14
Chapter

Statistics

Basic Concepts

1. The Mean for grouped data can be found by:

(i) The direct method $\overline{X} = \frac{\Sigma f_i x_i}{\Sigma f_i}$

(ii) The assumed mean method

$$\overline{X} = a + \frac{\Sigma f_i d_i}{\Sigma f_i} \text{ where } d_i = x_i - a$$

(iii) The Step deviation method

$$\overline{X} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h \text{ where } u_i = \frac{x_i - a}{h}$$

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

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

l = Lower limit of the modal class

f_1 = frequency of the 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

Modal class - class interval with highest frequency

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

$$\text{median} = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$$

l = lower limit of the median class

n = number of observations

cf = cumulative frequency of class interval preceed the median class

f = frequency of median class

h = class size

4. 3 median = mode + 2 mean.

VERY SHORT ANSWER TYPE QUESTIONS

1. What is the mean of first 12 prime numbers?

2. The mean of 20 numbers is 18. If 2 is added to each number, what is the new mean?

3. The mean of 5 observations 3, 5, 7, x and 11 is 7, find the value of x.

4. What is the median of first 5 natural numbers?

5. What is the value of x, if the median of the following data is 27.5?
24, 25, 26, $x + 2$, $x + 3$, 30, 33, 37

6. What is the mode of the observations 5, 7, 8, 5, 7, 6, 9, 5, 10, 6.

7. Write the relation between mean, median and mode.

8. What measure of the central tendency is represented by the abscissa of the point where 'less than' and 'more than' intersect?

9. Which measure of the central tendency cannot be determined graphically?

10. The mean and mode of a data are 24 and 12 respectively. Find the median.

11. Write the class mark of the class 19.5 – 29.5.

12. The mean of 5 numbers is 18. If one number is excluded then their mean is 16. Find the excluded number.

SHORT ANSWER TYPE QUESTIONS (I)

13. The mean of 11 observation is 50. If the mean of first Six observations is 49 and that of last six observation is 52, then find sixth observation.

14. Find the mean of following distribution

x	12	16	20	24	28	32
f	5	7	8	5	3	2

15. Find the median of the following distribution

x	10	12	14	16	18	20
f	3	5	6	4	4	3

16. Find the mode of the following frequency distribution.

Class	0–5	5–10	10 –15	15–20	20–25	25–30
Frequency	2	7	18	10	8	5

17. Draw a 'less than' ogive of the following data

Marks	No. of students
Less than 20	0
Less than 30	4
Less than 40	16
Less than 50	30
Less than 60	46
Less than 70	66
Less than 80	82
Less than 90	92
Less than 100	100

18. Write the following data into less than cummulative frequency distribution table.

Marks	0–10	10–20	20–30	30–40	40–50
No. of students	7	9	6	8	10

SHORT ANSWER TYPE QUESTIONS (II)

19. Find the mean of the following data

C. I	0–10	10–20	20–30	30–40	40–50
f	8	12	10	11	9

20. If the mean of the following distribution is 54, find the value of P.

Class	0–20	20–40	40–60	60–80	80–100
Frequency	7	ρ	10	9	13

21. Find the median of the following frequency distribution.

C.I.	0–10	10–20	20–30	30–40	40–50	50–60
f	5	3	10	6	4	2

22. The median of following frequency distribution is 24 years. Find the missing frequency x.

Age (In years)	0–10	10–20	20–30	30–40	40–50
No. of persons	5	25	x	18	7

23. Find the median of the following data.

Marks	Below 10	Below 20	Below 30	Below 40	below 50	Below 60
No. of student	0	12	20	28	33	40

24. Draw *a* 'more than type' ogive of the following data

Weight (In kg.)	30–35	35–40	40–45	45–50	50–55	55–60
No. of Students	2	4	10	15	6	3

25. Find the mode of the following data.

Height (In cm)	Above 30	Above 40	Above 50	Above 60	Above 70	Above 80
No. of plants	34	30	27	19	8	2

LONG ANSWER TYPE QUESTIONS

26. The mean of the following data is 53, Find the values of f_1 and f_2.

C.I	0–20	20–40	40–60	60–80	80–100	Total
f	15	f_1	21	f_2	17	100

27. The mean of the following distribution is 57.6 and the sum of its frequencies is 50, find the missing frequencies f_1 and f_2.

Class	0–20	20–40	40–60	60–80	80–100	100–120
Frequency	7	f_1	12	f_2	8	5

28. If the median of the distribution given below is 28.5, find the values of x and y.

C.I	0–10	10–20	20–30	30–40	40–50	50–60	Total
f	5	8	x	15	y	5	60

29. The median of the following distribution is 35, find the values of a and b.

C.I	0–10	10–20	20–30	30–40	40–50	50–60	60–70	Total
f	10	20	a	40	b	25	15	170

30. Find the mean, median and mode of the following data

C.I	45–55	55–65	65–75	75–85	85–95	95–105	105–115
f	7	12	17	30	32	6	10

31. Find the mean, median and mode of the following data

C.I	11–15	16–20	21–25	26–30	31–35	36–40	41–45	46–50
f	2	3	6	7	14	12	4	2

32. The rainfall recorded in a city for 60 days is given in the following table.

Raifall (In cm)	0–10	10–20	20–30	30–40	40–50	50–60
No. of Days	16	10	8	15	5	6

Calulate the median rainfall using a more than type ogive. Why is water conservation recessary?

33. Find the mean of the following distribution by step- deviation method

Daily Exponditure (in Rs.)	100–150	150–200	200–250	250–300	300–350
No. of Households	4	5	12	2	2

34. The distribution given below show the marks of 100 students of a class.

Marks	**No. of students**
0–5	4
5–10	6
10–15	10
15–20	10
20–25	25
25–30	22
30–35	18
35–40	5

Draw a less than type and a more than type ogive from the given data. Hence obtain the median marks from the graph.

35. The annual profit earned by 30 factories in an industrial area is given below. Draw both ogives for the data and hence find the median.

Profit (Rs. in lakh)	No. of Factories
More than or equal to 5	30
More than or equal to 10	28
More than or equal to 15	16
More than or equal to 20	14
More than or equal to 25	10
More than or equal to 30	7
More than or equal to 35	3
More than or equal to 40	0

ANSWERS

1. 16.4 approx.
2. 20
3. 9
4. 3
5. $x = 25$
6. 5
7. Mode = 3 median – 2 mean
8. Median
9. Mean
10. Median = 20
11. 24.5
12. 26
13. 56
14. 20
15. 14.8
16. 12.89 approx.
18.

Marks	No. of students
less than 10	7
less than 20	16
less than 30	22
less than 40	30
less than 50	40

19. 25.2
20. 11
21. 27
22. 10
23. 30
25. 63.75 cm
26. $f_1 = 18, f_2 = 29$
27. $f_1 = 8, f_2 = 10$
28. $x = 20, y = 7$
29. $a = 35, b = 25$
30. mean = 81.05, median = 82, mode = 85.71
31. Mean = 32.4 median = 33, mode = 34.39 approx.
32. Median = 25 cm
33. Mean = 211
34. Median = 24
35. Median = Rs. 17.5 lakhs.

Practice-Test

Statistics

Time : 50 Minutes *M.M.: 20*

SECTION-A

1. What is the class mark of a class $a - b$. **1**

2. Find the mean of all the even numbers between 11 and 21. **1**

SECTION-B

3. The mean of 50 observations is 20. If each observation is multiplied by 3, then what will be the new mean? **2**

4. The mean of 10 observations is 15.3. If two observations 6 and 9 are replaced by 8 and 14 respectively. Find the new mean. **2**

SECTION-C

5. Find the mean: **3**

Marks	less than 20	less than 40	less than 60	less than 80	less than 100
No. of Students	4	10	28	36	50

6. Find the value of x if the mode is given to be 58 years. **3**

Age (in years)	20–30	30–40	40–50	50–60	60–70	70–80
No. of patients	5	13	x	20	18	19

SECTION-D

7. The mean of the following frequency distribution is 57.6 and the number of observations is 50. Find the missing frequencies f_1 & f_2. **4**

Class Interval	0–20	20–40	40–60	60–80	80–100	100–120
frequency	7	f_1	12	f_2	8	5

8. Following is the age distribution of cardiac patients admitted during a month in a hospital: **4**

Age (in yers)	20–30	30–40	40–50	50–60	60–70	70–80
No. of patents	2	8	15	12	10	5

Draw a 'less than type' and 'more than type' ogives and from the curves, find the median. **4**