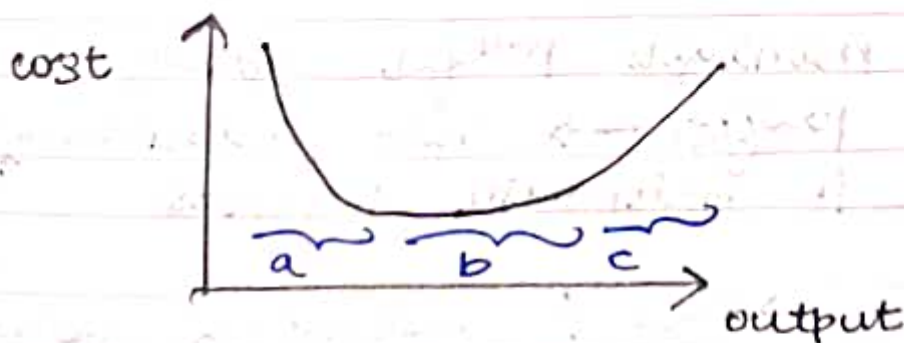
LRAC rises as quantity of o/p increases

#### ★ constant returns to scale

LRAC stays same as o/p increases



### 14 Return to scale



a) dec cost

inc returns

b) const cost

const returns

c) inc cost

dec returns

## UNIT-2, PART-3 OBJECTIVES OF FIRM AND PRICE DETERMINATION

- ① Profit Maximization & Sales Maximization
- ↓

highest net  
income

↓

highest  
revenue  
[preferred]

### ② why sales maximization?

- \* salaries & perks are based on sales (to managers)
- \* loans  $\rightarrow$  more sales
- \* better payment (to staff)
- \* sale  $\uparrow$  prestige of managers  $\uparrow$   
But large profit  $\rightarrow$  owners/shareholders
- \* managers prefer steady level of profit  $\rightarrow$  not maximum, difficult to maintain profits.
- \* sales  $\uparrow$  managers power  $\uparrow$
- \* managers wish to avoid risky venture,  $\rightarrow$  temporarily increase profits

### ③ Types of Market Structure

- ★ perfect competition
- ★ monopoly
- ★ monopolistic competition
- ★ oligopoly
- ★ degree of competition

### ④ Determinants of market structure

- ★ freedom of entry and exit
- ★ homogeneous / differentiated
- ★ control over supply / output
- ★ control over price
- ★ barriers to entry

### ⑤ characteristics of perfect competition

- ★ many buyers and sellers
- ★ homogeneous products
- ★ free entry / exit of firms
- ★ sellers have to accept market price
- ★ perfect information available to buyers and sellers

eg: foreign exchange markets  
agricultural markets  
stock markets



⑥

Revenue of a competitive firm

$$TR = P \times Q$$

$$AR = \frac{TR}{Q} = P$$

$$MR = \frac{\Delta TR}{\Delta Q}$$

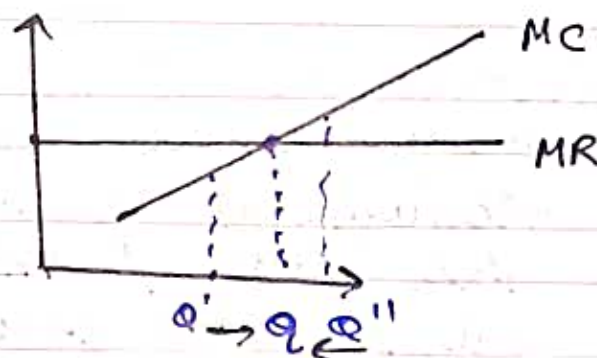
competitive firm

$$\boxed{MR = P}$$

increase output without affecting market price

⑦

Profit Maximization

$$\boxed{\text{max @ } Q \text{ where } MC = MR}$$


@  $Q'$  :  $MR < MC$ , increase  $Q$  to increase profit

@  $Q''$  ,  $MC > MR$ , decrease  $Q$  to increase profit

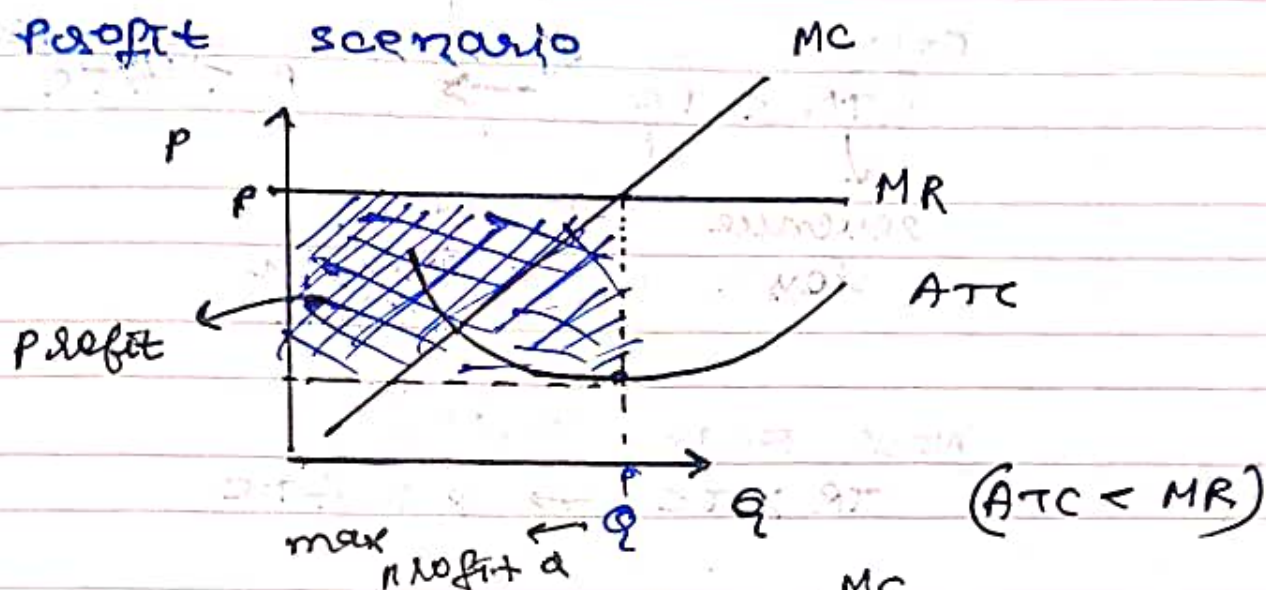
@  $Q$  : max profit  $MC = MR$

any change decreases profit

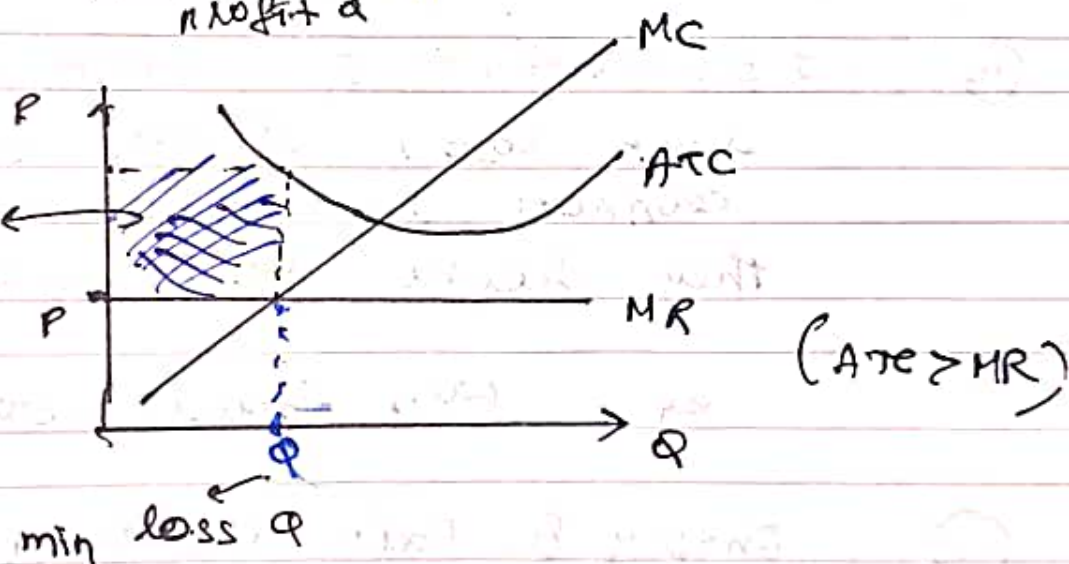
$$\boxed{MC \text{ curve} = \text{firm's supply curve}}$$

⑧

profit scenario



loss



⑨

shut down vs Exit

short-term

long-term

must pay FC

FC payment not needed

shut down if

$$TR < VC \rightarrow P < AVC$$

revenue loss

savings cost

Exit if

$$TR < TC \rightarrow P < ATC$$

revenue  
loss

cost  
savings in  
total

New Firm entry

$$TR > TC \rightarrow P > ATC$$

(10)

Irrelevance of sunk costs

sunk cost: already committed & cannot be recovered  
they should be irrelevant to decisions.

eg.: FC., fixed cost

(11)

Entry &amp; Exit in Long Run

the economic  
profit  
↓

loss  
↓

\* new firms  
\* SR market  
supply →

\*  $P \downarrow$  reducing  
profits, slowing  
entry

\* exit of firms  
\* SR market  
supply ←

\*  $P \uparrow$  reducing  
losses



## ⑫ zero-profit condition

long-run equilibrium



zero economic profit:  $P = ATC$

$$P = MR = MC$$

$$P = MC = ATC$$

@ min ATC

$$P = \min ATC \quad \text{in long run}$$

## ⑬ why do firms stay in business

if

$$P = 0?$$

$$EP = TC - (EC + IC)$$

zero profit equilibrium

★ earn enough to cover costs

★ accounting profit is the

## ⑭ LR Market supply curve



(15)

why it might slope upward?

LR supply curve is horizontal if

\* all firms have identical costs

\* costs do not change as other firms enter / exit the market.

else LR curve slopes upward