• Medical - Statistics •

• Definition - Statistics is a branch of Mathematics dealing with the collection.

- Analysis — (1)
- Interpretation — (2)
- presentation — (3)
- organization — (4)

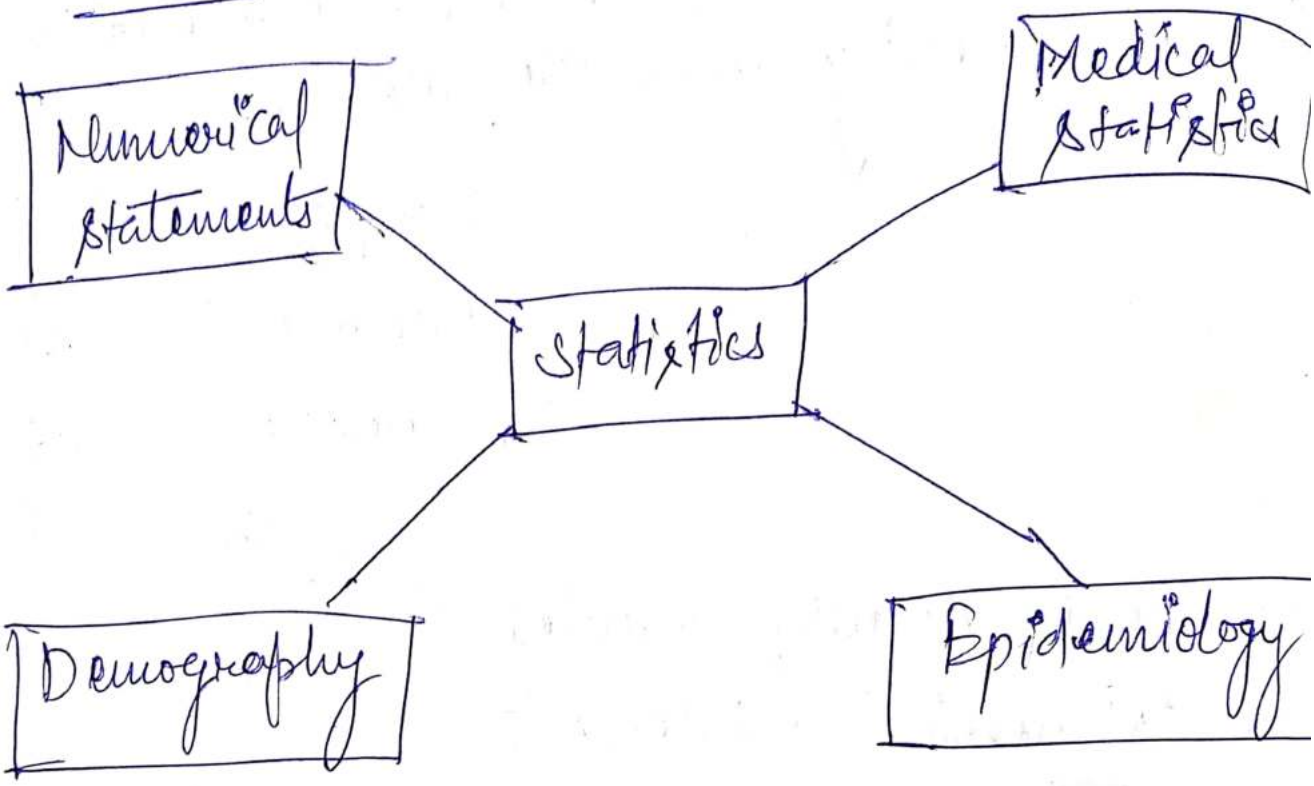
• Statistics is directly correlates with 'Numerical statements'

• Medical statistics deals with various factors —

- Including —
  - Epidemiology — (1)
  - Pubic Health. — (2)
  - Forensic Medicine — (3)
  - Clinical Research. — (4)

- It is a science of summarizing —
  - collecting — (1)
  - Presenting — (2)
  - Interpreting — (3)
  - Medical Practice — (4).

Chart -



- Demography - Statistical study of Populations
  - Especially Human Beings.
  - Study of size
    - structure — (1)
    - Distribution — (2)
    - Population — (3)
- Epidemiology - Study and Analysis of -
  - Patters — (1)
  - causes — (2)
  - Effects of Health — (3)
  - diseases — (4)

Scope of Medical statistics –

- Nature of statistics —— (1)
- Functions of statistics —— (2)
- Limitations of statistics —— (3)

Nature of statistics –

- Statistics is both a science and Art. —— (1)
- Art to Science – Statistics systematic manner —— (2)
- uses of statistics to solve the Problems of Real life —— (3)

- Statistics is Not a body of substantive Knowledge – But a body of Methods for obtaining knowledge. —— (4)

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(2) Functions of data -

- Simplification of data — (1)
- Presentation of facts — (2)
- Different techniques — (3)
- Different guidance — (4)
- Different formulations — (5)
- Individual experience — (6)
- Behaviour — (7)
- Evaluation of Projects — (8)

(3) Limitations of statistics —

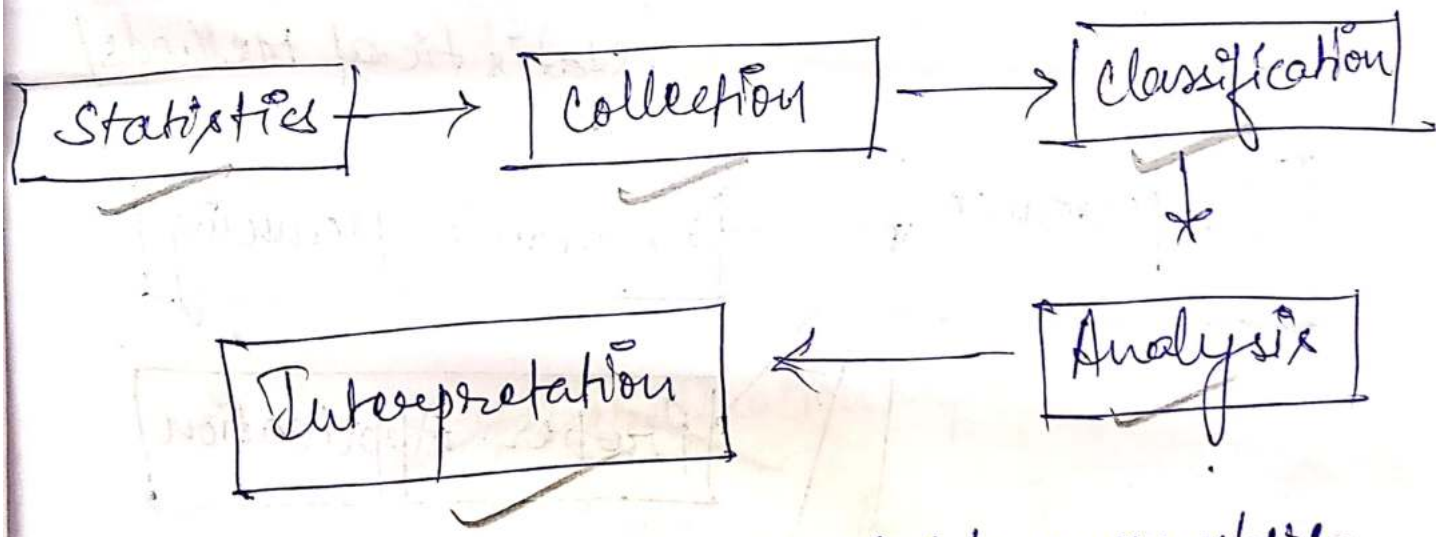
- Does Not Study Qualitative Phenomena — (1)
- Statistical Laws are Not exact — (2)
- does Not study Individuals — (3)
- Statistics can be Misused — (4).

Importance of statistics –

The word statistics is used as singular or plural.

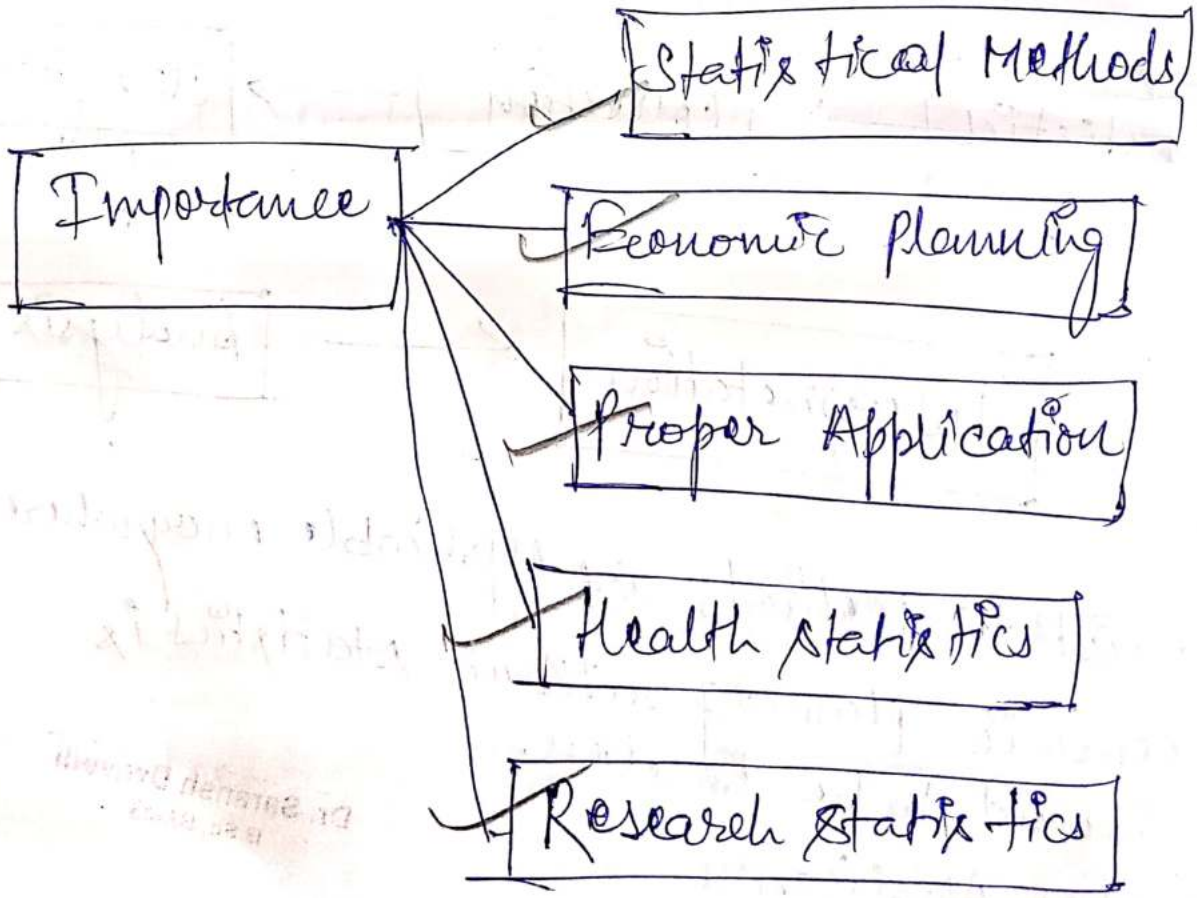
Various Methods Adopted –

- collection ——— (1)
- Classification ——— (2)
- Analysis ——— (3)
- Interpretation ——— (4)



- Statistical Methods are Applicable everywhere.
- Economic planning without statistics is Bound to be baseless.
- Proper Application
- Data Analysis
- understanding

- Advance Knowledge
- Health Statistics.
- Medicine Statistics.
- Research Articles
- Experiments
- Clinical trials
- Provide generalization.



Common Statistical terms and Notations

- Population ——— (1)
- sample ——— (2)
- Data ——— (3)
- Variable ——— (4)
- Normal distribution ——— (5)

Population – A statistical population can be a group of existing object.

- Hypothetical group ——— (1)
- Potentially group. ——— (2)
- generalization experience ——— (3)
- Statistical Analysis ——— (4)
- Specific population ——— (5)

eg:– A sample is the group of Individuals who participate in a study
Population is the broader group of people to whom results will Apply.

Difference between Population and Sample

(I) Population – Population refers to the collection of all elements ——— (1)

Inclusion – each unit of group. ——— (2)

Characters – Parameter ——— (3)

Data collection – complete ——— (4)

Focus – Identifying. ——— (5)

(II) Sample – refers to sub-group of the Members of Population ——— (1)

Inclusion – only Half unit. ——— (2)

Characters – Statistics ——— (3)

Data collection – Sample ——— (4)

Focus – Inferencing ——— (5)

Statistical Data —

- Statistical data directly co-relates with the raw Numbers.
- Data are Actual pieces of Informations that Persons collect. Through study.

Types —

- Qualitative Data — (1)
- Quantitative Data — (2)

- Qualitative data — Nominal Data — (1)
  ordinal Data — (2)

- Quantitative data — Discrete Data — (1)
  continous data — (2).

Nominal Data — The assignment of Numbers for classification purpose

Examples — Gender/Sex — Person's gender — (1)
Religion. — Marital status — (2)
— Hometown — (3).

B.) ordinal data -

- one value is greater
- But the Magnitude of the difference is unknown.
  - Muscles Response ——— (1)
  - Visual Analogue scale ——— (2)
  - Socio-economic status ——— (3).

② Quantitative Data -

- Quantitative Data → Discrete ——— (1)
  → continous. ——— (2)

(A) - Discrete - Number of Petals on a flower
- Number of children in a family

(B) continous - continous data can be divide and Reduced to finer
- Height — (1)
- weight — (2)
- Light years — (3)
- Blood Pressure — (4).

Variable –

1) A Variable is any characteristics
– Number or Quantity that can be measured or counted.
– Variable May also called a data.
– vary b/w data units in a population

eg – Age Sex ——— (1)
Business Income ——— (2)
eye colour ——— (3)
Vehicle type ——— (4)

Types – Numeric Variables ——— (1)
Categorical Variables ——— (2)

Number Variables – Continous Variable ——— (1)
Discrete ——— (2)

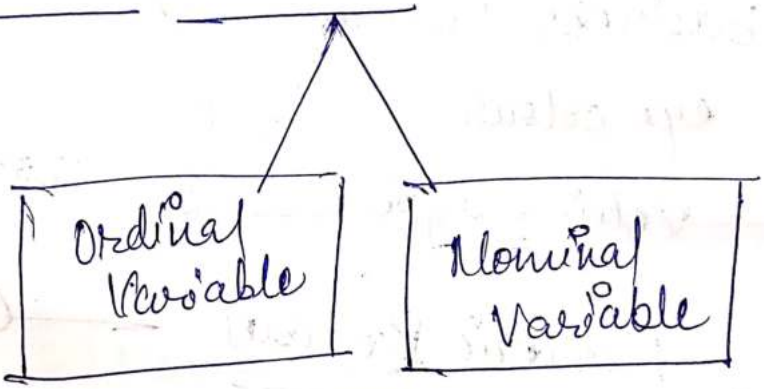
Continous Variable – eg – Height ——— (1)
Time ——— (2)
Age ——— (3)
Temperature ——— (4)

b) Discrete Variable – Number of Registered cars ——— ①

– No of Business locations ——— ②

– No of children in a family ——— ③

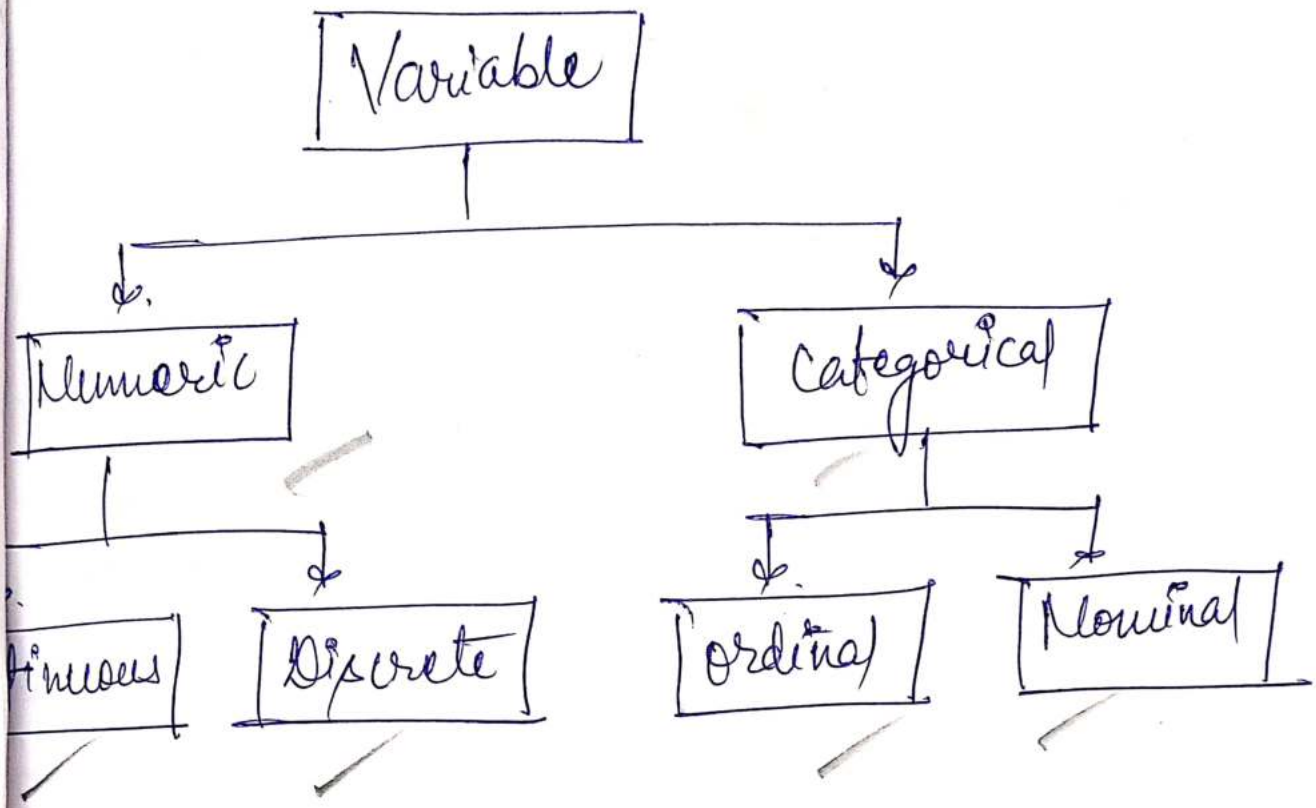
② Categorical Variables –



- Ordinal variable – logically ordered

  eg – Academic grades.
  Clothing size.

- Nominal Variable – value cannot be able to organized in a logical sequence.

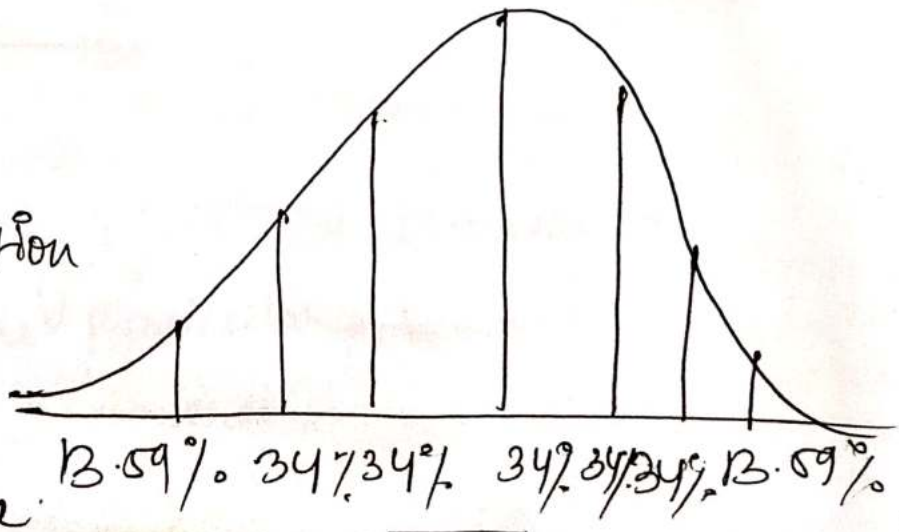


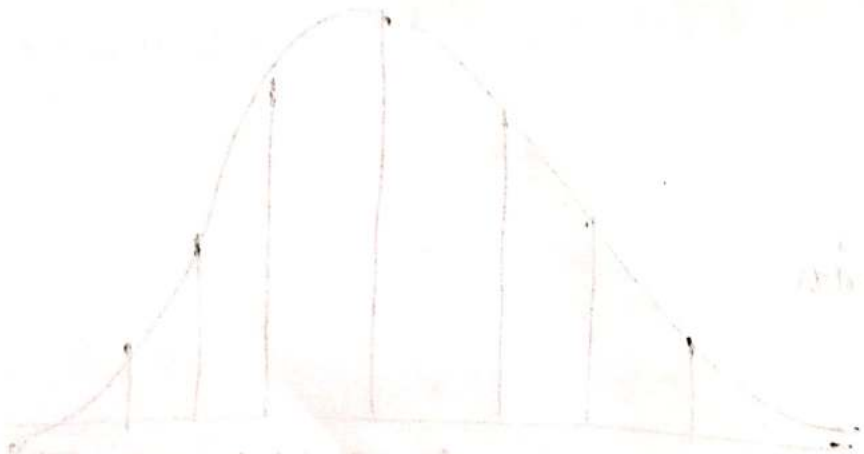
Normal Distribution -

- It is a probability distribution
- Symmetric
- Near to Mean
- Fare to Mean.

Properties

- Mean
- Standard Deviation
- Symmetric
- MMM
- empirical rule.





Collection and Presentation of Data

Data collection is directly co-relates with the process of gathering and Measuring Information.

Data collection Methods –

- Registration ——— (1)
- Question ——— (2)
- Interviews ——— (3)
- Direct observations ——— (4)
- Reporting ——— (5).

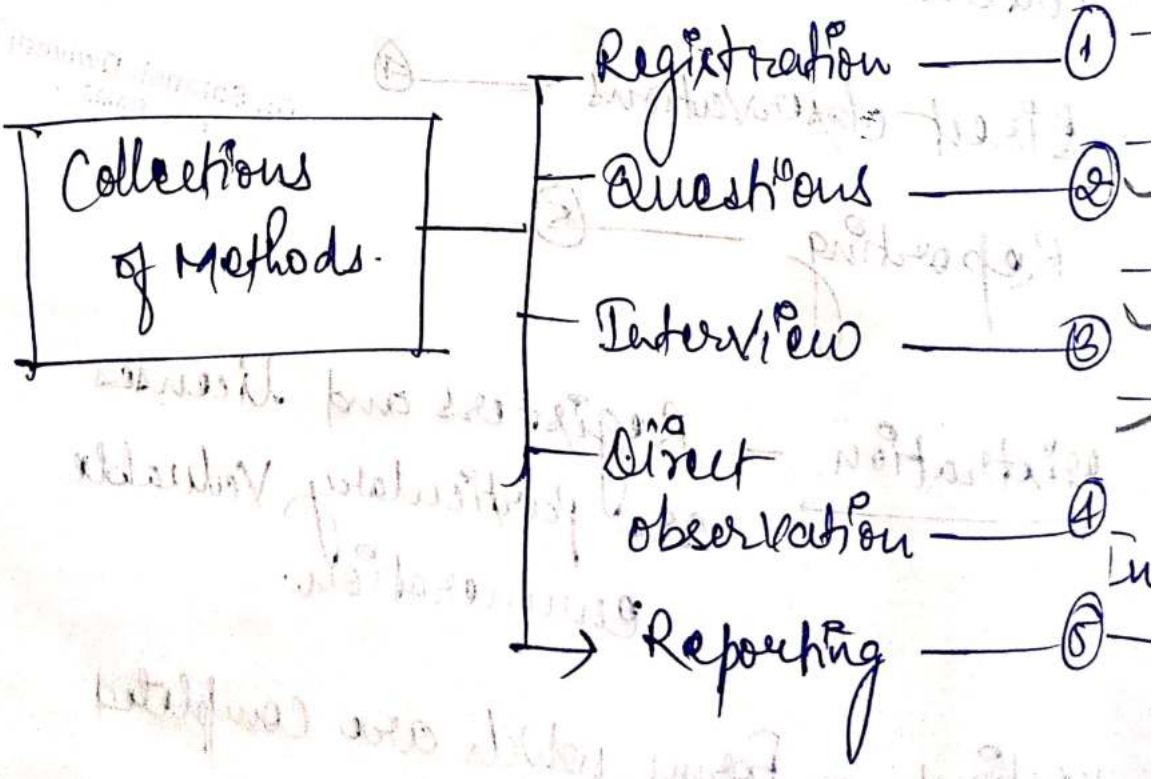
Registration – Registers and licenses are particulary valuable enumeration.

Questions – Forms which are completed through an Interview with respondent.

3) Interviews – Forms should are completed through Interview

4) Direct observation – Direct Measurement is Most Important and good for Business

5) Reporting – Activities should be Report and Note that In a particular paper.



Presentation of data

Data
- Tabular Presentation ——— (1)
- Graphical Presentation ——— (2)
- Diagrammatical Presentation ——— (3)

Tabular Presentation –

- It is a process of Presentation ——— (1)
- Data in a proper order ——— (2)
- Facilitate comparison ——— (3)
- Statistical table ——— (4)
- Horizontal columns ——— (5)
- Vertical columns ——— (6)

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Imp. factors –
- Table should Not be overloaded
- Should be Attractive
- Should be complete with itself.
- Table should contains all of Parts.

Parts of Table - 07:

1) Table Number ——— (1)
- Title of table ——— (2)
- Column and Row ——— (3)
- Body of table ——— (4)
- Head Note ——— (5)
- Foot Notes ——— (6)
- Source ——— (7).

- **Classification** -
  - One way table ——— (1)
  - Two-way table ——— (2)
  - Manifold table ——— (3)

1) **One way table** - Simplest table
   - Simple table is easy to construct and simple follow.

Two-way table – It's a table which contains data on two characteristics.

Manifold table – More than two characteristics of data.

– Enable full Information
– Facilitate Analysis

Graphical Representation – Help in analyzing and representing Quantitative data Visually

Every graph should :-

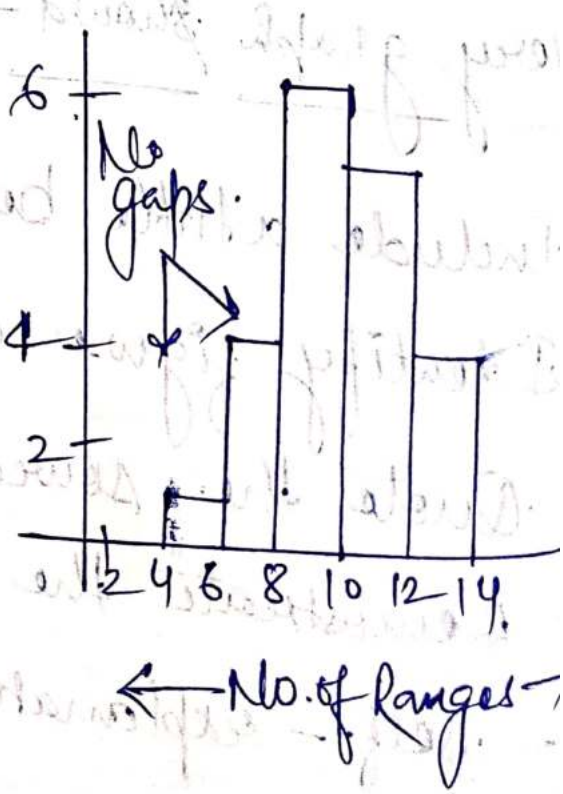
– Include a title below the figure ——— (1)
– Identify figure axis ——— (2)
– Quote the source ——— (3)
– Demostreate the scale ——— (4)
– Self-explanatory ——— (5).

- Types of Graphical Presentation

- Histogram ——— (1)
- Frequency polygon ——— (2)
- Frequency curve ——— (3)
- Line chart / graph ——— (4)
- Cumulative frequency diagram ——— (5)
- Dot diagram. ——— (6)
- Normal distribution curve ——— (7).

① Histogram –

- defined as a graphical representation of Mutually exclusive events.
- Rectangular Bars.
- No gap between any two bars.



Frequency polygon –

- It's a type of graphical representation —— (1)
- gives better understanding of the shape of given distribution —— (2)
- It's helpful in comparing two or more sets of data. —— (3)
- Rectangular bar is joined together in frequency polygon. —— (4)

Frequency curve –

- Smooth curve —— (1)
- Frequency distribution —— (2)
- continuous distribution —— (3)
- Becomes very Large —— (4)
- Smoothed curve —— (5)
- Joined by straight lines —— (6)

(4) Line chart -

- Represents data — (1)
- Series of points — (2)
- Segments are connected — (3)
- Straight lines — (4).

(5) cumulative frequency -

- Plotted from cumulative frequency — (1)
- called as O-give — (2).
  frequency curve

(6) Dot diagram -

- Known by many Names — (1)
- Scatter Graph — (2)
- Co-relation chart — (3)
- 1st Variable is independent — (4)
- 2nd Variable dependent on 1st one (5)
- Correlation b/w 1st and 2nd Variable — (6)
- Relation of two Variables — (7).

Diagrammatic Presentation —

Diagrammatic Presentation is directly co-relates with the statistical data.

Highly Abstract ideas
- Numbers are more easily

Types of diagram. —

- Bar diagram ——— (1)
- Pie diagram ——— (2)
- Pictogram ——— (3)
- Cartogram ——— (4)

Bar diagram —

Graph that presents grouped data with Rectangular bars.

Bars can be plotted vertically and Horizontally.

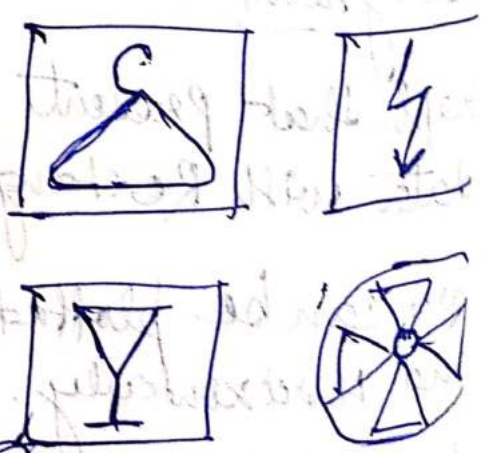
Also called as Line graph.

② Pie diagram —

- Pie diagram directly co-relates with the circular diagram.
- Divided into many different sectors
- The whole data represents the whole data into 360°. at the centre
- Straight lines from the centres.

③ Pictogram / Pictograph —

- Represents —
  - concept — ①
  - object — ②
  - Activity — ③
  - Place — ④
  - simplified style — ⑤
  - communication — ⑥
- Used for caution, dagerous Materials — ⑦.



Cartogram

- called as cartograph — (1)
- shown as geographical — (2)

Area distribution.

- Basic idea of distribution. — (3)
- Area wise distribution. — (4)
- land wise distribution. — (5)
- geographical distribution. — (6).

India land Area — diagram -

Measures of Locations

Measures of locations is directly co-relates with the statistical Analysis ——— (1)

To Estimate the location Parameter for the distribution. ——— (2)

One of the Most widely used ——— (3)

Also called as central locations ——— (4).

Types –

Location
- Average ——— (1)
- Percentile ——— (2).

Average –

- In statistics – Average is defined as –

" the No. of Measures the central tendency of given set of Numbers "

- Concentration of values
- Central Part of distribution

• Percentile –

– It's used in statistics ——— (1)
– Indicating the value Below ——— (2)
– given percentage of observation ——— (3).
group of observation fall,

– 20 percentile — 20% observation may Befound.

– Basic formats are :-

– Mean ——— (1)
– Median ——— (2)
– Mode ——— (3).

Mean $\bar{x} = \frac{x_1 + x_2 + x_3 \cdots x_n}{N}$.

$\bar{x}$ — the mean ——— (1)
x_1 — First value ——— (2)
x_2 — second value ——— (3)
x_3 — third value ——— (4)
N — No. of value ——— (5).

• Measures of Central tendency •

Measures of central tendency directly co-relates with the 03 Basic factors -

They are as follows :-

- Central tendency
  - Mean ——— (1)
  - Median ——— (2)
  - Mode ——— (3)

Mean - Mean is directly co-relates with the Arithmetic mean in accordance with the central location

The Mean refers to sum of all observations divided by No. of observations.

$$\text{Mean} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{N}$$

x_0 = the mean ——— (1)
x_1 - First value ——— (2)
x_2 - Second Value ——— (3)
x_3 - 3rd Value ——— (4)
x_4 - 4th Value ——— (5).

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eg - Feedata :-

12, 19, 15, 22, 17.

① Mean = Sum of all observations / No. of observations.

$= \frac{12+19+15+22+17}{05} = \frac{85}{05}$

$= 17$

② Median =

- Separating the higher Half of data —
- Probability distribution —— ②
- Median is the Middle ones —— ③
- Arrange the data in Ascending order —— ④

eg - 12, 15, (17), 19, 22

Median - $\frac{(N+1)^{th}}{02}$

- $\left(\frac{5+1}{2}\right)^{th}$ - 3rd observation
- $(6/2)^{th}$ - 3rd observation
- 03 = 17 Median

Mode –

- Mode is the most common No. —— ①
- collecting and organizing data —— ②
- this results with highest occurences —— ③
- Highest frequency / Repeating frequency —— ④.

Ex –

formulae –

$$\text{Mode} = l + \left[\frac{F_1 - F_0}{2F_1 - F_0 - F_2}\right] \times h$$

l = Lower limit —— ①

F_1 = Frequency of Model class. —— ②

F_0 = Preceding class. —— ③

F_2 = Succeeding class. —— ④

h = size of class. —— ⑤. —— ④

Interval

eg - Types of Mean -

- Arithmatic Mean
- weighted Mean
- Geometric Mean.
- Harmonic Mean.

Variability and its Measurements

Variability directly co-relates with the statistical distribution.

factors — Average factor ——— (1)
— Mean factor ——— (2)
— Median factor ——— (3)
— Mode factor ——— (4).

Types —
- Biological Variability ——— (1)
- Real Variability ——— (2)
- Experimental Variability ——— (3).

Biological Variability — co-relates with the Natural Variability
— Lab. parameter of Biological substances
— physiological differences.
— Ecological differences.

② Real Variability — Difference b/w
— two Readings —
— observations — ①
— class — ③
— Value — ④
— Samples — ⑤
— Limit Value — ⑥

③ Experimental Variability —

— Errors in experiments —
— subjective defects —
— Objective defects —
— observer defects —
— Instrumental defects —
— Data defects —

Basic types of Variability —

Range — (1)

Standard Deviation — (2)

Standard Error — (3).

Range - Range is directly co-relates with the maximum value and minimum value of a particular data.

Symbol - R = Range — (1)

L = Largest Value — (2)

S = Smallest value — (3).

Coefficient Range = Measure of Range

Coefficient Range = Largest value / Smallest value.

$$\text{Range} = \frac{L - S}{L + S}$$

• eg - weights of 25 boys. —

108, 104, 120, 180, 110, 125, 103, 112, 9

— Find the range of data ?

— 1st arrange in Ascending order —

— 99, 103, 104, 108, 110, 115, 12

180.

— Lowest Value — 99 —— ①

— Highest Value — 180. —— ②.

$$\text{Range} = \frac{h-s}{L+s} = \frac{180-99}{180+99} = \frac{81}{279} =$$

• 29 is the co-efficient of Range

• Range = $h - s$ = 180 - 99 = 81

• 81 is the Range Value.

Standard deviation —

Standard deviation directly co-relates with the Quantity

Denoted by - SD.

It is a statistical term used to find out the amount of variability on Average.

Larger the Variability = Higher the Standard deviation.

SD is Also known as —

"Root Mean Square deviation"

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Formula for standard deviation is —

$$SD = \sqrt{\frac{\Sigma |x - \bar{x}|^2}{n}}$$

SD = Standard deviation —— (1)

Σ = Sigma —— (2)

x = value of Any object or data. —— (3)

n = n is the No. of values. —— (4).

(4)

(8)

⑧ Standard Error –

– Standard error is directly co-relate with the standard deviation. in accordance with the sampling distribution.

– Measures Accuracy —— ①
– Sample representations —— ②
– Statical/statistical data —— ③
– Actual Mean data —— ④.

• Formulae of Standard error. –

$$SE_{\bar{x}} = \frac{s}{\sqrt{n}}$$

SE = Standard Error —— ①
$\bar{x}$ = Value —— ②
s = —— ③
n = Number of Value of Particular data —— ④.

• Introduction to Probability and test of significance

term probability is derived from 'Probable'

Meaning - 'Something likely to be true'

Probability - defined as proportion of favourable outcomes.

$$\frac{\text{Total Number of Possibilities.}}{}$$

Measure when any event will occur ——— (1)

Higher Probability of an event ——— (2)

more certainly event occur. ——— (3)

$$P(A) = \frac{\text{No. of Favourable outcomes.}}{\text{Total No. of Favourable outcomes.}}$$

A) = Number of events.

— The sum of Probability of success and failure is always 01 (unite)

$$p + q = 01$$

p = Probability of success ——— (1)
q = Probability of failure ——— (2)

• Law of Probability —

— Addition Law of Probability ——— (1)
— Multiplication Law of Probability ——— (2)

— $P = P(A) + P(B)$ = Addition Law

— $P = P(A) \times P(B)$ = Multiplication

— Probability — Fraction, decimal, Percentage. } Can be represented

diagrammatic —

Probability

0 ←——→ 0.5

Impossible ←——→ equally ←——→

Factors —

If event is Impossible then P = 0.
If event is certain then P = 1
All Probabilities lie b/w 0 and 01

Q - Total 05 Marbles in bag
04 are blue
01 is Red
— Probability?

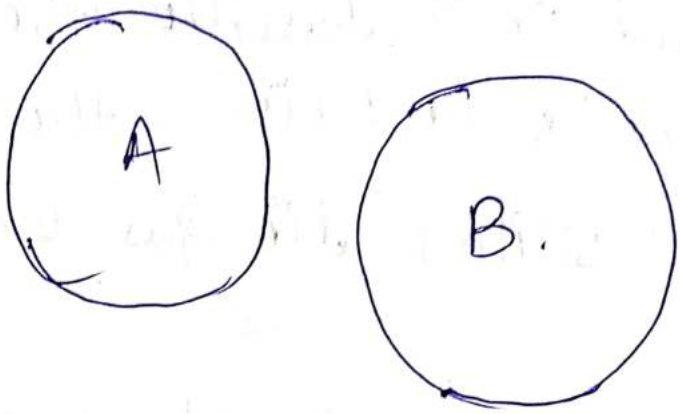
$$= \frac{\text{Total outcomes}}{\text{Happens}} = \frac{05}{04}$$

$$P(A) = \frac{04}{05} = 0.8$$

Types of events —

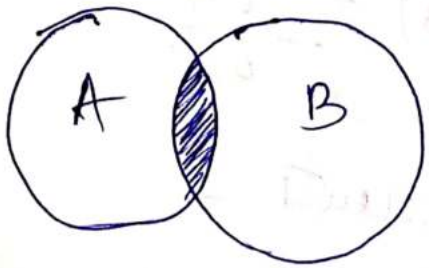
— Exclusive events — (1)
— Independent events — (2)
— Dependent events — (3).

(1) Exclusive events — can not joint togeth



(2) Independent Events — one does not af others.

(3) Dependent Events — one does affect o



— The Analysis of events governed by Probability is called statistics.

Test of significance –

It's a statistical technology ——— (1)
used for empirical data ——— (2)
Real effect ——— (3)
Co-relations b/w Variables ——— (4)
Effectiveness ——— (5)

Factors –

- Calculation ——— (1)
- Assessment ——— (2)

Steps –

- Research hypothesis ——— (1)
- Null Hypothesis ——— (2)
- Error Level ——— (3) ——— (4)
- Significance test ——— (5)
- Interpretation ——— (6). (8)

- Parametric and Non-Parametric test
- Testing of Hypothesis —

Testing of Hypothesis is directly co-relates with the type-I error and
- type II error

Type I error — Also known as False Positive ——— (1)

Type II error — Also known as. False Negative. ——— (2)

pe I error — Rejection of true Null Hypothesis.

e II error — Non-Rejection of false Null Hypothesis.

pothesis testing is a way to test the results of a survey or experiment.

- Testing of Hypothesis -

(Type I and Type II error)

- There are 4 Possibilities -

(1) H_0 Accepted when H_0 is true — (cor

(2) H_0 Rejected when H_0 is true — (Type

(3) H_0 Accepted when H_0 is false — (Type

(4) H_0 Rejected when H_0 is false — (corr

- Type I error —

α = Possibility (Type I error)

α = Possibility (Reject H_0 / H_0 is true)

- Type II error -

β = Possibility (Type II error)

β = Possibility (Accepted H_0 / H_1 is H_1)

Parametric test and Non Parametric test.

Parametric test is directly co-relates with the constant. Mean Variance.

Factors -

- Mean Variance ——— (1)
- Data Analyze ——— (2)
- Normal Distribution ——— (3)
- Binomial Distribution ——— (4)

Types -

- T test (Student test) ——— (1)
- Z test ——— (2)
- F test ——— (3)
- ANOVA ——— (4)
- fisher's test ——— (5)

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(2) Non-parametric test –

– A statistical test used in non-Metric Independent Variables. —— (1)

– Arbitary —— (2)

– Nominal —— (3)

– Unavailable —— (4)

– Variables —— (5)

– Spearman (correlation test) —— (6)

– Chi-square test,
Fisher test,
McNemar test
Wilcoxon test
—— (7).

• So, these are the factors of Non-parametric test which is inaccordance with the Non-parametric statistics.

Student 't' test - / welch t-test

William Gosset.

Method of testing hypothesis

Mean of small population

Normally distributed Population.

Deviation is unknown variable

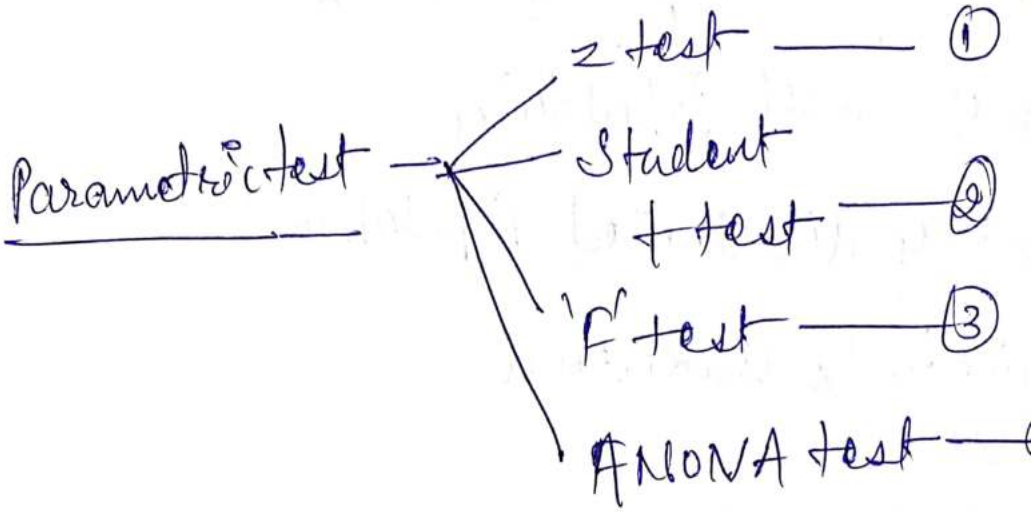
$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{N}}}$$

F test -

- It's a statistical test
- used to determine two population
- Having Normal distribution
- Same Variances.

$$f = \frac{\sigma_1^2}{\sigma_2^2}$$

- Parametric test -



① 'z' test - given by fischer

- It is a statistical test ——— ①
- Normal distribution is applied ———
- Large samples when ≥ 30. ——— ③
- Degree of freedom
  (n = sample size)

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

Analysis of Variance (ANOVA) test -

It's a statistical test ——— (1)

Analyze the different among other ——— (2)
Means.

Two factors -

- Systemic factors ——— (1)
- Random factors ——— (2)

Anova provides a statistical test of whether two or more population Means are equal.

Assumptions of Anova test -

Data are Normally distributed ——— (1)

Equal Variances b/w treatments ——— (2)

Independence of Samples ——— (3)

Randomly selected Samples ——— (4).

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- Non-parametric test -
- Chi-Square test $= (\chi^2)$.

Observed Values = Expected Values.

- Null Hypothesis - There is No Relation two variables.
- Alternate Hypothesis - There is a Signif Relation b/w t Variables.
- Generally significance level (α). $= \boxed{\alpha = 0.05}$

Formulae -

$$\boxed{\chi^2 = \sum \left(\frac{O - E}{E}\right)^2}$$

$\chi^2 = \left(\frac{\text{observed value} - \text{expected V}}{\text{expected value}}\right.$

observed counts ← difference → expected co

Null Hypothesis

H_0 : Medicine is curing cancer

(H₀ Reject) (Type I error)

treatment को दवा continue कर दिया

Assumption को accept कर लिया

Other cases :-

H_0 : Medicine is Not curing cancer
फिर भी इसको चिकित्सा को continue

(False)

H_0 (Accept) = Type-II error

दोनों error को minimize नहीं कर सकते।

सही करने के लिए - Risk लेना Type I error का

Level of Significance = (α)

α = 5%
α = 1%
α = 10%

Almost 0.05%

Testing of Hypothesis

(Type I and Type II error)

or Possibilities.

1. H_0 Accepted when H_0 is true (correct
2. H_0 Rejected when H_0 is true (Type I erro
3. H_0 Accepted when H_0 is false (Type II er
4. H_0 Rejected when H_0 is false (correct

Type I error

$\alpha = P(\text{Type I error})$

$\alpha = P(\text{Reject } H_0 / H_0 \text{ is true})$

Type II error

$\beta = P(\text{Type II er}$

$\beta = P(\text{Accepted } H_0 / H_1$

Qualification/ Marital Status	Middle Class.	High School	Bachelor's	Master	PhD	Total
Never Married	(18)	(36)	21	09	06	(90)
Married	12	36	45	36	21	150.
Divorced	06	09	9	3	3,	30
Widowed	03	09	9	6	3	30
Total	(39)	(90)	84	54	33	(300)

Observed values है।

Null hypothesis – No Relation B/w Marital Status and education.

Chi square = χ^2)

→ No correlation B/w two Variables

Significance Level = 0.05 usually रखा जाता है।

Expected value/calculated Value

Middle Class

$\frac{90 \times 39}{300} = 11.7$

High School

$\frac{90 \times 90}{300} = 27.$

Formulae = $\frac{(\text{observed value} - \text{Expected value})^2}{\text{expected Value}}$

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Table

Observed values.	expected value	$(O-E)$	$(O-E)^2$
18	11.7 (expected)		

Total $= \sum \frac{(O-E)^2}{E}$

$\chi^2 = 23.57$

χ^2 calculated $= 23.57$.

greater

χ^2 calculated $>$ χ^2 tabular.

Here - Null Hypothesis Rejected and Alternate Hypothesis is ~~expec~~ accepted.

Introduction to commonly used Statistical software

Statistical Software directly co-relates with the specialized computer programs.

Most commonly softwares are used –

1. Microsoft Excel
2. SPSS.
3. SAS.
4. STATA
5. R.
6. MINITAB.

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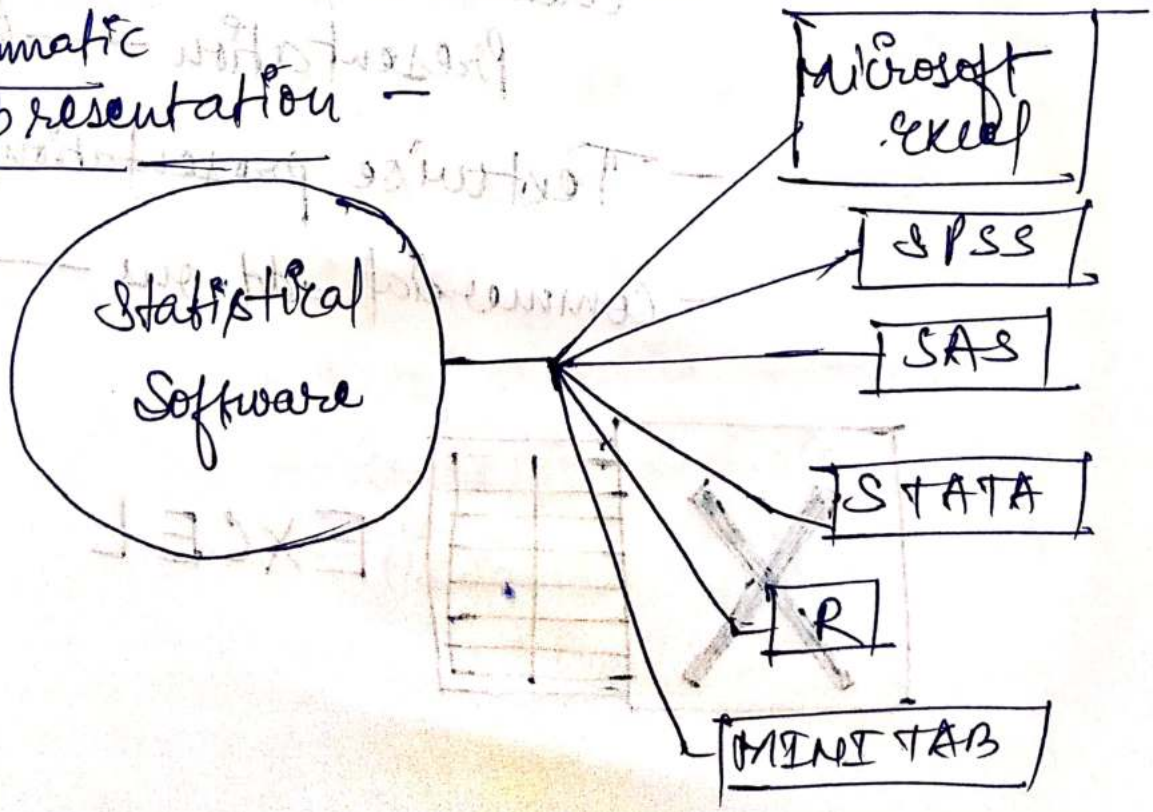
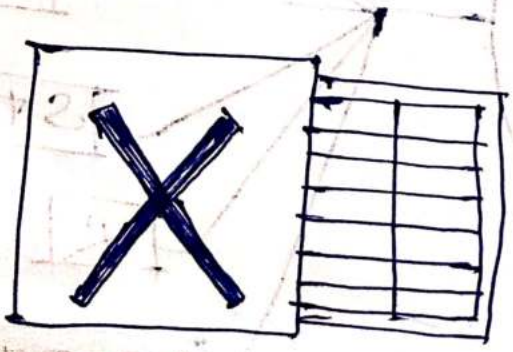
Gramatic Representation –



① Microsoft Excel —

— Microsoft office suite Programme —①
— Version 1.0 released in 1985 —②

- Advantages — Easy to use —③
— Widely Interchangable —④
— excel sheets —⑤
— statistical Packages —
— statistical Analysis —
— Add columns —⑥
— easily save datas —⑦
— Columns wise Presentation —⑧
— Text wise presentation
— Commercial add-ons —



EXCEL

Disadvantages. —

- Main Purpose - financial calculations. —— (1)
- But It's used for other purposes also. —— (2)
- Cannot undergo the extra features —— (3)
- purchase the premium to use —— (4).
  extra features to save or add your data

SPSS. —

- statistical Package for Social sciences.
- Version 01 released in 1968.

dvantages - Easy to learn —— (1)
- Easy to use —— (2)
- Menus files —— (3)
- Syntax files —— (4)
- Excel statistics —— (5)
- Regression Analysis —— (6)
- Variance Analysis —— (7)
- CART. —— (8).

- Disadvantages -

— His Many for Social science Statistics. ——— ①

— Epidemiological Analysis ——— ②

— Risk Analysis ——— ③

— Standard Analysis ——— ④.

③ SAS -

SAS — Statistical Analysis System.

— It was developed at the North carol state in 1966.

- Advantages - Can use Menus. ——— ①

— Can use syntax files ——— ②.

— More powerful than SPSS ——— ③

— Commonly used in data management in clinical trials ——— ④.

- Disadvantages - Harder to learn ——— ①

— use than SPSS ——— ②

STATA. —

- Stata is More recent statistical Package with Version 1 —— ①
- Released in 1985. —— ②
- used in epidemiology and economics —— ③

vantages —

- used Menus —— ①
- use syntax files —— ②
- More powerful than SPSS —— ③
- Equivalent to SAS —— ④
- Advanced Regression —— ⑤
- In-built Structure —— ⑥
- Good suite for epidemiology —— ⑦
- Available to all users —— ⑧

sadvantages —

- Harder to learn —— ①
- useful than SPSS —— ②
- Doesn't specialized —— ③
  techniques

⑤ R -

- S-Plus is directly co-relates with th
R-type of Programme ——— ①

- Statistical programming language. ——
——— ③
- developed in 1988.
- R is free version of s-Plus develop
in 1996. ——— ④.

o Advantages -

- Very powerful. ——— ①.
- Easily Matches ——— ②
- Easily surpasses. ——— ③.
- found in SAS ——— ④.
- around world wide ——— ⑤.
- Available for all users ——— ⑥
- free of charge ——— ⑦.

o Dis advantages -

- Much Harder to learn
- More useful than SAS and Stata.

MINITAB. —

MINITAB is directly co-relates with the diverse software Package for statistical Analysis.

Developed at Pennsylvania state University 1972.

Ivantages —

Versatile statistical package —— ①

- Cheaper and Quicker —— ②
- Requires less disk space —— ③
- Easily useable —— ④
- drop-down Menus or Syntax —— ⑤
- Simplicity to Learn —— ⑥
- output available in eng —— ⑦ french, German, Japanese, Korean

- Disadvantages —
  - Installation is Not much wide — (1)
  - Range decreases — (2)
  - Weaker choice for Mathematical uses — (3)
  - Less ability to Perform Mathematical and Numerical Analysis — (4).

- Importance —
  - Quantitative Research increases — (1)
  - More critical part of Data Analysis —
  - Digitally Analysis — (3)
  - Electronically Analysis — (4)
  - Produces Accurate figures — (5)
  - Avoidance of Mathematical Mistakes —
  - Write freely — (7)
  - use your own procedures — (8)
  - Available to all users — (9)
  - Active Knowledge constructions — (10)

• Research Historical Background •

Brief Historical Background ——— (1)
Research during the Vedic Period ——— (2)
Research during the upanishad Period ——— (3)
Research during the Samhita Period ——— (4)
Research during the Modern Period ——— (5).

Brief Historical Background —

- Knowledge of Ayurveda was Recollected By Lord Brahma ——— (1)
- Chronological Analysis of Vedas ——— (2)
- उपनिषद
- संहिता] वेद's

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Knowledge of 'आयुर्वेद' is eternal ——— (3)
Lord Brahma is regarded as the Creator of world and Primary Researcher ——— (4)
Collection of Medical writing called चरक संहिता ——— (5)
- Various scientific Methodologies ——— (6).

② Research during the Vedic Period —

- Vedic Literature

- प्राचीन ग्रन्थ — ऋग्वेद — (1)
  - यजुर्वेद — (2)
  - अथर्ववेद — (3)

- आदि Mentioned in ऋग्वेद — राजयक्ष्मा — (1)
  - अप्सरा — (2)
  - कुष्ठरोग — (3)
  - चर्मरोग — (4).

- In अथर्ववेद, युक्ति, दैव treatment principles are Mentioned as well.

- विष विज्ञान
- शालाक्य तंत्र
- भूत विद्या
- रसायन
- वाजीकरण

} Attained by physicians upto अथर्ववेद Period.

Research during the उपनिषद Period.

- दशा प्रश्न — (1)
- त्रिदोष सिद्धान्त — (2)
- चतुष्पाद सिद्धान्त — (3)
- चंदोग्य उपनिषद — describe the process of Assimilation of food and drink.

- उपनिषद Period —
- Physiology of Heart — (1)
- etiology of diseases — (2)
- दोषदूष्य काल — (3)

Research during the संहिता Period. —

- चरक संहिता — (1)
- सुश्रुत संहिता — (2)
- अष्टांग हृदय — (3)
- माधव निदान — (4)
- भावप्रकाश निघन्टु — (5)
- शारंगधर संहिता — (6).
- काश्यप संहिता — (7)
- So, these are the संहिता Period and their आचार्य's.

- Research during the Modern Period.

- Ayurveda can be traced to the Pre-colonial Period ——— (1)

- 1st European to describe drugs from Ayurvedic pharmacopoeias.

- Based on - Medical Historical ——— (1)
  - Linguistic ——— (2)
  - Philological point. ——— (3).

Introduction to Research –

अनुसंधान – अनु – To follow —— ①
Along —— ②
Along with —— ③
Connected —— ④

– **संधान** – Assembling —— ①
Meeting —— ②
union —— ③
Aiming —— ④.

परिभाषा –

कार्यकारणभावस्य द्रव्याणां गुणकर्मणो
परीक्षणस्य स्थापन सम्यक् अनुसन्धानम् उच्यते ॥.

(P.V. Sharma)

- Study of cause —— ①
- effect Relationship —— ②
- Dravya Guna —— ③
- Dravya Karma —— ④
- Seviceable observations —— ⑤.
- Final conclusion —— ⑥.

पर्याय -

अनुसन्धान — Research ——— (1)

शोध — Validation, Enquiry ——— (2)

संशोधन — Discovery ——— (3)

अन्वेषण — (the search for the missing ones'
— search for the missing links. ——— (4)

अन्वेषणा — Desire to search ——— (5)

कल्पना — idea, Hypothesis ——— (6)

विचयन — Enquiry, Research ——— (7)

RESEARCH WORD MEANING —

R = Review of literature ——— (1)

E = Economical ——— (2)

S = Scientific and Specific ——— (3)

E = Ethical ——— (4)

A = Achievable and Applicable ——— (5)

R = Reviewed throughly ——— (6)

C = Creative ——— (7)

H = Hypothesis Proven ——— (8).

- Purpose of Research -

Controlling Events
- Describing and explaining
- Prediction — (2)
- control — (3)

(1) Describing and explaining → Attempt to understand the world we live in
- Acquiring knowledge —
- Establishing facts —
- Developing New Methods

(2) Prediction - Predictions are usually stated as Hypothesis — (1)
- unambiguous statements — (2)
- Scientific verification — (3)

Not open to More than one Interpretation

(3) control - Sucessful verification of hypothesis
- Real problems and situations — (2)
- Shape our environment — (3).

• Research in Ayurveda •

Research in आयुर्वेद is Based on कार्य-कारण सिद्धान्त

with Knowing कार्य-कारण सिद्धान्त

complete Knowledge is Not possible.

Factors :-

अन्वेषण ——— ①
अन्वेषण ——— ②
पर्येषण ——— ③
अनुसन्धान ——— ④
एषण ——— ⑤
मंथन ——— ⑥
विमर्श ——— ⑦
तन्त्र युक्ति ——— ⑧
प्रतिपत्ति ——— ⑨.

- Scope for Research in Ayurveda

1.) Theoretical Research ——— (1)
2.) Experimental Research ——— (2)
3.) Clinical Research ——— (3)

(1) Theoretical Research -

- concept of दोष ——— (1)
- concept of धातु ——— (2)
- concept of मल ——— (3)
- concept of अग्नि ——— (4)
- concept of आवरण ——— (5)
- concept of आम ——— (6).

(2) Experimental Research -

- प्रत्यक्ष, आप्तोपदेश ——— (1) - अष्टविध पर
- अनुमान ——— (2)
- त्रिविध परीक्षा ——— (3)
- दशविधा परीक्षा ——— (4)

(3)

Clinical Research

03 Aspects -

- Curative Aspects —— (1)
- Promotive Aspects —— (2)
- Preventive Aspects —— (3).

Need for Research in Ayurveda

- To Review and Revive —— (1)
- To explore the historical Aspects of आयुर्वेद —— (2)
- To develop evidence based support —— (3)
- To generate data on 'saftey —— (4)
  - Standardization —— (5)
  - Quality control —— (6).
- Effectiveness —— (4)
- Formulations —— (5)
- Upgrade आयुर्वेद time to time —— (6).

Importance of Research in Ayurveda

- Careful Investigations — (1)
- observations — (2)
- Experimental studies — (3)
- supported by Accurate data with proper statistical Analysis — (4)
- Gaining global Acceptance — (5)
- Demand is Rapidly Increasing — (6)
- standardization and Quality control — (7)
- programmes in order to determine the Allocation of Resources — (8)

UTILITY -

- परीक्ष्यकारिणो हि कुशलो भवन्ती ॥ Ca.su
- Reasoning
- experiments
- comparisons
- judgements

} A/c to चरक.

Problems Encountered

No fixed universal dose of Ayurvedic drugs.
difficult to do clinical study with Ayurvedic drug
No Quantitative Measures.
Difficult to consider Ayurvedic प्रकृति -

- वातज प्रकृति — (1)
- पित्तज प्रकृति — (2)
- कफज प्रकृति — (3)

• Types of Research •

Research is generally divided into Primary and Secondary Research.

Research
- Primary Research ——— (1)
- Secondary Research ——— (2)

Primary Research ——— (1)

- Data gathered ——— (1)
- Original Research ——— (2)
- Primary purpose ——— (3)

Secondary Research ——— (2)

- Single data ——— (1)
- Multiple data ——— (2)
- Secondary purpose ——— (3).

o Classification of Research —

- A/c to study —— (1)
- A/c to enquiry —— (2)
- Role of Investigator —— (3)

- A/c to study - Pure Research —— (1)
  - Applied Research —— (2)

- A/c to Enquiry - Qualitative Research —— (1)
  - Quantitative Research —— (2)
  - Mixed Research —— (3)

- A/c to Investigator - 1) observational Research -
  2) Interventional Research -

o Type of Research

Pure Research –

Desire to expand Knowledge —— (1)

curiosity driven. —— (2)

Intended to – why
– what —— (3)
– How

understanding of —— (4)
fundamentals principles.

commercial objectives. —— (5)

Solution to a practical Problem. —— (6).

Applied Research –

Creating New knowledge —— (1)

solution of specific Problems. —— (2)

Research objectives —— (3)

Applied studies. —— (4)

External validity —— (5)

II Based on Elements of Enquiry –

- Qualitative Research —— (1)
- Quantative Research —— (2)
- Mixed Research. —— (3).

(1) Qualitative Research –

- directly co-relates with the –
  - collecting —— (1)
  - Analysing —— (2)
  - Interpreting —— (3)

- Classification –
  - Phenomenology —— (1)
  - Ethnography —— (2)
  - case study —— (3)
  - Grounded theory —— (4)
  - Historical Research —— (5).

① Phenomenology – Experience a phenomenon.

② Ethnography – Focuses on describing the culture of a group.

- Values ——— ①
- attributes ——— ②
- Norms ——— ③
- practices ——— ④
- language ——— ⑤
- Material ——— ⑥.

Case study – Focuses on providing detailed Account of one or more cases.

Grounded theory – Based on observation data.

④ Historical Research – Discuss on past events Provide possible solutions.

② Quantitative Research –

- Facts about social Phenomena
- Assumes a fixed Reality
- Data are collected through Measuring things
- Analysed through Numerical Comparisons.
- Reported through statistical Analysis.

③ Mixed Research –

- Mixed Methods ——— ①
- Systematic Integration ——— ②
- combining Qualitative and Quantitative ——— ③
- Single Investigation ——— ④.

Based on Investigator —

- observational Research ——— (1)
- Interventional Research ——— (2).

observational Research —

- It's also called epidemiological studies ——— (1)
- Relationships B/w factors and outcomes ——— (2).

eg - Researcher is simply observing the Answers of a survey without Influencing the outcome.

Interventional Research

- It's also called experimental study
- also called clinical trials.
- Evalutes direct Impacts of treatment.
- More Interventions.
- Investigator Randomly Assigns the participants.

• Ethics in Research •

Ethics in Research directly correlates with the person behaviour and Research Activities.

- Provide guidelines ——— (1)
- Conduct of Research ——— (2)
- educators ——— (3)
- Monitors ——— (4)
- standardization ——— (5)
- Ethical Issues ——— (6)

} factors

Ethics Principles —

- Honesty ——— (1)
- objectivity ——— (2)
- Integrity ——— (3)
- carefulness ——— (4)
- openness ——— (5)
- confidentially ——— (6)
- Responsibly ——— (7)
- Publication ——— (8)
- Socially ——— (9)
- Non-Discrimination ——— (10)
- competence ——— (11)
- Legality ——— (12)
- Animal care ——— (13)

- Importances of ethics in Research

— Promotes Aims of Research — (1)
— Such as Knowledge — (2)
— Truth, Avoidance of error — (3)
— Promotes Values — (4)
— collaborative work — (5)
— Accountability — (6)
— Mutual Respect — (7)
— fairness — (8)
— Build Public support — (9)
— Trust the Quality — (10)
— Integrity of Research — (11)
— Social Responsibility — (12).

- Social Responsibility
  - Human Rights — (1)
  - Compliance — (2)
  - Responsibility — (3)
  - Public Health — (4)
  - Safety — (5)

Research Process

esearch Process is directly co-relates with he process of coverts data into Information.

Factors –

- Information into knowledge — (1)
- Knowledge into wisdom — (2)

Research Methodology is a way to systematically solve the research problem.

Types –

- Basic 07 stages are as follows :-
- selection — (1)
- Review — (2)
- Formulation — (3)
- Aims and objectives — (4)
- Material and Methods — (5)
- Observations — (6)
- communication — (7).

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(1) Selection of topic -

- Interest —— (1)
- Magnitude —— (2)
- Recent trends —— (3)
- Level of experts —— (4)
- Relevance —— (5)
- Availability —— (6)
- Ethical issues —— (7)
- Expenses —— (8)
- Time period —— (9)

- **FINER** criteria in the development research Question :-

F = Feasible —— (1)
I = Interesting —— (2)
N = Novel —— (3)
E = Ethical —— (4)
R = Relevant —— (5).

Scanned with OKEN Scanner

Review of Literature –

- Literature Survey —— (1)
- Literature Review —— (2)
- sets the scope —— (3)
- Theoretical framework —— (4)

Factors –

- Sharpen the Questions —— (1)
- proper understanding —— (2)
- Practical knowledge —— (3)
- Previous Research —— (4)
- proposed problem —— (5)

Formulations of Hypothesis –

- Scientifically Resonable Prediction —— (1)
- Done only after Survey —— (2)
- Literature and Learning —— (3)
- Formulated —— (4)
- Researches and observations —— (5)

— Clear ——— (6)
— understandable ——— (7)
— testable ——— (8)
— Measurable ——— (9)
— Independent ——— (10)
— dependent Variable ——— (11)

(4) AIMS and objectives —

AIMS — Achieve by the end of the Resea
— Should be clear ——— (1)
— Concise ——— (2)
— Expressed ——— (3)

SMART Research objectives —

S = specific ——— (1)
M = Measurable ——— (2)
A = Realistic ——— (3)
R = Achievable ——— (4)
T = Time constrained ——— (5)

Material and Methods -

- what was done ——— (1)
- How it was done ——— (2)
- Brand Names ——— (3)
- Concentrations ——— (4)
- Quantities ——— (5)
- organisms studied ——— (6)
- Location of study ——— (7)
- Materials used -
  - Diagrams ——— (1)
  - primary Materials ——— (2)
  - formula ——— (3)
  - Algorithm ——— (4)
  - statistical Analyses ——— (5).

Observations and Results -

- Systematic data collections ——— (1)
- use all of their sense to examine people ——— (2)
- Prolonged engagement ——— (3)
- clearly expressed ——— (4)
- self-conscious ——— (5).

- Types of observational Methods :-

- Controlled observation
  - At what time
  - which Participants
  - what circumstances

- Natural observation
  - observe
  - Records
  - Behaviour

- Participant Observation
  - which is observed to get a deeper insight
  - Variant - Natural observation

- Results -
  - Study based upon the Methodology
  - Gather the Information - (2)
  - Arranged Manner - (3)
  - Interpretation - (4)
  - Implications for work - (5)

Methods of communication of Research.

Factors -

- Publication of findings in Scholarly Journals ——— (1)
- Local Professional conferences ——— (2)
- Written clinical statements ——— (3)
- Dissertations ——— (4)
- communication plan ——— (5)
- Goals and objectives ——— (6)
- Study findings ——— (7)
- Statistical Analysis ——— (8)
- Appropriate language ——— (9).

• ROLE OF प्रमाण's as Research tools

- The concept of प्रमाण is directly co-relates with the 'epistemology'

प्रमाण comes from — प्रमा + करण ——— (1)

प्रमा Means — true Knowledge ——— (2)

करण Means — Special causative ——— (3)
factors

- Factors —

- Testimony ——— (1)
- Proof ——— (2)
- evidence ——— (3)
- causative factors ——— (4).

- According to the school of thought and school of Philosophy

- There are 05 प्रमाण's & and they are as follows :-

- प्रत्यक्ष प्रमाण —— (1)
- अनुमान प्रमाण —— (2)
- युक्ति —— (3)
- उपमान —— (4)
- आप्तोपदेश —— (5)

- Also Various आचार्य's

- Also आचार्य चरक -

- प्रत्यक्ष —— (1)
- अनुमान —— (2)
- युक्ति —— (3)
- आप्तोपदेश —— (4)

Also आचार्य

- प्रत्यक्ष -
- अनुमान -
- उपमान -
- आप्तोपदेश

Role of प्रत्यक्ष प्रमाण as Research tool -

06 types of perception process. and they are as follows :-

1. संयोग
2. संयुक्त समवाय
3. संयुक्त समवेत समवाय
4. समवाय
5. समवेत समवाय
6. विशेषण विशेष्य भाव

1) संयोग - संयोग directly co-relates with the contact of substances with the इन्द्रियाँ (Sense organ)
(co-joined)

2) संयुक्त समवाय - co-relates with the contact of the Quality of the substances

③ समयुक्त समवेत समवाय – Inherently Joine
– This Precedes the degree
of Quality.

④ समवाय – Inherence
– Perception of sound
touch etc.

⑤ समवेत समवाय – Inherently Inherent
– perception of the Quality
of Sound.
– Regards to Pitch —— ①
– Frequency —— ②
– Wavelength —— ③
– Perception —— ④.

⑥ विशेषण विशेष्य भाव – Relation of Qualification
and Qualified
– Non-existance

Role of अनुमान प्रमाण as Research Tool.

- obtaining true knowledge by Inference.
- preceded by the Perception
- 03 stages of time —
  - वर्तमान ——① (Present)
  - अतित ——② (Past)
  - अनागत ——③ (future)

अनुमान is classified into two types :-

- स्वर्था अनुमान ——①
- परार्थ अनुमान ——②

- स्वर्था अनुमान – (Provide knowledge for oneself)
- परार्थ अनुमान – (Provide knowledge to others)

① स्वार्थ अनुमान – Inference of Knowledge from one's own perspective of observation by previous experience.

② परार्थ अनुमान – Process of exploiting Knowledge to others or someone

– valid knowledge to someone else.

– with proper Reasoning and Logic.

– eg – पञ्चावयव वाक्य

– प्रतिज्ञा – Mountain is on fire ——①

– हेतु – cause ——②

– उदाहरण – example ——③

– उपनय – Discussion ——④

– निगमन – Conclusion ——⑤.

Application of प्रयोगात्मक दर्शन

- प्रतिज्ञा (Hypothesis)

- Formulation of Hypothesis —— (1)
- proposition of Research problem —— (2)
- systematically study —— (3)

- हेतु (Materials and Methods)

- Research Activity —— (1)
- Research plan —— (2)
- Research Materials —— (3)

- उपपत्ति (Experiment and Demostration)

- experimental Data —— (1)
- Documentation —— (2)
- Scientific Data —— (3)
- Demonstration —— (4).

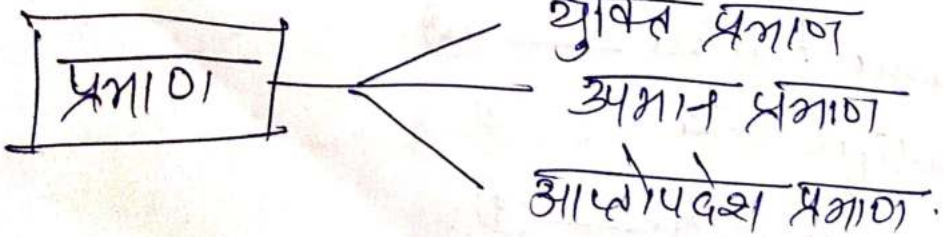
④ Discussion (चर्चा)

- Interpretation ——— (1)
- Collected data ——— (2)
- Possible Reaction ——— (3)
- Causes ——— (4)
- Effect ——— (5).

⑤ Conclusion – (निगमन)

- Approval ——— (1)
- Rejection. ——— (2)
- Hypothesis deals. ——— (3)
- Final Conclusions ——— (4).

.. Other 03 Basic types of प्रमाण



युक्ति प्रमाण as Research tools.

युक्ति प्रमाण – Planning

- Basis of प्रत्यक्ष and अनुमान
- Based on logic Reference
- It has Multidimensional Aspects
- Fruitful combination
- Multiple causative factors
- Valid knowledge.

अनुमान प्रमाण as Research tool.

- Obtaining New Knowledge — (1)
- Already known thing — (2)
- Analogy — (3)
- Analogical Reasoning — (4)
- Analogical Arguments — (5)
- Legal Reasoning — (6).

- Role of आलोचनात्मक प्रश्नों as Research Tool.

- आलोचनात्मक प्रश्नों ——— (1)
- Indirect प्रश्नों ——— (2)
- Partial प्रश्नों ——— (3)
- Attachment ——— (4)
- Aversion ——— (5)
- Fatual statements ——— (6)
- Respecting knowledge ——— (7)
- Review Literature ——— (8)

• EVIDENCE BASED MEDICINE •

EBM defined as — 'Integration of Best Research'

The Practice of EBM involves a process of lifelong self-directed learning.

The practice of EBM Involve a process of 'lifelong · self-directed'

- Important Information about clinical and other Health care issues.
- Task of staying current.
- Although Never easy
- Incorporate into everyday clinical Practice.

EBM FACTORS —

- Patient values ——— (1)
- Expectations ——— (2)
- Individual clinical exptise ——— (3)
- Best External evidence ——— (4)

- Basic factors :-

- Personal Experience ——— (1)
- Judgement ——— (2)
- Skills ——— (3)
- Patient Values ——— (4)
- Preferences ——— (5)
- Clinical History ——— (6)
- Physical Examination ——— (7)
- Current Evidence ——— (8)

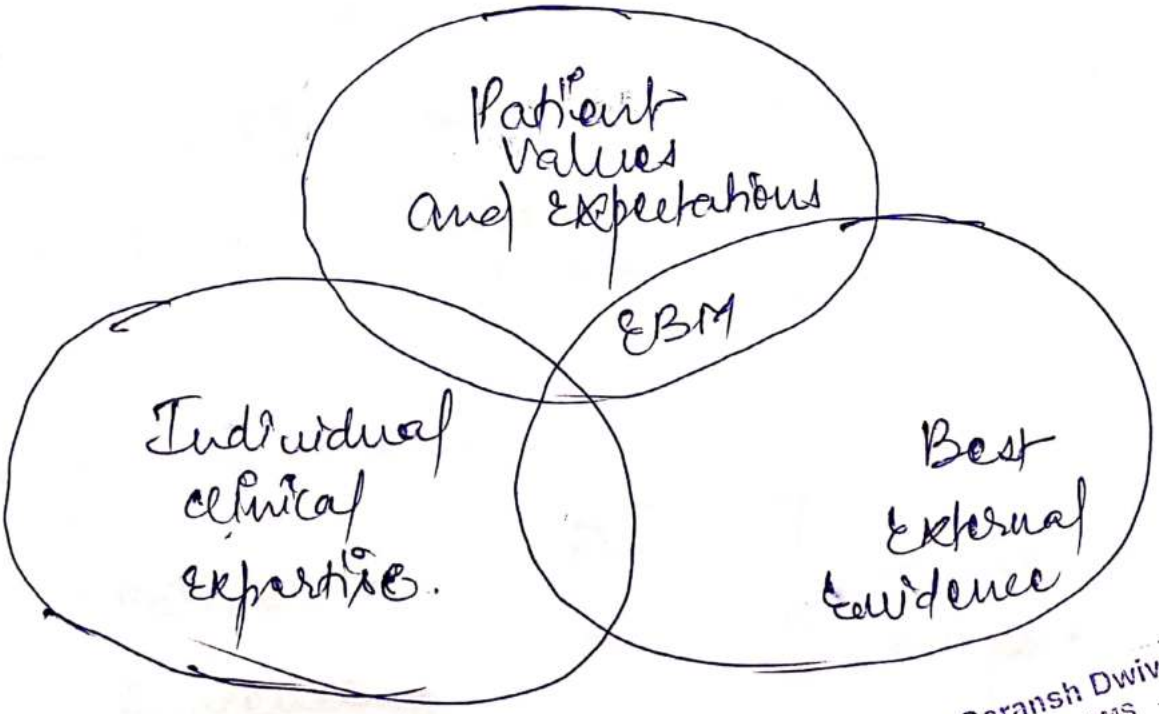
- Steps of EBM - Evidence Based Medicine -

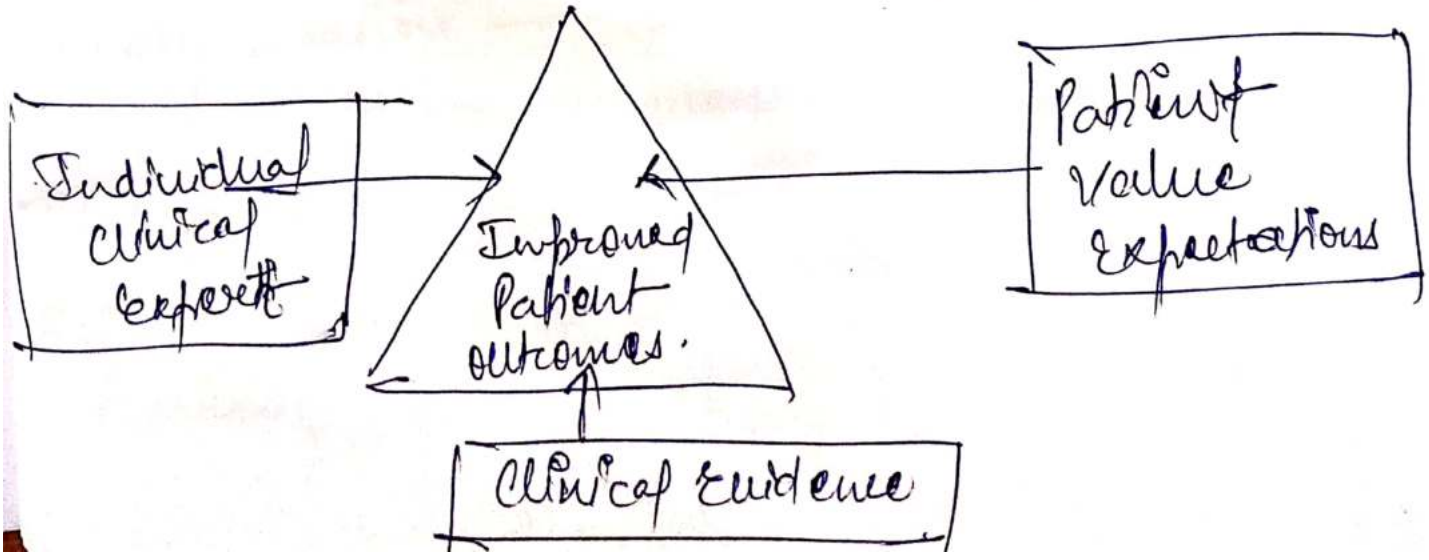
- Step-01 - Ask clinical Questions ——— (1)
- Step-02 - Acquire Best evidence ——— (2)
- Step-03 - Appraise the evidence ——— (3)
- Step-04 - Apply the evidence ——— (4)
- Step-05 - Asses your performance ——— (5)

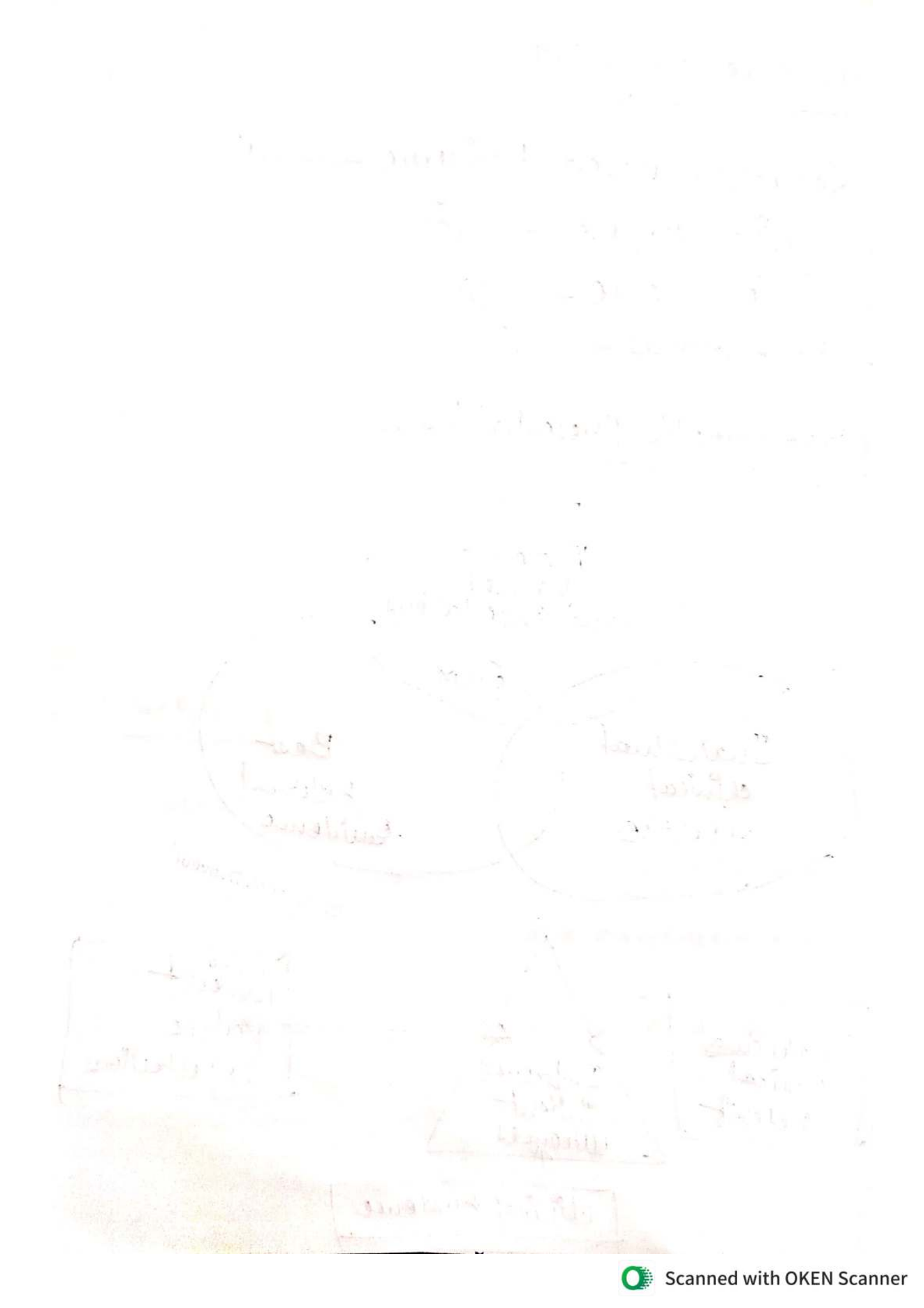
Components of EBM

- Research Based Evidence ——— (1)
- Clinical expert ——— (2)
- Patient Value ——— (3)
- Expectations ——— (4).

Diagrammatic Presentations -







SCIENTIFIC WRITING

Scientific writing is directly co-relates with the communications scientific information

Depending on specific scientific genre -

- Factors -
  - Journal Article ——— ①
  - Scientific Poster ——— ②
  - Research Proposal ——— ③.

} Scientific genre.

- Other factors -
  - Purpose ——— ①
  - Audience ——— ②
  - organization ——— ③.

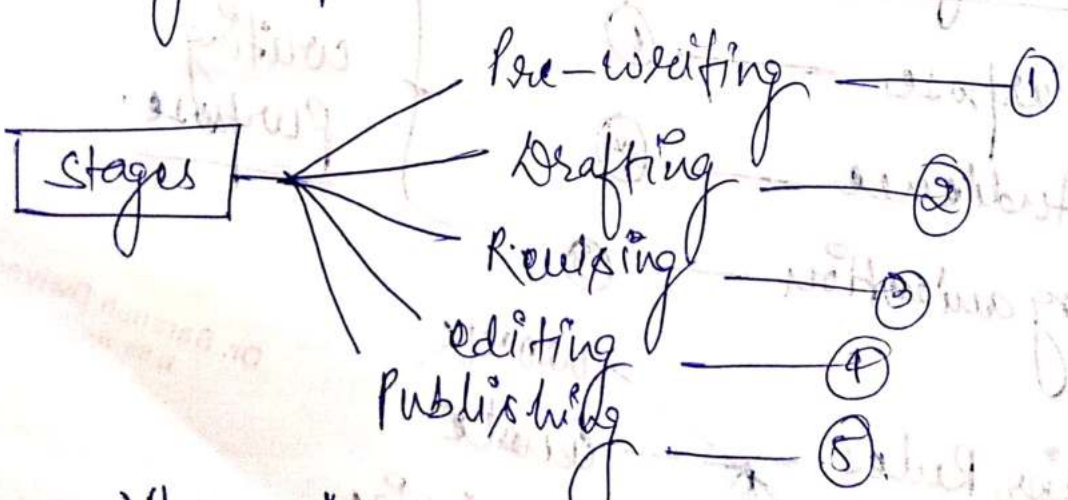
} writing Purpose

- 09 Major Rules.
  - work
  - Quote
  - plagiarize
  - support
  - think
  - Practice
  - write
  - Possibility
  - vision

- 09 Major Rules are as follows :-

— Work to understand ——— (1)
— Quote Not Required ——— (2)
— Plagiarize not Required ——— (3)
— Support all Statements ——— (4)
— Thinking Process. ——— (5)
— Practice Required. ——— (6)
— Real updates Require ——— (7)
— Possibility ——— (8)
— Revision is Necessary ——— (9).

- Writing Steps —



(1) Pre-writing - taking Notes — (1) — collects Information — (5).
— Outlining — (2)
— gathering — (3)
— Thinking — (4).

Drafting – Putting ideas into sentences. —— (1)
– In paragraphs. —— (2)
– Fully explain —— (3)
– Fully supportive —— (4).

Revising – Think More deeply About
Reads. —— (1)
– Needs —— (2)
– expectations —— (3)

Editing – grammer —— (1)
– Mechanics —— (2)
– spelling —— (3)

Publishing – Process of publish —— (1)
– communicating —— (2)
– processing —— (3)

- Format of scientific writing –

– This structure Includes –

– Introduction – ①
– Methods – ②
– Results – ③
– Discussion – ④

} IMRAD.

- Introduction → what is the Question?
– Methods ← How was studied?
– Results – what was found?
– Discussion – So what?

- Factors –

Introduction
- Questions – ①
- Reasons – ②
- Importance – ③
- Approach – ④
- Contribute – ⑤.

Methods

- Study Questions — (1)
- who, what, when and where — (2)
- Study design — (3)
- Data Sources — (4)
- Outcomes — (5)
- Analysis — (6)
- Ethical Approval — (7).

Methods.

- Study Questions — (1)
- who, what, when and where — (2)
- Study design — (3)
- Data Sources — (4)
- outcomes — (5)
- statistical tests — (6)
- Ethical Approval — (7).

- **Results** – Individual
  Included and excluded —— (1)
  – Demographic characteristics —— (2)
  – Results of Analysis —— (3)
  – Statistical significance —— (4)
  – Tables and figures —— (5)
  – Supplemental digital content —— (6)
  – Tables and figures —— (7)

- **Discussion** – So what —— (1)
  – Summary —— (2)
  – Compare findings —— (3)
  – Implications —— (4)
  – Limitations —— (5)
  – Recommendations —— (6)
  – conclusions —— (7)

Information technology
Data mining and Data Portals.

Information technology —

- Applications of computers —— (1)
- Store —— (2)
- Study —— (3)
- Retrieve —— (4)
- Transmit —— (5)
- Manipulate data —— (6)

- The technology involving the development maintenance and use of computer systems.
- Software Networks
- Distribution of data

- HIT — Health Information technology
  - Processing of Both
    - Hardware —— (1)
    - Software —— (2).

— factors —

- storage — (1)
- Retrieval — (2)
- sharing — (3)
- Information — (4)
- data — (5)
- knowledge — (6)
- communication — (7)
- decision — (8).

• Importance —

- E-prescribing — (1)
- Patient Records — (2)
- confirm Medicines — (3)
- Dosages — (4)
- formulations — (5)

• It has Provided development of Electronic Medical Records (EMR)

- converted into single data base
- Reduces Paper cost

Data Mining

It's a process of extracting and discovering patterns in large data -

Data Mining factors -

- Data cleaning ——— (1)
- Data Integration ——— (2)
- Data Selection ——— (3)
- Data transformation ——— (4)
- Data mining ——— (5)
- Knowledge Presentation ——— (6).

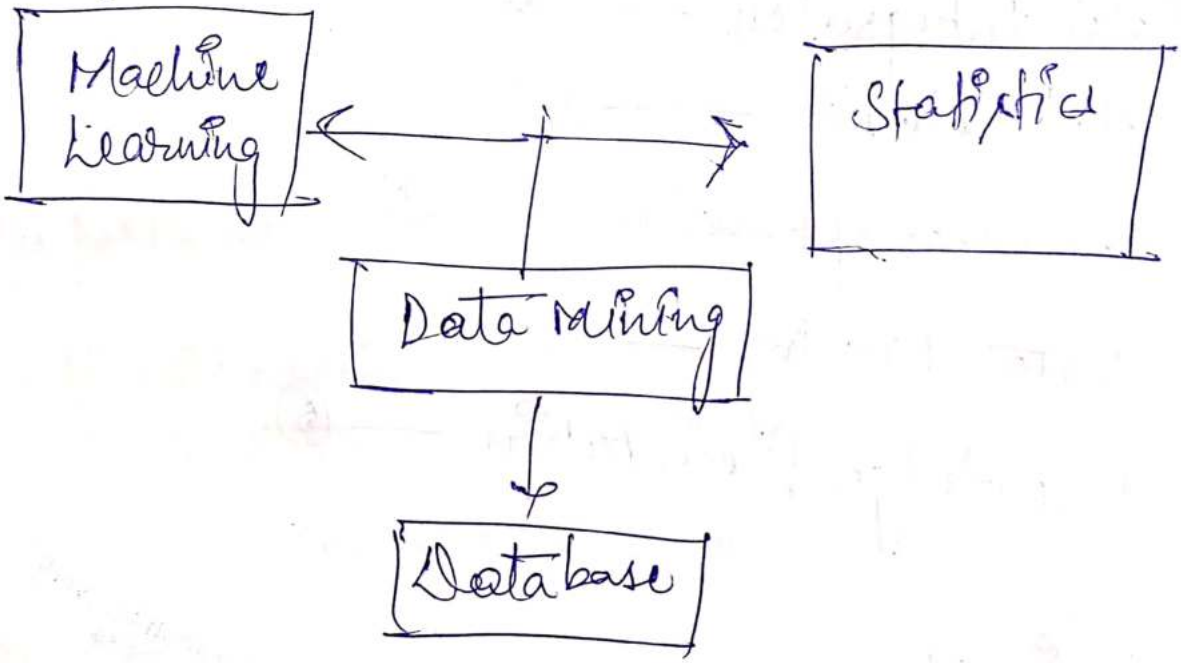
Techniques -

- Anomaly Detection ——— (1)
- Association Learning ——— (2)
- Clustering Analysis ——— (3)
- Classifications Analysis ——— (4)
- Regression Analysis ——— (5)

– Data Mining Softwares –

- Data Handling ——— (1)
- Data Modelling ——— (2)
- Visualization ——— (3)
- clustering ——— (4)

– diagrammatic presentation –



ata Portal –

- Data Portal directly co-relates with the world wide web site
- opendata Portal – List of data sets

- Types –

- PubMed ——— (1)
- BRC (Bio Informatics center) ——— (2)
- RIMS (Research Information management system) ——— (3)

- Ayurveda Data Portals.

- AYUSH RESEARCH Portal ——— (1)
- DHARA ——— (2)

① PubMED :-

- It is a free search engine — (1)
- About Medline Science — (2)
- Biomedical topics — (3)
- National Library of Medicine (NLM) —
- From 1971 to 1997 — (5)
- Free to public starting in June 1997

website - www.pubmed.ncbi.nlm.nih.gov.

② BRC (Bio Informatics centre)

- To create comprehesive database of Reliable —
- uptodate bioinformatic data — (2)
- provide researchers — (3)
- Easy Acess. — (4)
- Internet based search. — (5)
- Data Retrieval users. — (6)
- Provide researchers Relavent data — (7).

website - Niad.nih.gov/Research Bioinformatics

RIMS -

- Research Information Management System.
- Refer to CRIS.
- Current Research Information system
- Information System to store
- website - www.symplectic.co.uk

Data Portal of Ayurveda -

AYUSH Research Portal -

- Department of Ayush launched the Online Ayush Research portal.
- 18/04/2021 to serve community
- Research findings :-
  - Ayurveda - (1)
  - Yoga - (2)
  - Naturopathy - (3)
  - Unani - (4)
  - Siddha - (5)

- organized fashion and prevent duplication of work.
- Encourage Interdisciplinary
- generate evidence
- Wide Acceptance.

website - Ayushportal.nic.in

② DHARA -

- Digital Helpline for Ayurveda Research Articles
- DHARA is 1st comprehensive online Indexing service.
- DHARA means - 'flow'
- Refers to free flow of Information on Research in Ayurveda.
- In collaboration with central council for Research in Ayurvedic (CCRAS)

website - (dharaonline.org)/Home.

Central tendency examples. –

– Mean —— ①
– Median —— ②
– Mode —— ③

Mean – The first measure of central location
– Mean refers to the No. you obtain
– Sum of all the observation / Total No. of observation

Types:

– Arithmatic Mean —— ①
– weighted Mean —— ②
– Geometric Mean —— ③
– Harmonic Mean —— ④.

Q – Find out the Mean of following data –

– 1, 2, 3, 4, 5

Formulae – $\bar{x} = \frac{\sum x}{n}$ $= \bar{x} = \frac{1+2+3+4+5}{5}$

$= 15/5 = 03$

- Mean formulae —

— $\bar{x} = \frac{\Sigma Fx}{n}$ — Frequency

= $\bar{x}$ = Mean —— (1)

— Σ = Submission of —— (2)

— x = observations —— (3)

— n = Total No. of observations —— (4).

(2) Median —

— Meadian is one of the measure central tendency which divide given data into two equal distribution.

— Median is always a positional value

For-Odd — $Md = \left(\frac{n+1}{2}\right)^{th}$ — observation

-for-even - $Md = \left(\frac{n}{2}\right)^{th} + \left(\frac{n}{2}+1\right)^{th}$ — observation

Mean –

Direct Method –

Class Interval का diff add करते जाओ

Class Interval	No. of students (f)	Class Mark (x)	Fx
10 – 25	02 $\frac{10+25}{2}$	17.5	35.0
25 – 40	03	32.5	97.5
40 – 55	07	47.5	332.5
55 – 70	06	62.5	375.0
70 – 85	06	77.5	465.0
85 – 100	06	92.5	555.0

$\Sigma f = 30$ $\quad$ $1860 = \Sigma fx$

$$\text{Mean} = \bar{x} = \frac{\Sigma fx}{\Sigma f}$$

$$\bar{x} = \frac{1860}{30} = \frac{186}{3} = 62$$

$$\bar{x} = 62 \text{ Mean}$$

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Median - $l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$ = $55 + \left(\frac{15-12}{06}\right) \times 15$

$= 55 + \left(\frac{03}{\cancel{6}2} \times 15\right)$

$= 55 + 15/2$

$= 55 + 7.5$

$= 62.50$

cf = cumulative frequency

f = Frequency

l = Lower limit

h = size.

Class Interval	No. of Students (f)	CF
0-25	02	02
25-40	03 (2+3)	05
40-55	07 (5+7)	(12) cf
(55)-70 ←	06 (12+6) ←	(18).
70-85	06 (18+6)	24
85-100	06. (24+6)	(30)

$\Sigma f = (30)$

$\therefore = n/2 = \frac{30}{2} = 15$. से ज्यादा find out करना है cf में 1.

- f = 06.
- l = 55
- h = 70 - 55 = 15
- cf = 12.

• Mode

Eg- Class Interval | Students

	10 – 25	02
	25 – 40	03 – f_0
l.	40 – 55	07 – F_1
	55 – 70	06 – f_2
	70 – 85	06
	85 – 100	06

∴ Here,

$H = 55 - 40 = 15$ (H)

$F_1 = 07$

$F_0 = 03$

$f_2 = 06.$

So, Mode – $l + \left(\frac{F_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h.$

$= 40 + \left[\frac{07 - 03}{2\times 7 - 03 - 06}\right) \times 15$

$= 40 + \left(\frac{4}{14 - 9}\right) \times 15$

$= 40 + \frac{4 \times 15}{5}$ 3

$= 40 + 12 = 52.$

So, Mode = 52

eg – Find out the Median of following data –

12, 15, 17, 19, 22.

If odd No – $\left(\frac{N+1}{2}\right)^{th}$

Arrange – 12, 15, 17, 19, 22

– $\left(\frac{5+1}{2}\right)^{th}$

– $\left(\frac{6}{2}\right)^{th}$

– (3rd) observations.

= Median

(18)

If even – 12, 15, 17, 19, 22, 25

$-\left(\frac{n}{2}\right)^{th} + \left(\frac{n}{2}+1\right)^{th}$.

$= \frac{\left(\frac{6}{2}\right)^{th} + \left(\frac{7}{2}\right)^{th}}{2} = \frac{6/2 + 7/2}{2} = \frac{3+4}{2} = \frac{17+19}{02}$

$= (18)$.

- Mode – Highest frequency / Repeating frequency.
  - defined as Measurable unit of central tendency
  - defined as highest frequency observation in the given distribution is known as Mode
- सबसे ज्यादा Repeat होने वाला Frequency

- Another Mode — System

$$l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$$

- l_1 = The lower limit of Model class. ——— (1)
- f_1 = Frequency of Model class. ——— (2)
- f_0 = frequency of class preceding Model class. ——— (3)
- f_2 = Frequency of class succeeding Model class. ——— (4)
- h = Height / size of Model class. ——— (5).

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