Balachandran Sir

6/08/20

UNIT-I

Statistics for Business.

Meanings:

Statistics meaning for plural = data / Numerical statement.

Statistics meaning for Singular – Science of statistics.

Definition:

Croxton and Cowdon:

* Statistics may be defined as the science of collection, organisation, presentation, analyses and interpretation of numerical data.

Functions of Statistics:

1. It presents facts in a definition form.
2. It simplifies mass of figures.
3. It facilitates comparison.
4. It helps in formulating and testing hypothesis.
5. It helps in prediction
6. It helps in formulation of suitable policies.
7. Estimation.

a) collection

b) Numerical representation

c) Numerical presentation

d) Dygramatic presentation

e)

Collection of data (10 marks)

* Statistical data may be classified as primary and secondary data.

Primary data:

* It is the data collected for first time.
* It is collected originally.
* It is a raw material. (Raw data)

Different Sources of Primary data: (5 marks)

(i) Direct person observation

(ii) Indirect oral interview

(iii) Information to agency.

(iv) Mailed Quotineers.

(v) Scheduled sent to enumerators.

[Explain each and every point & explain its merits and demerits]

Secondary data:

* Those data's are not collected originally.

*data are already collected and analysed by some agency.

*Secondary data are classified as two types.

Secondary data

published data — unpublished data.

Published Sources:

*It belongs to various agencies, various government, international and publicated the data.

a) International publication:

Eg: I.M.F, I.B.R.D, U.N.O

b) official publication of central and State government.

c) Semi official publication:

Semi government institutions like Aided schools, colleges.

d) publication of Reasearch institution:

Eg: IsI (Indian Statistical Institute)

ICAR (Indian council of Agricultural Resource).

e) Journals and Newspapers.

Unpublished Sources:

* There are various sources.
* Record maintained by various government and private sources,

Classification of Statistical data [10 Marks]

a) Quantitative data
b) Qualitative data
c) Chronological data
d) Geographical data.

a) Quantitative data:

* It is the data that classified according to some characteristics which are capable, weight, price, production, sales, profits etc.,

b) Qualitative data:

* when the data are classified according to the quality [honesty, intelligence, religious, sex etc].

It is classified as

(i) Simple qualitative data
(ii) Manyfold qualitative data.

(i) Simple qualitative data

* when the data is classified into only two classification.

Eg: population < male / Female.

(ii) Many fold classification data

* data are classified into many classification.

Eg:- population
- Male
  - literate
  - illiterate
- Female
  - literate
  - illiterate.

c) Chronological data:

* Chronological data is based on the time [year, month, week, hour, second]

* This data belongs to only based on times.

d) Geographical data:

* Geographical data belongs to the place.

Tabulation of data:

Table ⇒ arranged into rows and columns.

parts of tabulation:

1. Table no.
2. Title
3. Head note
4. caption [Headings]
5. Foot notes [inside the tables to feed data]
6. Final notes [conclude the table]

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Definition of classification:

* It is the process of arranging things in groups (or) classes.
* Arranging data into sequence.

[overview of types of classification]

Eg:- of chronological data.

year	1921	1931	1941	1951	1961
population	248 million	276 million	313 million	357 million	435 million

Tabulation:

* It is the systematic arrangement of classified data in rows and columns.

Objectives of tabulation:

* It simplifies complex data.
* It is easy understood.
* Facilitates comparison of data.
* Computation of various statisticals measures like average, mean, meadian, mode.
* Good for graphical representation.

Parts of Table.

a) Table. no:

b) Title:

c) Head note:

* It is a statement below the title and table.

d) captions:

* It is the vertical lines located in the table and vertical columns.

e) stuff:

* It is the horizontal lines located in the table [columns]

f) Body of the table

g) Footnotes

h) sources.

Rules of Tabulation:

① The table should be simple and complex.

② The captions and stuffs in the table should be arranged in the systematic

③ It should be purpose of the investigation

④ The unit of measurement should be clearly defined.

⑤ Figures may be rounded (or) to avoid.

⑥ Suitable approximation must be

⑦

⑧ A table should be complete and self explantory.

⑨ A table should be attractable.

⑩ Abbrevation should be avoided.

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Structure of tabulation

Table definition:

Table is the process of arranging data systematically in rows and columns of a table.

General Format of table:

Sum: (Pg: 6,7) (10 mark)

classification and tabulation (difference)

S. NO	Classification	Tabulation
1.	This is the process of dividing the data into homogeneous subgroups	This is the process of arranging the classified data systematically in rows and columns of a table.

S. NO	Classification	Tabulation
2.	This condenses the mass of data and facilitates to grasp the nature.	This provides the data a readily referable and almost permanent form.
3.	This forerunns tabulation	This completes an important stage of enumeration.
4.	This is the process of analysis of data.	This is a process of presentation of data.
5.	Careful planning for tabulation is necessary even at this stage.	This is mechanical function after classification.

11/05/20

Diagramatic representation:

Graphical representation

diagrammatic representation.

horizontal line = x axis

vertical line = y axis

y axis → length of frequency.

Types of diagram.

a) Bar diagram } (our syllabus)

b) pie diagram }

Bar diagram!

One dimensional diagram

There are 4 types of bar diagram.

a) simple bar diagram.

b) Multiple bar diagram.

c) Sub divider bar diagram.

d) percentage bar diagram.

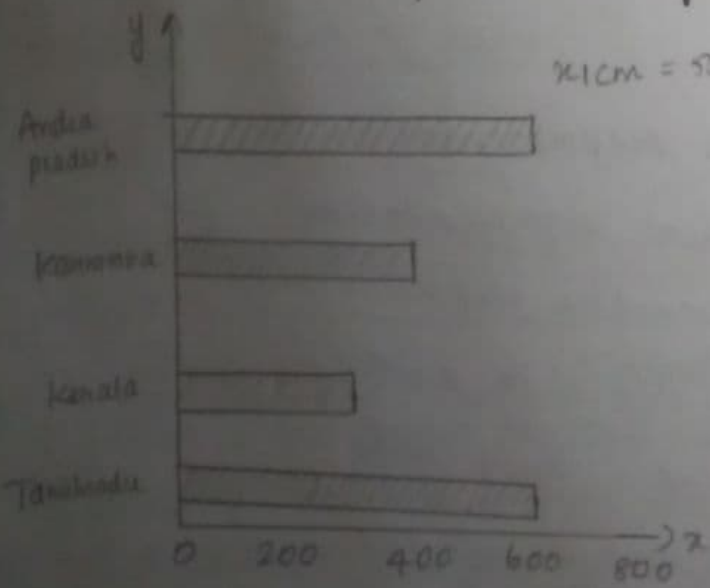
a) simple bar diagram:

Leave the equal length for every bars There are two types.

a) Horizontal simple bar diagram.

b) Vertical simple bar diagram.

a) Horizontal simple bar diagram (Eg)

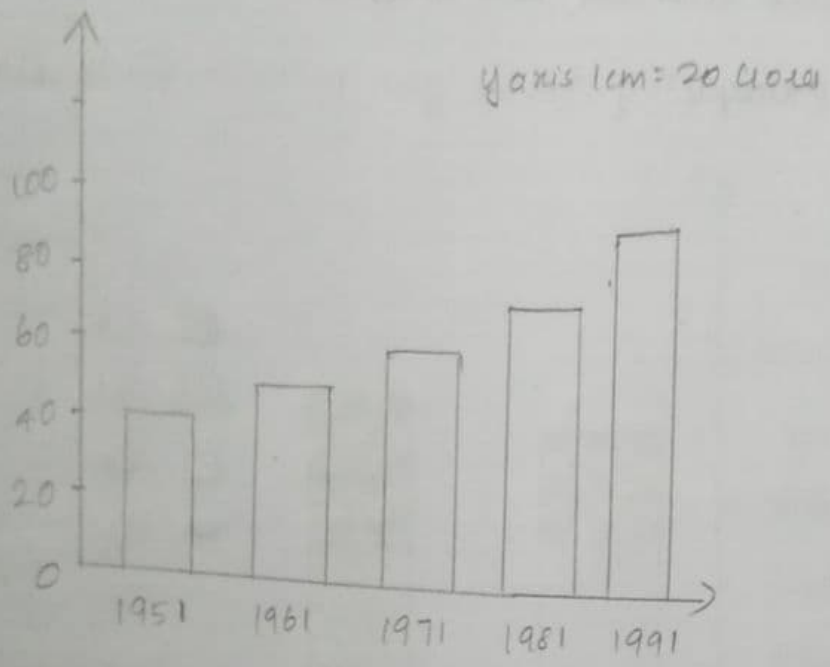


Note:

1 cm = 10 decimal

$\frac{200}{10}$ = 20 units.

b) Vertical bar diagrams.



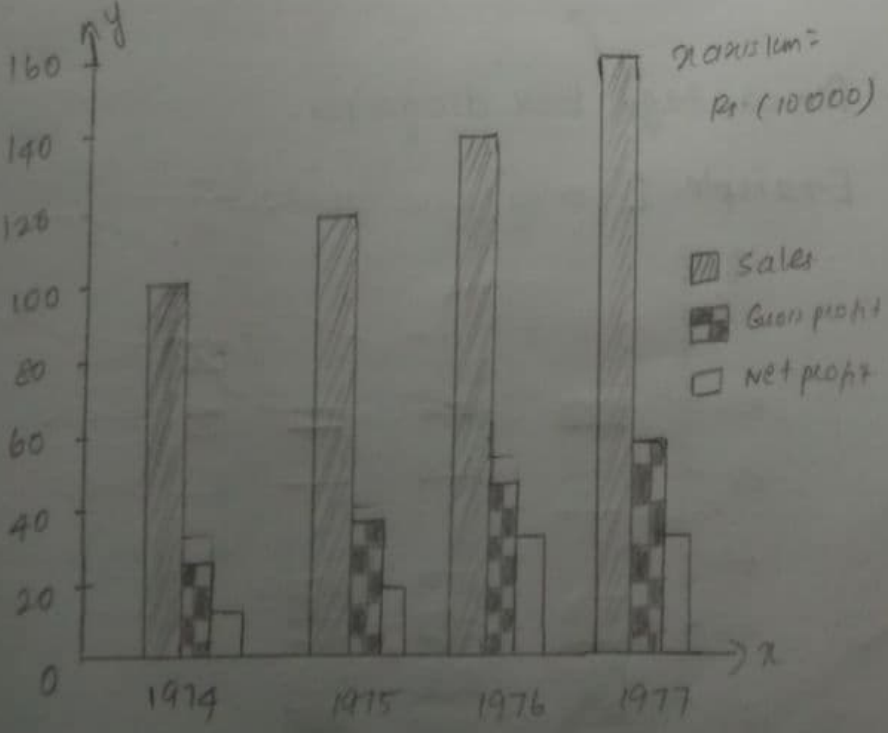
Question:-

Draw a simple bar diagram?

[we must draw only vertical method]

2) Multiple bar diagram:

Bars which represent the same aspect in different groups are given the same colour or designs.

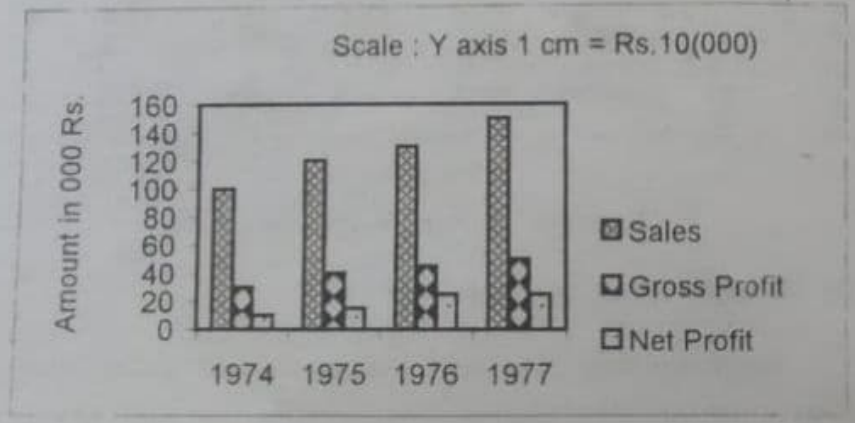


Year	Sales (000 Rs.)	Gross Profit (000 Rs.)	Net Profit (000 Rs.)
1974	100	30	10
1975	120	40	15
1976	130	45	25
1977	150	50	25

(B.Com. Delhi, Apr.77)

Solution:

SALES, GROSS PROFIT AND NET PROFIT IN 1974-77



YEARS

Diagram 3 Multiple Bar Diagram

(iii) Sub-divided Bar Diagram:

This is also called 'Component Bar Diagram'. Each bar is drawn according to the total and is sub-divided on the basis of the components. Sub-divided bars of equal width are drawn on a common base line such that the gaps in between the bars are equal. The order of the sub-divisions is same in all the bars and is that of the components given. The sub-divisions which represent the same aspect in all the bars are given the same

colour or design. Hence each bar has a number of colours or designs.

Suitability: *Sub-divided Bar Diagram is suitable when the totals (as well as components) are to be compared. Comparison is among the absolute values.*

Example 4: The details of sources of funds of the Industrial Finance Corporation of India Limited as on 31.3.94 and 31.3.95 are given below. Draw a suitable diagram for the same.

Sources of Funds	Amount (Rs. Crores)	
	1994	1995
Share Capital	339	352
Reserves and Surplus	998	1043
Rupee Loans	5843	5614
Foreign Currency Loans	2553	3262
Total	9733	10271

Solution:

Note: 1. The amounts are as on 31.3.94 in 1994 and 31.3.95 in 1995

2. The following abbreviations have been used in the index of the diagram.

SC - Share Capital

RS - Reserves and Surplus

RL - Rupee Loans

FL - Foreign Currency Loans

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SOURCES OF FUNDS OF IFCI IN 1994 AND 1995

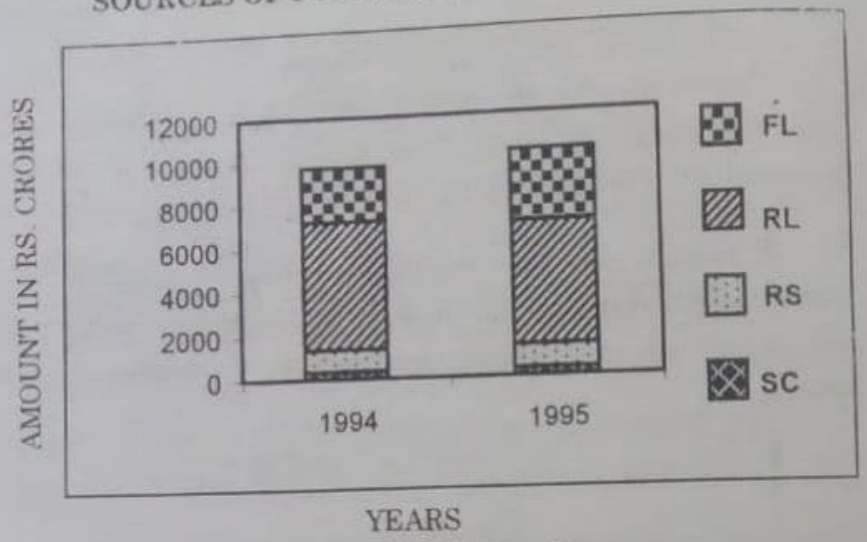

Diagram 4 Sub-divided Bar Diagram

(iv) Percentage Bar Diagram:

For drawing a percentage bar diagram, percentages corresponding to the actual values of the components are calculated first as follows when they are not given in a problem.

$$\text{Percentage} = \frac{\text{Actual Value}}{\text{Total of Actual Values}} \times 100.$$

Percentage Bar Diagram is nothing but a Sub-divided Bar Diagram representing the percentage of the components. The total percentages is 100 and so the bars are of equal heights also.

Suitability: *Percentage Bar Diagram is suitable when the components are to be compared in percentage form*

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Example 5: Represent the following data by means of a percentage bar diagram:

Item	Cost of Production (Rs.)		
	1992	1993	1994
Raw Material	5000	6600	9000
Labour	2000	3000	3000
Overhead	2000	1800	1800
Others	1000	600	1200
Total	10000	12000	15000

Solution:

Item	1992		1993		1994	
	Cost	Percentage	Cost	Percentage	Cost	Percentage
Raw Material	5000	50	6600	55	9000	60
Labour	2000	20	3000	25	3000	20
Overhead	2000	20	1800	15	1800	12
Others	1000	10	600	5	1200	8
Total	10000	100	12000	100	15000	100

COST OF PRODUCTION IN 1992-94

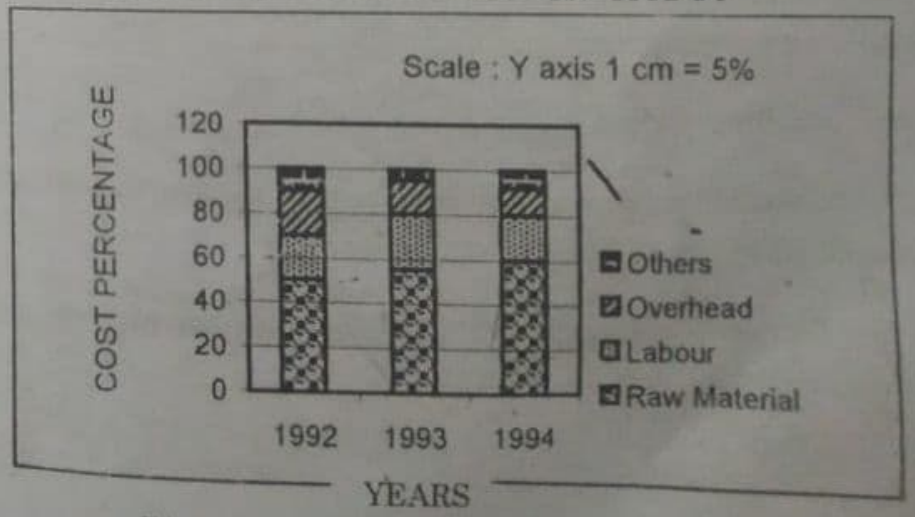

Diagram 5 Percentage Bar Diagram

(iv) Pie Diagram:

Pie Diagram consists of one or more circles which are divided into a number of sectors.

Suitability: *It is suitable whenever the relative proportions of the components which make up the total are to be revealed. It is used to represent the expenses of families or Governments on different heads and revenues from different sources.*

The pie diagram is so called because the circle looks like a pie and the sectors resemble slices cut from the pie. Pie diagram is an important and a popular means of representation. Circles are more attractive than squares. Even when there are more than four components, pie diagram remains effective unlike a component bar diagram.

Pie diagram has a few limitations. It is less effective than bar diagrams for comparison and interpretation. More than three sets of values could not be purposefully presented in a single diagram. Further, there should not be more than eight sectors in a circle.

Case 1: One Circle

Step 1: Whenever one set of actual amounts or percentages are given, find the corresponding angles in degrees by using the following formula:

$$\text{Angle} = \frac{\text{Actual Value}}{\text{Total of Actual Values}} \times 360 \quad \text{(or)}$$

$$= \frac{\text{Percentage}}{100} \times 360$$

$$= \text{Percentage} \times 3.6$$

Angles are taken to the nearest integral values. When the values obtained by the above formula are fractions but have been rounded off to the nearest integers, the total of the angles may not be 360° sometimes. Then one or more of the rounded off values are to be revised reasonably to get the total as 360.

Step 2: Using a compass draw a circle of any convenient radius. Convenient in the sense that it looks neither too small nor too big on the paper.

Step 3: Using a protractor divide the circle into sectors whose angles have been calculated in step 1. Sectors are to be in the order of the given items.

Step 4: Sketch one colour or design to each sector.

Step 5: Write the title, index and identification number.

Example 9: Draw a suitable diagram to represent the following submitted as a part of the budget proposal of the Govt. of India for the year 1995-96.

Item of Expenditure	Percentage
1.Interest	26
2.Defence	13
3.Subsidies	6
4.Other non-plan expenditure	10
5.States share of taxes and duties	15
6.Non-plan assistance to State and UT Govts.	6
7.State and UT plan assistance	10
8.Central plan	14
Total	100

Source: The Hindu dt. 16.3.95

Solution:

Item of Expenditure	Percentage	Angle in degrees
1.Interest	26	93
2.Defence	13	47
3.Subsidies	6	22
4.Other non-plan expenditure	10	36
5.States share of taxes and duties	15	54
6.Non-plan assistance to State and UT Govts.	6	22
7.State and UT plan assistance	10	36
8.Central plan	14	50
Total	100	360

BUDGET PROPOSAL OF GOVT. OF INDIA FOR 1995-96

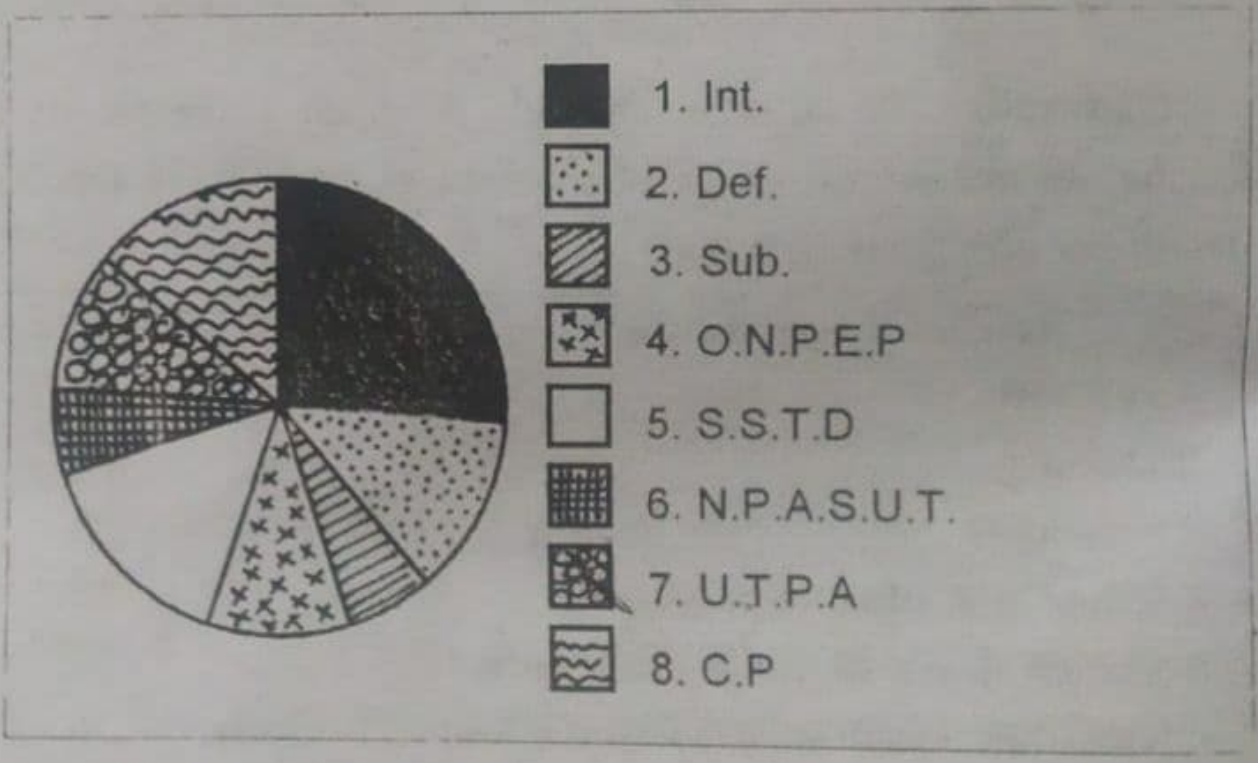

Diagram 9 Pie Diagram

Case 2: More than One Circle

When there are more than one set of values, one circle is to be drawn for each set as explained below.

Figure 16 False Base Line

7. Graphs of Frequency Distributions.

The following five graphs can be drawn from a given frequency distribution:

(i) Histogram (ii) Frequency Polygon
(iii) Frequency Curve (iv) Ogives (v) Frequency Lines

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(i) Histogram: It is the suitable form to represent a frequency distribution. It has adjoint bars erected on X axis. Depending on the nature of class intervals, equal or unequal two cases arise.

The advantages of histogram are that it is the popular method of presenting a frequency distribution and it enables location of mode for equal class intervals. It is two dimensional and depicts the variation in both, variable and frequency.

It is likely to be misconstructed or misleading for unequal class-intervals. Histograms are not useful for finding the positional values such as median, quartiles, deciles and percentiles or for finding the number of frequencies less than or more than a certain value. Ogives are useful for those purposes.

Case 1: Equal Class-Intervals

Class intervals are to be represented in X axis and the bases of the bars are the respective class intervals. **Frequencies** are to be represented in Y axis. The heights of the bars are equal to the corresponding frequencies. Scales are to be decided and the bars are to be drawn.

Example 17: Draw a Histogram for the following data:

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	4	6	7	14	16	14	8	16	5

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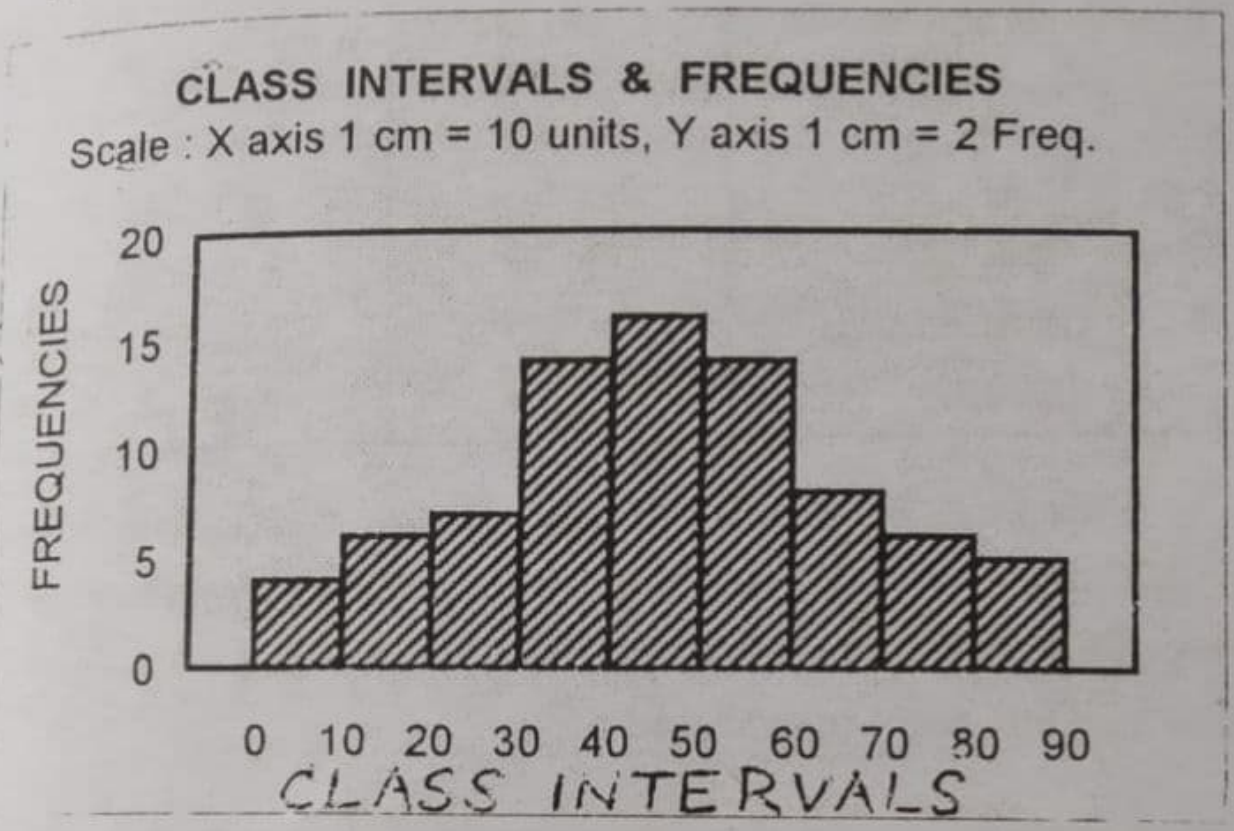
Solution:



Grpah 17 Histogram

Note: The concept of 'mode' is explained in the next chapter. From the histogram of equal class-intervals it can be determined as follows. Draw two lines diagonally inside the bar of the greatest height, starting from each upper corner to the nearby upper corner of the adjacent bars. Draw a dotted line perpendicularly from the point of intersection to the X axis and read the Y coordinate of the point. It is the modal value.

Example 18: Draw a Histogram and hence find the modal wage.

Weekly Wage in Rs. (Mid Value)	310	330	350	370	390
No.of Labourers	25	50	75	60	15

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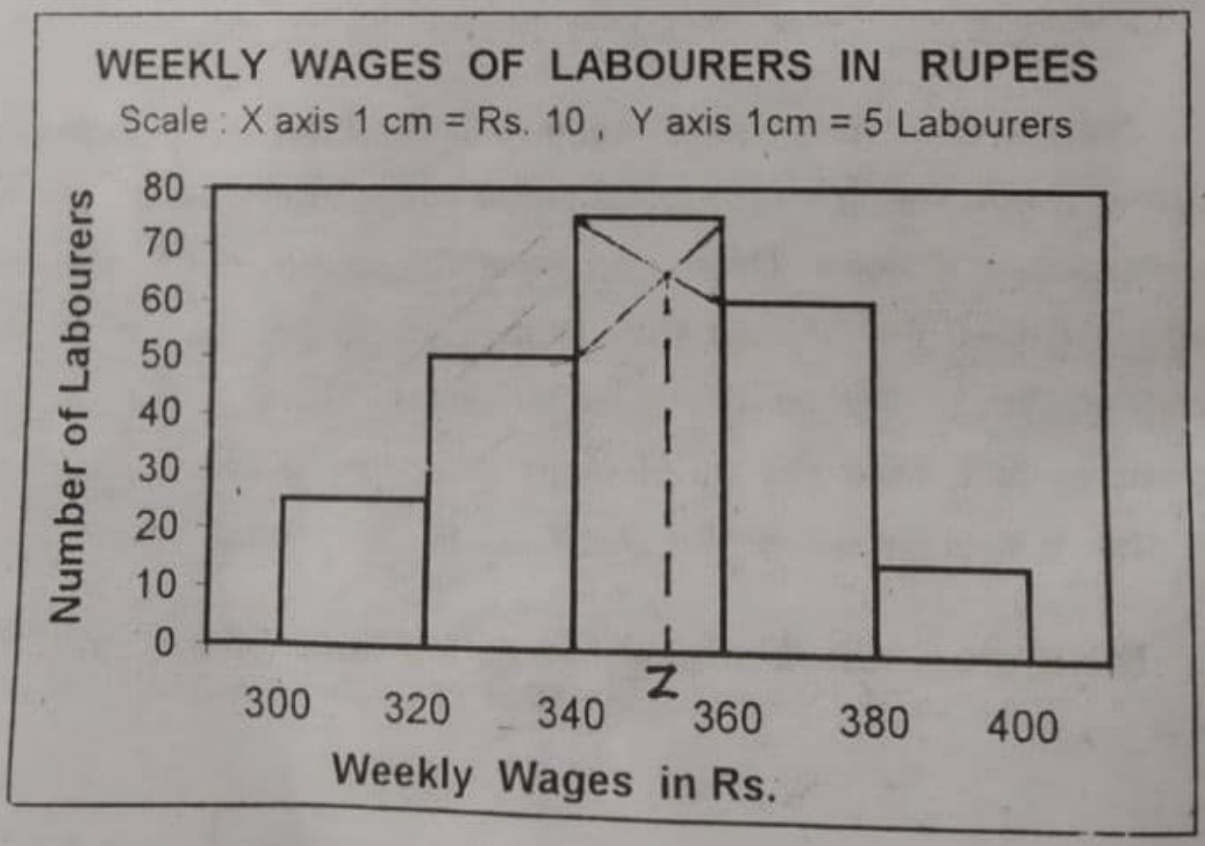
Solution:

Weekly Wage in Rs. (Mid Value)	No.of Labourers	Weekly Wage in Rs. (Class-Interval)
310	25	300-320
330	50	320-340
350	75	340-360
370	60	360-380
390	15	380-400

Difference between mid-values is 20. Half of the difference is 10.10 has been substracted from each mid value to get the lower limit of the class-interval. 10 has been added to each mid value to find the upper limit.

Diagram is drawn as explained in the **previous example**



Graph 18 Histogram.

From the graph, modal wage Z = Rs. 353.

bars are 0.5–1.5, 1.5–2.5, . . .

(ii) Frequency Polygon: This can be drawn along a histogram or separately. This is obtained by drawing straight lines from the mid point of the top of each bar to those of the adjoint bars. The frequency polygon is ended on the X axis on both the sides of the histogram so that the area under the frequency polygon equals that of the histogram. For this purpose, the frequency polygon is continued to meet the X axis at each end at the mid value of the next possible class. For those classes the frequencies are zeros.

Without drawing the historgram, the mid points of the tops of the bars could be plotted on a graph sheet and the frequency polygon could be drawn.

(iii) Frequency Curve: If a smooth curve is drawn along all the points of a frequency polygon, this is known as frequency curve.

(31)

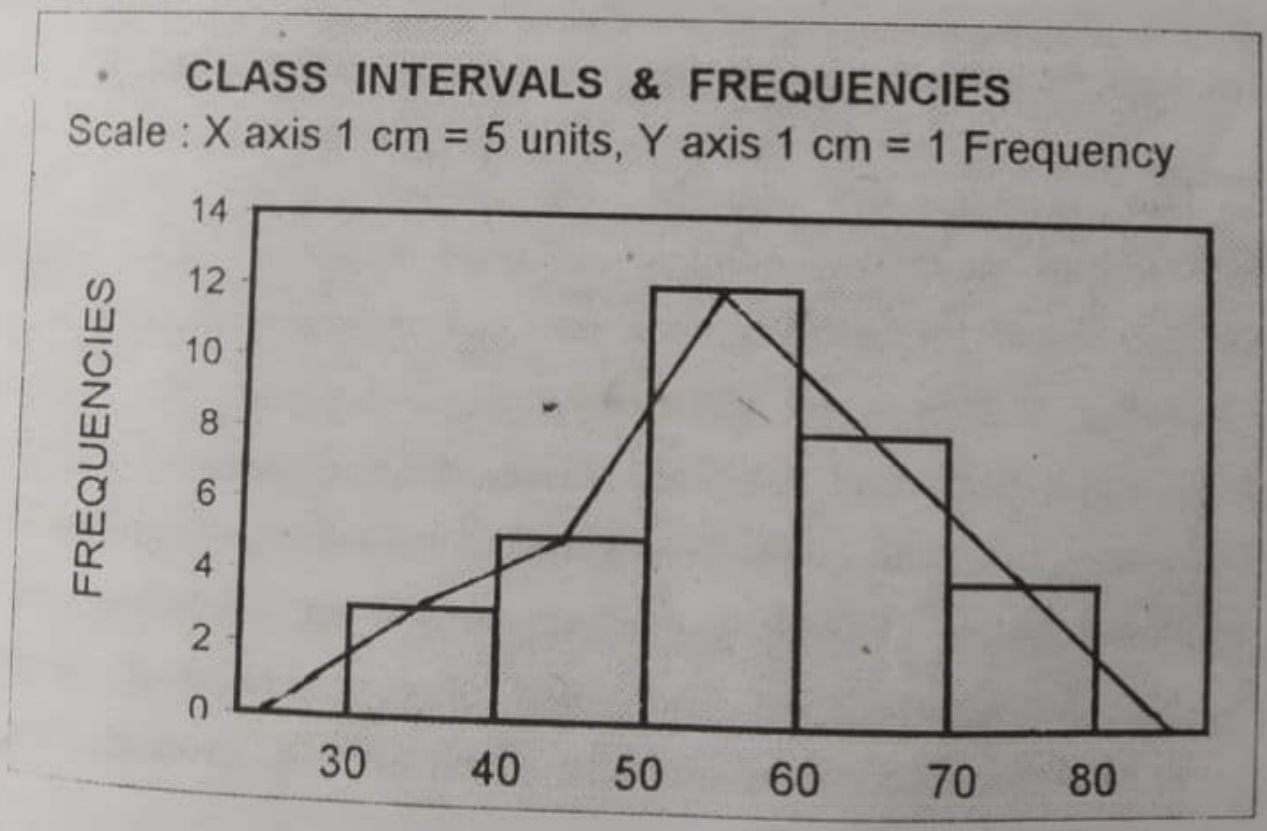
As explained in chapter 8. this shows the symmetry or otherwise of a frequency distribution and also the kurtosis.

Example 20: Draw a histogram and frequency polygon.

Size	30-40	40-50	50-60	60-70	70-80
Frequency	3	5	12	8	4

(B.Com. B'dasan, N98)

Solution: Histogram is drawn as in Example 5.17. Mid points are then marked at the tops of the rectangles and successive mid points are joined by straight lines. These lines are the frequency polygon. The frequency polygon has to start from and end at the X axis as shown in the graph.



Graph 20 Histogram and Frequency Polygon.

2. Frequency polygon:

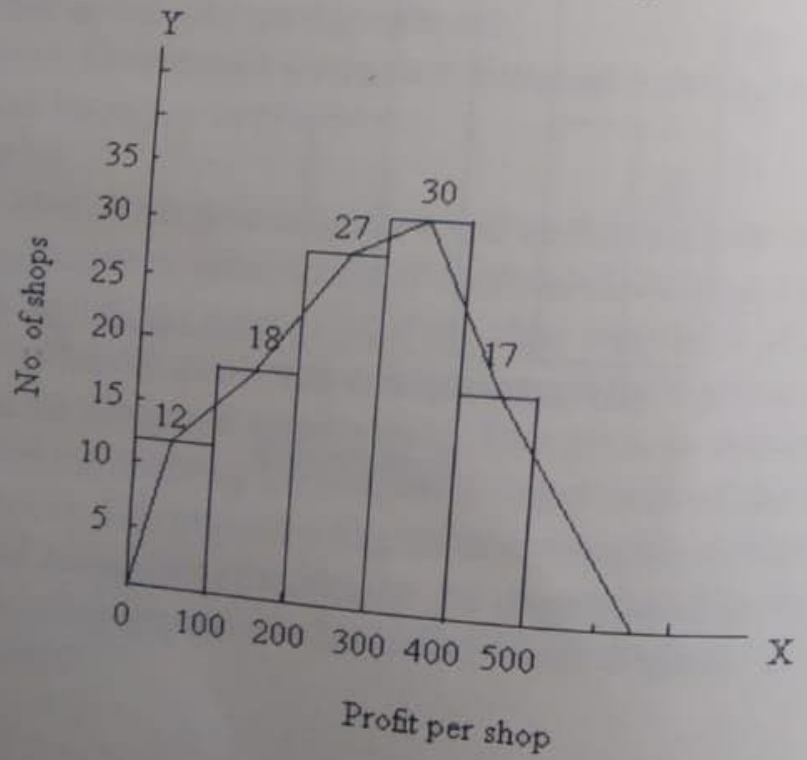
A grouped frequency distribution can be represent by a histogram. A simple method of smoothing the histogram is draw a frequency polygon. This is done by connecting the mid- point of the top of each rectangle with the mid-point of the top each adjacent rectangle, by straight lines. The area of the polyg is equal to the area of the histogram, because the area left out is just equal to the area included in it. Mode can easily be found o

Example 12: Draw the Histogram and frquency polygon from the data given below.

Profit per shop:	0 - 100	100 - 200	200 - 300	300 - 400	400-5
No: of shops :	12	18	27	30	17

Solution: To draw the Histogram and frquency polygon.

Histogram and frquency polygon



. Frequecy curve:

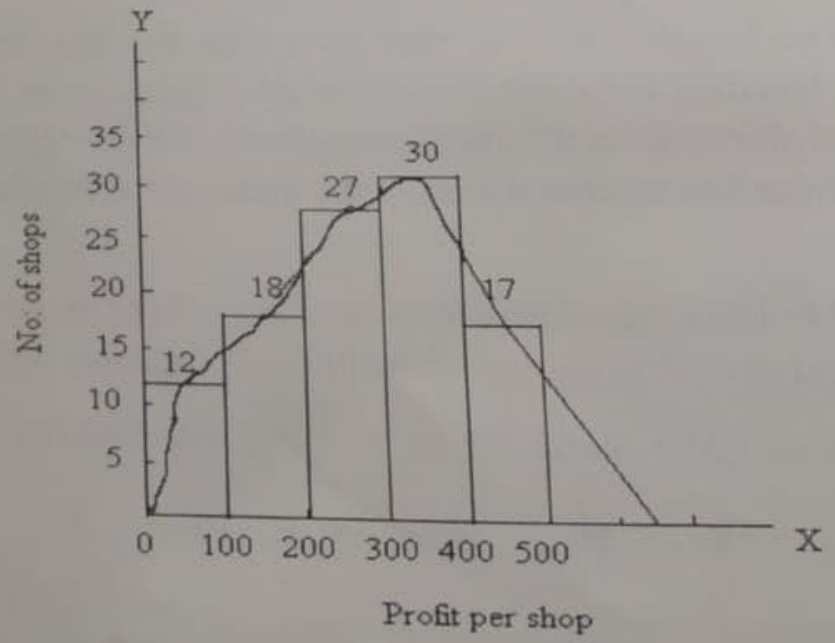
A frequency curve is drawn by smoothing the frequency olygon. It's smoothed in such a way that the sharp turns are voided. A frequency polygon, if smoother further, so as to inimize sudden changes, results into a continuous smooth curve nown as frequency or smooth frequency curve. The curve should egin and end of the base line.

xample 13: Draw the Histogram and frquency curve from the data iven below.

rofit per shop:	0 - 100	100 - 200	200 - 300	300 - 400	400-500
lo: of shops :	12	18	27	30	17

olution: To draw the Histogram and frquency curve.

Histogram and frquency curve



Ogives or cumulative frequency curves:

When cumulative frequencies are plotted on a graph, then the frequency curve obtained is called 'Ogive' or 'cumulative frequency curve'. Ogives determine median, quartiles, percentiles, etc. The class limits are shown along the x-axis and cumulative frequencies along the y-axis. In drawing an Ogive, the cumulative frequency is plotted at the upper limit of the class interval, the successive points are later joined together to get an Ogive curve.

1. Less than Ogive. 2. More than Ogive.

Less than Ogive: In less than Ogive, the less than cumulative frequencies are plotted against upper class boundaries of the respective classes.

More than Ogive: In more than Ogive, the more than cumulative frequencies are plotted against the lower class boundaries of the respective classes. One can locate the median by drawing two

Ogives. One less than and the other more than. For this, one has to calculate less than and more than cumulative frequencies. As mentioned above, from the intersection point of these Ogives, a perpendicular line touches x-axis, is the value of the median.

Example 14: Draw cumulative frequency polygon or ogives (both less than and more than ogives) of the followin frquency distribution

Class intervals:	50-59	60-69	70-79	80-89	90-99	100-109	110-119
Frequency:	8	10	16	14	10	5	2

Solution:

Calculation for drawing less than and more than ogives.

Class boundary	Cumulative frequency	
	Less than	More than
49.5	0	65
59.5	8	57
69.5	18	47
79.5	34	31
89.5	48	17
99.5	58	7
109.5	63	2
119.5	65	0

Less than Ogive and More than Ogive