Welcome students. I will cover the module “Graphical presentation of data, cumulative frequency curves and pie charts” from Unit 1 ‘Data Collection and Presentation’. I'll cover topics in this module: cumulative frequency curves, less than ogive and more than ogive, and pie charts. At the end of this module, you will be able to understand the concept of cumulative frequency curves, which you also call ‘ogives’ and pie charts. You can apply these concepts for data classification and analysis. First, we will try to understand what cumulative frequency curves are. The cumulative frequency curve is defined as the running total of frequencies. It is the sum of all previous frequencies up to the current point. A curve representing the cumulative frequency distribution of grouped data on a graph is called a cumulative frequency curve or an Ogive. Representative cumulative frequency data on a graph is the most efficient way to understand the data and derive results from it. Cumulative frequency curves are useful in representing the population, per capita income (per capita earnings), and similar distribution in Economics and Statistics. The differences in steepness and share of the ogives facilitate comparative observations. Cumulative Frequency distribution enables us to know how many observations are above or below a certain value. The number of observations lying between two points can be determined graphically with the help of cumulative frequency curves.

First, we will see the ‘less than ogive’ method. In the less than ogive method, we get the upper limits of the classes and add the frequencies. When these frequencies are plotted, we get the rising curve on a graph. To construct the less than ogive, we have weekly earnings as class intervals on the X-axis and the number of employees as frequencies or observations on the Y-axis. So as per the data, below ₹550 per week, we have five employees; between 550 to 600, there are ten employees; 22 employees earn between 600 to 650 per week; 30 employees between ₹650-700, sixteen employees from ₹700-750. Similarly, 12 employees from 750 to 800

and 15 from 800 to 850. However, this is the between a particular range, but to get the cumulative frequency we must add the previous frequencies or observations. For instance, less than 550, we have five observation that is obvious. But for less than 600, we have ten observations that fall between 550 and 600, i.e., ten employees plus the previous five employees. Hence the cumulative number or the community frequency in this case is 15. Then for those employees who are earning less than 650 per week, we have 22 in that range plus the previous who are earning below 650 so it will be 22 + 10 + 5 which is 37. So, likewise in a similar way less than 700 earnings, we have 67 employees, for less than 750, there are 83 employees and for less than 800, we have 95 employees. Similarly, for less than 850, which is the upper limit in this case, we must add all the employees, which is 110. So, to put this in a graphical form, we must see it from the first-class interval that is less than 550, which corresponds to the number 5; we have point (A) here. Then, for employees earning less than 600, the corresponding number is 15, and we have the point (B). Then, for the next class interval less than 650, we have 37 (point C), corresponding to this Y-axis. Then for less than 700, we have 67, which corresponds here (at point D) and is followed by other points. So, if we join all these points, we are getting this curve with an upward-rising shape. So, for less than ogive we are beginning with the lower limits we are getting an upward-rising curve.

We will take one more example to understand the ‘less than ogive’ curve. As class intervals, we have the height of students which is measured in centimeters. And as a frequency, we have the number of students. The students who have a height below 165 are 10. Then, students whose height is between 165 to 170 are 22. Similarly, between 170 and 175 there are eight students, from 175 to 180 there are ten students, between 180-185 there are five, and from 185 to 190 there are three. All these are within a particular range. Our frequency or observation here is that

observations are in this range and must treat them as a cumulative frequency. For less than 165, there are 10 students. But for the number of students with a height of less than 170, we have to add the previous number of students with a height of less than 165 cm. Hence number 12 plus this 10, total is 22. Similarly, for the students who come within the height of 175 centimeters, we have 22, plus these 8 numbers. So, the cumulative total number in this case is 30. Similarly, for the next observation the students whose height is less than 180, we must add the 30 plus 10, which is 40. Likewise, for less than 185, the total number of students is 45, and for less than 190, we have 48 students. Similar way, we now must plot the curve. Now, for the class interval, which is less than 165, we have ten students (point A). For the students whose height is less than 170, we have 22 students (point B), then point C for 30 students, and point D for 40 students. Now, plot a curve by joining all these points; we again have an upward-rising curve.

Now let us see the next part, the ‘more than ogive’ curve. In more than method, we start with the lower limits of the class, and from the frequencies, we subtract the frequencies of each class. So, when these frequencies are plotted, we get the declining curve. So, let us see how we are getting this downward-sloping curve. Let us take an example to draw more than ogive curve. As class intervals, we have item sizes (let's say item D) measured in centimeters. And as frequency, we have these numbers/observations. The number of items that are more than 200 cm is 400 items, then the item whose size is more than 250 centimeters is 370 observations, then the item whose size is more than 300 is 315 items, and so on. Likewise, we have other observations and, in the end, none of the objects has a size of more than 550. So having these observations from the previous data as a class interval and frequency. So, as you know, the class intervals are represented on the X-axis, which is a horizontal curve, and observations are represented on the Y-axis. So, the first observation is 400, i.e., this point A, which corresponds to the size of up to

200 cm. Then the size is up to 250 cm, and it is coming as here at point B, where we have the number 370. Then we have the next size up to 300. For the items whose size is more than 300, we have 315 items. Then for the next observation, the items whose size is more than 350, we have 220 items, and so on. For more than 550 cm, there is not a single object. So, if we plot a curve, we get this as a downward-sloping curve. Since naming these points as A, B, C, D, E, F, G, & H will get this as a downward falling ogive.

Now, we will see the last part of this module- pie charts. Pie charts are noted as circular statistical graphics. The data are converted to percentages of the total and proportionate segments. Therefore, it gives a clear picture of the relationship among the components or these parts. Each sector or slice denotes a proportionate part of the whole distribution. Pie charts are commonly used to give the sectoral distribution of national income, the cost structure of a firm, budgetary allocation, or any other type of simple percentage distribution. We have here two examples. On the left side, is the first example. Here are the sales of product A, that are taken into consideration. Let us divide the year into four quarters, the first quarter, which is from January to March, and then from April to June is the second quarter. So, in the third quarter (from July – September) and October to December in the fourth quarter. So, if we see in each quarter the percentage of product A sales is changing. In the first quarter we have 30%, then second quarter it is 35%, then 10% sales of product in the third quarter and 25% in the fourth quarter. Based on such distribution, the firm can conduct a study or research to know the variance in these sales. We have one more example of the expenditure structure of a firm. Let us say that the firm is spending on raw materials, followed by wages and salaries, marketing expenses, and some other expenses. So raw materials, which are represented in blue colour, have the highest expenditure, which is 45% of the total expenditure, and 40% on wages and salaries of

employees. Then followed by 5% on marketing expenses and the remaining 10% on other miscellaneous expenses. Such distribution helps the firm to know how much allocation they require for the forthcoming year. With this discussion, I hope you understood today's topic. For further reading, you can refer to these books.