Graphical Presentation of Data

SESSION 4

Structure

4.1 INTRODUCTION

In Lab Session 3, you have learnt how to present data in the form of different types of bar diagrams and pie diagram. In Unit 15 of MST-001 (Foundation in Mathematics and Statistics), you have learnt that we can use graphs for plotting frequency distributions. We can represent the discrete frequency distribution using a frequency bar graph and the continuous frequency distribution using a histogram. We can use cumulative frequency curves (ogives) to represent the cumulative frequency distributions. In Lab Session 2, we have explained the construction of frequency distributions using Excel 2007.

Prerequisite

- Lab Sessions 2 and 3 of MSTL-001 (Basic Statistics Lab).
- Unit 15 of MST-001 (Foundation in Mathematics and Statistics).

In this lab session, you will learn how to draw the frequency bar graph to represent the discrete frequency distribution graphically. You will also learn how to draw the most commonly used graphs, e.g., histogram, frequency polygon, frequency curve for the continuous frequency distributions and cumulative frequency curves (or ogives) for the cumulative frequency distributions. We shall explain how to draw graphs for time series data in Lab Session 5.

Objectives

After performing the activities of this session, you should be able to:

- prepare the spreadsheet in MS Excel 2007;
- plot the frequency bar graph for discrete frequency distributions;
- draw the histogram, frequency polygon, frequency curve for continuous frequency distributions; and
- construct the cumulative frequency curves for cumulative frequency distributions.

4.2 PROBLEM DESCRIPTION

For this lab session, we consider

1. The data of Problem 2 given in Lab Session 2 to represent the number of mobile phones graphically in a frequency bar graph.
2. The data of Problem 3 given in Lab Session 2 to represent the life span of the bulbs graphically using histogram, frequency polygon, frequency curve and both the ogives.

4.3 FREQUENCY BAR GRAPH

You have learnt in Unit 15 of MST-001 that we use the frequency bar graph to represent the discrete frequency distribution graphically. It is the same as simple bar diagram explained in Sec. 3.3 of Lab Session 3. In the frequency bar graph, we use bars of the same width and these bars are separated from each other by equal intervals. We briefly mention the main steps as follows:

Step 1: We draw the horizontal (X) axis and the vertical (Y) axis.

Step 2: We take different values of the variable on the horizontal axis and the frequencies on the vertical axis.

Step 3: We draw a perpendicular bar, for each value of the variable on the horizontal axis. The height of the bar represents the frequency of the corresponding value of that variable.

Steps in Excel

You have learnt about the manual plotting of the frequency bar graph to represent the discrete frequency distribution in Unit 15 of MST-001. In order to plot the frequency bar graph for the data of Problem 1 in MS Excel 2007, we follow the steps given below:

Step 1: We directly enter the discrete frequency distribution of the data, which was formed in Sec. 2.4 of Lab Session 2 in Excel 2007 spreadsheet as shown in Fig. 4.1.

	A	B	C
1	Number of Mobile Phones	No. of Families	
2	1	6	
3	2	16	
4	3	22	
5	4	24	
6	5	22	
7	6	16	
8	7	9	
9	8	5	
10			

Fig. 4.1: Partial screenshot of the spreadsheet for the given data.

Step 2: We select Cells B2:B9 and follow Steps 2 to 9 explained in Sec. 3.3 of Lab Session 3 to obtain the formatted frequency bar graph. The resulting graph is shown in Fig. 4.2.

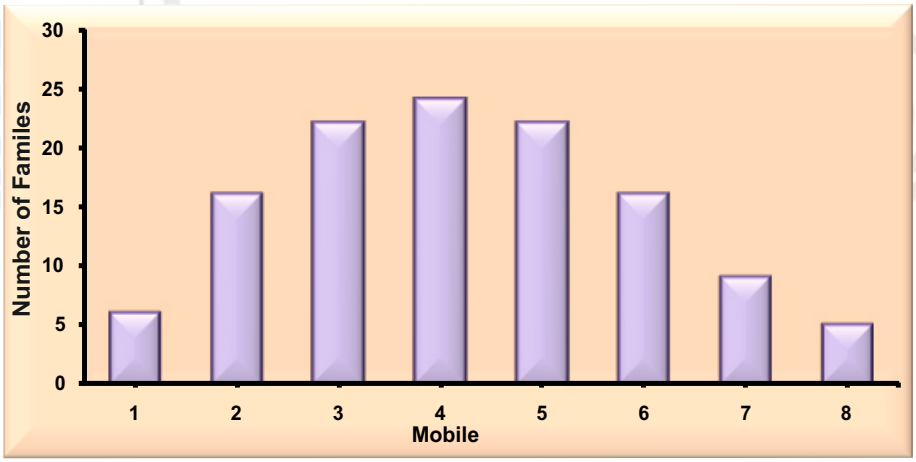


Fig. 4.2

Note that here the values of the variable (number of mobile phones) are in sequence from 1 to 8. If the values of the variable are not in a sequence starting from 1, we change the horizontal axis labels with respect to the values of the variable as explained in Steps 7 to 11 of Sec. 4.4.

4.4 HISTOGRAM

Histogram is used to represent the continuous frequency distribution. It is similar to a bar diagram and represents a frequency distribution with continuous classes. The main difference between a bar diagram and a histogram is that in the histogram, there is no gap between the bars and it has a continuous appearance. We briefly mention the main steps as follows:

Step 1: We take the class intervals on the horizontal axis (X-axis) and frequencies on the vertical axis (Y-axis).

Step 2: For constructing a histogram, we draw adjacent rectangles (or bars) over the class intervals such that the height of the rectangles is proportional to the corresponding class frequency and the width of all bars is equal to the class interval.

We can construct the histogram using Excel 2007 in two different ways:

i) Using Bar Diagram

ii) Using Data Analysis ToolPak

We shall explain how to draw a histogram using bar diagram in this section. In the next section, we shall use the ***Data Analysis ToolPak*** to draw the histogram.

Steps in Excel

You have learnt how to construct a histogram manually in Unit 15 of MST-001. In this lab session, we explain the method of constructing the histogram for Problem 2 in Excel 2007 using the bar diagram.

Step 1: For plotting the histogram using the bar diagram as explained in Sec. 3.3 of Lab Session 3, we directly use the continuous frequency distribution of the data which was formed in Sec. 2.5 of Lab Session 2 Here we enter only the continuous frequency distribution in Excel 2007 spreadsheet as shown in Fig. 4.3.

	A	B	C
1	Class Interval	No. of Bulbs (Frequency)	
2	500-600	11	
3	600-700	20	
4	700-800	25	
5	800-900	32	
6	900-1000	27	
7	1000-1100	19	
8	1100-1200	11	
9	1200-1300	5	
10			

Fig. 4.3: Partial screenshot of the spreadsheet for the given data.

Step 2: We now draw a bar diagram by following the steps shown in Fig. 4.4. For this, we

1. select Cells B2:B9,
2. click on the ***Insert*** tab,
3. click on the ***Column*** option under the ***Chart*** group, and
4. choose a ***Clustered Column*** subtype under ***2-D Column***.

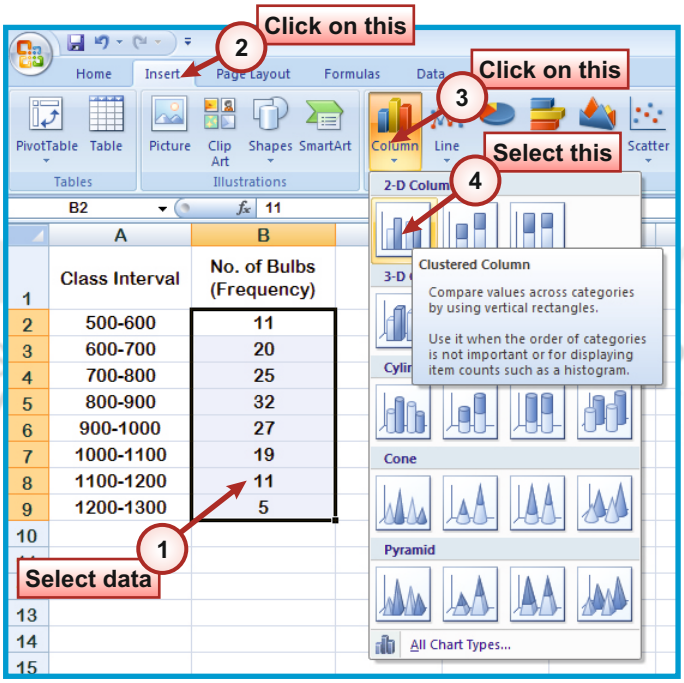


Fig. 4.4

Step 3: The resulting chart is shown in Fig. 4.5.

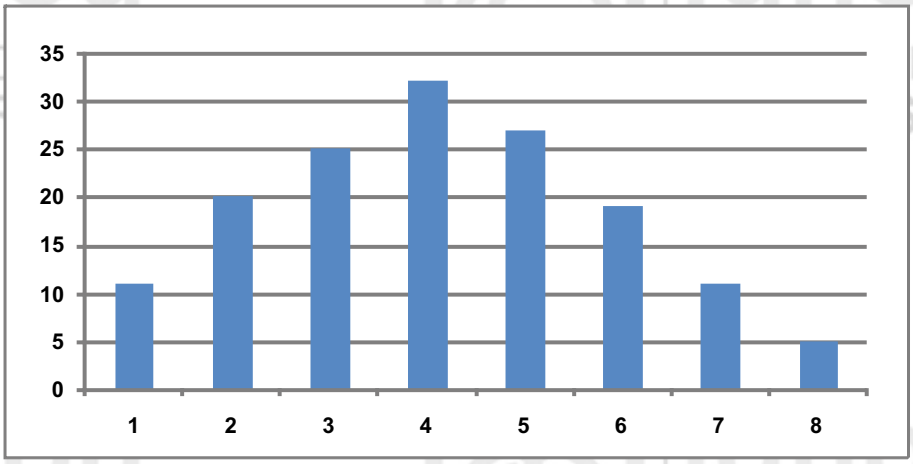


Fig. 4.5

Step 4: To remove the gap between the bars, we

1. select bars given on the chart,
2. click on the ***Format*** tab under ***Chart Tools***, and
3. click on the ***Format Selection*** as shown in Fig. 4.6.

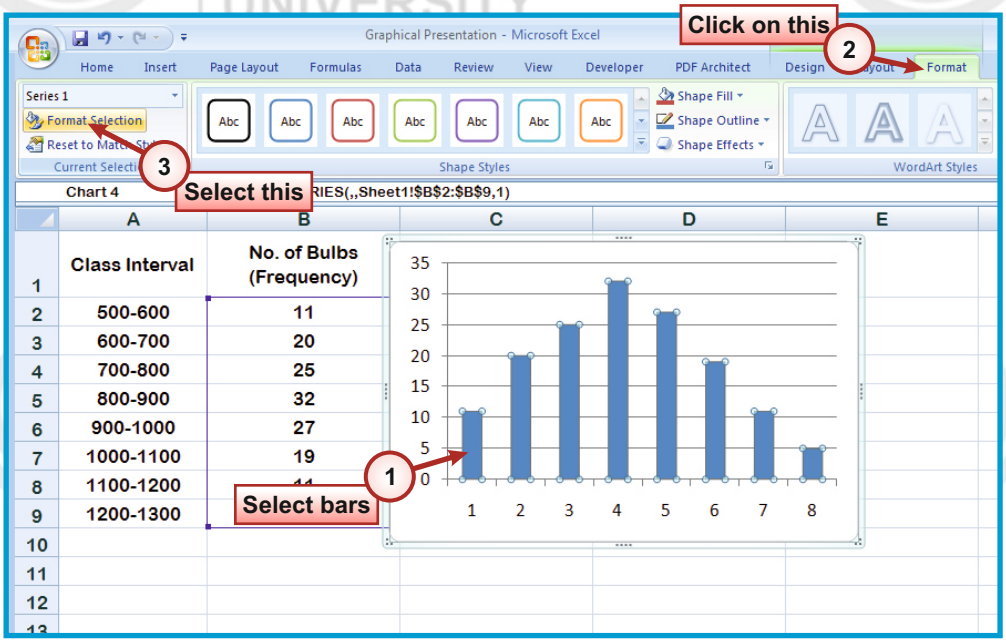
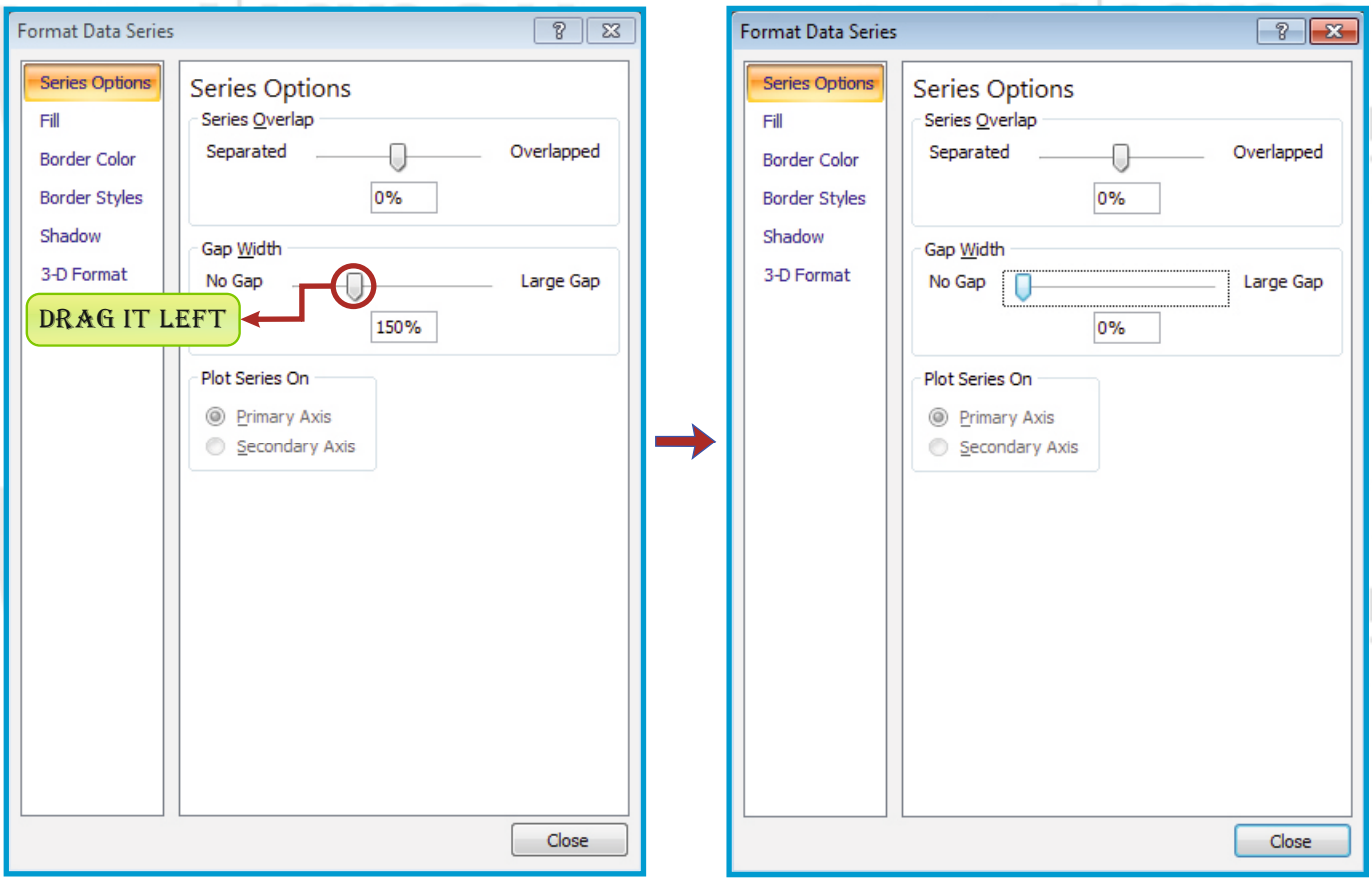


Fig. 4.6

Step 5: A new dialog box as shown in Fig. 4.7a appears. We now drag the ***Gap Width*** up to ***No Gap***, i.e., we take the gap width as 0% (Fig. 4.7b).



(a) **(b)**

Fig. 4.7

Step 6: Thus, the gap between the bars is eliminated and the resulting graph is shown in Fig. 4.8. It is known as the histogram.

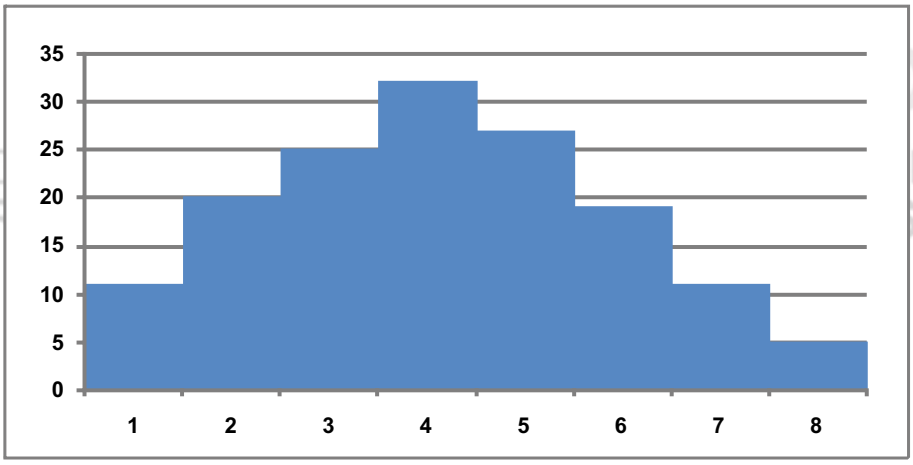


Fig. 4.8

Step 7: We now change the horizontal axis labels. For this, we

1. select the horizontal axis labels of the chart shown in Fig. 4.9,
2. click on ***Design*** tab under ***Chart Tools***, and
3. click on ***Select Data***.

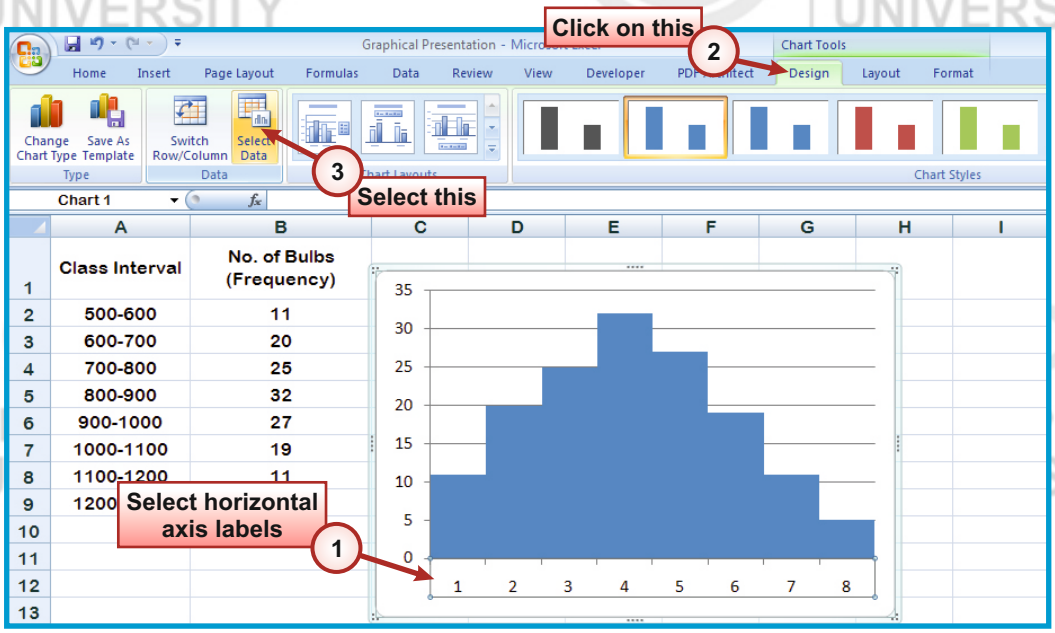


Fig. 4.9

Step 8: A new dialog box as shown in Fig. 4.10 appears. We click on ***Edit*** under ***Horizontal (Category) Axis Labels*** as shown in Fig. 4.10.

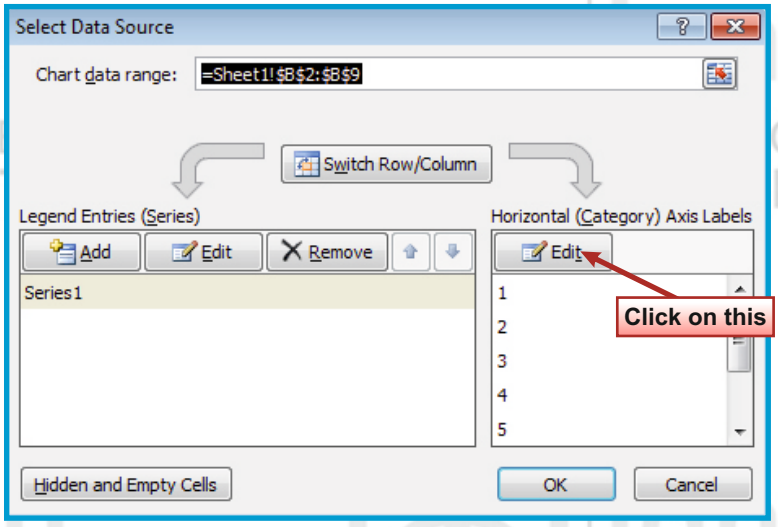
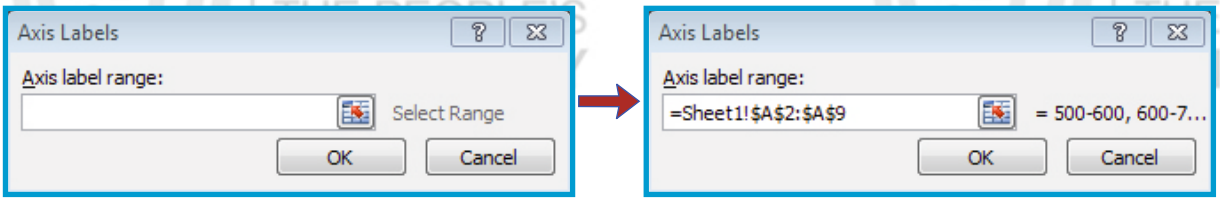


Fig. 4.10

Step 9: Again a new dialog box shown in Fig. 4.11a appears. We select Cells A2:A9 as ***Axis label range*** as shown in Fig. 4.11b and click on ***OK***.



(a) (b)

Fig. 4.11

Step 10: Now the dialog box shown in Fig. 4.10 changes to the one shown in Fig 4.12 and we click on ***OK***.

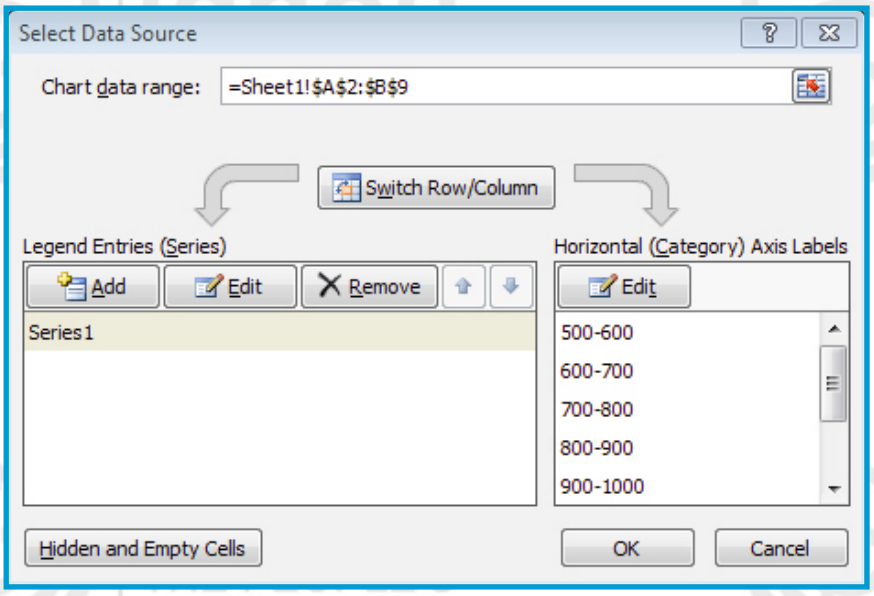


Fig. 4.12

Step 11: Thus, we obtain the histogram with class intervals on the horizontal axis as shown in Fig. 4.13.

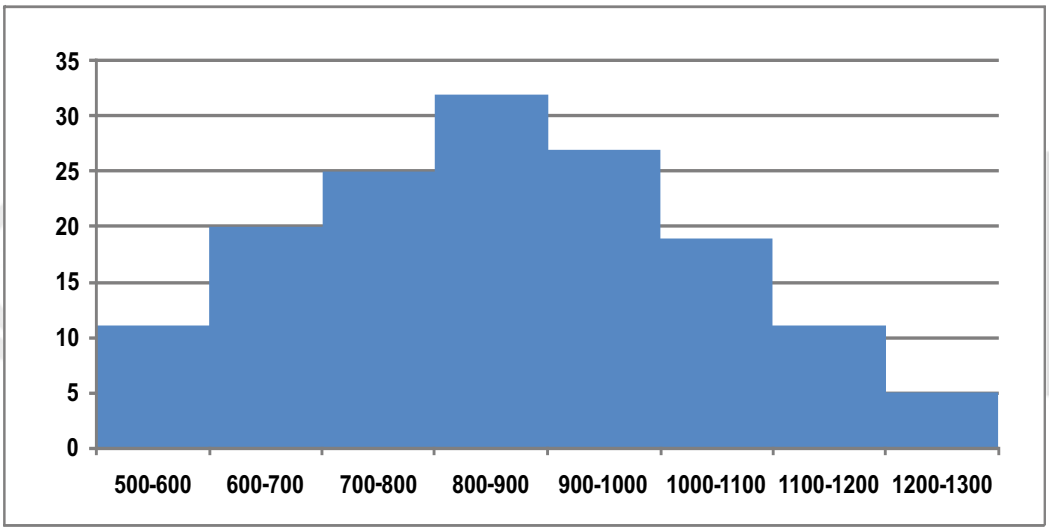


Fig. 4.13

Step 12: We format the histogram as explained in Steps 4 to 9 of Sec. 3.3 under the heading 'Steps in Excel' of Lab Session 3. The resulting histogram is shown in Fig. 4.14.

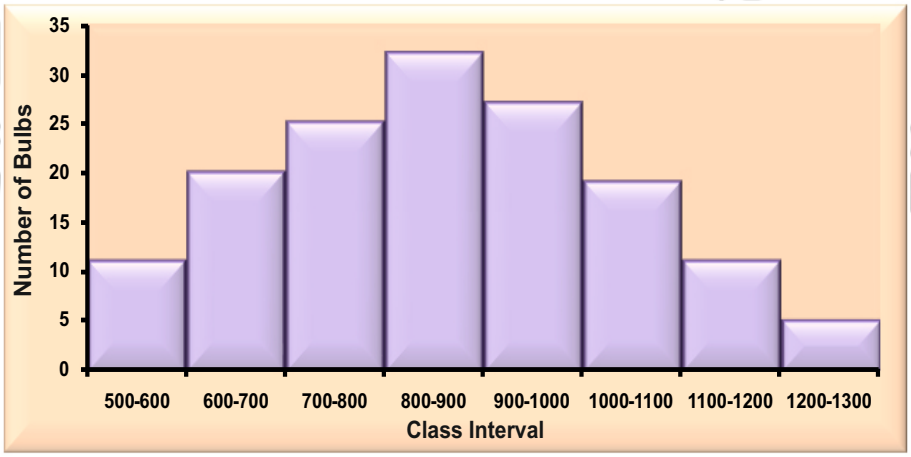


Fig. 4.14

We now explain how to construct a histogram using the ***Data Analysis ToolPak***.

4.5 HISTOGRAM USING DATA ANALYSIS TOOLPAK

Step 1: To construct a histogram using ***Data Analysis ToolPak***, we consider the raw data given in Table 3 of Lab Session 2 (Problem 2 of this session). We enter the data in Excel sheet as shown in Fig. 4.15.

	A	B	C
1	S.No.	Life of Bulb (in hours)	
2	1	1087	
3	2	1289	
4	3	876	
5	4	725	
6	5	900	
7	6	1080	
8	7	952	
9	8	741	
10	9	1000	
11	10	900	
12	11	957	
13	12	745	

Fig. 4.15: Partial screenshot of the spreadsheet for the given data.

Step 2: Here we need the values of **Bin** computed in Step 7 of Sec. 2.5 of Lab Session 2 under the heading 'Steps in Excel'. We type the values of **Bin** in Cells C2:C9 as shown in Fig. 4.16.

	A	B	C	D
1	S.No.	Life of Bulb (in hours)	Bin	
2	1	1087	599	
3	2	1289	699	
4	3	876	799	
5	4	725	899	
6	5	900	999	
7	6	1080	1099	
8	7	952	1199	
9	8	741	1299	
10	9	1000		

Fig. 4.16

Step 3: We now plot the histogram using the ***Data Analysis ToolPak***. We click on ***Data*** tab and then click on ***Data Analysis*** as shown in Fig. 4.17.

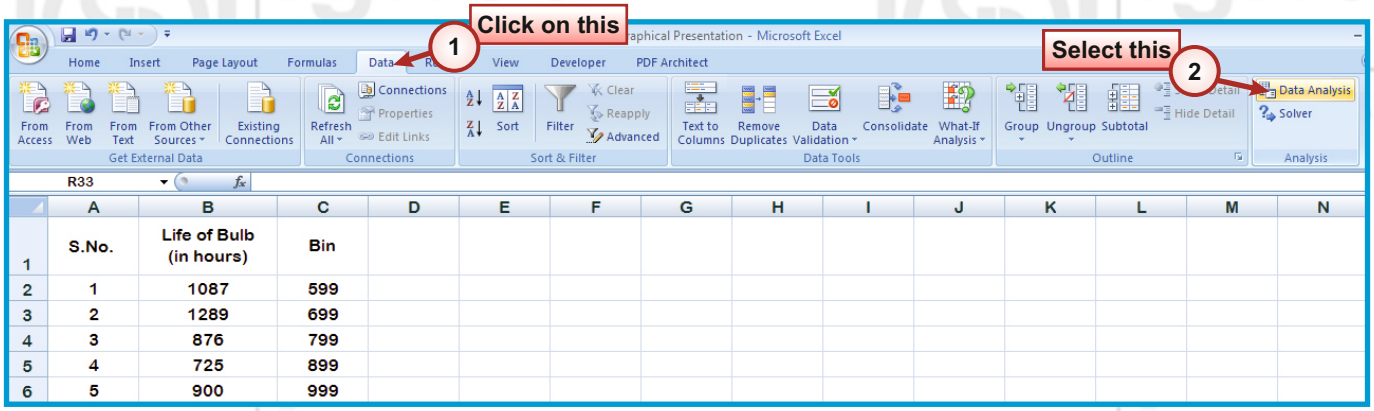


Fig. 4.17

Step 4: The dialog box shown in 4.18 appears. We select the option ***Histogram*** and click on ***OK***.

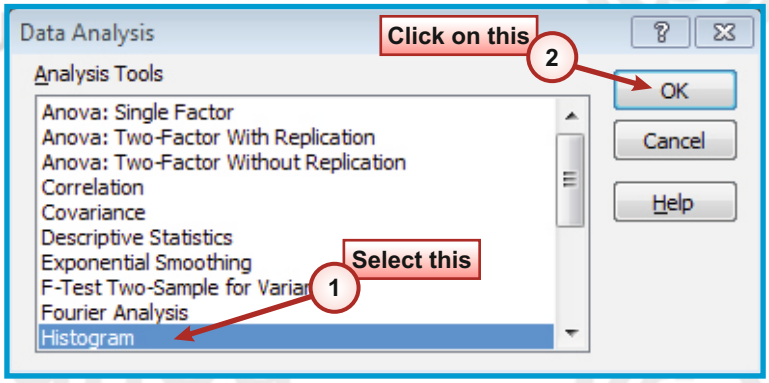
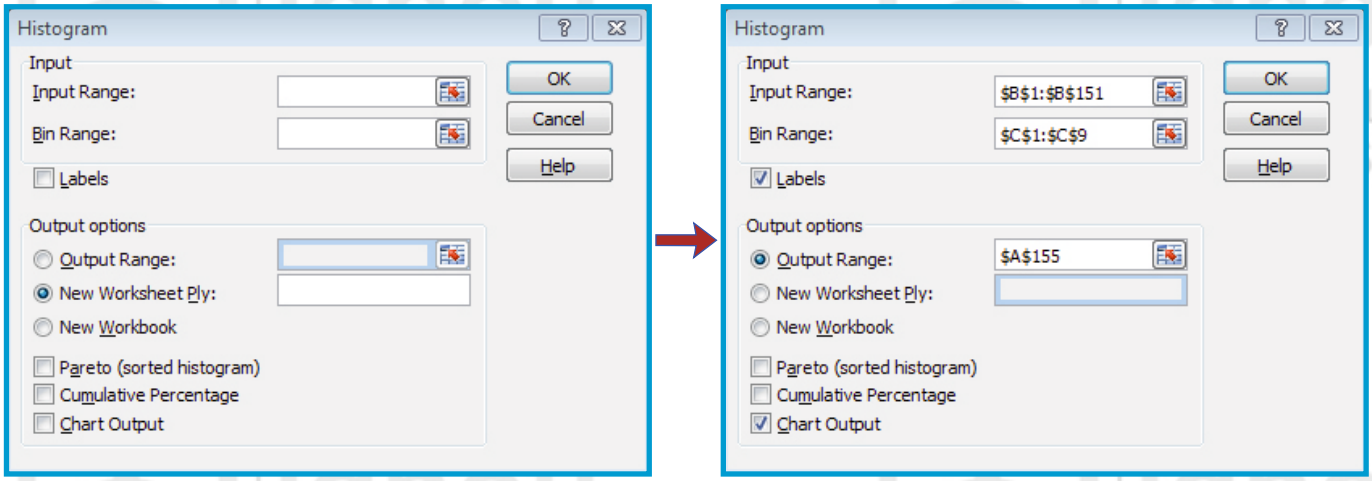


Fig. 4.18

Step 5: Again a new dialog box as shown in Fig. 4.19a appears. We fill the desired ranges in this dialog box as shown in Fig. 4.19b. We

1. select ***Input Range*** as Cells B1:B151,
2. select ***Bin Range*** as Cells C1:C9,
3. tick on the ***Labels***,
4. provide ***Output Range*** as Cell A155 (You can also use ***New Worksheet*** or ***New Workbook*** to get the output), and
5. tick on the ***Chart Output*** and click on ***OK***.



(a) **(b)**

Fig. 4.19

Step 6: The output is shown in Fig. 4.20.

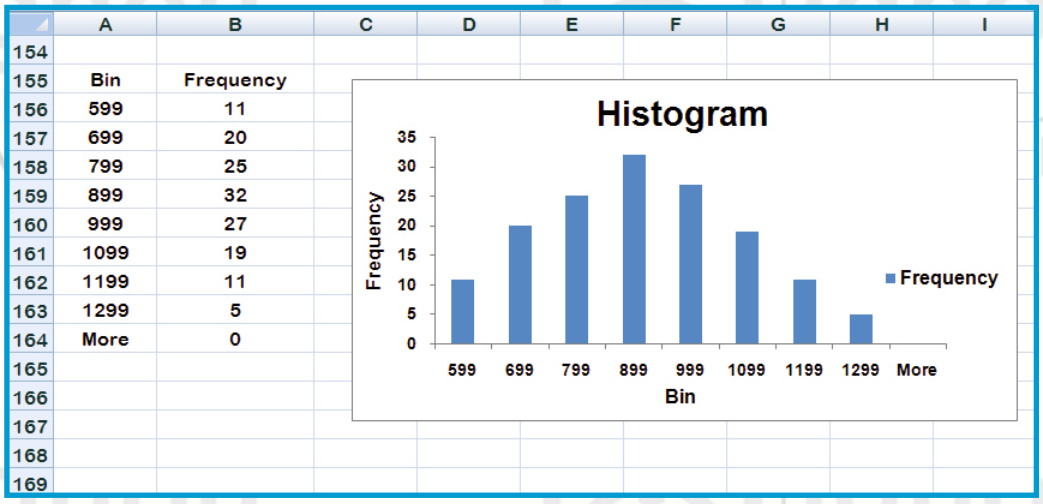


Fig. 4.20

We now follow Steps 5 to 12 of Sec. 4.4 under the heading 'Steps in Excel' and obtain the same histogram as shown in Fig. 4.14.

4.6 FREQUENCY POLYGON

You have learnt how to construct a frequency polygon for the continuous frequency distribution in Unit 15 of MST-001. Here we briefly mention the main steps as follows:

Step 1: To draw the frequency polygon, we compute the mid values of all class intervals as

$$\text{Mid value} = \frac{\text{lower limit} + \text{upper limit}}{2}$$

Step 2: We take the mid values on the horizontal axis (X-axis) and frequencies on the vertical axis (Y-axis). We plot the respective points on the graph using the mid values and frequencies.

Step 3: We join these points by line segments.

Step 4: We add two imaginary classes of the same width as the class intervals with zero frequencies, one just before the first class interval and the other just after the last class interval.

Step 5: We plot the points (mid values) of the imaginary classes with zero frequencies and join these points with the plotted graph. The graph thus obtained is known as the frequency polygon.

Step 6: We can also plot the frequency polygon along with a histogram. For this, we mark the points in the middle of the upper side of each rectangle (or bar) and join them as explained in Steps 3 to 5.

Steps in Excel

You have learnt how to construct the frequency polygon manually in Unit 15 of MST-001. In this lab session, we shall consider Problem 2 and explain the method of constructing the frequency polygon using Excel 2007.

Step 1: For plotting the frequency polygon, we consider the data used in Sec. 4.4 as shown in Fig. 4.21.

	A	B	C
1	Class Interval	No. of Bulbs (Frequency)	
2	500-600	11	
3	600-700	20	
4	700-800	25	
5	800-900	32	
6	900-1000	27	
7	1000-1100	19	
8	1100-1200	11	
9	1200-1300	5	
10			

Fig. 4.21

Step 2: We now insert a new row before Row 2 as shown in Fig. 4.22. For this, we

1. select Row 2 as shown in Fig. 4.22a,
2. click on the ***Home*** tab,
3. choose ***Insert Sheet Rows*** under ***Insert*** option as shown in Fig. 4.22a, and
4. obtain a new blank Row 2 as shown in Fig. 4.22b.

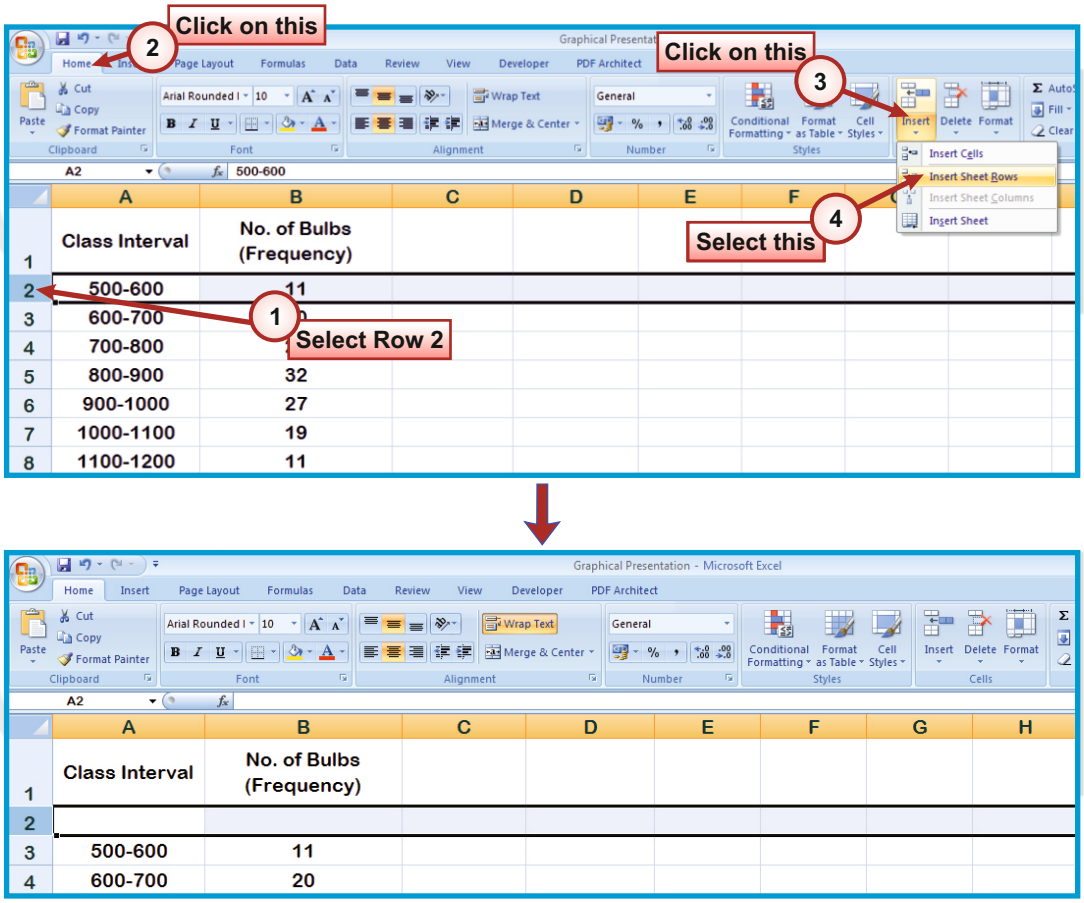


Fig. 4.22

Step 3: We add one imaginary class (400-500) with frequency zero, i.e., Cells A2:B2 before the first class (500-600) of equal width and one imaginary class (1300-1400) with zero frequency, i.e., Cells A11:B11 after the last class (1200-1300) as shown in Fig. 4.23.

	A	B
1	Class Interval	No. of Bulbs (Frequency)
2	400-500	0
3	500-600	11
4	600-700	20
5	700-800	25
6	800-900	32
7	900-1000	27
8	1000-1100	19
9	1100-1200	11
10	1200-1300	5
11	1300-1400	0

Fig. 4.23

Step 4: We type the corresponding lower and upper limits in Cells C2:C11 and Cells D2:D11, respectively, as shown in Fig. 4.24.

	A	B	C	D
1	Class Interval	No. of Bulbs (Frequency)	Lower Limit	Upper Limit
2	400-500	0	400	500
3	500-600	11	500	600
4	600-700	20	600	700
5	700-800	25	700	800
6	800-900	32	800	900
7	900-1000	27	900	1000
8	1000-1100	19	1000	1100
9	1100-1200	11	1100	1200
10	1200-1300	5	1200	1300
11	1300-1400	0	1300	1400

Fig. 4.24

Step 5: We compute the mid value for the first class interval by typing "=(C2+D2)/2"in Cell E2 as shown in Fig. 4.25.

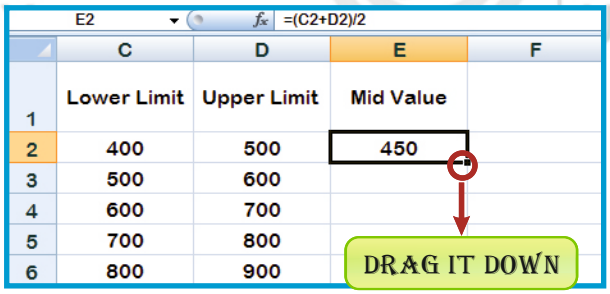


Fig. 4.25

Step 6: We drag down Cell E2 up to Cell E11 to compute the mid values for the remaining class intervals as shown in Fig. 4.26.

	C	D	E	F
1	Lower Limit	Upper Limit	Mid Value	
2	400	500	450	
3	500	600	550	
4	600	700	650	
5	700	800	750	
6	800	900	850	
7	900	1000	950	
8	1000	1100	1050	
9	1100	1200	1150	
10	1200	1300	1250	
11	1300	1400	1350	

Fig. 4.26

We can plot a frequency polygon in two different ways:

i) With Histogram, and

ii) Without Histogram.

We first explain how to plot the frequency polygon with histogram.

Step 7: To plot the frequency polygon with histogram, we plot the histogram as explained in Sec. 4.4 by selecting the data given in Cells B2:B11 and choose the horizontal axis labels given in Cells A2:A11. The resulting histogram after formatting is shown in Fig. 4.27.

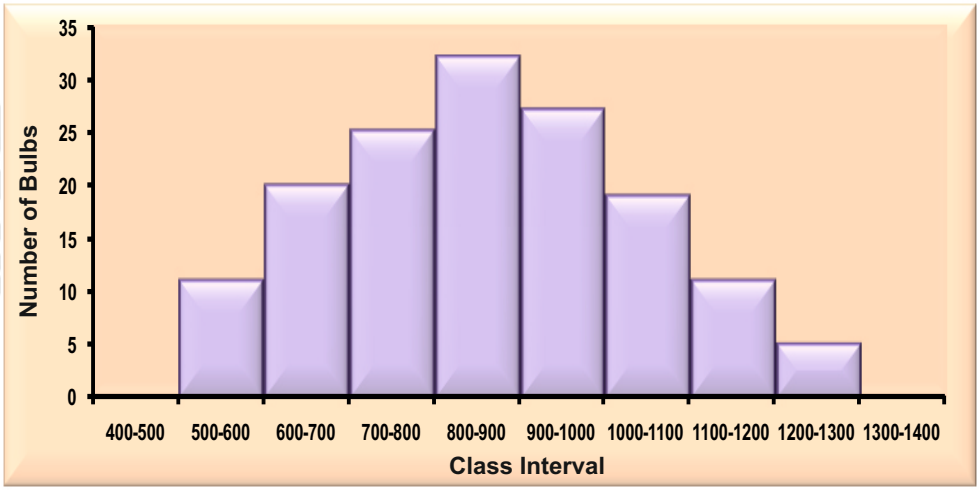


Fig. 4.27

Step 8: To add frequency polygon in the histogram shown in Fig. 4.27, we

1. click on the chart,
2. click on the ***Design*** tab, and
3. click on the ***Select Data*** as shown in Fig. 4.28.

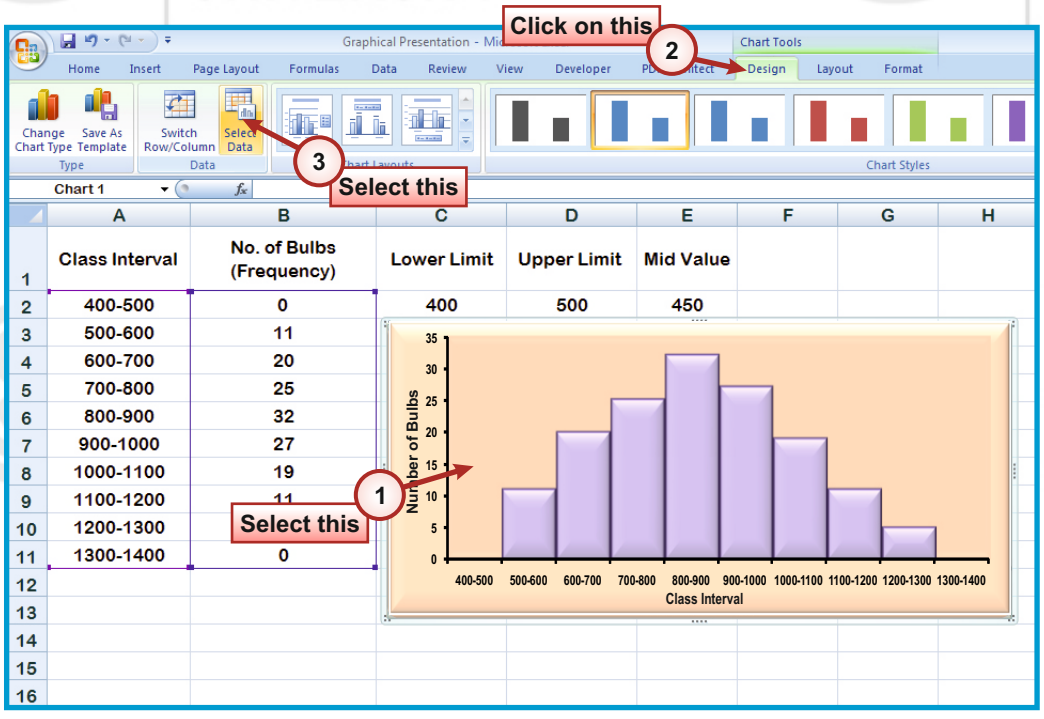


Fig. 4.28

Step 9: This opens a new dialog box as shown in Fig. 4.29. In this dialog box, we click on ***Add***.

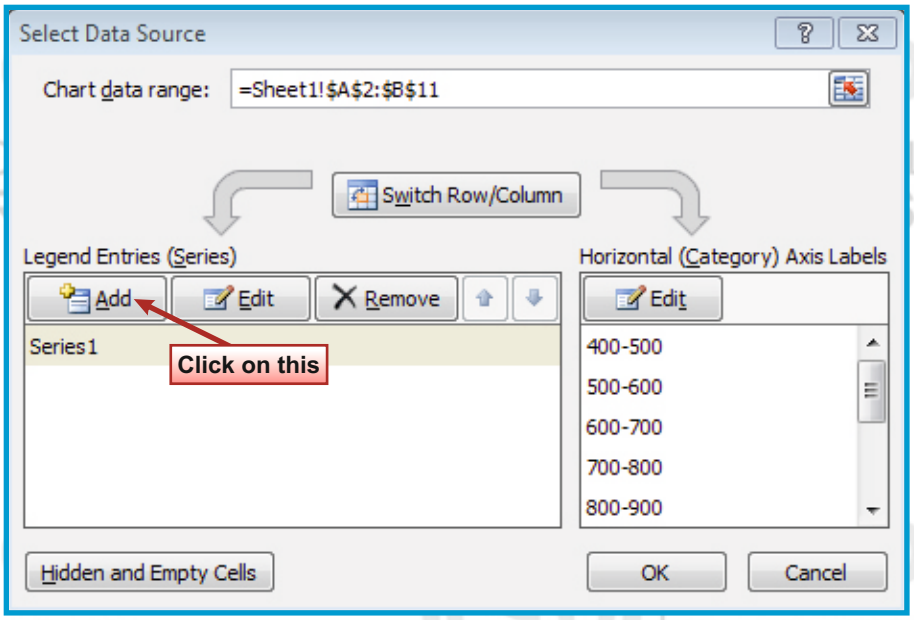
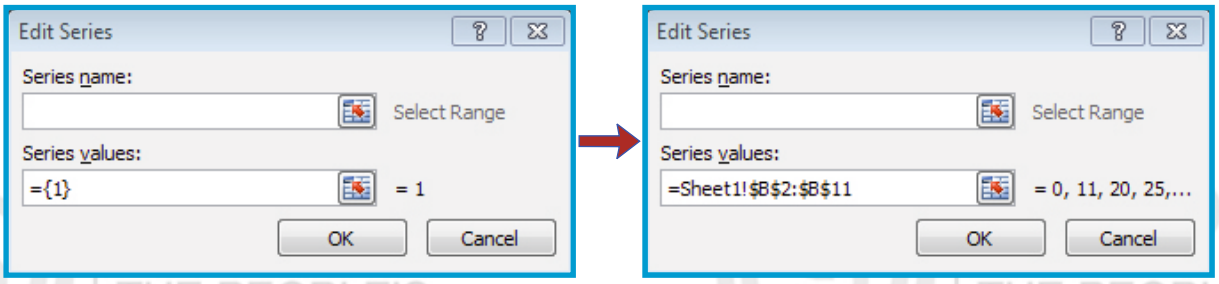


Fig. 4.29

Step 10: It opens another dialog box shown in Fig. 4.30a. We select ***Series Values*** by selecting Cells B2:B11 as shown in Fig. 4.30b and click on ***OK***.



(a) **(b)**

Fig. 4.30

Step 11: The dialog box shown in Fig.4.29 will change to the one shown in Fig. 4.31. We click on ***OK***.

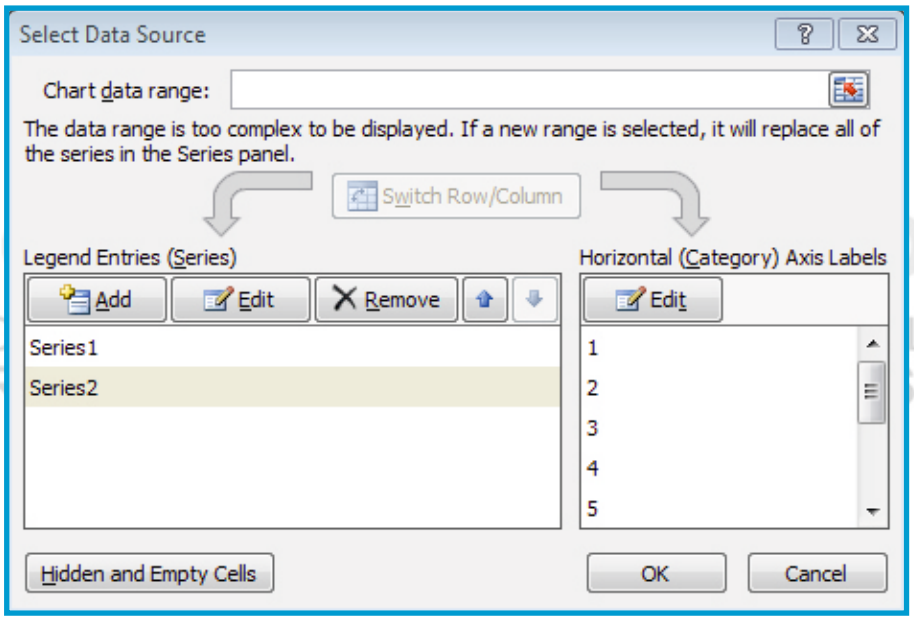


Fig. 4.31

Step 12: The resulting chart is shown in Fig. 4.32. The new series appears in red coloured bars.

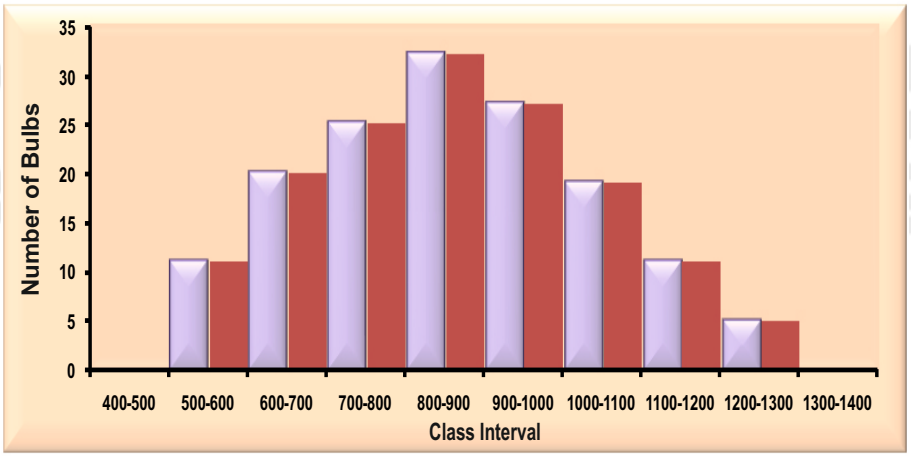


Fig. 4.32

Step 13: We now select the red coloured bars and click on ***Change Chart Type*** option in ***Design*** tab under ***Chart Tools*** as shown in Fig. 4.33.

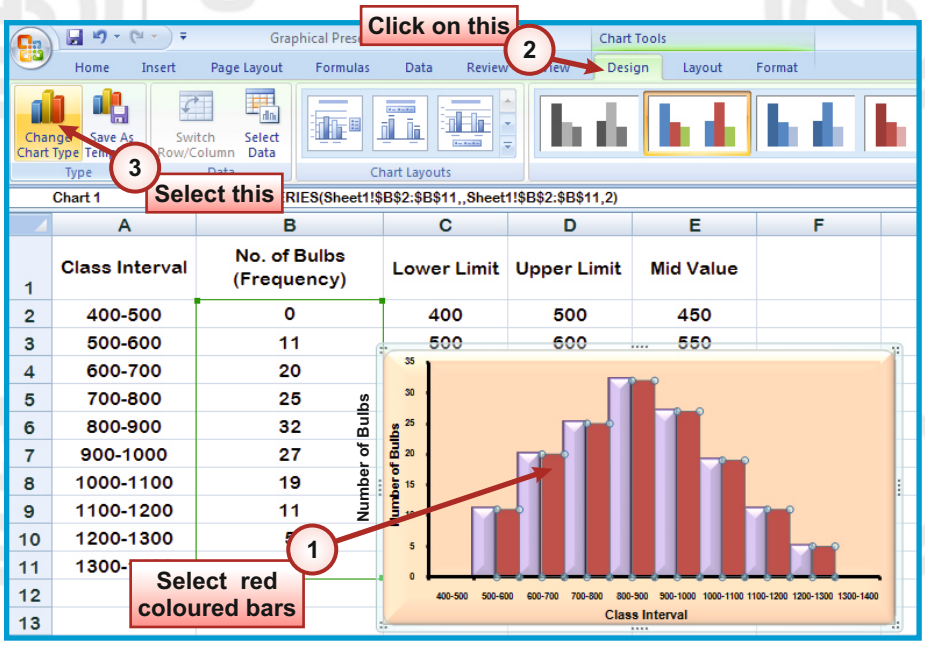


Fig. 4.33

Step 14: The dialog box shown in Fig 4.34 appears. We select the fourth chart subtype ***Line with Markers*** under ***Line*** option as shown in Fig. 4.34 and click on ***OK***.

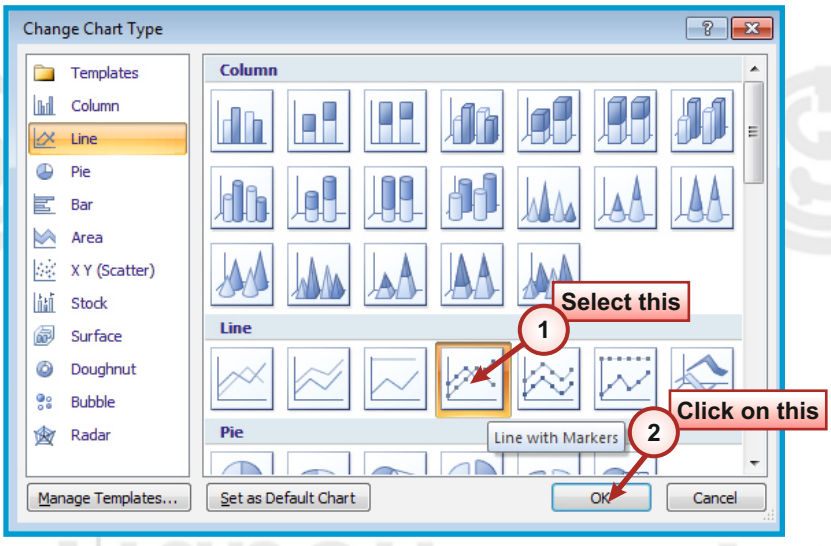


Fig. 4.34

Step 15: The resulting frequency polygon along with the histogram is shown in Fig. 4.35.

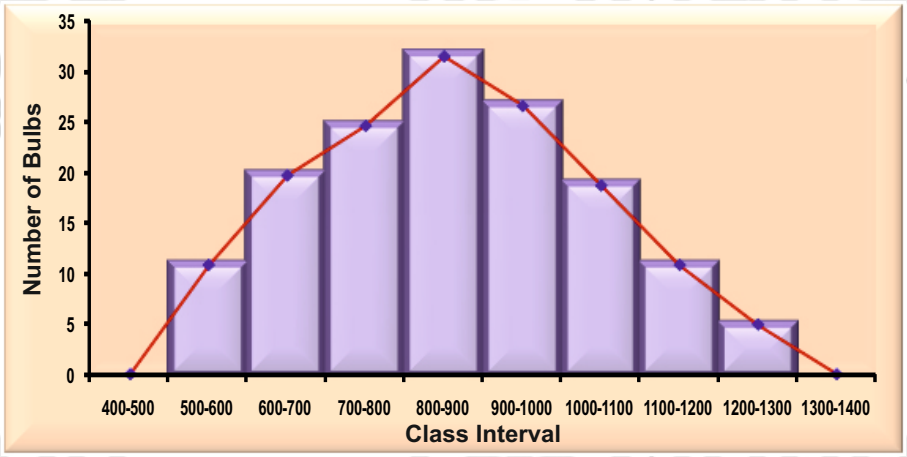


Fig. 4.35

We can plot frequency polygon directly without drawing the histogram as follows:

Step 16: We first click on ***Scatter*** under ***Insert*** tab and choose a ***Scatter with Straight Lines and Markers*** chart subtype as shown in Fig. 4.36. In this way, we get the blank chart shown in Fig. 4.37.

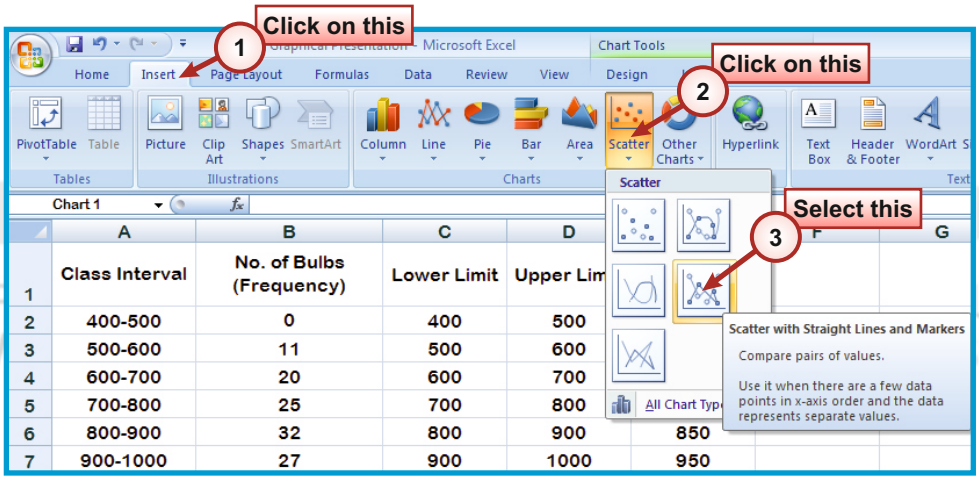


Fig. 4.36

Step 17: We click on the chart, the ***Design*** tab under ***Chart Tools*** and then click on the ***Select Data*** option as shown in Fig. 4.37.

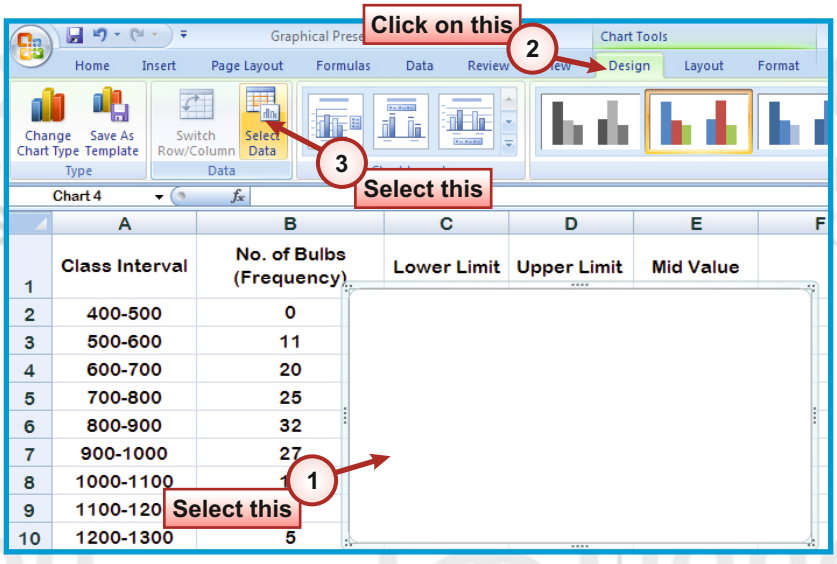


Fig. 4.37

Step 18: A new dialog box opens as shown in Fig. 4.38.

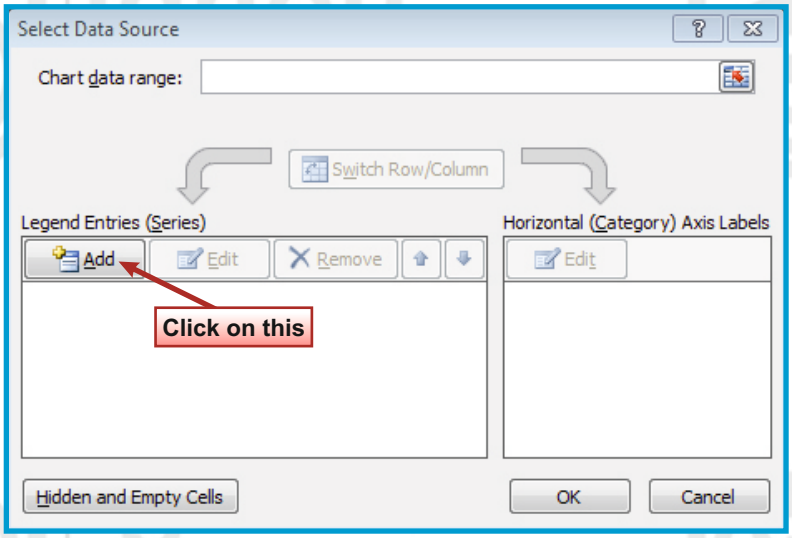
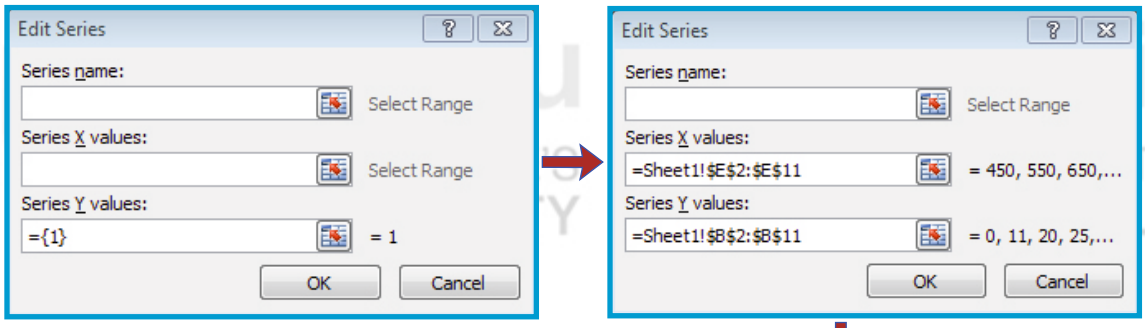


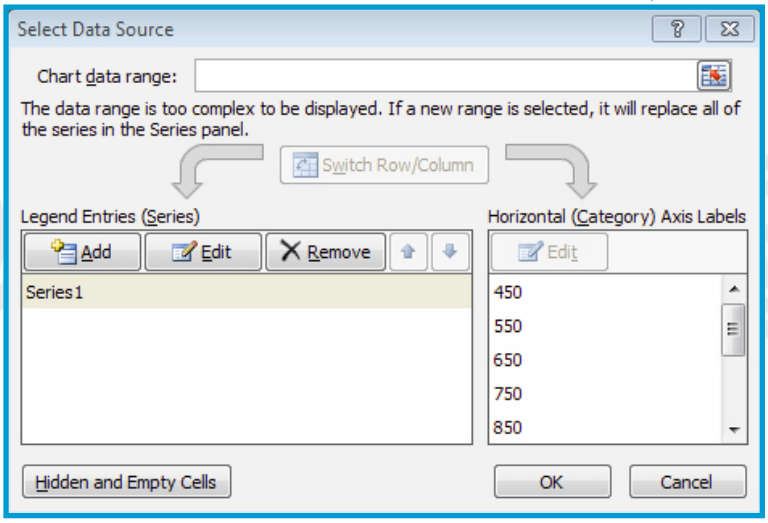
Fig. 4.38

Step 19: When we click on ***Add,*** the dialog box shown in Fig. 4.39a appears. Then we,

1. select Cells E2:E11 as ***Series X values***,
2. select Cells B2:B11 as ***Series Y values***,
3. click on ***OK*** as shown in Fig. 4.39b, and
4. click on ***OK*** as shown in Fig. 4.39c.



(a) **(b)**



(c)

Fig. 4.39

Step 20: The resulting graph shown in Fig. 4.40 is called the frequency polygon.

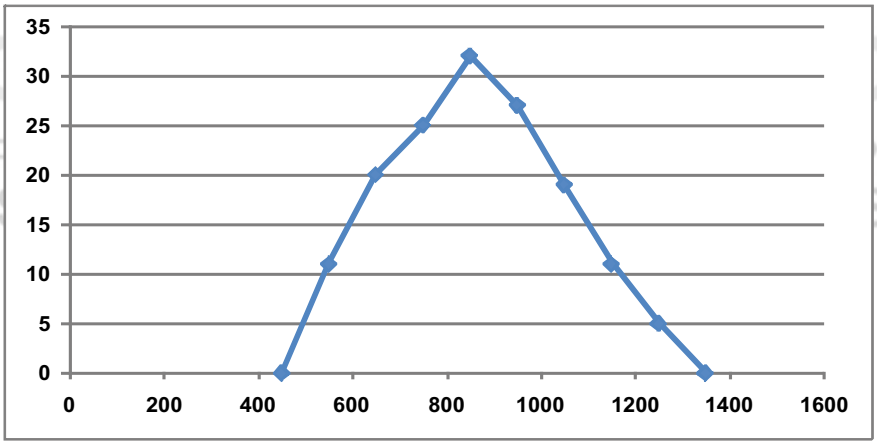


Fig. 4.40

Step 21: We now format this graph as explained in Sec. 3.3 of Lab Session 3. The resulting graph is shown in Fig. 4.41.

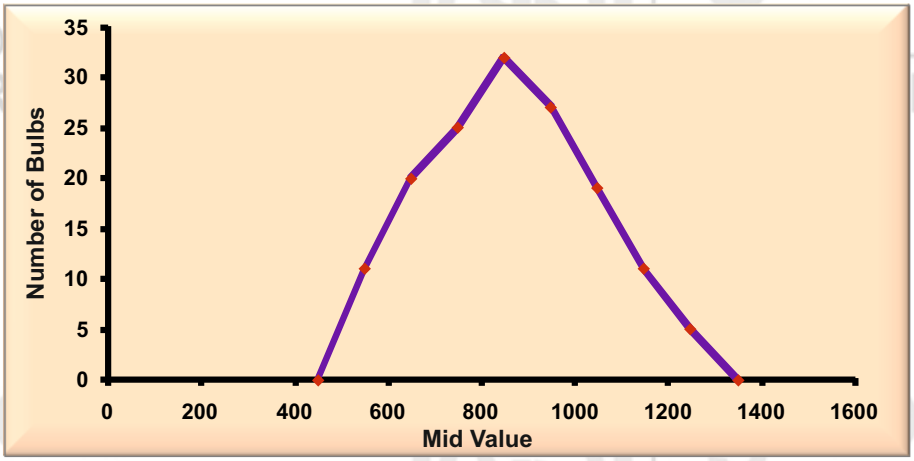


Fig. 4.41

Step 22: We can also change the minimum and maximum values of the horizontal axis. For this, we

1. select the horizontal axis,
2. click on the ***Format*** tab under ***Chart Tools***, and
3. choose ***Format Selection*** option as shown in Fig. 4.42.

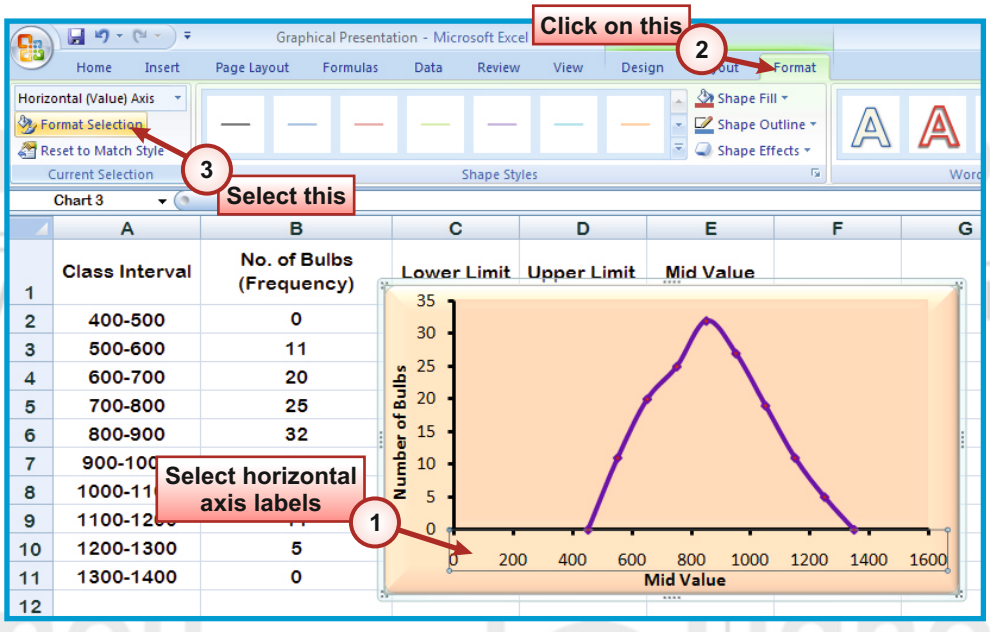


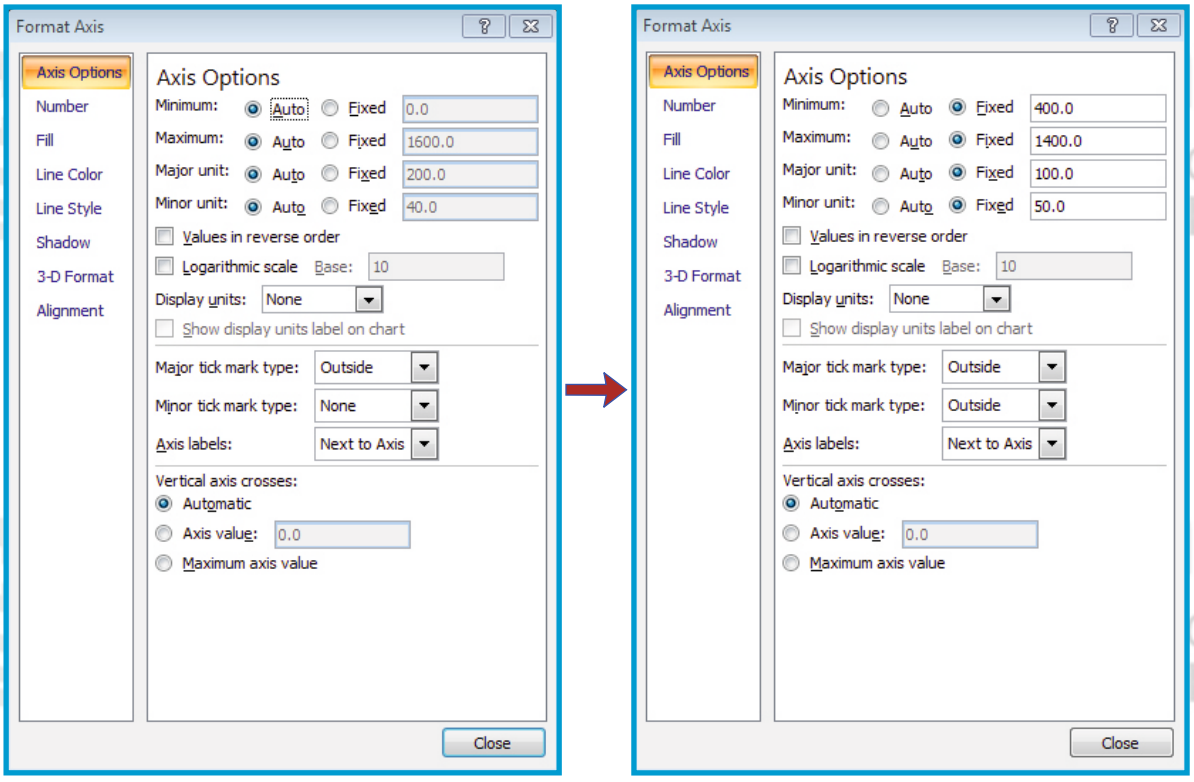
Fig. 4.42

Step 23: The dialog box shown in Fig. 4.43a appears. As shown in Fig. 4.43b, we change the

- ✓ ***Minimum*** label to 400.0,
- ✓ ***Maximum*** label to 1400.0,
- ✓ ***Major Unit*** label to 100.0,
- ✓ ***Minor Unit*** label to 50.0,

Then we

- ✓ Choose ***Minor tick mark type*** as ***Outside***, and
- ✓ tick on ***Close***.



(a) **(b)**

Fig. 4.43

Step 24: The resulting graph with the changed horizontal axis is shown in Fig. 4.44.

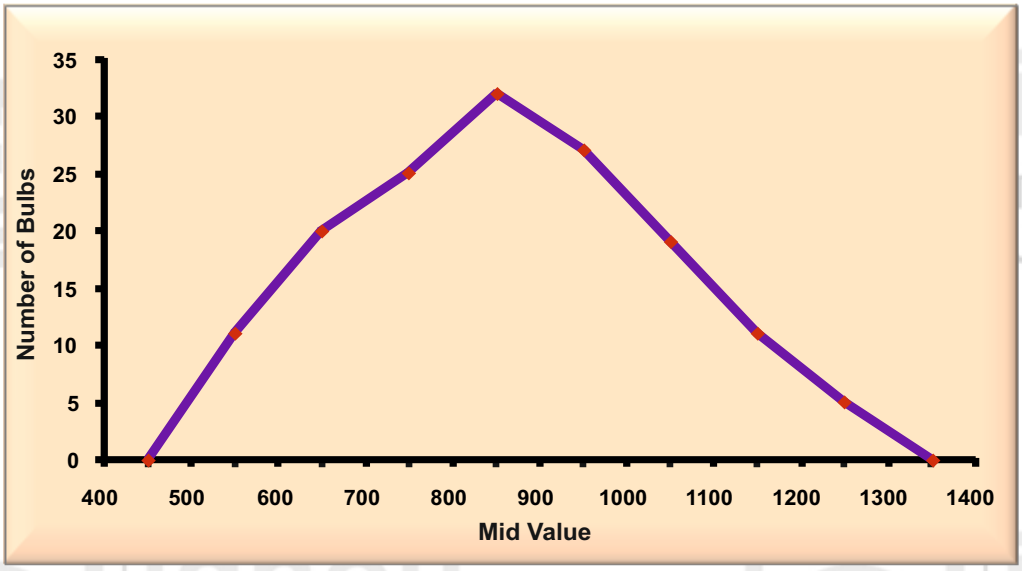


Fig. 4.44

4.7 FREQUENCY CURVE

In Unit 15 of MST-001, you have learnt how to construct the frequency curve for a continuous frequency distribution. The frequency curve is a smooth curve. We state the main steps as follows:

Steps 1 and 2 : The first two steps of plotting frequency curve are the same as explained in Sec. 4.6.

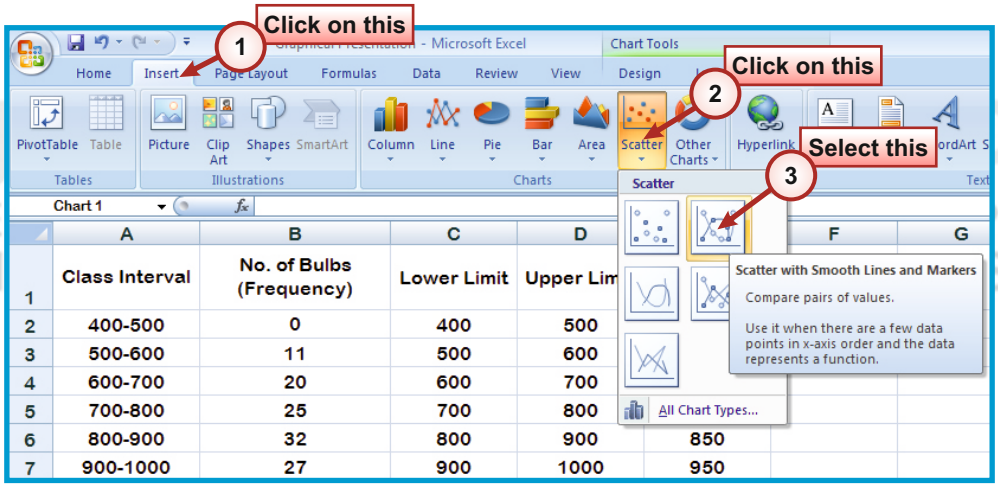
Step 3 : We join the points by a smooth curve instead of straight lines.

Steps 4 to 6 : The last three steps are the same as explained in Sec. 4.6.

Steps in Excel

You have learnt how to construct the frequency curve manually in Unit 15 of MST-001. In this lab session, we consider Problem 2 and explain the method of constructing the frequency curve using Excel 2007.

Step 1: The method of plotting the frequency curve in Excel is the same as explained in Steps 16 to 24 of Sec. 4.6. The only difference is that we select a chart subtype ***Scatter with Smooth Lines and Markers*** instead of a chart subtype ***Scatter with Straight Lines and Markers*** in Step 16 of Sec. 4.6. This is shown in Fig. 4.45.



	A	B	C	D
1	Class Interval	No. of Bulbs (Frequency)	Lower Limit	Upper Lim
2	400-500	0	400	500
3	500-600	11	500	600
4	600-700	20	600	700
5	700-800	25	700	800
6	800-900	32	800	900
7	900-1000	27	900	1000

Fig. 4.45

Step 2: We now format this graph as explained in Sec. 3.3 of Lab Session 3. The resulting frequency curve is shown in Fig. 4.46.

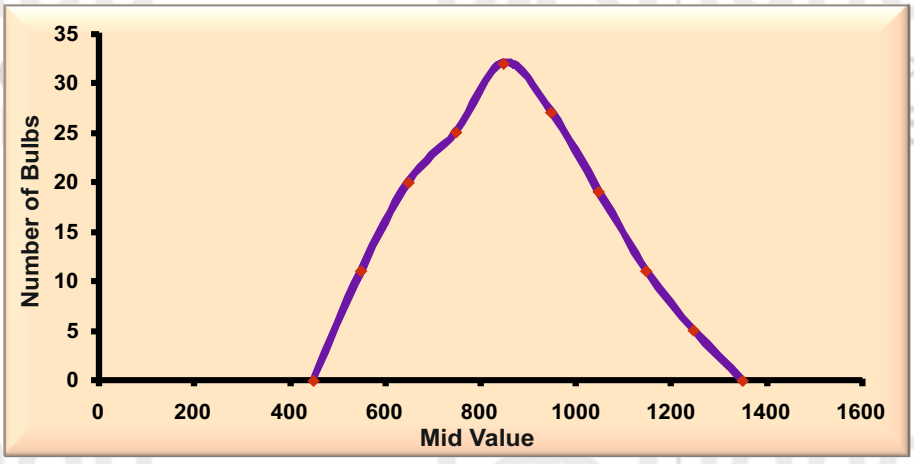


Fig. 4.46

4.8 CUMULATIVE FREQUENCY CURVES (OGIVES)

We plot two types of cumulative frequency curves, namely, less than frequency curve (or less than ogive) and more than frequency curve (or more than ogive) to study the graphical representation of less than and more than cumulative frequency distributions, respectively. Here we briefly mention the main steps as follows:

Less than ogive

Step 1: We take the upper limits of the class intervals on the X-axis and less than cumulative frequencies on the Y-axis and plot the respective points.

Step 2: We join the points by line segments. The curve so obtained is known as **less than cumulative frequency curve** or **less than ogive**.

More than ogive

Step 1: We take the lower limits of the class intervals on the X-axis and more than cumulative frequencies on the Y-axis and plot the respective points.

Step 2: We join the points by line segments. The curve so obtained is known as **more than cumulative frequency curve** or **more than ogive**.

Steps in Excel

In Unit 15 of MST-001, you have learnt that we use two forms of ogives depending on the types of cumulative frequencies. Here we consider Problem 2 and explain how to plot two types of ogives using MS Excel.

You can also continue with same Excel sheet to plot the ogives, which we used for histogram, frequency polygon and frequency curve.

Step 1: We enter the class intervals, frequencies, lower and upper limits of the class intervals in an Excel sheet in the same way as explained in Secs. 4.4 and 4.5 and name the sheet "**Ogive**" as shown in Fig. 4.47.

	A	B	C	D
1	Class Interval	No. of Bulbs (Frequency)	Lower Limit	Upper Limit
2	500-600	11	500	600
3	600-700	20	600	700
4	700-800	25	700	800
5	800-900	32	800	900
6	900-1000	27	900	1000
7	1000-1100	19	1000	1100
8	1100-1200	11	1100	1200
9	1200-1300	5	1200	1300

Ogive

Fig. 4.47

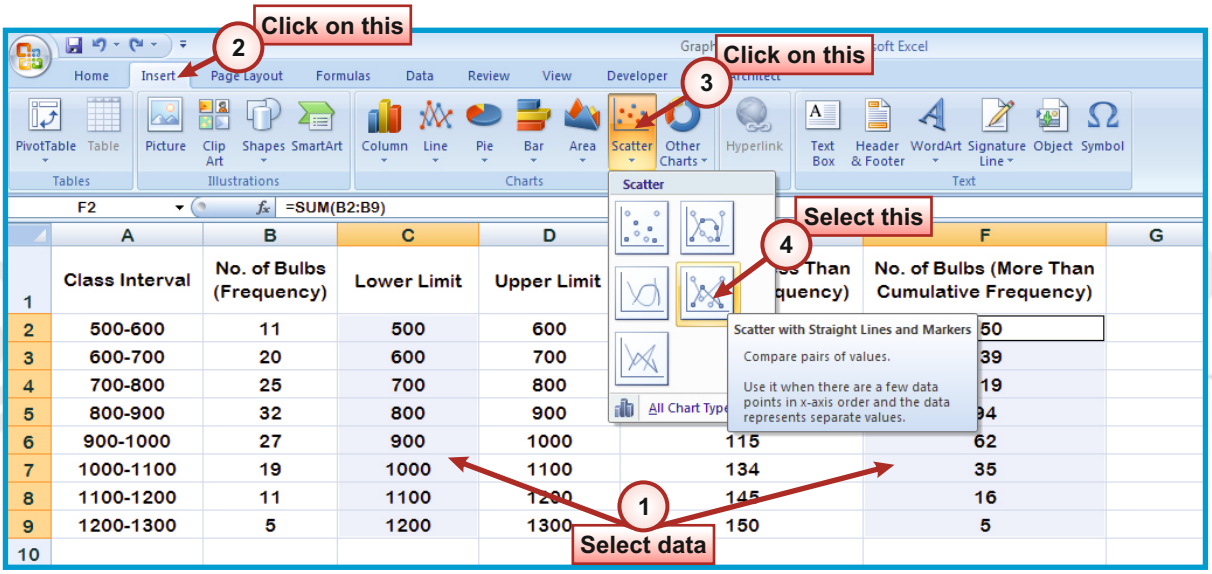
Step 2: We compute the less than and more than type cumulative frequencies as explained in Steps 16 to 19 of Sec. 2.5 under the heading 'Steps in Excel' of Lab Session 2 (Fig. 4.48).

	E	F
1	No. of Bulbs (Less Than Cumulative Frequency)	No. of Bulbs (More Than Cumulative Frequency)
2	11	150
3	31	139
4	56	119
5	88	94
6	115	62
7	134	35
8	145	16
9	150	5

Fig. 4.48

Step 3: To plot the more than type cumulative frequency curve (more than ogive), we

1. select Cells C2:C9 and F2:F9 by holding ***Ctrl*** key,
2. click on the ***Scatter*** under ***Insert*** tab, and
3. choose a ***Scatter with Straight Lines and Markers*** chart subtype as shown in Fig. 4.49.



	A	B	C	D	E	F	G
1	Class Interval	No. of Bulbs (Frequency)	Lower Limit	Upper Limit	...s Than ...quency)	No. of Bulbs (More Than Cumulative Frequency)	
2	500-600	11	500	600		50	
3	600-700	20	600	700		39	
4	700-800	25	700	800		19	
5	800-900	32	800	900		94	
6	900-1000	27	900	1000	115	62	
7	1000-1100	19	1000	1100	134	35	
8	1100-1200	11	1100	1200	145	16	
9	1200-1300	5	1200	1300	150	5	
10							

Fig. 4.49

Step 4: In this way, we get a more than type ogive as shown in Fig. 4.50.

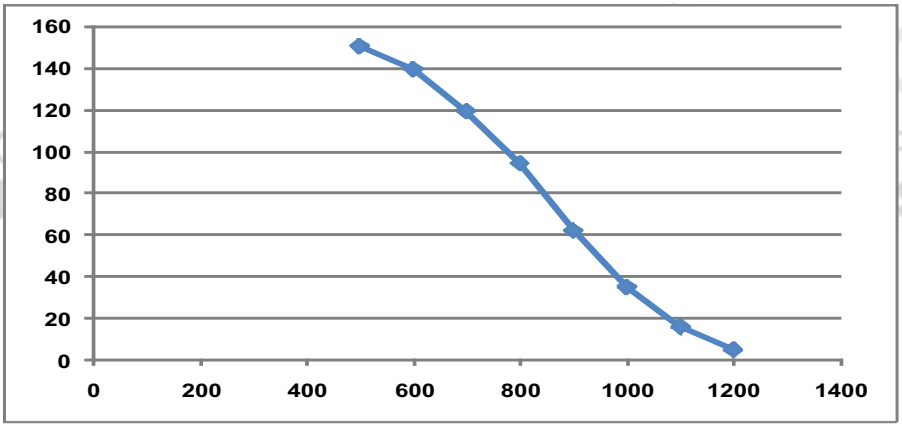


Fig. 4.50

Step 5: We now format this graph as explained in Sec. 3.3 of Lab Session 3. The resulting graph is shown in Fig. 4.51.

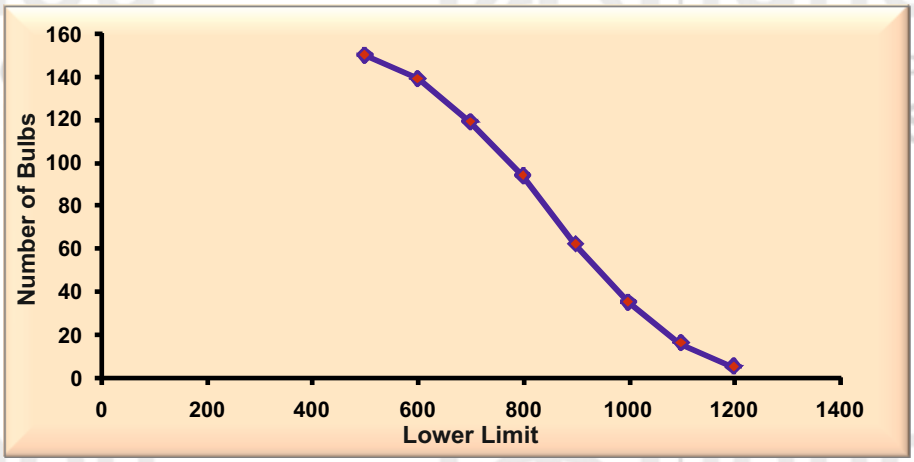


Fig. 4.51

Step 6: We can also change the minimum and maximum horizontal axis labels as shown in Fig. 4.52. For this, we

1. select the horizontal axis labels of the chart,
2. click on the ***Format*** tab under ***Chart Tools***, and
3. choose ***Format Selection*** option.

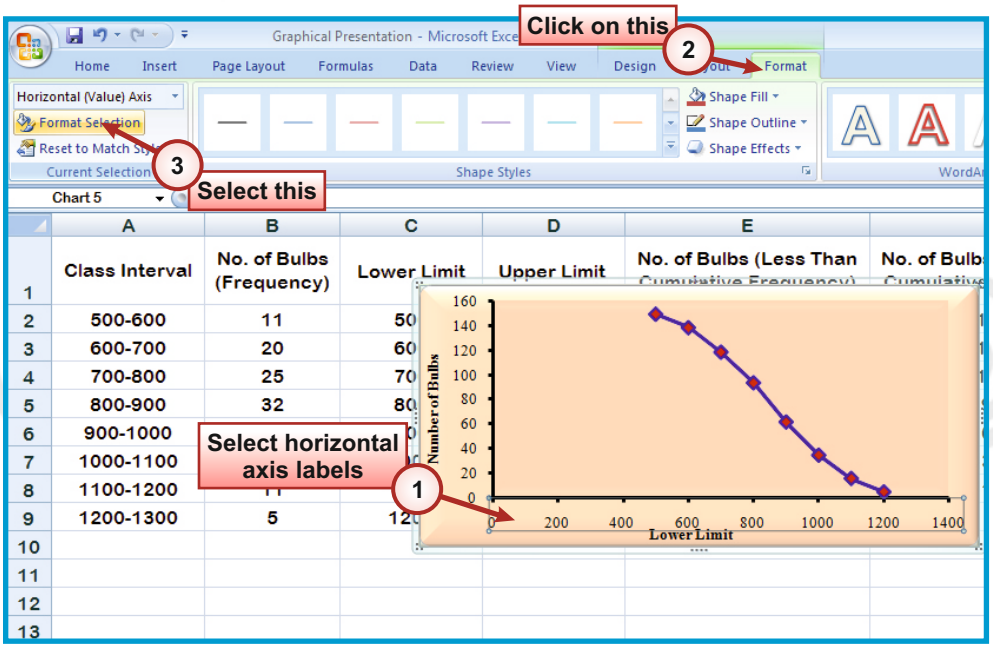


Fig. 4.52

Step 7: The dialog box shown in Fig. 4.53 appears. We change the

- ✓ ***Minimum*** label to 500.0,
- ✓ ***Maximum*** label to 1300.0, and
- ✓ ***Close*** the box.

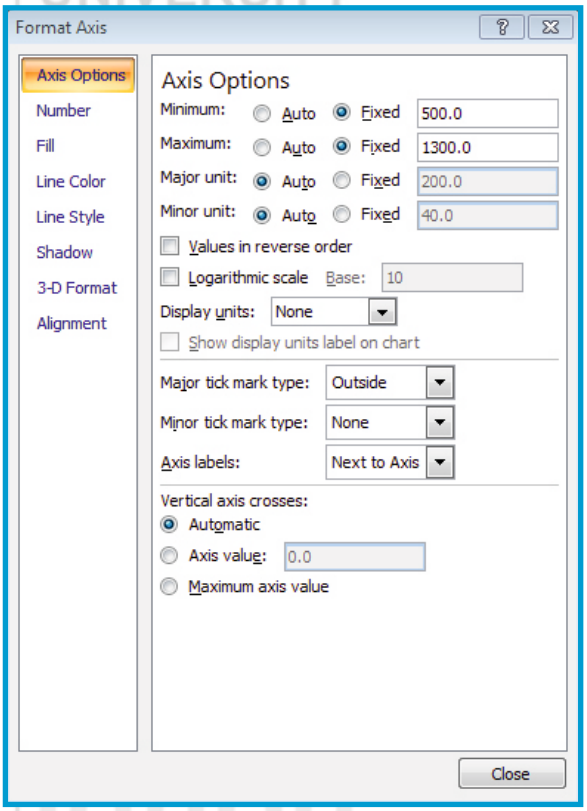


Fig. 4.53

Step 8: The more than ogive with the changed horizontal axis is shown in Fig. 4.54.

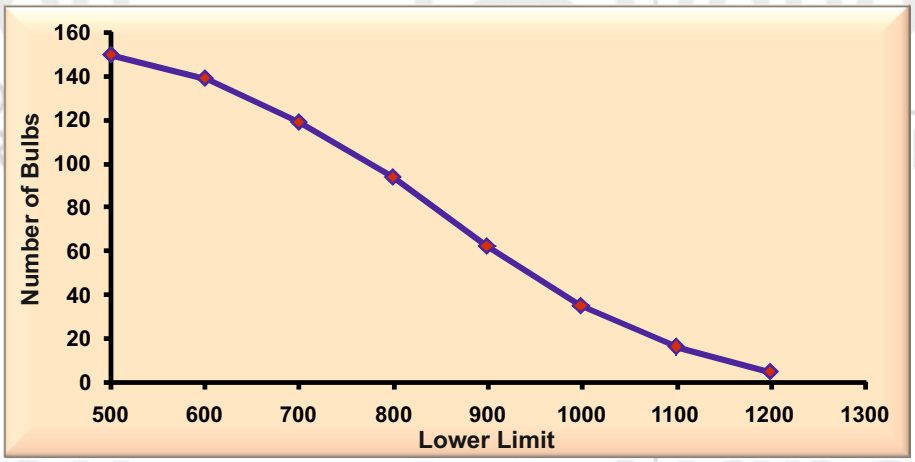


Fig. 4.54

Step 9: To plot the less than type cumulative frequency curve (less than ogive), we follow the steps shown in Fig. 4.55 and

1. select Cells D2:E9,
2. click on ***Scatter*** under ***Insert*** tab, and
3. choose the ***Scatter with Straight Lines and Markers*** chart subtype.

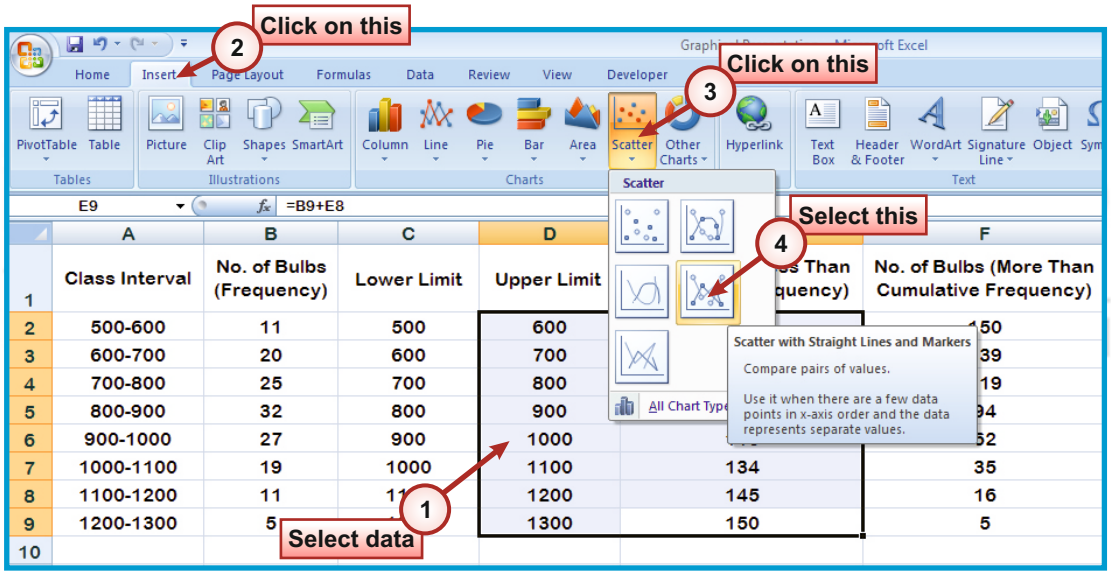


Fig. 4.55

Step 10: In this way, we get a less than type ogive as shown in Fig. 4.56.

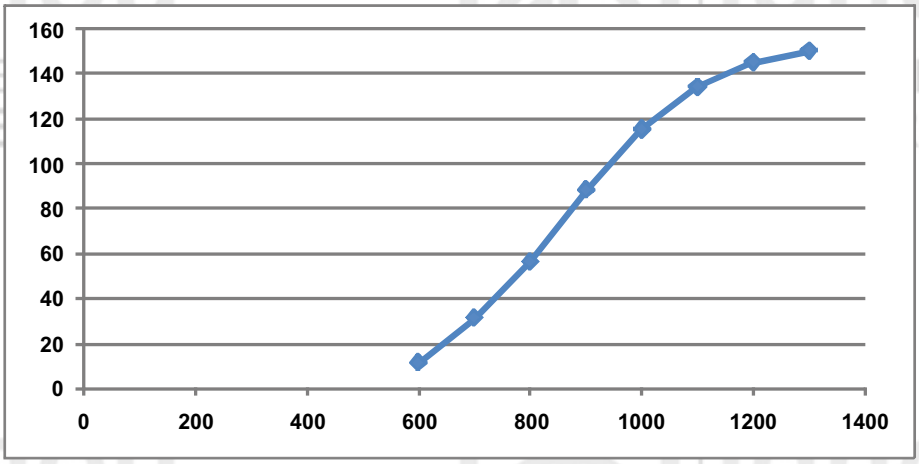


Fig. 4.56

Step 11: We now format this graph as explained in Sec. 3.3 of Lab Session 3. The resulting graph is shown in Fig. 4.57.

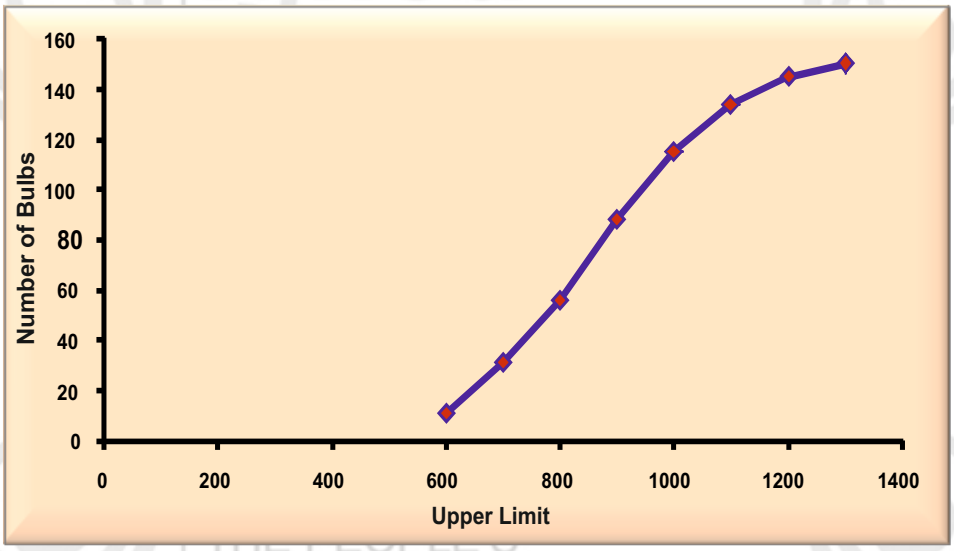


Fig. 4.57

Step 12: We can also change the minimum and maximum horizontal axis labels. For this, we repeat Step 6. The dialog box shown in Fig. 4.58 appears. We change the

- ✓ ***Minimum*** label to 500.0,
- ✓ ***Maximum*** label to 1400.0, and
- ✓ ***Close*** the box.

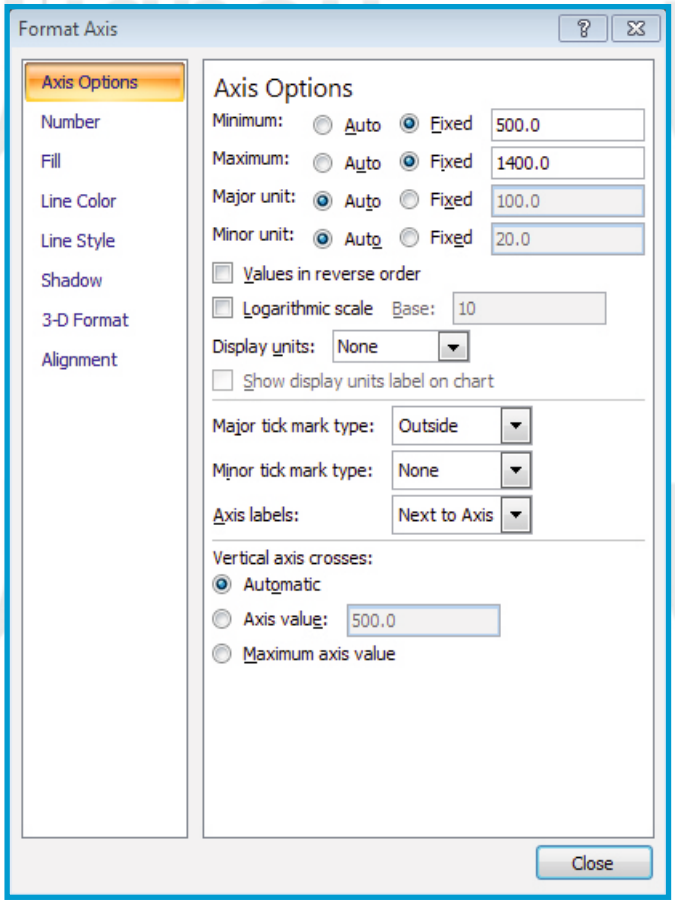


Fig. 4.58

Step 13: The less than ogive with the changed horizontal axis is shown in Fig. 4.59.

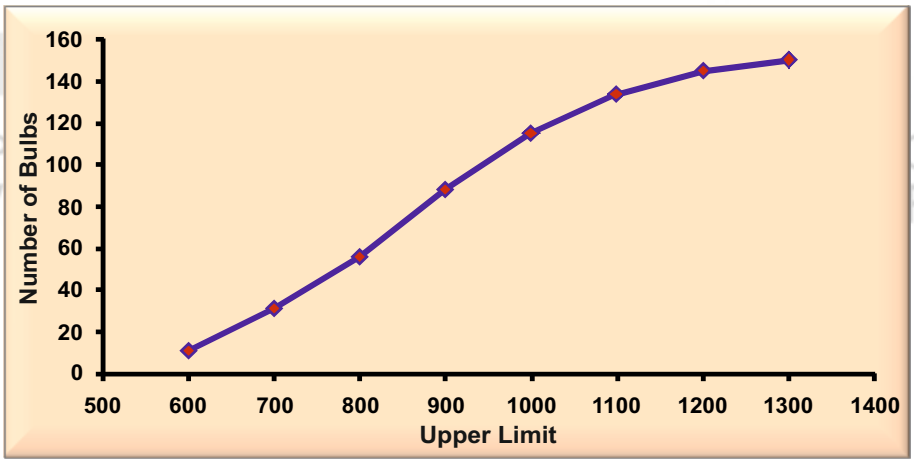


Fig. 4.59

You should now apply this method to other problems for practice.

Activity

Construct suitable graphs with the help of MS Excel 2007 for

A1) Examples 1 and 2 given in Unit 15 of MST-001.

A2) Exercises E1 to E7 given in Unit 15 of MST-001.

Match the results with the manual graphical representation of data carried out in Unit 15 of MST-001.

Continuous Assessment 4

1. Consider the data given in Table 5 of Lab Session 2. Represent the egg consumption in 120 families graphically using a frequency bar graph.
2. Consider the data given in Table 6 of Lab Session 2. Represent the rainfall patterns in 120 different areas of a state graphically using a histogram, frequency polygon, frequency curve and both ogives.

Home Work: Do It Yourself

1) Follow the steps explained in Secs. 4.3 to 4.8 to represent the data of Tables 2 and 3 of Lab Session 2 graphically. Use a different format for the graphs. Take the screenshots and keep them in your record book.
2) Develop the spreadsheets for the exercises of "Continuous Assessment 4" as explained in this lab session. Take the screenshots of the final spreadsheets and the graphs.
3) **Do not forget** to keep these screenshots in your record book as these will contribute to your continuous assessment in the Laboratory.