

UNIT-1: Introduction to Managerial Economics and Demand Analysis - Demand Forecasting

Economics: Economics is a word derived from Latin word economus → House hold management.

Father of Economics → Adam Smith in 1776.

Bookname: Wealth of Nations

Economics

Def-1: Economics is science of wealth. - Adam Smith

Def-2: Economics is science of welfare. - Alfred Marshall.

Def-3: Economics is a science which studies human behaviour as a relationship between ends and scarce means which have alternative uses. - L. Robbins.

Branches in Economics:

① Microeconomics: study of individual units

Eg: A consumer, a firm, factors of production

factors of production → Land, Labour, Capital,

Distribution of income }
organise. }
Profit }
 ↓ ↓ ↓
 Rent Wage/salary Rent
 ↓ ↓ ↓
 Technology Profit Rate of interest

similarity between or relationship : I-TING
pricing decisions etc... → explain business firms

Micro economics is also known as pricing theory
and many business firms are engaged in microeconomics ;
product market

microeconomics study of individual firms
→ microeconomics firms

② Macro Economics: study of Aggregates or
Totality.

e.g. National Income, investments,
general price, Employment, ROI (Rate of return)

Inflation → Deflation :
continuous increasing of prices in economy.

Deflation → continuous decrease of prices.

Macro economics concepts were introduced by
J.M. Keynes a british economist.

- 1. IMF - International Monetary Fund
- 2. W.B / IBRD - World Bank / International Bank for Reconstruction & Development.
- 3. W.T.O - World Trade Organisation

Three institutions were introduced by J.M. Keynes in 1937 A.D.

International Monetary Fund → responsible for world

World Bank → responsible for reconstruction & development
World Trade Organisation → responsible for trade

Managerial Economics:

Management: Management is an art of getting things done through and with the people.

* Managerial Economics (M.E.): Application of Economics principles, theories applies in management for effective decision making.

Important areas (or) Key areas (or) scope of M.E.:

1. Demand decisions.
2. production (or) input-output decisions.
3. Pricing decisions.
4. Investment decisions.

* SEBI → Securities Exchange Board of India.

* BSE - Bombay Stock Exchange. (Bombay)

* NSE - National Stock Exchange (Delhi)

5. profit planning

6. Inventory decisions.

7. Risk and uncertainty decisions.

ME - Relationship with other subjects:

ME - statistics:

CSO - Central Statistical Organisation

It is duty to collect the data from everyone

Data is supplied from CSO to every department in the central level

ME - OR :-

OR is known as operations Research
basic objective of OR is to maximum
Profits and minimize cost and time

Techniques in OR

1. Linear programming Problems (LPP)

2. Statistical Quality Control (SQC)

3. Game theory (GT)

4. Inventory management (IDM)

5. Sequencing Problems (S.P)

6. Queuing Problems (Q.P)

7. Network Analysis (NWA)

• PERT → Programme Evaluation

(Planning) & Review Technique - 328

(Controlling) scheduling methods - 329

→ CPM - Critical path method

ME - Accountancy (A/c) :

CA / ICWAI / CS → Accountancy

• 2 years part time commerce - 3M

Who looks after accounts - 3M

ME - Mathematics

Econometrics = (Economics + Statistics) 3 years of 2nd year

The duty is to apply mathematics
techniques

Demand Analysis

An important area in Economics

As per economics; demand means a desire based by willingness and ability to pay

Demand

/ \
Design Pay
Willingness

Demand depends on "Design", "Willingness", and ability to pay

Kinds in demand Analysis

Price demand

Price and demand are always associated. When price decreases, demand increases.

and vice versa

There is an inverse association between Price and demand

Income demand

If income is high, we purchase superior goods and services. When

income is low, we prefer inferior goods and services

It is a direct relationship between income and demand

Level of income decides the consuming pattern in the market

Cross - demand:

Substitutes: Alternative goods & services

Complementary: Associated goods

* Factors influencing on Demand (or) Determination of demand:

1. P (Price of the product)
2. Y / Yield or Income of consumer)
3. Sp prices of the substitutes or complementary goods.
4. Tastes and preferences. (T & P)
5. Expenditure on advertising. (Aexp)
6. Size of population / Demography (Sp)
7. Arrival of new products in the market.
8. Availability of credit. (EMI) (Avp)
↳ EMI (Acre) \downarrow
↳ Equated Monthly Instalment



Demand function: It is a mathematical expression of relation b/w quantity demanded and determinants. $D_x = f(P, Y, Sp, T \& P, Aexp, Sp, Avp, Acre, Tech, \dots)$

If other things are being equal (constant)

then $D_x = f(P_x)$



Law of Demand:

" If other things are being equal, there is an inverse relation between price and

quantity of demand for a given product or service".

$P \uparrow Q_D \downarrow$

* Demand schedule:

Q stands for quantity.

Price is Q. of Demand

10.00 20,000

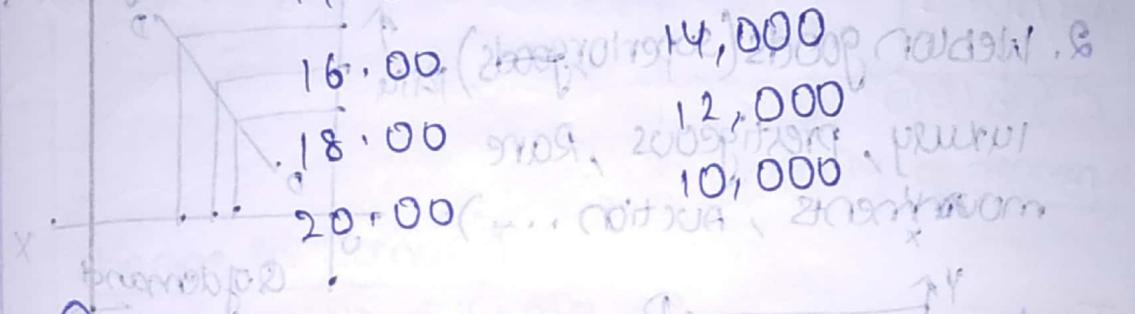
12.00 18,000

14.00 16,000

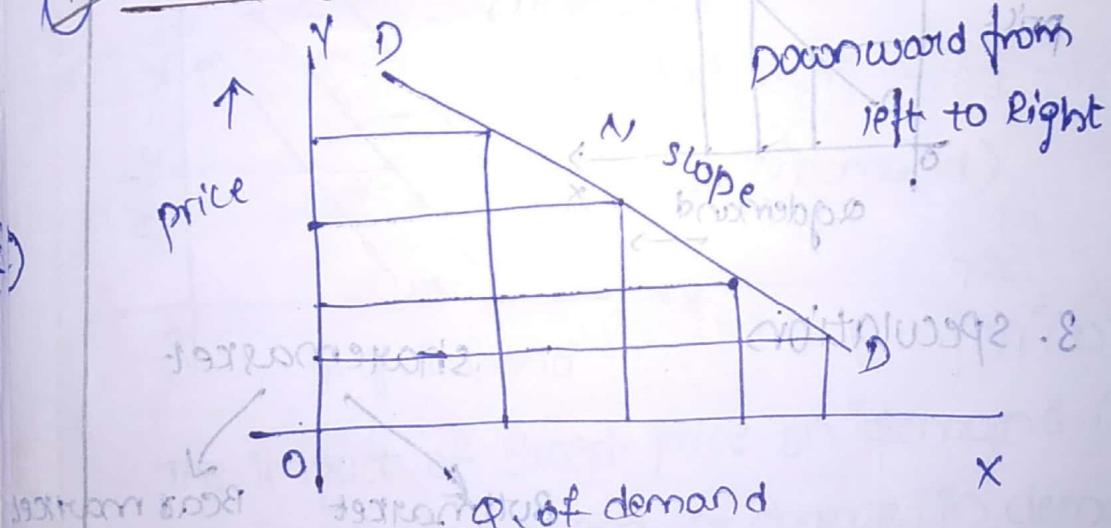
16.00 14,000

18.00 12,000

20.00 10,000



* Demand curve:

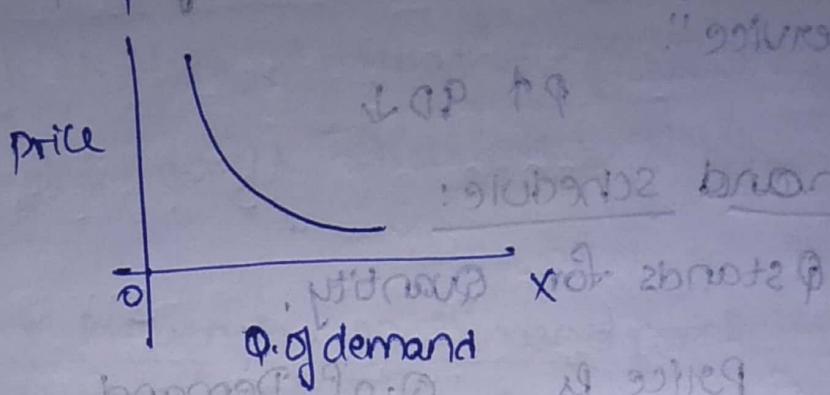


The demand curve is always downward from left to right.

Some times the demand curve may not be a straight line - it can also be as follows.

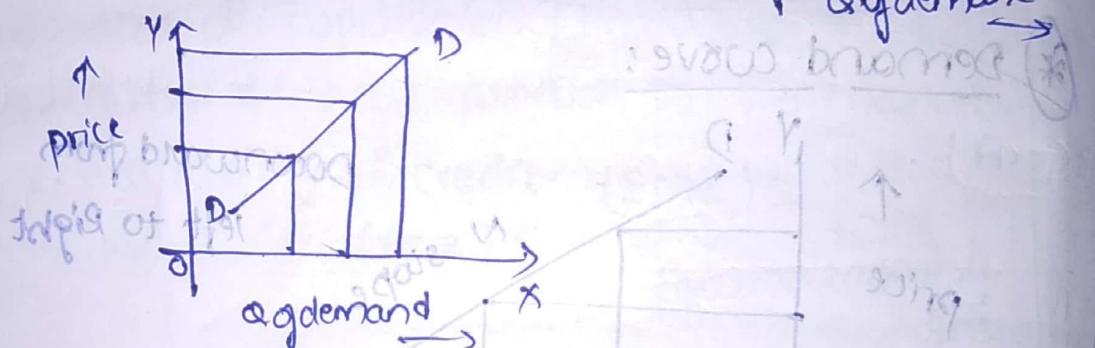
to showing curve of demand to price

" inverse"

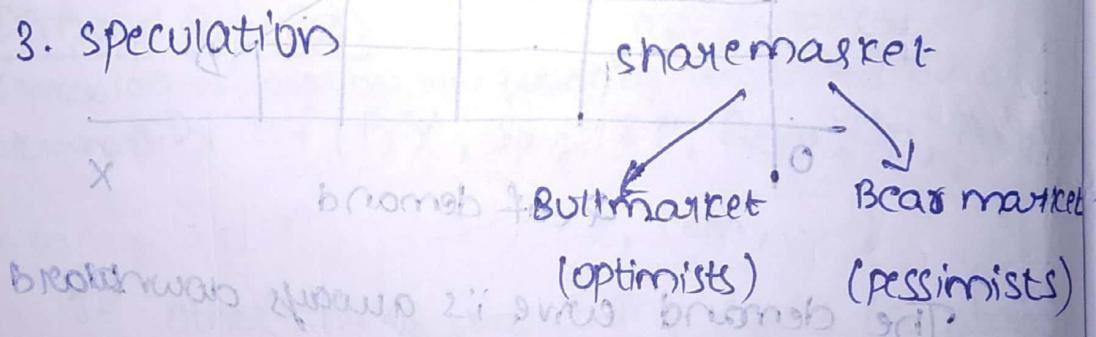


* Expectations of law of demand:

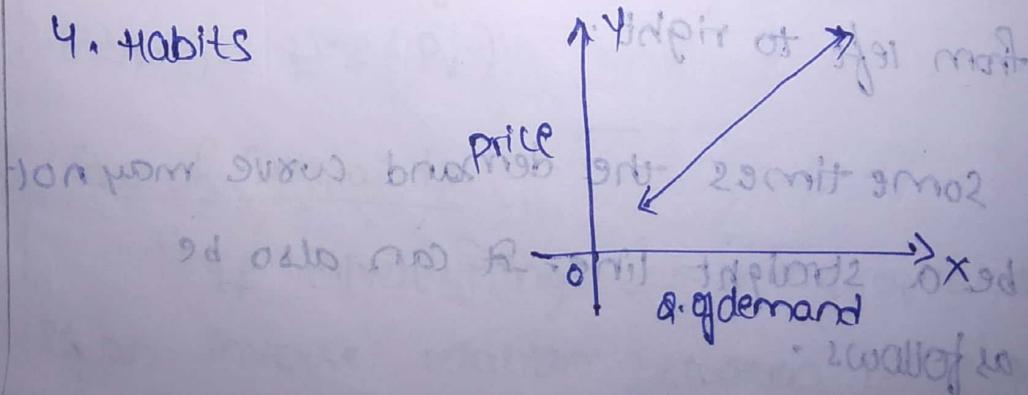
1. Giffen goods (Inferior goods) \Rightarrow (less price goods)
luxury, prestigious, Rare movements, Auction ...
2. Veblen goods (Superior goods)



3. Speculations



4. Habits

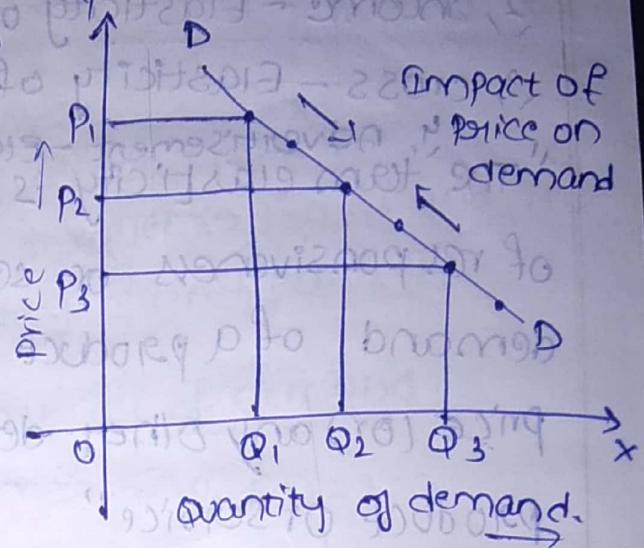


Quantity change in Demand:

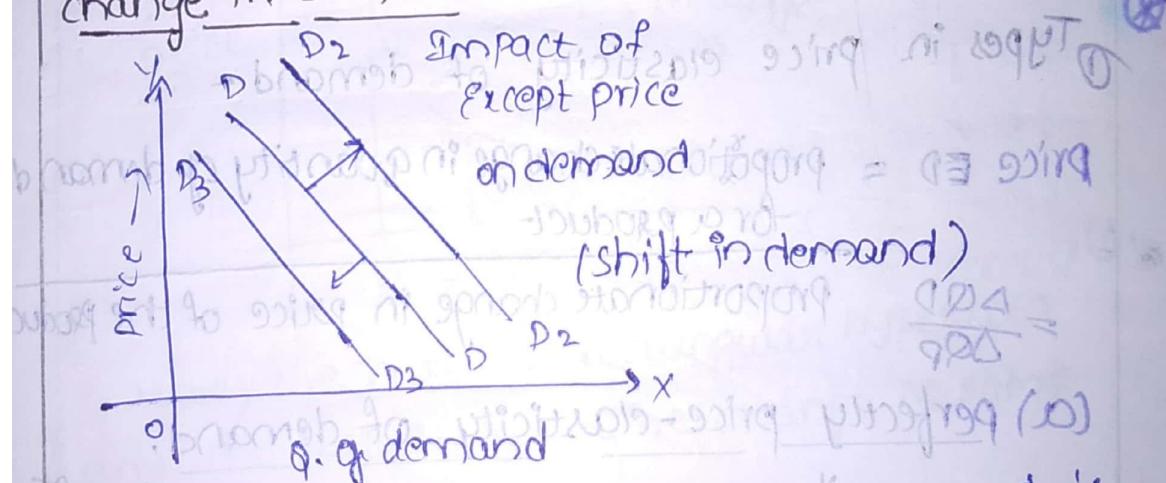
Impact of price on demand is known as quantity change in demand.

Here, there is no new demand curve.

The moments are on the same line



change in Demand:



The impact of Except price on demand is called shift in demand or change in demand. It may either increase or decrease.

Here, there are new demand curves. The moments are not on the same line. There is a shift from one line to another line.

* Elasticity of demand: late change in quantity of demand with respect to rate of change in determining factors
 → Marshall

Types in elasticity of demand -

- 1, price-elasticity of demand.
- 2, Income - Elasticity of demand.
- 3, cross - Elasticity of demand.
- 4, advertisement - Elasticity of demand

"The term elasticity is defined as the rate of responsiveness or sensitivity in the demand of a product or a given change in price (or) any other determinants of the product or service"

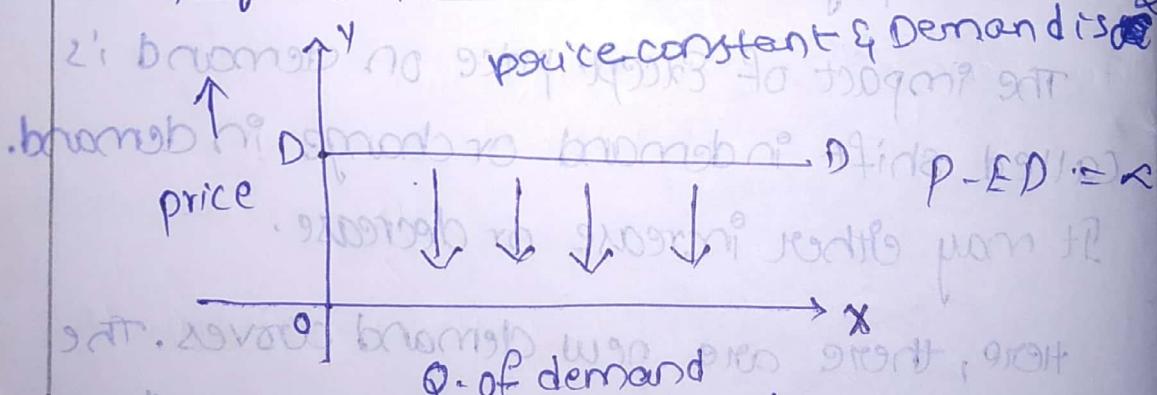


① Types in price elasticity of demand -

price ED = proportionate change in quantity of demand
 for a product

$$= \frac{\Delta QD}{\Delta QP} \quad \text{proportionate change in price of the product}$$

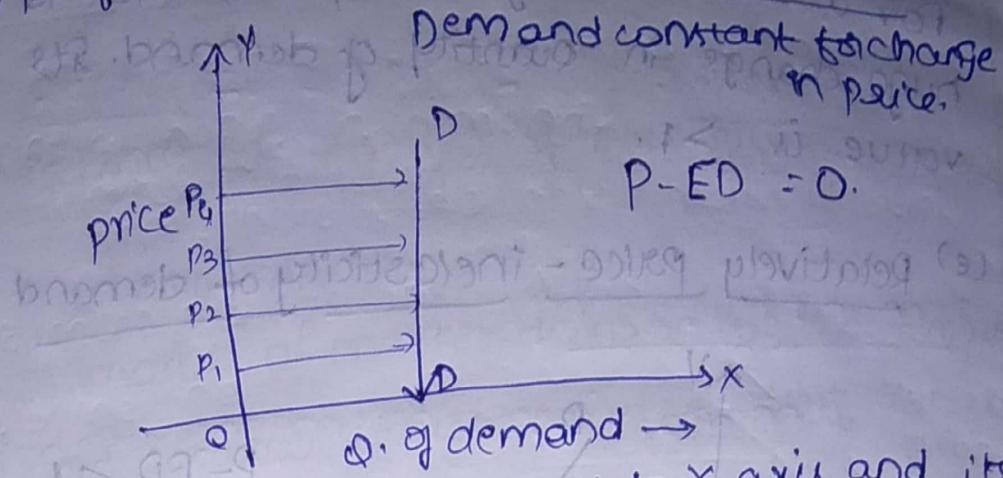
(a) perfectly price-elasticity of demand.



The curve is parallel to x-axis and its value is infinity (∞)

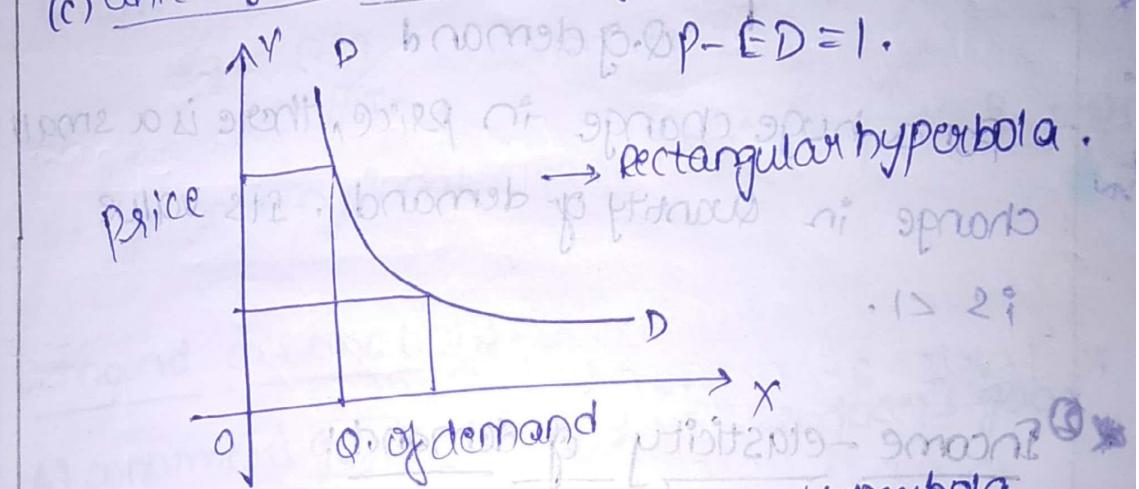
e.g. necessary goods

(b) perfectly price-inelasticity of demand.



here, the curve is parallel to Y-axis and its value is (0). Quantity is limited.

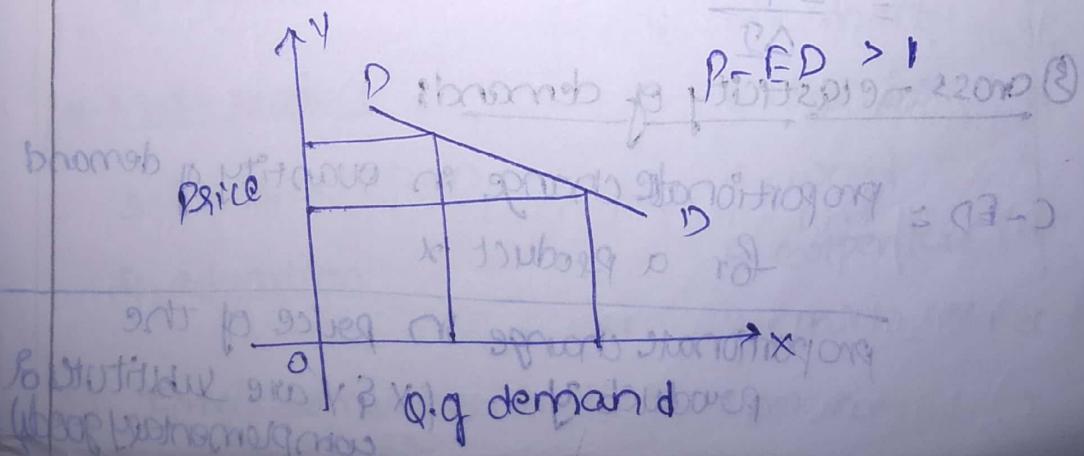
(c) unitary price-elasticity of demand.



Here, the curve is rectangular hyperbola and its value is 1. The change is same between

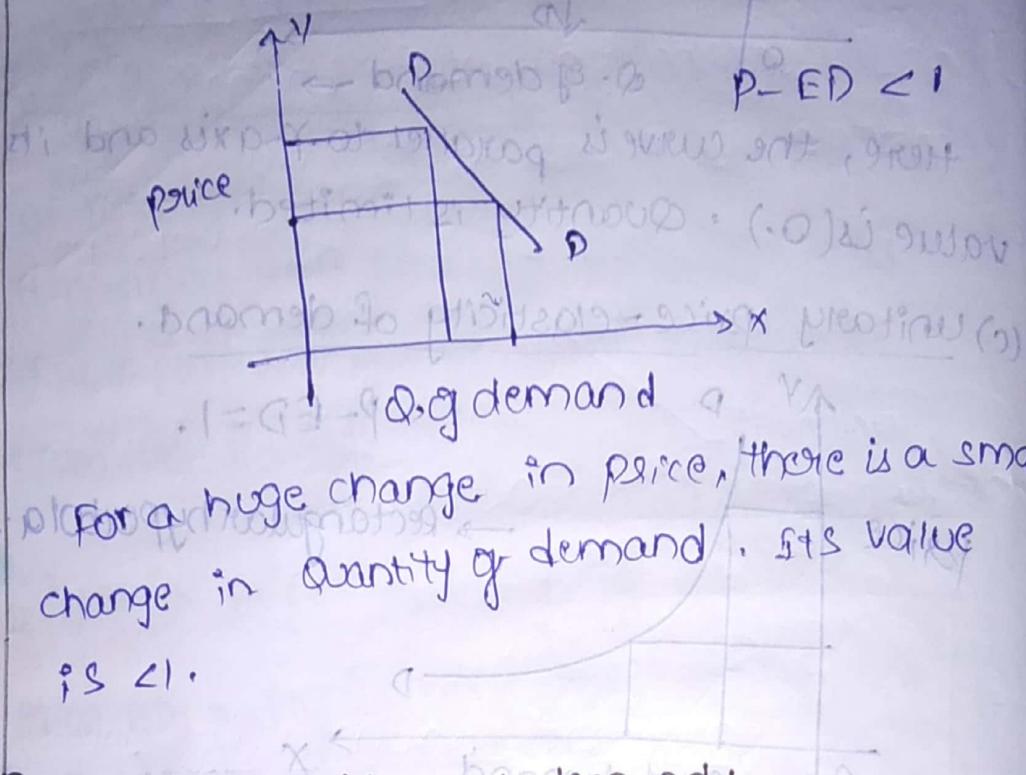
$$\frac{\Delta QD}{\Delta P}$$

(d) relatively price-elasticity of demand.



for a small change in price, there is a huge change in quantity of demand. Its value is > 1 .

(e) Relatively price - inelasticity of demand



② Income - elasticity of demand:

$\text{PeED} = \frac{\text{proportionate change in quantity of demand per a product}}{\text{proportionate change in income of a consumer}}$

$$= \frac{\Delta QD}{\Delta I}$$

③ Cross - elasticity of demand:

$C-ED = \frac{\text{proportionate change in quantity of demand for a product } x}{\text{proportionate change in price of the product } y}$

(x & y are substitutes or complements)

$$= \frac{XP}{Y}$$

Importance of Analysis of elasticity of demand:

1. Production decisions.
 2. Estimation of market demand for the future.
 3. [The customer is also known as sovereign king]
[The customer will disappear]
 4. Pricing decisions.
 5. Government's taxation policies.
 6. Trade (IT). [Exports & Imports]
 7. For International Trade (IT).
- egs: GST
VAT

Demand distinctions:

A) consumer's good demand vs producer's good demand

B) Autonomous Demand vs Derived Demand

Associated / dependent

1. Land

1. Building
2. Brick

2. Apartment

3. Cement

* Main product

increase

4. Iron & Steel

5. Wood

6. Carpenter

3. Transportation

7. Paints etc

4. Education

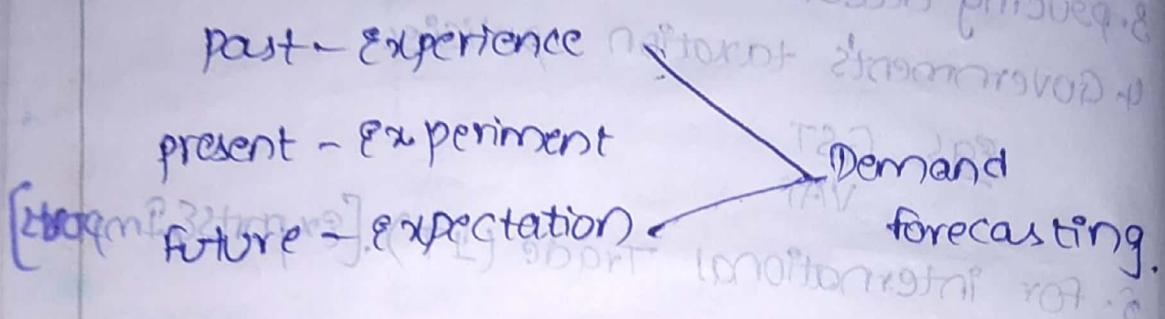
C) Firm's demand vs industry demand
small unit

D) Price demand vs Income demand vs Cross demand

E) Perishable goods demand vs Durable goods
: items with short life vs items with long life

* Demand forecasting:

Demand forecasting means estimation of future demand for a given product or service



* Levels of demand forecasting:

A) Product level demand forecasting

B) Firm (or) company level demand forecasting

C) Industry level demand forecasting

D) Macro-level Demand forecasting

levels of demand forecasting (on the basis of time):

A) very short run demand forecasting

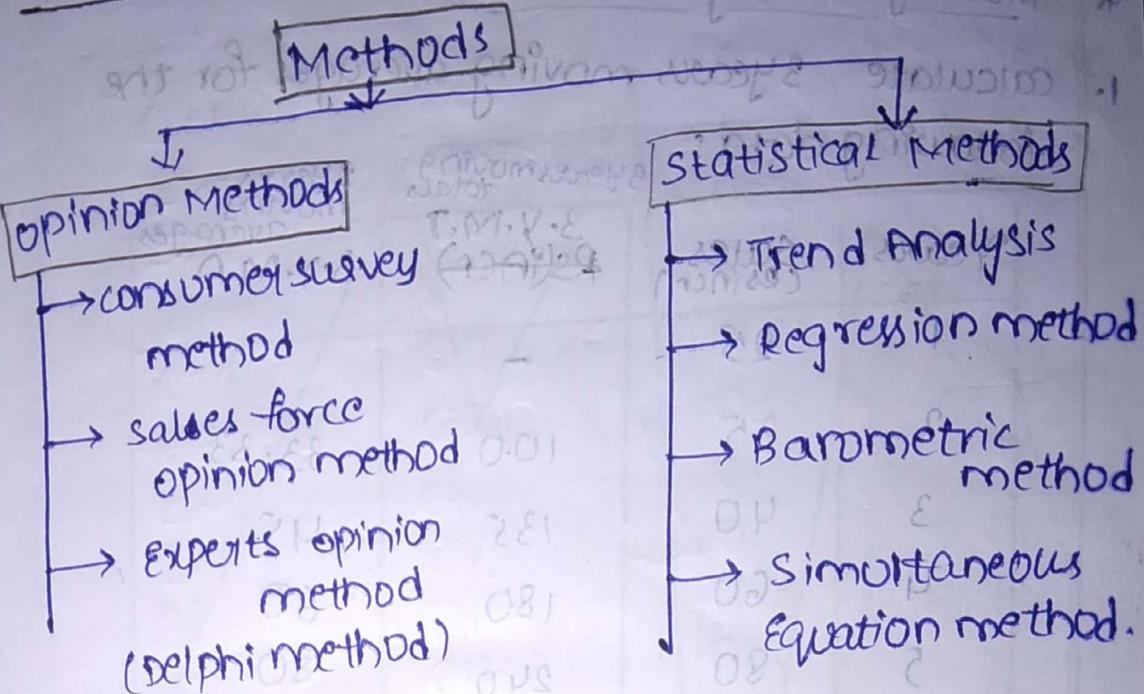
B) short run demand forecasting

C) medium run demand forecasting

D) long run demand forecasting

E) very long run demand forecasting

* Methods of demand forecasting:



* Regression Method:

A) Trend line

B) L.S. L.E. Regression

C) Time Series Analysis.

D) Moving Averages method

E) Exponential smoothing Method

F) Auto-Regressive Integrated Moving Averages

* Time series analysis:

Time series indicates the arrangement of data in chronological order.

Components in Time series:

$$A) \text{ Trend } (T) \quad \text{Time Series} (T.S.) = T + SV + BC + RV.$$

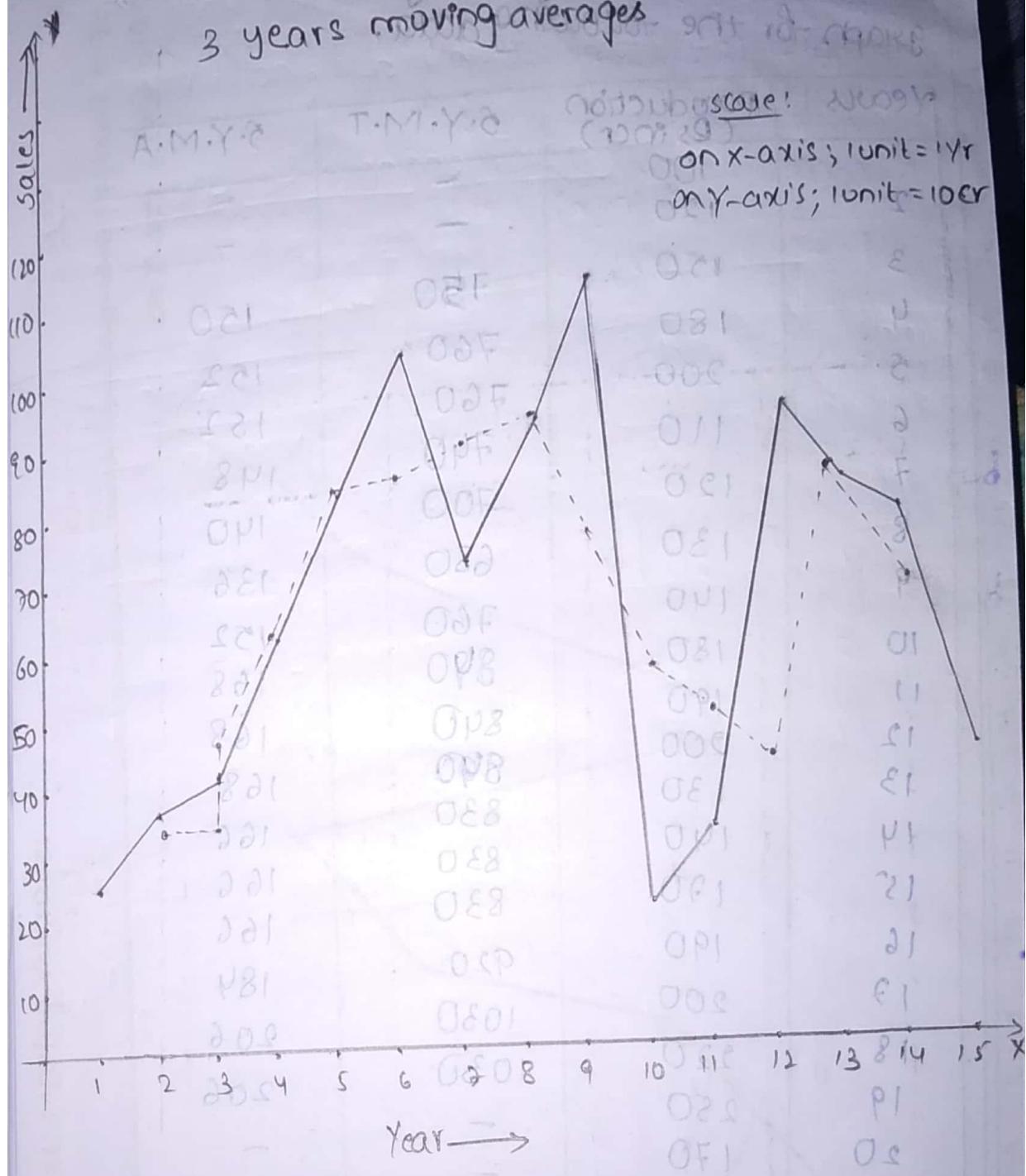
- b) S.V (Seasonal variations) \rightarrow $y = a + b \sin(\frac{2\pi}{T}t)$
- c) B.C (Business cycles) \rightarrow $y = a + b \cos(\frac{2\pi}{T}t)$
- d) R.V (Random variations) \rightarrow $y = a + b \sin(\frac{2\pi}{T}t) + c \cos(\frac{2\pi}{T}t) + d$

* Moving Averages Method!

1. calculate 3 years moving averages for the following data:

Year	Sales (incr.)	3.Y.M.A Reliance	3.Y.M.A USV.B.Y.M.A
1	25	-	bottom value
2	35	100	bottom 33.33
3	40	135	bottom 45
4	60	180	bottom 60
5	80	240	(bottom 80) \rightarrow 80
6	100	250	83.33
7	70	260	86.66
8	90	270	90
9	110	220	73.33
10	20	160	53.33
11	30	140	46.66
12	90	200	40
13	80	245	81.66
14	75	195	65
15	40	-	

3 years moving averages



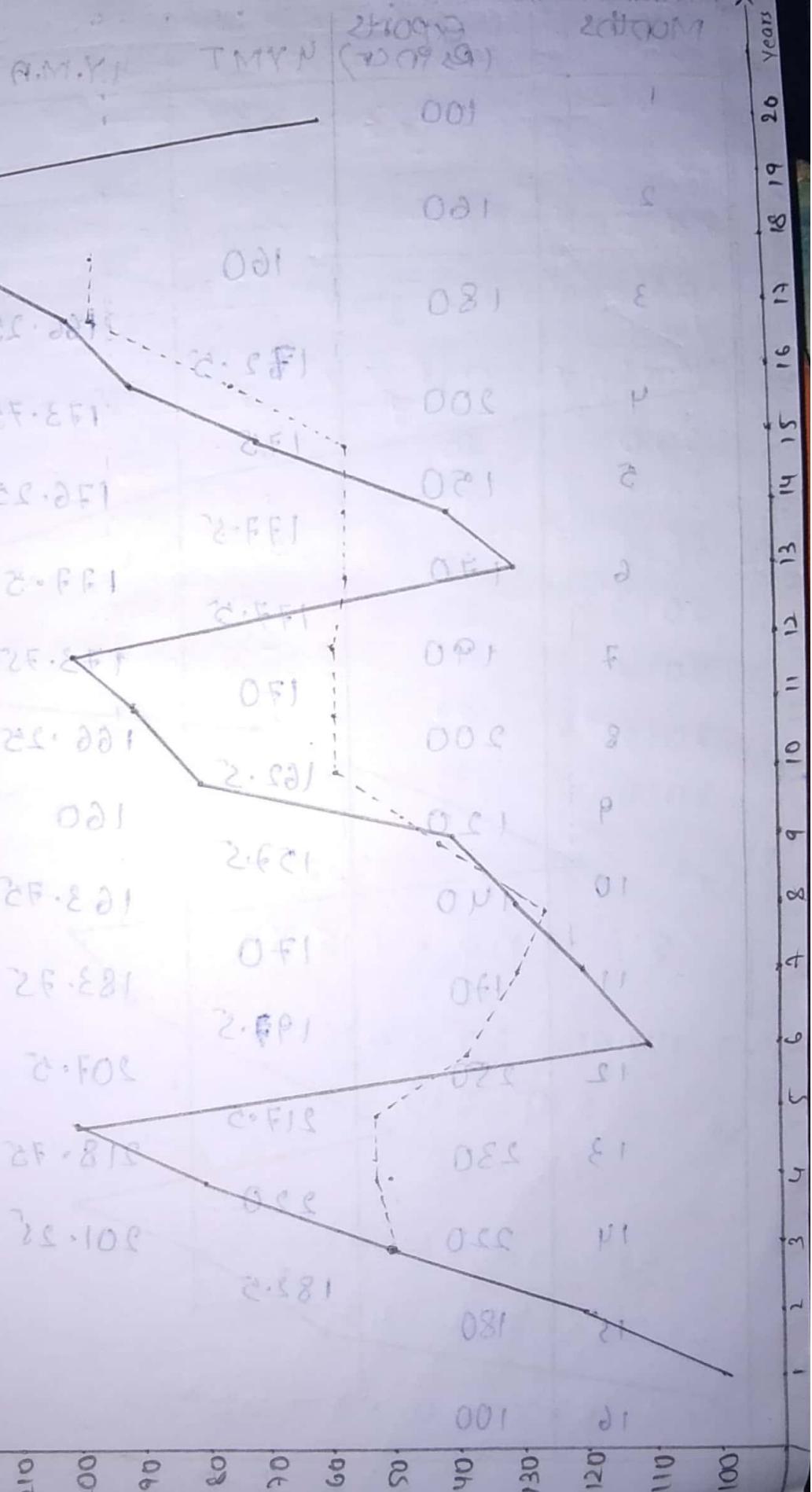
2. calculate 5 years moving averages and draw the graph for the following data.

Years	Production (Rs mcr)	S.Y.M.T	S.Y.M.A
1	100	-	-
2	120	-	-
3	150	750	150
4	180	760	152
5	200	760	152
6	110	740	148
7	120	700	140
8	130	680	136
9	140	760	152
10	180	840	168
11	190	840	168
12	200	840	168
13	130	830	166
14	140	830	166
15	170	830	166
16	190	920	184
17	200	1030	206
18	220	1030	206
19	250	-	-
20	170	-	-

5 - Years Moving Averages

scale:

on x -axis; 1 unit = 1 yr
on y -axis; 1 unit = 10 cr



* 4-Year moving Averages:

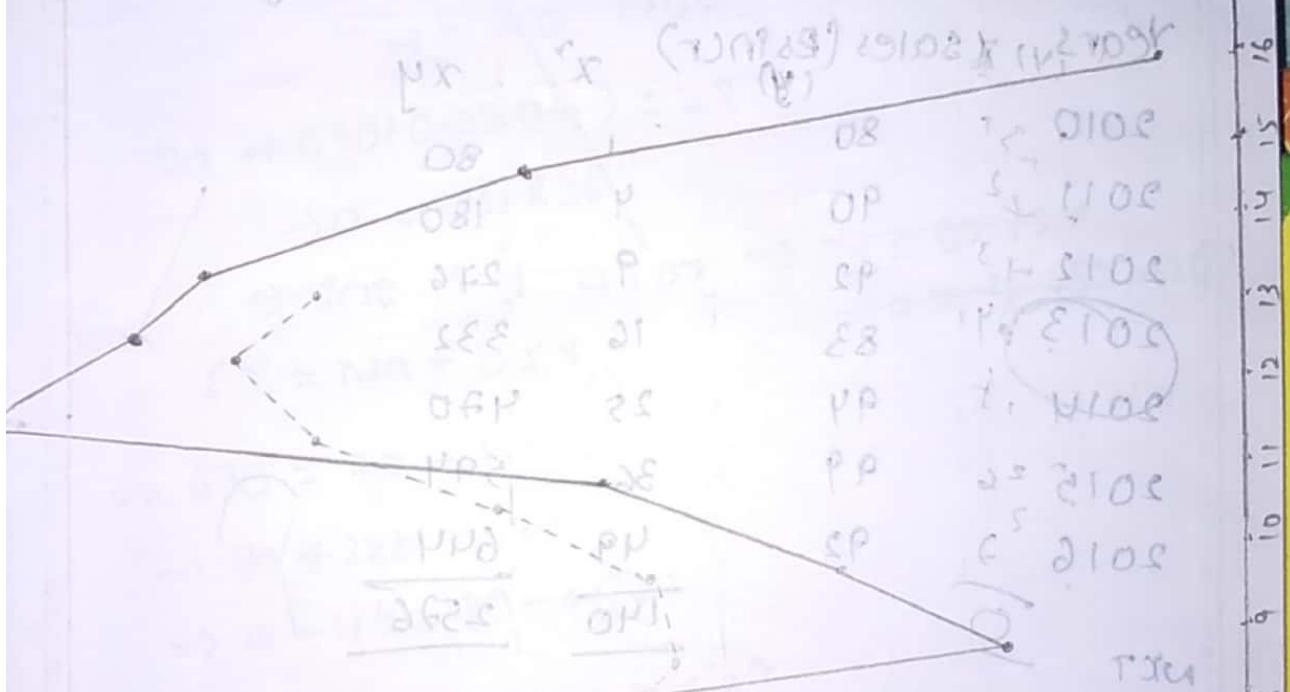
1. calculate 4-Year moving Averages and draw the graph for the following data.

Months	Exports (Rs in cr)	4 YMT	4 Y.M.A
1	100		
2	160	160	
3	180	172.5	166.25
4	200	175	173.75
5	150	177.5	176.25
6	170	177.5	173.75
7	190	170	
8	200	162.5	166.25
9	120	152.5	160
10	140	170	163.75
11	170	192.5	183.75
12	250	217.5	207.5
13	230	220	218.75
14	220	182.5	201.25
15	180		
16	100		

scale:
on X-axis; unit = 1 month
on Y-axis; unit = 10 cr

$$k\sigma \neq 0 = p$$

and students who are collecting money for the building of a new school.



$$x^3 d + \partial x = y^3$$

$$(\text{OEA} d + \text{OF} = 100\text{m})$$

$$(O E) d + O F = B C$$

$$\textcircled{1} \leftarrow 85 = \text{deg at } 0^\circ$$

$$x_3 d + x_3 p = rx_3 \text{ bnd}$$

* Straight Line Method:

$$y = a + bx$$

Normal Equations for straight Line

$$\sum Y = na + b \sum x \rightarrow \text{I}$$

$$\sum XY = a \sum x + b \sum x^2 \rightarrow \text{II}$$

1. Find straight line and calculate expected values and draw the graph for the following data.

Years (x)	Sales (Rs in Cr) (y)	x^2	xy
2010	80	1	80
2011	90	4	180
2012	92	9	276
2013	83	16	332
2014	94	25	470
2015	99	36	594
2016	92	49	644
		<u>140</u>	<u>2576</u>
NXT	0		

$$\sum Y = na + b \sum x$$

$$\Rightarrow 1409 = 7a + b (630)$$

$$\Rightarrow \begin{aligned} \sum Y &= 630 \\ \sum x &= 28 \end{aligned} \quad \sum XY = 2576$$

~~$$\Rightarrow 28 = 7a + b (630)$$~~

~~$$\Rightarrow 7a + 630b = 28 \rightarrow \text{I}$$~~

~~$$\text{and } \sum XY = a \sum x + b \sum x^2$$~~

$$\Rightarrow 2576 = a(630) + b(56954)$$

$$\Rightarrow 630a + 56954b = 2576 \rightarrow ②$$

$$② - ① \times 90$$

$$\Rightarrow 630a + 56954b = 2576$$

$$\underline{630a - 56700b = 2820}$$

$$\underline{\underline{+284b = 156}}$$

$$\Rightarrow b = 0.00109$$

$$\Rightarrow b = 0.2204$$

$$7a + 630(0.2204) = 28$$

$$\Rightarrow a = -15.836$$

Now ~~st line is $y = a + bx$~~ $\Rightarrow y = 82 + 2x$

$$\Rightarrow 630 = 7a + b(28)$$

$$\Rightarrow 7a + 28b = 630$$

$$\Rightarrow a + 4b = 90 \rightarrow ①$$

and $\sum xy = a \sum x + b \sum x^2$

$$\Rightarrow 2576 = a(28) + b(140)$$

$$\Rightarrow 28a + 140b = 2576$$

$$\Rightarrow a + 5b = 92 \rightarrow ③$$

$$① - ③ \Rightarrow a + 4b = 90$$

$$\underline{\underline{a + 5b = 92}}$$

$$\Rightarrow -b = -2$$

$$\Rightarrow b = 2$$

$$① \Rightarrow a + 8 = 90 \Rightarrow a = 82$$

\therefore st line is $y = a + bx$
 $\Rightarrow y = 82 + 2x$
contd...

* calculation of expected trend values:

$$\begin{aligned}
 2010 (x=1) & \leftarrow 82 + 2(1) = 84 \\
 2011 (x=2) & = 82 + 2(2) = 86 \\
 2012 (x=3) & = 82 + 2(3) = 88 \\
 2013 (x=4) & = 82 + 2(4) = 90 \\
 2014 (x=5) & = 82 + 2(5) = 92 \\
 2015 (x=6) & = 82 + 2(6) = 94 \\
 2016 (x=7) & = 82 + 2(7) = 96 \\
 \text{Total} & = \frac{630}{7}
 \end{aligned}$$

$\uparrow Y$

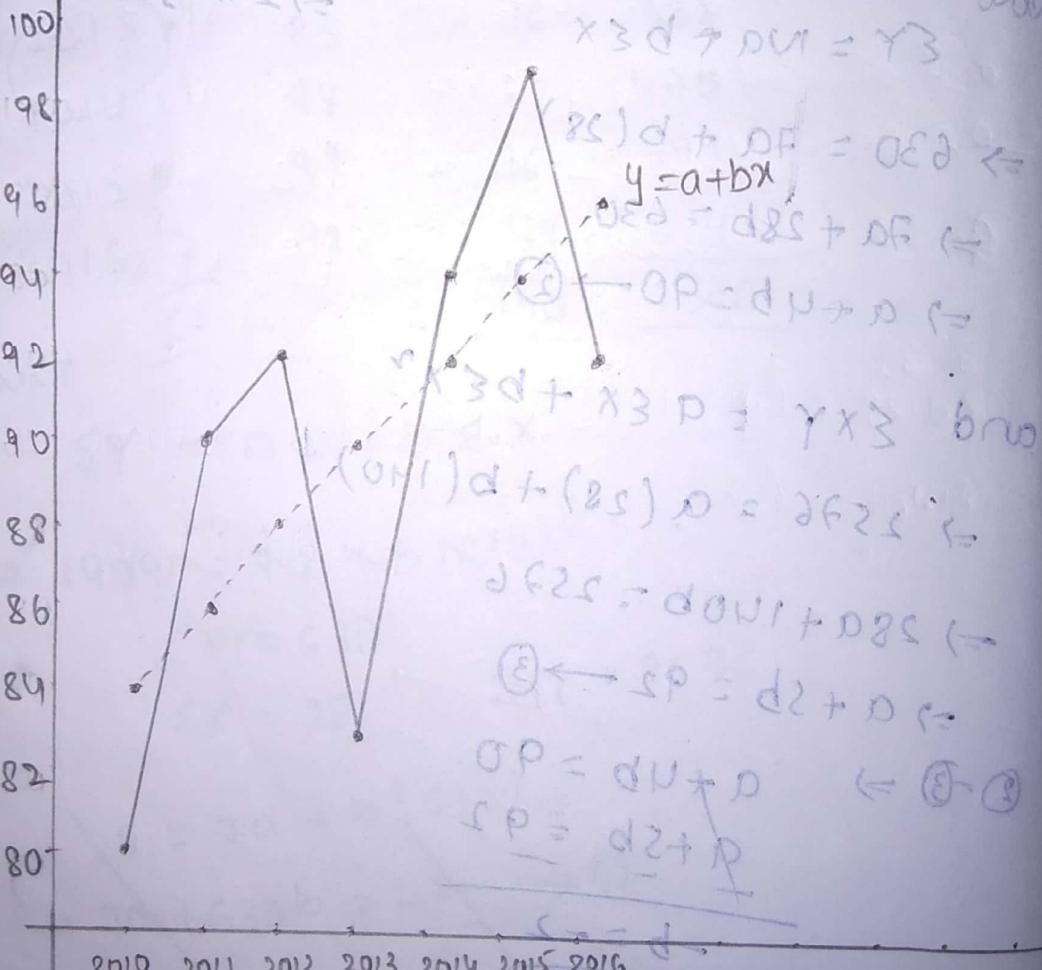
$$82 = (\text{Initial Value} + \text{D}) + \text{DF}$$

$$\Delta S - D = D \leftarrow$$

$$Kd + Cg = P \leftarrow Kd + D - P \text{ (given)} \quad \text{way}$$

$$(C - D) = P - Kd \leftarrow$$

$$X3d + Dv = Y3 \quad \text{b/w}$$



$$(82)d + DF = 0 \leftarrow$$

$$DF = dS + DF \leftarrow$$

$$OP = DN + D \leftarrow$$

$$X3d + X3P = Y3 \quad \text{b/w}$$

$$(DN) + (82)D = 262 \leftarrow$$

$$262 = DN + D \leftarrow$$

$$OP = DN + D \leftarrow$$

$$SP = D2 + P \leftarrow$$

$$OP = DN + D \leftarrow$$

$$SP = D2 + P \leftarrow$$

$$\begin{aligned}
 Kd + D &= P \quad \text{b/w} \\
 Kd + SP &= P \quad \text{b/w} \\
 \therefore SP &= P \quad \text{b/w}
 \end{aligned}$$

$$SP = D \leftarrow \quad OP = 82 + D \leftarrow$$

* Year : 2010 11 12 13 14 15 16 17 18

Production : 63 86 34 56 60 88 72 94 77
 (in units) $28 \cdot PC = DC$

(in units)
1000) a straight line

b) estimate trend values

c) Draw the graph of production for the year 2008-2025

D) Estimate production

a) D) Estimate production by years x: production (y)

$$2010 \text{ (4.61)} = 63(1.8 + 28 \cdot \frac{1}{4}) = 172.0106$$

$$20110 \cdot 02 = (86)_{\text{E1-E}} + 2e \cdot u^2 = (102^p)_{\text{1+0E}}$$

$$\frac{PF \cdot 83}{2012} = \frac{34181 \cdot 8}{16} + 28 \cdot PE = (2245) + 102$$

$$16 \times 68.004 = (156 \times 1.04 + 28.00) = (300 \times 1.04) - 8$$

2013 -- 4 (331.2 + 28.1) = (300.1) 2100
- 80.0E 5 (2⁶⁰) (38.1E + 28.1E) = (528)

2014 88 36 504
2015 86 6 28 48

$$2018 \cdot DF = \frac{f}{q_4} = \frac{f}{81.8 + 28.164} = \frac{f}{110} \text{ also}$$

$$2017 \cdot 96 = 19296 + 28 \cdot 96 = \underline{19296} + 2304 = 21600$$

2018. 09 77 $\sum xy = 3338$

$$\sum X = 45 \quad \sum Y = 630 \quad \sum X^2 = 285 \quad \sum XY = 3338$$

$$26 \cdot 28 = (27 \cdot 27 - 1) + 27 \cdot 12 + 1$$

$$w^{LT} \hat{Y} = \hat{N}a + b \hat{X}/2 \Rightarrow (p_1 - x) \text{ or } 0$$

$$\Rightarrow 630 = 9a + b(45) \Rightarrow (a - x) 2505$$

$$\Rightarrow a + 5b = 70 \rightarrow ①$$

$$\text{and } \mathbb{E}XY = a\mathbb{E}X + b\mathbb{E}X^2.$$

$$\Rightarrow 3338 = a(45) + b(285)$$

$$\Rightarrow a + 6.33b = 74.17 \rightarrow ②$$

$$\textcircled{1} - \textcircled{2} \Rightarrow 1.33b = 4.17$$

$$\Rightarrow b = 3 \cdot 13$$

$$\textcircled{1} \Rightarrow a + 5(3.13) = 70$$

$$\Rightarrow a = 54.35$$

\therefore straight line is $y = a + bx$

$$\Rightarrow y = 54.35 + 3.13x$$

b) calculation of expected trend values: x \rightarrow y

$$2010 (x=1) = 54.35 + 3.13(1) = 57.48$$

$$2011 (x=2) = 54.35 + 3.13(2) = 60.61$$

$$2012 (x=3) = 54.35 + 3.13(3) = 63.74$$

$$2013 (x=4) = 54.35 + 3.13(4) = 66.87$$

$$2014 (x=5) = 54.35 + 3.13(5) = 70.00$$

$$2015 (x=6) = 54.35 + 3.13(6) = 73.13$$

$$2016 (x=7) = 54.35 + 3.13(7) = 76.26$$

$$2017 (x=8) = 54.35 + 3.13(8) = 79.39$$

$$2018 (x=9) = 54.35 + 3.13(9) = 82.52$$

$$\textcircled{2} \quad 2020 (x=10) = 54.35 + 3.13(10) = 85.65$$

$$2025 (x=15) = 54.35 + 3.13(15) = 104.43$$

$$\textcircled{1} \leftarrow OF = d_2 + D \leftarrow$$

$$x_3d + x_3D = YX_3$$

$$(282)d + (242)D = 8888$$

$$\textcircled{2} \leftarrow F1 \cdot HF = dEE \cdot D + D \leftarrow$$

$$F1 \cdot H = dEE \leftarrow \textcircled{1} \rightarrow \textcircled{2}$$

$$[F1 \cdot E = dE]$$

