CHAPTER 6

STATISTICS

KEY POINTS

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

   (i) The direct method $= \overline{X} = \frac{\sum fixi}{\sum fi}$.

   (ii) The assumed mean method $= \overline{X} = a + \frac{\sum fidi}{\sum fi}$,
   where $d_i = x_i - a$.

   (iii) The step deviation method

   $= \overline{X} = a + \frac{\sum fiui}{\sum fi} \times h$, where $u_i = \frac{x_i - a}{h}$.

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

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

l = lower limit of the modal class.

f_1 = frequency of the modal class.

f_0 = frequency of the proceeding 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 :

$$\text{median} = l + \left[\frac{n/2 - Cf}{f}\right] \times h$$

l = lower limit of the median class.

n = number of observations.

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

f = frequency of median class.

h = class size.

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

5. Cumulative frequency curve or an Ogive :

   (i) Ogive is the graphical representation of the cumulative frequency distribution.

   (ii) Less than type Ogive :

   - Construct a cumulative frequency table.
   - Mark the upper class limit on the x = axis.

   (iii) More than type Ogive :

   - Construct a frequency table.
   - Mark the lower class limit on the x-axis.

   (iv) To obtain the median of frequency distribution from the graph :

   - Locate point of intersection of less than type Ogive and more than type Ogive :

   Draw a perpendicular from this point on x-axis.

   - The point at which it cuts the x-axis gives us the median.

MULTIPLE CHOICE QUESTIONS

1. Mean of first 10 natural numbers is

   (a) 5 (b) 6

   (c) 5.5 (d) 6.5

2. 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

3. 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

4. The median of 2, 3, 2, 5, 6, 9, 10, 12, 16, 18 and 20 is

   (a) 9 (b) 20

   (c) 10 (d) 9.5

5. The median of 2, 3, 6, 0, 1, 4, 8, 2, 5 is

   (a) 1 (b) 3

   (c) 4 (d) 2

6. Mode of 1, 0, 2, 2, 3, 1, 4, 5, 1, 0 is

   (a) 5 (b) 0

   (c) 1 (d) 2

7. 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

8. 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

9. 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

10. 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

11. Class mark of the class 19.5 – 29.5 is

(a) 10 (b) 49

(c) 24.5 (d) 25

12. 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

13. 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

14. 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

15. 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

16. The mean of first 5 prime numbers is

(a) 5.5 (b) 5.6

(c) 5.7 (d) 5

17. The sum of deviations of the values 3, 4, 6, 8, 14 from their mean is

(a) 0 (b) 1

(c) 2 (d) 3

18. If median = 15 and mean = 16, then mode is

(a) 10 (b) 11

(c) 12 (d) 13

19. 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

20. 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

SHORT ANSWER TYPE QUESTIONS

21. 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.

22. Find 'x' if the median of the observations in ascending order 24, 25, 26, $x + 2$, $x + 3$, 30, 31, 34 is 27.5.

23. Find the median of the following data.

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

24. 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

25. Find the mean of the following distribution.

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

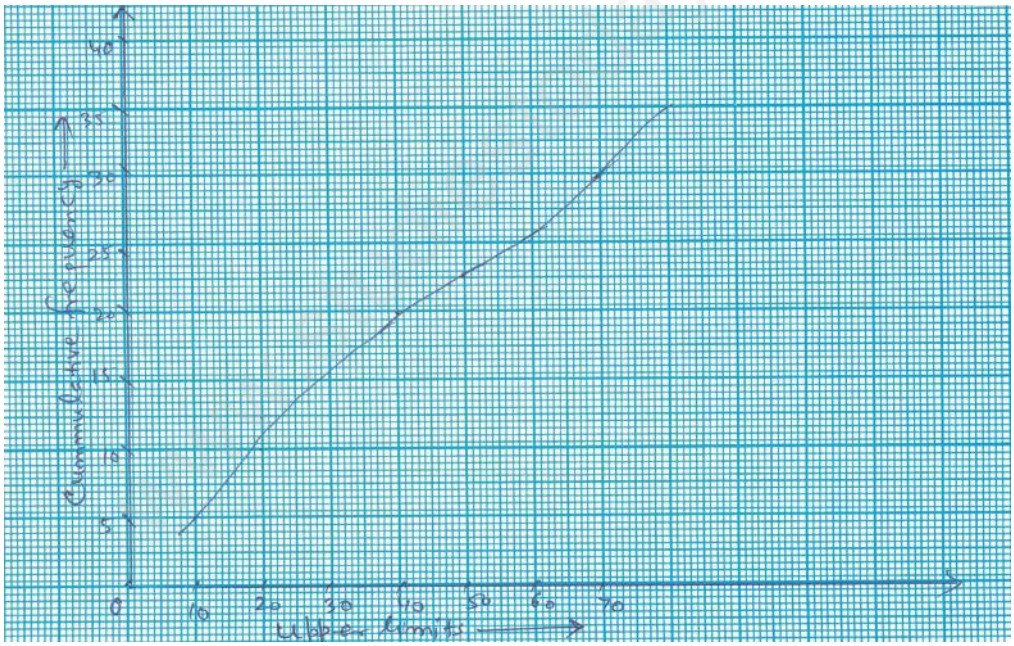
26. The Arithmetic Mean of the following frequency distribution is 53. Find the value of P.

Class Interval :	0–20	20–40	40–60	60–80	80–100
Frequency :	12	15	32	P	13

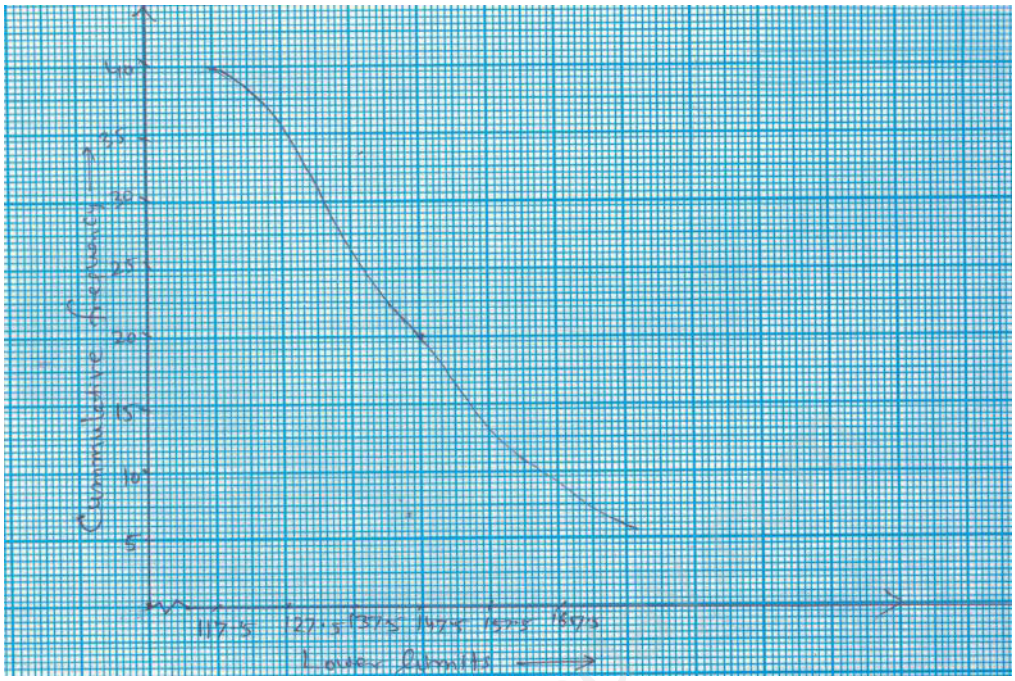
27. From the cumulative frequency table, write the frequency of the class 20–30.

Marks	*Number of Student*
Less than 10	1
Less than 20	14
Less then 30	36
Less than 40	59
Less than 50	60

28. Following is a commulative frequency curve for the marks obtained by 40 students as shown in figure. Find the median marks obtained by the student.



29. The following 'more than ogive' shows the weight of 40 students of a class. What is the lower limit of the median class.



LONG ANSWER TYPE QUESTIONS

30. The mean of the following frequency distribution is 62.8 and the sum of all the 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

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

Daily Wage (in ₹)	*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

32. 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

33. 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

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

35. 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.

36. A survey regarding the heights (in cm) of 50 students of class x of a school was conducted and the following data was obtained.

Height (in cm) :	120–130	130–140	140–150	150–160	160–170	Total
No. of Students :	2	8	12	20	8	50

Find the mean, median and mode of the above data.

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

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

38. During the medical checkup of 35 students of class '*X*' their weights recorded as follows :

Weight (in kg.) :	38–40	40–42	42–44	44–46	46–48	48–50	50–52
Number Students :	3	2	4	5	14	4	3

Find mean, median and mode of the above data.

39. The weekly observations on cost of living index in a city for the year 2008-2009 are given below :

Cost of Living Index :	140–150	150–160	160–170	170–180	180–190	190–200	Total
No. of Weeks :	5	10	20	9	6	2	52

Find the mean weekly cost of living index.

40. Calculate the mode from the following table

Class Interval :	0–5	5–10	10–15	15–20	20–25	25–30	30–35	35-40	40-45
Frequency :	20	24	32	28	20	16	34	10	8

ANSWERS

1. *c*
2. *b*
3. *b*
4. *a*
5. *b*
6. *c*
7. *a*
8. *b*
9. *a*
10. *b*
11. *c*
12. *b*
13. *c*
14. *a*
15. *d*
16. *b*
17. *a*
18. *d*
19. *a*
20. *c*
21. 161
22. $x = 25$
23. 14.8
24. $p = 3$
25. 20
26. 28
27. 22
28. 40
29. 147.5
30. $x = 8, y = 12$
31. ₹ 182.50
32. $x = 8, y = 7$
33. Mean = 30, Median = 30.67, Mode = 33.33
34. 41.82
35. 47.3 (Approx)
36. Mean = 149.8 cm, Median = 151.5 cm, Mode = 154 cm
37. $x = 10, y = 5$.
38. Mean = 45.8, Median = 46.5, Mode = 47.9
39. 166.3
40. 13.33