Chapter 10 - Measures of Central Tendency- Median and Mode

Question 1

The following series show marks in statistics of 9 students in class 11. Find the median marks.

Marks	22	16	18	13	15	19	17	20	23

Solution:

The data is first arranged in the ascending order:

S.no.	**Marks**
1	13
2	15
3	16
4	17
5	18
6	19
7	20
8	22
9	23
N = 9	

$$M = Size\,of\left(\frac{N+1}{2}\right)th\,item = Size\,of\left(\frac{9+1}{2}\right)th\,item$$

= Size of 5th item = 18

Hence, Median = 18

Question 2: The following table gives the marks obtained by some students. Calculate the median marks obtained by the students.

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
Number of students	6	12	17	30	10	10	8	5	2

Solution:

Marks	**Frequency (f)**	**Cumulative Frequency**
0-5	6	6
5-10	12	18

10-15	17	**35(c.f.)**
(*l*1)15-20	**30 (f)**	65
20-25	10	75
25-30	10	85
30-35	8	93
35-40	5	98
40-45	2	100
	= N = 100	

M = Size of $\left(\frac{N}{2}\right) th\ item$

= Size of $\left(\frac{100}{2}\right) th\ item$ = Size of 50th item

50th item lies in 65th cumulative frequency and the corresponding median class is 15-20.

$$M = l1 + \frac{N/2 - c.f.}{f} \times i$$

$$= = 15 + \frac{100/2 - 35 \times 5}{30}$$

$$= = 15 + \frac{15-35}{30} \times 5 = 15 + \frac{15}{30 \times 5}$$

= 15 + 2.5 = 17.5

Median = 17.5 marks

Question 3: Find the mode from the following data:

8, 10, 5, 8, 12, 7, 8, 9, 11, 7

Solution:

Arrange the series in an ascending order as:

5, 7, 7, 8, 8, 8, 9, 10, 11, 12

An inspection of the series shows that the values 8 occurs most frequency in the series.

Hence, ***Mode (Z) = 8***

Question 4: Calculate the mode from the following data:

Wages (₹)	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Number of workers	3	7	15	30	20	10	5

Solution:

Wages (₹)	**Frequency (f)**
0-5	3
5-10	7
10-15	15 (***f*0**)
(*l*) 15-20	**30 (*f*1)**

20-25	20 (*f***2**)
25-30	10
30-35	5

Since the series is regular, we may not do grouping for the location of the model group. By inspection, the modal class is 15-20.

$Z = l1 + \frac{f1 - f0}{2f1 - f0 - f2} \times i$

Here, ***l*1** = 15, ***f*1** = 30, ***f*0** = 15, ***f*2** = 20, i = 5

Substituting the values, we get,

$Z = 15 + \frac{30\ 15}{2(30) - 15 - 20} \times 5 = 15 + \frac{15}{60 - 35} \times 5 = 15 + \frac{15}{25} \times 5$

= 15+3=18

Thus, Mode = 18