Statistics

KEY POINTS

1. The mean of grouped data can be found by:

   (i) The direct method: $\bar{X} = \frac{\sum f_i x_i}{\sum f_i}$

   (ii) The assumed mean method: $\bar{X} = A + \frac{\sum f_i d_i}{\sum f_i}$

   where $d_i = x_i - A$

   (iii) The step deviation method: $\bar{X} = A + \frac{\sum f_i u_i}{\sum f_i} \times h$, where $u_i = \frac{x_i - A}{h}$

2. The mode for grouped data can be found by using the formula:

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

   where l = lower limit of the modal class.

   f_1 = frequency of modal class.

   f_0 = frequency of the preceding class of the modal class.

   f_2 = frequency of the succeeding class of the modal class.

   h = size of the class interval. (assuming all class size to be equal)

   Modal class – class interval with highest frequency.

3. The median for the grouped data can be found by using the formula:

   Median = $l + \left[\frac{\frac{N}{2} - F}{f}\right] \times h$

   where, l = lower limit of the median class.

   f = frequency of median class

   h = size of the class interval. (assuming all class size to be equal)

   N = Number of observations.

   F = cumulative frequency of class interval proceeding the median class.

4. **Empirical Formula:** Mode = 3 median -2 mean

5. **Cumulative frequency curve or an Ogive:** Ogive is graphical representation of the cumulative frequency distribution.

   Steps to draw cumulative frequency curve or an ogive:
   Less than method: To draw an ogive by less than method use following steps:
   Step1: Start with upper limits of class intervals and add class frequency to get cumulative frequency distribution.
   Step2: Mark upper class limits along X-axis on suitable scale.
   Step3: Mark cumulative frequency along Y-axis on suitable scale.

Step4: Plot the points (x_i, f_i) where x_i is upper limit of a class and f_i is the corresponding cumulative frequency.

Step5: Join the points plotted above by free hand to get an ogive.

More than method: To draw an ogive by more than method use following steps:

Step1: Start with lower limits of the class intervals and from the total frequency subtract the frequency of each class to obtain the cumulative frequency distribution.

Step2: Mark the lower class limits along X-axis on suitable scale.

Step3: Mark cumulative frequency along Y-axis on suitable scale.

Step4: Plot the points (x_i, f_i) where x_i is lower limit of class and f_i is the corresponding cumulative frequency.

Step5: Join the points plotted above by free hand to get an ogive.

Multiple Choice Questions

1. If mean of 4, 6, 8, 10, x, 14, 16 is 10 then the value of 'x' is
   (a) 11 (b) 12 (c) 13 (d) 9
2. The mean of x, x+1, x+2, x+3, x+4, x+5 and x+6 is
   (a) x (b) x+3 (c) x+4 (d) 3
3. If the mode of 2, 3, 5, 4, 2, 6, 3, 5, 5, 2 and x is 2 then the value of 'x' is
   (a) 2 (b) 3 (c) 4 (d) 5
4. The modal class of the following distribution is

Class Interval	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35
Frequency	4	7	12	8	2

   (a) 30 – 35 (b) 20 – 25 (c) 25 – 30 (d) 15 – 20
5. A teacher ask the students to find the average marks obtained by the class students in Maths the student will find
   (a) mean (b) median (c) mode (d) sum
6. The empirical relationship between the three measures of central tendency is
   (a) 3 mean = mode + 2 median (b) 3 median = mode + 2 mean
   (c) 3 mode = mean + 2 median (d) median = 3 mode – 2 mean
7. Class mark of the class 19.5 – 29.5 is
   (a) 10 (b) 49 (c) 24.5 (d) 25
8. Measure of central tendency is represented by the abscissa of the point where the less than ogive and more than ogive intersect is
   (a) mean (b) median (c) mode (d) None of these
9. The median class of the following distribution is

Class Interval:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency:	4	4	8	10	12	8	4

(a) 20 – 30 (b) 40 – 50 (c) 30 – 40 (d) 50 – 60

10. The mean of 20 numbers is 17, if 3 is added to each number, then the new mean is
    (a) 20 (b) 21 (c) 22 (d) 24
11. The mean of 5 numbers is 18. If one number is excluded then their mean is 16, then the excluded number is
    (a) 23 (b) 24 (c) 25 (d) 26
12. The mean of first 5 prime numbers is
    (a) 5.5 (b) 5.6 (c) 5.7 (d) 5
13. The sum of deviations of the values 3, 4, 6, 8, 14 from their mean is
    (a) 0 (b) 1 (c) 2 (d) 3
14. If median = 15 and mean = 16, then mode is
    (a) 10 (b) 11 (c) 12 (d) 13
15. The mean of 11 observations is 50. If the mean of first six observations is 49 and that of last six observations is 52, then the sixth observation is
    (a) 56 (b) 55 (c) 54 (d) 53
16. The mean of the following distribution is 2.6, then the value of 'x' is

Variable	1	2	3	4	5
Frequency	4	5	x	1	2

(a) 24 (b) 3 (c) 8 (d) 13

2/3/4 Marks Questions

1. The mean of 40 observations was 160. It was detected on rechecking that the value of 165 was wrongly copied as 125 for computing the mean. Find the correct mean.
2. Find 'x' if the median of the observations in ascending order 24, 25, 26, x+2, x+3, 30, 31, 34 is 27.5.

3. Find the value of 'p' if mean of the following distribution is 7.5

Variable	3	5	7	9	11	13
Frequency	6	8	15	p	8	4

4. The Arithmetic Mean of the following frequency distribution is 53. Find the value of p.

Class Interval:	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Frequency:	12	15	32	p	13

5. From The cumulative frequency table, write the frequency of the class 20 – 30.

Marks	Number of Students
Less than 10	1
Less than 20	14
Less than 30	36
Less than 40	59
Less than 50	60

6. The mean of the following frequency distribution is 62.8 an the sum of all frequencies is 50. Find the values of x and y

Class Interval:	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100-120
Frequency:	5	x	10	y	7	8

7. The following frequency distribution gives the daily wages of a worker of a factory. Find mean daily wage of a worker.

Daily Wage (in Rs.)	Number of Workers
More than 300	0
More than 250	12
More than 200	21
More than 150	44
More than 100	53
More than 50	59
More than 0	60

8. The median of the following frequency distribution is 28.5 and sum of all the frequencies is 60. Find the values of x and y.

Class Interval:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency:	5	x	20	15	y	5

9. Find the mean, median and mode of the following:

Class Interval:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency:	6	8	10	15	5	4	2

10. The following frequency distribution shows the marks obtained by 100 students in a school. Find mode.

Marks	Number of Students
Less than 10	10
Less than 20	15
Less than 30	30
Less than 40	50
Less than 50	72
Less than 60	85
Less than 70	90
Less than 80	95
Less than 90	100

11. Draw 'less than' and 'more than' ogives for the following distribution

Marks:	0-10	10- 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90-100
No. of students:	5	6	8	10	15	9	8	7	7	5

Also find median from graph.

12. The mode of the following distribution is 65. Find the values of x and y, if sum of frequencies is 50.

Class Interval:	0 - 20	20 - 40	40 - 60	60 - 80	80-100	100- 20	120 -140
Frequency:	6	8	x	12	6	y	3

Answers

Multiple Choice Questions

1. (b) 2. (b) 3. (a) 4. (b) 5. (a) 6. (b) 7. (c)

8. (b) 9. (c) 10. (a) 11. (d) 12. (b) 13. (a) 14. (d)

15. (a) 16. (c)

2/3/4 Marks Questions

1. 161 2. x = 25 3. p = 3 4. 28 5. 22

6. x = 8, y = 12 7. Rs. 182.50 8. x= 8, y = 7

9. Mean = 30, median = 30.67, Mode = 33.33 10. 41.82

11. 47.3 12. x = 10, y = 5

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