Unit 14 : PRESENTATION OF DATA

UNIT STRUCTURE

14.1: Learning Objectives

14.2: Introduction

14.3: Diagrammatic Presentation

- 14.3.1 General Rules of Drawing a Diagram
- 14.3.2 Advantages of Diagramatic Presentation
- 14.3.3 Disadvantages of Diagramatic Presentation
- 14.3.4 Types of Diagram
- 14.3.4.a) Bar Diagram
- 14.3.4 b) Pie-Diagram
- 14.3.5 Disadvantages of Diagramatic Presentation

14.4: Graphic Presentation of Data

- 14.4.1 Difference between Diagrams and Graphs
- 14.4.2 Disadvantages of Graphic Presentation
- 14.4.3 Rules for Constructing Graphs
- 14.4.4 Types of Graphs
- 14.4.5 a) Histogram of column Diagram
- 14.4.5 b) Cumulative Frequency Curve of Ogive

14.5 Let us Sum Up

14.6 Further Reading

14.7 Answers to Check Your Progress

14.8 Model Questions

14.1 LEARNING OBJECTIVES

After going through this unit, you will be able to -

- Know how to draw a diagram
- Know about the different types of diagram
- Know how to graphically present data

14.2 INTRODUCTION

Presentation of data means exhibition of data in a clear and attractive manner so that these can be easily understood and analysed. Statistical data may be presented in the forms of diagrams and graphs. Diagrammatic presentation is the most popular and commonly used form of representing statistical data. It presents data in an attractive and appealing way. In case of graphical presentation, statistical data are presented in the form of lines and curves in graph paper.

14.3 DIAGRAMMATIC PRESENTATION

14.3.1 General Rules of Drawing a Diagram

- **Title:** First and foremost it is very essential that a suitable title is given to the diagram. The title should be written either on top or just below the diagram. It should be very clear precise, self-explanatory and convincing.
- **Size:** It is very important to decide the size of the diagram. It should be neither to small nor too big.
- **Scale:** The scale should be proper and accurate so that no mistake creeps in and the diagram can properly depict the data.
- **Actual Drawing:** The diagram should be neatly and clearly drawn. The different parts of the diagram should be drawn in such a way that each part is easily distinguishable.
- **Use of colours and signs:** Each part of the diagram should be separated with the use of appropriate types of lines or shades or colours.
- **Footnotes and Source Notes:** this is a very important part of the diagram. Source notes and footnotes are given at the bottom of the diagram. Footnotes are given in order to clarify some points related to the diagram and source notes are given to indicate the source from which data have been given.

14.3.2 Advantages of Diagrammatic Presentation

- A diagram is easy to understand. No special knowledge and skill are required.
- Data presented in the form of diagram are attractive and appealing, thereby paving way for easy memorization.
- Diagrams also carries the merit of economy of time as they are easy to understand and easy to draw conclusion from.
- With diagrams, comparisons between two sets of data are made easy.
- Diagrams are universally useful as they can be used at any time and any place.

14.3.3 Disadvantages of Diagrammatic Presentation

- Diagrams provide limited information. In order to get detailed and precise information one needs to go through the original statistical tables.
- Diagrams are useful only when comparisons are desired. A single diagram may not be useful.
- Diagrams are not suitable for further analysis.

14.3.4 Types of Diagram

There are different types of diagrams. But here we will discuss only bar diagram and pie diagram.

14.3.4.a) Bar Diagram

There are three types of bar diagram – simple, multiple and sub-divided bar diagram

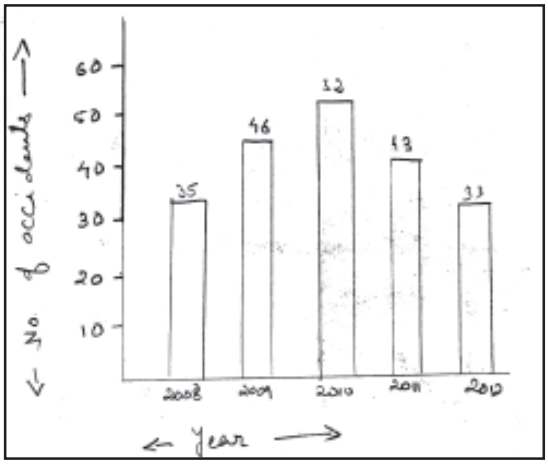
Simple Bar Diagram :

A simple bar diagram takes the form of single bar to represent values of a single variable.

Example: Represent the following data with the help of a suitable diagram.

Year	2008	2009	2010	2011	2012
No. of Accidents	35	46	52	43	33

Figure 14.1



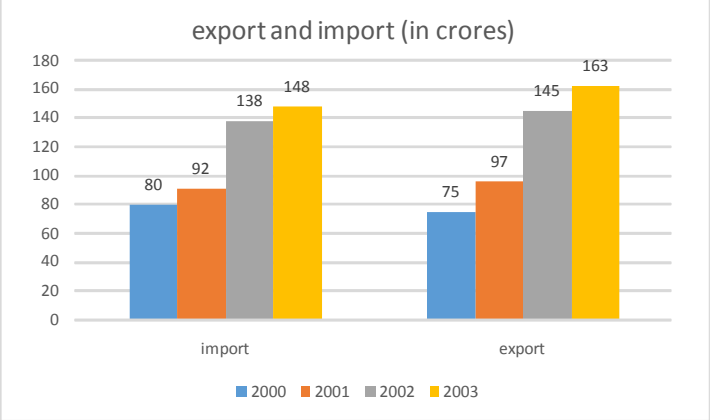
Multiple Bar Diagram:

Multiple Bar Diagram is drawn to represent two or more sets of interrelated data.

Example: Draw a multiple bar diagram t represent the following data.

Year	2000	2001	2002	2003
Import(in crores)	80	92	138	148
Export(in crores)	75	97	145	163

Figure 14.2: Export and Import (in Crores)



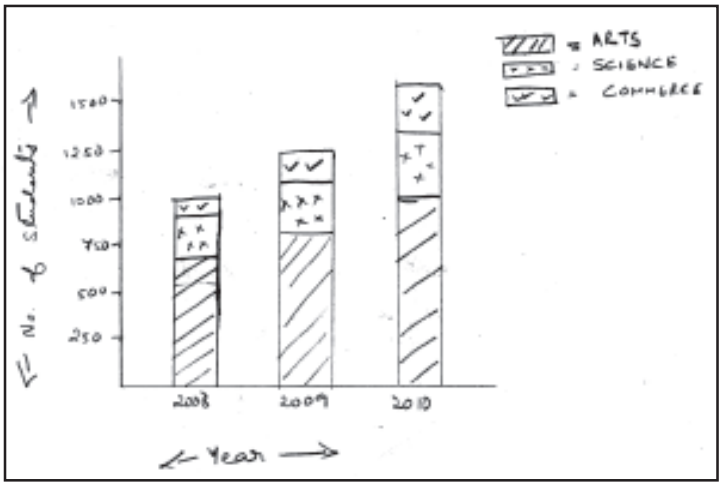
Sub-Divided Bar Diagram:

The diagram which represents the total values and parts of a set of a data in one diagram is known as sub-divided bar diagram.

Example: Construct a sub-divided bar diagram to represent no. f students admitted in science, arts and commerce stream of a college in the last three years.

Year	Arts	Science	Commerce	Total
2008	650	250	100	1000
2009	800	300	150	1250
2010	900	400	250	1550

Figure 14.3



14.3.4 b) Pie-Diagram

Just as sub-divided bars are used to represent the total magnitude and its various components, the circle may be divided into various sections or segments, viz, sectors representing certain proportions or percentage of the various component parts of the total. Such a sub-divided circle diagram is known as an angular or pie-diagram as the various segments resembles slices cut from a pie.

STEPS TO CONSTRUCT A PIE DIAGRAM

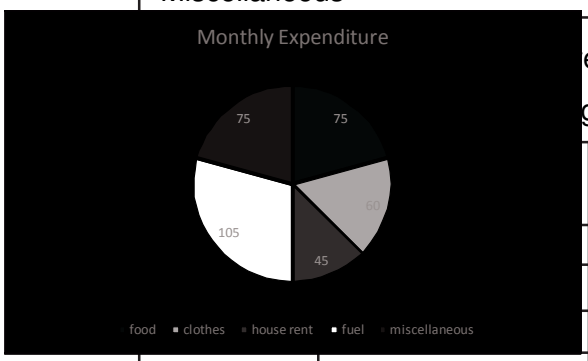
- Using a compass, construct a circle of an appropriate size.
- Then express each of the component values as a percentage of respective totals.
- Then the percentage values are covered into corresponding degrees in the circle. One circle contains 360 and percentage values of all the items are equal to 100, therefore one percentage value is

represented by 360/100 = 3.6. Therefore to get size of angles each percentage value is multiplies with 3.6.

- Take a radius as base line to draw the angle represented by the first component. The new line will then become the base for second component's angular representation. This process is repeated till all the components are represented.
- Then different component parts are distinguished from one another by using different shades, dotting, colours, etc.

EXAMPLE : Expenditure of a family in different heads in a year:

HEADS OF EXPENDITURE	EXPENDITURE (in Rs.)
Food	50
Clothes	40
House Rent	30
Fuel	70
Miscellaneous	50



e information in pie diagram, the various

grees of the circle as shown below –

		PERCENTAGE VALUE	PROPORTIONATE ANGLE
		50/240x100=20.83	75
		40/240x100=16.66	60
		30/240x100=12.5	45
Fuel	70	70/240x100=29.16	105
Miscellaneous	50	50/240x100=20.83	75
Total	240		360

Figure 14.4

14.3.5 Disadvantages of Diagramatic Presentation

- Diagrams provide limited information. In order to get detailed and precise information one needs to go through the original statistical tables.
- Diagrams are useful only when comparisons are desired. A single diagram may nt be useful.
- Diagrams are not suitable for further analysis.

14.4 GRAPHIC PRESENTATION OF DATA

Another useful method of presenting data is graphic presentation. In this method statistical data are shown in the form of line or curve in the graph paper.

14.4.1 Difference Between Diagrams and Graphs

- In the construction of a graph generally graph papers are used, but diagrams are drawn on plain paper.
- Graphs are easy to construct than diagrams.
- Graphs are used to determine certain measures of central tendencies, but these values cannot be determined through diagrams.
- Graphs are less attractive and impressive than diagrams.

14.4.2 Advantages of Graphic Presentation

- Complex data can be presented in simple and understandable way through graph.
- Graphs are used for forecasting, interpolation and extrapolation.
- Comparisons of two or more phenomenon are made easier by graph.
- Graphs are now widely used in various fields such as economics, commerce, advertising, government department, etc.

14.4.3 Disadvantages of Graphic Presentation

- Actual values are not known in graphs.
- Graphical presentation depends on scale. If scales are not accurate, graphs can be misleading.

- Graphs cannot be followed if multiple features of data are to be shown.
- Graphs are not easy to interpret for a layman.

14.4.4 Rules for Constructing Graphs

- Every graph should have a heading or title.
- Graphs are prepared on graph paper. Considering the size and nature of data a suitable point on the graph is fixed as the point of origin. Horizontal and vertical lines intersecting through this point are shown as bold lines which are known as axis. Horizontal line from left to right is known as Horizontal axis or X-axis. On the other hand, the line going upward r downward is known as vertical axis or Y-axis. Intersected by X-axis and Y-axis a graph paper is divided into four parts and each part is called quadrant. Point of origin in the graph is indicated by the word "O". To the right and above the point of origin, positive values of a statistical series are indicated. Therefore, in the first quadrant, both X and Y are +X and +Y respectively. In the second quadrant X is –X while Y is –Y respectively; in the third quadrant both X and Y are –X and –y respectively; in the fourth quadrant while +X, Y is +Y (Choudhury, et al., 2013).
- A suitable scale should be chosen such that the whole data can be accommodated.
- The scale n the Y-axis should begin from zero.
- The curve drawn must be distinct and the curve must not be overcrowded with curves.
- An index is to given to indicate the scale and meaning of different curves.
- Sometimes the actual figures are also indicated in the graph.
- The source of information must be given at end of the graph.

14.4.5 Types of Graph

Although there are many types of graph, here we will discuss only two types – Histogram and Ogive.

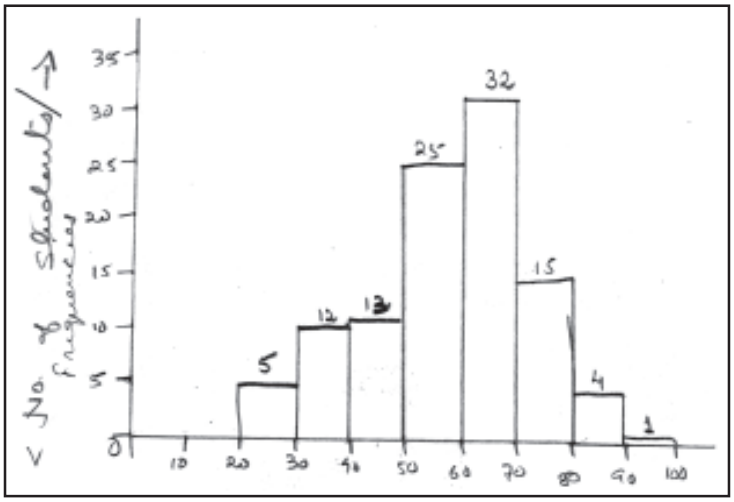
14.4.5 a) Histogram or Column Diagram

Histograms are the most commonly used forms of graphs. They are a series of rectangles that are drawn adjacent to each other without any gaps between them. They are drawn on the basis of number of class intervals. The shapes of class interval depend on whether the class intervals are equal or unequal.

When class intervals are equal: Marks obtained by 100 students in Economics are given below. Construct a Histogram.

Marks (Classes)	No. of Students
20-30	5
30-40	13
40-50	12
50-60	25
60-70	32
70-80	15
80-90	4
90-100	1

Figure 14.5



When class intervals are unequal: Let us consider the following data.

Age	25-29	30-34	35-39	40-44
No. of persons	50	30	40	25

In order to prepare a histogram with unequal class intervals, we have to first make the class intervals equal. For this, we delete 0.5 from the lower limit and 0.5 in the upper limit. This is shown in the following table.

Classes (age)	No. of persons (f)	Class limit	Class length (h)	Frequency density = f/h
25-29	50	24.4-29.5	5	10
30-34	30	29.5-34.5	5	6
35-39	40	34.5-39.5	5	8
40-44	25	39.5-44.5	5	5

DIFFERENCE BETWEEN HISTOGRAM AND BAR DIAGRAM

- A histogram is a two dimensional diagram where both the width and length are important. On the other hand, bar diagram is one dimensional diagram in which only length matters while width is arbitrary.
- In histogram, the bars are adjacent to each other whereas in bar diagram proper spacing is given between different bars.
- In histogram the class frequencies are represented by the area of rectangles while in a bar diagram they are represented by the heights of the corresponding bars.
- Histogram is drawn only for continuous variable while bar diagram is drawn both for continuous and discrete variable.

14.4.5 b) Cumulative Frequency Curve or Ogive

Ogive is a graphical representation of cumulative frequency distribution of continuous variable. Cumulative frequencies are plotted against the class boundaries. Cumulative frequencies are placed in the Y-axis and class boundaries are placed in the X-axis. As there are two types of cumulative frequencies — less than and more than – so there are two types of ogives – less than and more than.

LESS THAN OGIVE : In order to construct less than ogive, less than cumulative frequencies are plotted against the upper class

boundaries of the respective classes. Points so obtained are joined by a smooth free hand curve to get less than ogive. Less than ogive is an increasing curve, slopping upwards from left to right and has the shape f an elongated S.

MORE THAN OGIVE : In order to construct less than ogive, more than cumulative frequencies are plotted against the upper class boundaries of the respective classes. Points so obtained are joined by a smooth free hand curve to get more than ogive. More than ogive is a decreasing curve, slopping downwards from left to right and has the shape of an elongated S, upside down.

Point of intersection of the less tan and more than ogives give the median. The foot of the perpendicular from their point of intersection on the X-axis gives the value of the median.

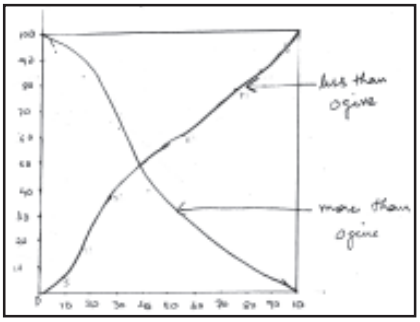
Example: Construct less than and more than ogive with the following data.

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of Students	5	13	20	22	17	9	10	4

In order to construct the ogive, we first work out the following table.

Less than ogive		More than ogive	
Marks	Students	Marks	Students
<20	5	>20	100
<30	18	>30	95
<40	38	>40	82
<50	60	>50	62
<60	77	>60	40
<70	86	>70	23
<80	96	>80	14
<90	100	>90	4

Figure 14.6



CHECK YOUR PROGRESS

Q1 : What is graphical representation of data?

.....

.....

Q2 : What is histogram?

.....

.....

Q3 : What do you mean by ogive?

.....

.....

Q4 : What are less than ogive and more than ogive?

.....

.....



14.5 LET US SUM UP

- Presentation of data means exhibition of data in a clear and attractive manner so that these can be easily understood and analysed.
- Data may be presented in the form of diagrams or graphs.
- Diagrammatic presentation can take two forms – bar diagram and pie-diagram.
- Bar diagrams are of three types – simple, multiple and sub-divided.
- In graphic presentation of data statistical data are shown in the form of line or curve in the graph paper.

- Graphs may be presented in the form of histogram and ogive. Ogives are of two types – more than ogive and less than ogive



14.6 FURTHER READING

1) Gupta, S.C. (2009). ' Fundamentals of Statistics, Himalayan Publishing House, Mumbai, Sixth Edition Reprint.

2) Gupta, S.P. (2010). 'Statistical Methods', Sultan Chand & Sons, New Delhi.

14.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1 : It is a method by which statistical data are shown in the form of line on curve in a graph paper.

Ans to Q No 2 : They are series of rectangles that are drawn adjacent to each other without any gaps between them.

Ans to Q No 3 : Ogive is a graphical presentation of c.f. distribution of continuous variable.

Ans to Q No 4 : Less than ogive is an increasing curve, slopping up wards from left to right; and more then ogive is a decreasing curve, slopping downwards from left to right.



14.8 MODEL QUESTIONS

A) Short Question (Answer each question in about 150 words)

Q1 : What do you mean by presentation of data?

Q2 : Distinguish between graph and diagram.

Q3 : What are the different types of graph?

B) Long Question (Answer each question in about 300-500 words)

Q1 : What are the advantages and disadvantages of diagrammatic presentation of data?

Q2 : Discuss the merits and demerits of graphic presentation of data.

Q3 : What is a pie diagram? What are the general rules for drawing a pie diagram?

Q4 : Discuss the general rules for drawing a graph.

Q5 : Explain how the method of drawing a histogram with equal class interval different from the method of drawing a histogram with unequal class interval.

*** ***** ***