Data Handling

Question 1.
Consider the following numbers :
68, 76, 63, 75, 93, 83, 70, 115, 82, 105, 90, 103, 92, 52, 99, 73, 75, 63, 77 and 71.
(i) Arrange these numbers in ascending order.
(ii) What the range of these numbers?
Solution:
(i) When the above data are written in ascending order. We get,
52, 63, 63, 68, 70, 71, 73, 75, 75, 76, 77, 82, 83, 90, 92, 93, 99, 103, 105, 115
(ii) Range of given numbers = Largest number – Smallest number
= 115-52 = 48

Question 2.
Represent the following data in the form of a frequency distribution table :
16, 17, 21, 20, 16, 20, 16, 18, 17, 21, 17, 18, 19, 17, 15, 15, 19, 19, 18, 17, 17, 15, 15, 16, 17, 17, 19, 18, 17, 16, 15, 20, 16, 17, 19, 18, 19, 16, 21 and 17.
Solution:
The frequency distribution for these data will be as shown below :

Numbers	Tally marks	Frequency
15	﹋	5
16	﹋ II	7
17	﹋ ﹋ I	11
18	﹋	5
19	﹋ I	6
20	III	3
21	III	3
Total		40

Question 3.
A die was thrown 20 times and following scores were recorded.
2, 1, 5, 2, 4, 3, 6, 1, 4, 2, 5, 1, 6, 2, 6, 3, 5, 4, 1 and 3.
Prepare a frequency table for the scores.
Solution:
The frequency table for the scores will be as shown below :

No. of thrown dies	Tally marks	Frequency
1	IIII	4
2	IIII	4
3	III	3
4	III	3
5	III	3
6	III	3
Total		20

Question 4.
Following data shows the weekly wages (in ₹) of 10 workers in a factory.
3500, 4250, 4000, 4250, 4000, 3750, 4750, 4000, 4250 and 4000
(i) Prepare a frequency distribution table.
(ii) What is the range of wages (in ₹)?
(iii) How many workers are getting the maximum wages?
Solution:
(i) The frequency table for the wages of 10 workers will be as shown below :

Weekly wages in (₹)	Tally marks	Frequency
3500	I	1
3750	I	1
4000	IIII	4
4250	III	3
4750	I	1
Total		10

(ii) Range of wages (₹) = ₹4750 – ₹3500 = ₹1250
(iii) One

Question 5.
The marks obtained by 40 students of a class are given below :
80, 10, 30, 70, 60, 50, 50, 40, 40, 20, 40, 90, 50, 30, 70, 10, 60, 50, 20, 70, 70, 30, 80,
40,20, 80, 90, 50, 80, 60, 70, 40, 50, 60, 90, 60, 40, 40, 60 and 60
(i) Construct a frequency distribution table.
(ii) Find how many students have marks equal to or more than 70?
(iii) How many students obtained marks below 40?
Solution:
(i) The frequency distribution table will be shown as below :

Numbers	Tally marks	Frequency
10	II	2
20	III	3
30	III	3
40	THL II	7
50	THL I	6
60	THL II	7
70	THL	5
80	IIII	4
90	III	3
Total		40

(ii) Students have marks equal to or more than 70 = 5 + 4 + 3 = 12
(iii) Students obtained marks below 40 = 2 + 3 + 3 = 8 students

Question 6.
Arrange the following data in descending order:
3.3, 3.2, 3.1, 3.7, 3.6, 4.0, 3.5, 3.9, 3.8, 4.1, 3.5, 3.8, 3.7, 3.9 and 3.4.
(i) Determine the range.
(ii) How many numbers are less than 3.5?
(iii) How many numbers are 3.8 or above?
Solution:
Descending order : 4.1, 4.0, 3.9, 3.9, 3.8, 3.8, 3.7, 3.7, 3.6, 3.5, 3.5, 3.4, 3.3, 3.2, 3.1
(i) Range = 4.1 – 3.1 = 1
(ii) Number less than 3.5 = 4
i.e., 3.4, 3.3, 3.2, 3.1
(iii) Number are 3-8 or above = 6
i.e., 3.8, 3.8, 3.9, 3.9, 4.0, 4.1

Question 1.
Find the mean of 53, 61, 60, 67 and 64.
Solution:
Mean of 53, 6i, 60, 67 and 64

$$\therefore \text{ Mean} = \frac{53+61+60+67+64}{5} \qquad \text{(Here } n = 5)$$

$$= \frac{305}{5} = 61$$

Question 2.
Find the mean of first six natural numbers.
Solution:
First six natural numbers are : 1, 2, 3, 4, 5, 6

$$\therefore \text{ Mean} = \frac{1+2+3+4+5+6}{6} \qquad \text{(Here } n = 6)$$

$$= \frac{21}{6} = 3.5$$

Question 3.
Find the mean of first ten odd natural numbers.
Solution:
First ten odd natural numbers are 1, 3, 5, 7, 9, 11, 13, 15, 17, 19

$$\therefore \text{ Mean} = \frac{1+3+5+7+9+11+13+15+17+19}{10} \qquad \text{(Here } n = 10)$$

$$= \frac{100}{10} = 10$$

Question 4.
Find the mean of all factors of 10.
Solution:

The factor of 10 are 2 and 5

$$\therefore \text{Mean} = \frac{2+5}{2}$$ (Here $n = 2$)

$$= \frac{7}{2} = 3 \cdot 5$$

Question 5.
Find the mean of x + 3, x + 5, x + 7, x + 9 and x + 11.
Solution:
Mean of x + 3, x + 5, x + 7, x + 9 and x + 11

$$\therefore \text{Mean} = \frac{(x+3)+(x+5)+(x+7)+(x+9)+(x+11)}{5}$$ (Here $n = 5$)

$$= \frac{5x+35}{5} = \frac{5(x+7)}{5} = x + 7$$

Question 6.
If different values of variable x are 19.8,15.4,13.7,11.71,11.8, 12.6,12.8,18.6,20.5 and 2.1, find the mean.
Solution:
19. +15.4 +13.7 +11.71 +11.8 +12.6 + 12.8 +18.6 + 20.5 +21.1

$$\therefore \text{Mean} = \frac{19 \cdot 8 + 15 \cdot 4 + 13 \cdot 7 + 11 \cdot 71 + 11 \cdot 8 + 12 \cdot 6 + 12 \cdot 8 + 18 \cdot 6 + 20 \cdot 5 + 21 \cdot 1}{10}$$

$$= \frac{158 \cdot 01}{10} = 15 \cdot 801$$

Question 7.
The mean of a certain number of observations is 32. Find the resulting mean, if each observation is,
(i) increased by 3
(ii) decreased by 7
(iii) multiplied by 2
(iv) divided by 0.5
(v) increased by 60%
(vi) decreased by 20%

Solution:

(i) Increased by = 3

Observed mean = 32

If increased by 3

∴ Resulting mean = 32 + 3 = 35

(ii) Observed mean = 32

Decreased by = 7

∴ Resulting mean = 32 – 7 = 25

(iii) Observed mean = 32

Multiplied by = 2

∴ Resulting mean = 32 × 2 = 64

(iv) Observed mean = 32

Divided by = 0·5

∴ Resulting mean = $\dfrac{32}{0.5}$ = 64

(v) Observed mean = 32

Increased by = 60%

∴ Resulting mean = $32 + \dfrac{60}{100}$

$= \dfrac{3200 + 60}{100} = \dfrac{3260}{100} = 32·6$

(vi) Observed mean = 32

Decreased by = 20%

∴ Resulting mean = $32 - \dfrac{20}{100}$

$= \dfrac{3200 - 20}{100} = \dfrac{3180}{100} = 31.8$

Question 8.
The pocket expenses (per day) of Anuj, during a certain week, from monday to Saturday were ₹85.40, ₹88.00, ₹86.50, ₹84.75, ₹82.60 and ₹87.25. Find the mean pocket expenses per day.
Solution:
The pocket expenses (per day) during a certain week are : ₹85.40, ₹88.00, ₹86.50, ₹84.75, ₹82.60 and ₹87.25

$$\therefore \text{ Mean of pocket expenses per day} = \frac{85{\cdot}40 + 88{\cdot}00 + 86{\cdot}50 + 84{\cdot}75 + 82{\cdot}60 + 87{\cdot}25}{6}$$

(Here $n = 6$)

$$= \frac{514{\cdot}5}{6} = ₹85.75$$

∴Anuj expenses per day = ₹85.75

Question 9.
If the mean of 8, 10, 7, x + 2 and 6 is 9, find the value of x.
Solution:
The mean 8, 10, 7, x + 2 and 6 is 9

$$\therefore \frac{8 + 10 + 7 + x + 2 + 6}{6} = 9$$

$$\Rightarrow \frac{x + 33}{6} = 9 \Rightarrow x + 33 = 9 \times 6$$

$$\Rightarrow x = 54 - 33 \Rightarrow x = 21$$

Question 10.
Find the mean of first six multiples of 3.
Solution:
The six multiples of 3 are 3, 6, 9, 12, 15, 18

$$\therefore \text{ Mean} = \frac{3 + 6 + 9 + 12 + 15 + 18}{6}$$

(Here $n = 6$)

$$= \frac{63}{6} = 10.5$$

Question 11.
Find the mean of first five prime numbers.
Solution:

The first five prime numbers are 2, 3, 5, 7, 11

$$\therefore \text{ Mean} = \frac{2+3+5+7+11}{5} \qquad \text{(Here } n = 5\text{)}$$

$$= \frac{28}{5} = 5\frac{3}{5} = 5 \cdot 6$$

Question 12.
The mean of six numbers :x-5,x- 1, x, x + 2, x + 4 and x + 12 is 15. Find the mean of first four numbers.
Solution:
The mean of six numbers are x – 5, x – 1,x,x + 2,x + 4 and x + 12 is 15

$$\therefore \text{ Mean} = \frac{(x-5)+(x-1)+(x)+(x+2)+(x+4)+(x+12)}{6}$$

$$= \frac{x-5+x-1+x+x+2+x+4+x+12}{6}$$

$$= \frac{12+6x}{6} = 15$$

$$\Rightarrow 12 + 6x = 90$$
$$\Rightarrow 6x = 90 - 12$$
$$\Rightarrow 6x = 78$$

$$\Rightarrow x = \frac{78}{6} = 13$$

$$x = 13$$

$\therefore$ The six numbers are (13 – 5), (13 – 1), 13, (13 + 2), (13 + 4), (13 + 12)
i.e. 8, 12, 13, 15, 17, 25

$$\text{Now, mean of first four numbers} = \frac{8+12+13+15}{4} = \frac{48}{4} = 12$$

Question 13.
Find the mean of squares of first five whole numbers.
Solution:
First five whole numbers are 0, 1, 2, 3, 4

Then square the whole prime numbers

$= (0)^2, (1)^2, (2)^2, (3)^2, (4)^2$

$= 0, 1, 4, 9, 16$

$\therefore$ Mean $= \dfrac{0+1+4+9+16}{5}$ (Here $n = 5$)

$= \dfrac{30}{5} = 6$

Question 14.
If the mean of 6, 4, 7, p and 10 is 8, find the value of p.
Solution:
The mean of 6, 4, 7, p and 10 is 8

$\therefore$ Mean $= \dfrac{6+4+7+p+10}{5} = 8$

$\Rightarrow 27 + p = 40$

$\Rightarrow p = 40 - 27$

$\Rightarrow p = 13$

Question 15.
Find the mean of first six multiples of 5.
Solution:
Six multiples of 5 are :
5, 10, 15, 20, 25 and 30

5, 10, 15, 20, 25 and 30

$\therefore$ Mean $= \dfrac{5+10+15+20+25+30}{6}$ (Here $n = 6$)

$= \dfrac{105}{6} = 17.5$

Question 16.
The rainfall (in mm) in a city on 7 days of a certain week is recorded as follows

Day :	Mon	Tue	Wed	Thus	Fri	Sat	Sun
Rainfall (in mm) :	0·5	2·7	2·6	0·5	2	5·8	1·5

Find the total and average (mean) rainfall for the week.

Solution:

The rainfall in a city on 7 days are 0.5, 2.7, 2.6, 0.5, 2, 5.8, 1.5

$$\text{Average rainfall} = \frac{0\cdot5 + 2\cdot7 + 2\cdot6 + 0\cdot5 + 2 + 5\cdot8 + 1\cdot5}{7} \qquad \text{(Number of days = 7)}$$

$$= \frac{15\cdot6}{7} = 2\cdot2 \text{ mm}$$

Question 17.

The mean of marks scored by 100 students was found to be 40, later on it was discovered that a score of 53 was misread as 83. Find the correct mean.

Solution:

Mean of 40 observations = 100

Total sum of 40 observations = 100 × 40 = 4000

Incorrect total of 40 observation is = 4000

Correct total of 40 observations = 4000 – 83 + 53 = 3970

∴ Correct mean = $\frac{3970}{100}$ = 39.70

Question 18.

The mean of five numbers is 27. If one number is excluded, the mean of remaining numbers is 25. Find the excluded number.

Solution:

Mean of 5 observations = 27

Total sum of 5 observations = 27 × 5 = 135

On excluding an observation, the mean of remaining 6 observations = 25

⇒ Total of remaining 4 observations = 25 x 4 = 100

⇒ Included observation = Total mean of 5 observations – Total mean of 4 observations

= 135- 100 = 35

Question 19.

The mean of 5 numbers is 27. If one new number is included, the new mean is 25. Find the included number.

Solution:

Mean of 5 observations = 27

Total sum of 5 observations = 27 x 5 = 135

On including an observation the mean of 6 observation = 25 x 6 = 150

⇒ Included observations = Total Mean of 6 observations – Total mean of 5 observations

= 150- 135 = 15

Mean of 5 numbers is 20 and mean of other 5 numbers is 30. Find the mean of all the 10 numbers taken together.
Solution:
The mean of 5 number = 20
Then, mean of other 5 number = 30

$$\therefore \text{Mean} = \frac{20+30}{2} = \frac{50}{2} = 25$$

Question 21.
Find the median of:
(i) 5,7, 9, 11, 15, 17,2, 23 and 19
(ii) 9, 3, 20, 13, 0, 7 and 10
(iii) 18, 19, 20, 23, 22, 20, 17, 19, 25 and 21
(iv) 3.6, 9.4, 3.8, 5.6, 6.5, 8.9, 2.7, 10.8, 15.6, 1.9 and 7.6.
Solution:

(i) 5, 7, 9, 11, 15, 17, 2, 23 and 19

Arranging in ascending order : 2, 5, 7, 9, 11, 15, 17, 19, 23

Here, number of terms = 9 which is odd

$$\text{Median} = \frac{n+1}{2} = \frac{9+1}{2}\text{th term} = \text{5th term} = 11$$

Hence, median = 11

(ii) 9, 3, 20, 13, 0, 7 and 10

Arranging in ascending order : 0, 3, 7, 9, 10, 13, 20

Here, number of terms = 7 which is odd

$$\therefore \text{Median} = \frac{n+1}{2} = \frac{7+1}{2}\text{th term} = \text{4th term} = 9$$

Hence, median = 9

(iii) 18, 19, 20, 23, 22, 20, 17, 19, 25 and 21

Arranging in ascending order : 17, 18, 19, 19, 20, 20, 21, 22, 23, 25

Here, numbers of terms = 10 which is even.

$$\therefore \text{Median} = \frac{1}{2}\left\{\frac{n}{2}\text{th term} + \left(\frac{n}{2}+1\right)\text{th term}\right\}$$

$$= \frac{1}{2}\left\{\frac{10}{2}\text{th term} + \left(\frac{10}{2}+1\right)\text{th term}\right\}$$

$$= \frac{1}{2}\{\text{5th term} + \text{6th term}\}$$

$$= \frac{1}{2}\{20 + 20\} = \frac{1}{2} \times 20 = 20$$

Hence, median = 20

(iv) 3.6, 9.4, 3.8, 5.6, 6.5, 8.9, 2.7, 10.8, 15.6, 1.9 and 7.6

Arranging in ascending order : 1.9, 2.7, 3.6, 3.8, 5.6, 6.5, 7.6, 8.9, 9.4, 10.8, 15.6

Here, number of terms = 11 which is odd

$$\therefore \text{ Median} = \frac{n+1}{2} = \frac{11+1}{2} = \text{6th term}$$

= 6th term = 6.5

Hence, median = 6.5

Question 22.
Find the mean and the mode for the following data :

Term	18	22	26	30	34	38
Frequency	3	5	10	2	8	2

Solution:
We prepare the table given below :

Term (x_i)	Frequency (f_i)	$(f_i x_i)$
18	3	54
22	5	110
26	10	260
30	2	60
34	8	276
38	2	76
Total	30	832

$$\text{Mean} = \frac{\Sigma f_i x_i}{f_i} = \frac{832}{30} = 27.73$$

Since, the frequency of Number 26 is maximum.

$\therefore$ Mode = 26

Question 23.
Find the mode of:
(i) 5, 6, 9, 13, 6, 5, 6, 7, 6, 6, 3
(ii) 7, 7, 8, 10, 10, 11, 10, 13, 14
Solution:

(i) Arranging the Numbers in ascending order : 3, 5, 5, 6, 6, 6, 6, 6, 7, 9, 13
Mostly repeated term = 6
∴ Mode = 6
(ii) Arranging the Numbers in ascending order = 7, 7, 8, 10, 10, 10, 11, 13, 14
Mostly repeated term =10
∴ Mode = 10

Question 24.
Find the mode of :

(i)
x	15	16	17	18	19	20	21	22	23
f	6	7	9	13	10	12	8	0	4

(ii)
Height (cm)	37	38	39	40	41
Number of plants	46	89	93	90	153

Solution:
(i) Since, the frequency of number 18 is maximum
∴Mode = 18
(ii) Since, the frequency of number 41 is maximum
∴ Mode = 41

Question 25.
The heights (in cm) of 8 girls of a class are 140,142,135,133,137,150,148 and 138 respectively. Find the mean height of these girls and their median height.
Solution:
Arranging in ascending order : 133, 135, 137, 138, 140, 142, 148, 150
Here, number of girls = 8 which is even

$$\therefore \text{Median} = \frac{1}{2}\left\{\frac{n}{2}\text{th term} + \left(\frac{n}{2}+1\right)\text{th term}\right\}$$

$$= \frac{1}{2}\left\{\frac{8}{2}\text{th term} + \left(\frac{8}{2}+1\right)\text{th term}\right\}$$

$$= \frac{1}{2}\{4\text{th term} + 5\text{th term}\}$$

$$= \frac{1}{2}\{138 + 140\}\text{ cm} = \frac{1}{2} \times 278 = 139 \text{ cm}$$

$$\therefore \quad \text{Mean} = \frac{133+135+137+138+140+142+148+150}{8}$$

$$= \frac{1123}{8}\text{ cm} = 140.375 \text{ cm}$$

Question 26.
Find the mean, the median and the mode of:
(i) 12, 24, 24, 12, 30 and 12
(ii) 21, 24, 21, 6, 15, 18, 21, 45, 9, 6, 27 and 15.
Solution:

(i) 12, 24, 24, 12, 30 and 12

$$\therefore \text{Mean} = \frac{12+24+24+12+30+12}{6}$$

$$= \frac{114}{6} = 19$$

Numbers are 12, 24, 24, 12, 30 and 12

Mostly repeated term = 12

$\therefore$ Mode = 12

Now, Arranging the numbers in ascending order = 12, 12, 12, 24, 24, 30

Here, number of terms 6 which is even

$$\therefore \text{Median} = \frac{1}{2}\left\{\frac{n}{2}\text{th term} + \left(\frac{n}{2}+1\right)\text{th term}\right\}$$

$$= \frac{1}{2}\left\{\frac{6}{2}\text{th term} + \left(\frac{6}{2}+1\right)\text{th term}\right\}$$

$$= \frac{1}{2}\{3\text{th term} + 4\text{th term}\}$$

$$= \frac{1}{2}\{12 + 24\} = \frac{1}{2} \times 36 = 18$$

$\therefore$ Median = 18

(ii) 21, 24, 21, 6, 15, 18, 21, 45, 9, 6, 27 and 15

$$\therefore \text{Mean} = \frac{21+24+21+6+15+18+21+45+9+6+27+15}{12}$$

$$= \frac{228}{12} = 19$$

Numbers are 21, 24, 21, 6, 15, 18, 21, 45, 9, 6, 27 and 15

Mostly repeated term = 21

$\therefore$ Mode = 21

Arranging the terms in ascending order : 6, 6, 9, 15, 15, 18, 21, 21, 21, 24, 27, 45

Here, number of terms = 12 which is even

$$\therefore \text{Median} = \frac{1}{2}\left\{\frac{n}{2}\text{th term} + \left(\frac{n}{2}+1\right)\text{th term}\right\}$$

$$= \frac{1}{2}\left\{\frac{12}{2}\text{th term} + \left(\frac{12}{2}+1\right)\text{th term}\right\}$$
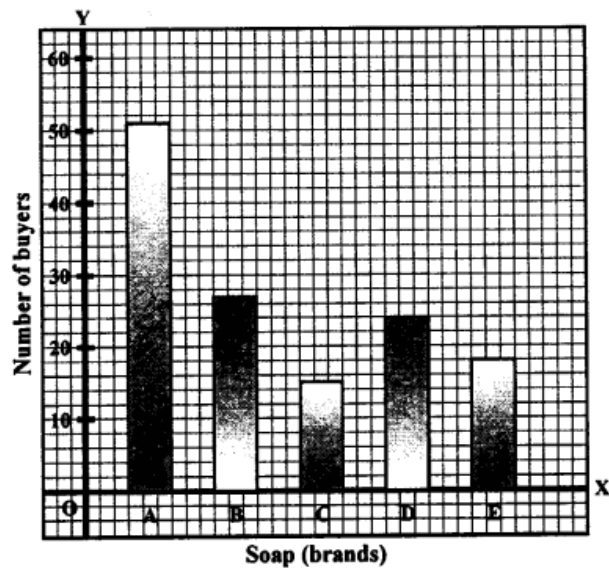
$$= \frac{1}{2}\{6\text{th term} + 7\text{th term}\}$$

$$= \frac{1}{2}\{18 + 21\} = \frac{1}{2} \times 39 = 19.5$$

Question 27.
The following table shows the market positions of some brands of soap.
Draw a suitable bar graph :

Soap (brands) :	A	B	C	D	E
No. of buyers :	51	27	15	24	18

Solution:

Question 28.
The birth rate per thousand of different countries over a particular period of time is shown below.

INDIA	U.K.	CHINA	GERMANY	SWEDEN
35	22	42	13	8

Solution: