Question:1
Define the terms:

i Data
ii Raw data
iii Array
iv Tabulation of data
v Observations
vi Frequency of an observation
vii Statistics
Solution:
i Data: Information in the form of numerical figures is known as data.

ii Raw data: Data that is obtained in the original form is known as raw data.

iii Array: When the raw data is obtained in ascending or descending order of magnitude, it is known as array.

iv Tabulation of data: Arranging the data in a systematic way in the form of a table is known as the tabulation of the data.

v Observations: Each numerical figure in a data is known as an observation.

vi Frequency of an observation: Number of times an observation occurs in the data is known as the frequency of an observation.

vii Statistics: The subject that deals with the collection, presentation, analysis and interpretation of the numerical data is known as statistics.

Question:2
A die was thrown 20 times and the following outcomes were recorded:
5, 2, 1, 3, 4, 4, 5, 6, 2, 2, 4, 5, 5, 6, 2, 2,4, 5, 5, 1.

Arrange the above data in ascending order and prepare the frequency table.
Solution:
Data in the ascending order:

1, 1, 2, 2, 2, 2, 2, 3, 4, 4, 4, 4, 5, 5, 5, 5, 5, 6, 6

Observation	Frequency
1	2
2	5
3	1
4	4
5	6
6	2

Question:3
The daily wages $in Rs$ of 15 workers in a factory are given below.
200, 180, 150, 150, 130, 180, 180, 200, 150, 130, 180, 180, 200, 150, 180.

Arrange the above data in ascending order and prepare the frequency table.
Solution:
Daily wages in the ascending order:

130, 130, 150, 150, 150, 150, 180, 180, 180, 180, 180, 180, 200, 200, 200

Frequency table:

Daily wages (in Rs.)	No. of workers
130	2
150	4
180	6
200	3

Question:4
Write the data given below in ascending order and prepare the frequency table.
7, 8, 7, 10, 6, 8, 9, 7, 10, 5, 7, 6, 8, 5, 6, 7, 8, 9, 7, 6, 7, 8.
Solution:

Data in ascending order:

5, 5, 6, 6, 6, 6, 7, 7, 7, 7, 7, 7, 7, 8, 8, 8, 8, 8, 8, 9, 9, 10, 10

Frequency table:

Observation	Frequency
5	2
6	4
7	7
8	5
9	2
10	2

Question:5

Fill in the blanks:

i Data means information in the form of ..... figures.
ii Data obtained in the ..... form is called raw data.
iii Arranging the numerical figures in ascending of descending order is called an ..... .
iv The number of times a particular observation occurs is called its ..... of data.
v Arranging the data in the form of a table is called ..... of data.

Solution:

i numerical
ii original
iii array
iv frequency
v tabulation

Question:6

Find the mean of first five natural numbers.

Solution:

First five natural numbers are 1, 2, 3, 4 and 5.

Mean of the first five natural numbers $=\frac{\text{Sum of the given observations}}{\text{Number of given observations}}$

$=\frac{1+2+3+4+5}{5}=\frac{15}{5}=3$

Hence, mean of the first five natural numbers is 3.

Question:7

Find the mean of first six odd natural numbers.

Solution:

First six odd natural numbers are 1, 3, 5, 7, 9 and 11.

Mean of the first six natural numbers $=\frac{\text{Sum of the given observations}}{\text{Number of the given observations}}$

$$=\frac{1+3+5+7+9+11}{6}=\frac{36}{6}=6$$

Mean of the first six odd natural numbers is 6.

Question:8

Find the mean of first seven even natural numbers.

Solution:

First seven even natural numbers are 2, 4, 6, 8, 10, 12 and 14.

Mean of the first seven even natural numbers $=\frac{\text{Sum of the given observations}}{\text{Number of the given observations}}$

$$=\frac{2+4+6+8+10+12+14}{7}=\frac{56}{7}=8$$

Mean of the first seven even natural numbers is 8.

Question:9

Find the mean of first five prime numbers.

Solution:

First five prime numbers are 2, 3, 5, 7 and 11.

Mean of the first five prime numbers $=\frac{\text{Sum of the given observations}}{\text{Number of the given observations}}$

$$=\frac{2+3+5+7+11}{5}=\frac{28}{5}=5.6$$

Mean of the first five prime numbers is 5.6.

Question:10

Find the mean of first six multiples of 5.

Solution:

First six multiples of 5 are 5, 10, 15, 20, 25 and 30.

Mean of the first six multiples of 5 $=\frac{\text{Sum of the given observations}}{\text{Number of the given observations}}$

$$\frac{5+10+15+20+25+30}{6}=\frac{105}{6}=17.5$$

Question:11

The following table shows the weights $inkg$ of 15 workers in a factory:

Weight $inkg$	60	63	66	72	75
Number of workers	4	5	3	1	2

Calculate the mean weight.

Solution:

Weight (in kg) (xi)	Number of workers (fi)	$(fi \times xi)$
60	4	240
63	5	315
66	3	198
72	1	72
75	2	150
	$\sum fi = 15$	$\sum(fi \times xi) = 975$

Mean weight $=\frac{\Sigma(f_i \times x_i)}{\Sigma f_i}=\frac{975}{15}=65 \text{ kg}$

Question:12

The daily wages $inrupees$ of 60 workers in a factory are given below:

Daily wages $inRs$	140	150	160	180	190
Number of workers	14	16	15	7	8

Find the mean daily wages.

Solution:

Daily wages (in Rs.)	Number of workers (f_i)	$(f_i \times x_i)$
140	14	1960
150	16	2400
160	15	2400
180	7	1260
190	8	1520
	$\sum f_i = 60$	$\sum(f_i \times x_i) = 9540$

Mean daily wages $=\frac{\Sigma(f_i \times x_i)}{\Sigma f_i}=\frac{9540}{60}=\text{Rs } 159$

Question:13

The heights $incm$ of 90 plants in a garden are given below:

Height $incm$	58	60	62	64	66	74

Number of plants	20	25	15	8	12	10

Find the mean height.

Solution:

Height (in cm) (x_i)	Number of plants (f_i)	$(f_i \times x_i)$
58	20	1160
60	25	1500
62	15	930
64	8	512
66	12	792
74	10	740
	$\sum f_i$ =90	$\sum(f_i \times x_i)$=5634

Mean height $=\frac{\Sigma(f_i \times x_i)}{\Sigma f_i} = \frac{5634}{90} = 62.6 \text{ cm}$

Question:14

The ages $in years$ of 50 players of a school are given below:

Age $in years$	14	15	16	17	18
Number of players	15	14	10	8	3

Find the mean age.

Solution:

Age (in years) (x_i)	Number of players (f_i)	$(f_i \times x_i)$
14	15	210
15	14	210
16	10	160
17	8	136
18	3	54
	$\sum f_i$ =50	$\sum(f_i \times x_i)$=770

Mean age $=\frac{\Sigma(f_i \times x_i)}{\Sigma f_i} = \frac{770}{50} = 15.4 \text{ years}$

Question:15

The heights $incm$ of 40 boys were measured and recorded and under:

Height $incm$	165	170	175	180
Number of boys	9	8	11	12

Find the mean height.

Solution:

Height (in cm) (x_i)	Number of boys (f_i)	$(f_i \times x_i)$
165	9	1485
170	8	1360
175	11	1925
180	12	2160
	$\sum f_i$ =40	$\sum(f_i \times x_i)$=6930

Mean height $=\frac{\Sigma(f_i \times x_i)}{\Sigma f_i} = \frac{6930}{40} = 173.25 \text{ cm}$

Question:16

Find the median of:

i 3, 11, 7, 2, 5, 9, 9, 2, 10

ii 9,25, 18, 15, 6, 16, 8, 22, 21

iii 21, 15, 6, 25, 18, 13, 20, 9, 16, 8, 22

Solution:

We have to find the median of the following data.

i 3, 11, 7, 2, 5, 9, 9, 2 and 10

Arranging them in ascending order:

2, 2, 3, 5, 7, 9, 9, 10, 11

Number of terms, N= 9
It is an odd number.

Median =$\left(\frac{N+1}{2}\right)\text{th observation}$

Median=$\left(\frac{9+1}{2}\right)\text{th observation}$

Median = 5th observation

Median=7

ii 9, 25, 18, 15, 6, 16, 8, 22, 21

Arranging them in ascending order,

6, 8, 9, 15, 16, 18, 21, 22, 25

Number of terms, N=9
It is an odd number.

Median =$\left(\frac{N+1}{2}\right)\text{th observation}$

Median =$\left(\frac{9+1}{2}\right)\text{th observation}$
Median = 5th observation

Median=16

iii 21, 15, 6, 25, 18, 13, 20, 9, 16, 8, 22

Arranging them in ascending order:

6, 8, 9, 13, 15, 16, 18, 20, 21, 22, 25

Number of terms, N = 11
It is an odd number.

Median =$\left(\frac{N+1}{2}\right)\text{th observation}$

Median =$\left(\frac{11+1}{2}\right)$th observation

Median = 6th observation

Median=16

Question:17
Find the median of:

i 10, 32, 17, 19, 21, 22, 9, 35
ii 55, 60, 35, 51, 29, 63, 72, 91, 85, 82
Solution:
We have to find the median of the following data.

i 10, 32, 17, 19, 21, 22, 9, 35

Arranging them in ascending order:

9, 10, 17, 19, 21, 22, 32, 35

Number of terms, N = 8

Median =$\frac{1}{2}\left\{\left(\frac{N}{2}\right)\text{th observation}+\left(\frac{N}{2}+1\right)\text{th observation}\right\}$

Median $=\frac{1}{2}(4\,\text{th observation}+5\,\text{th observation})$

Median $=\frac{1}{2}(19+21)=20$

$\therefore$ Median= 20

ii 55, 60, 35, 51, 29, 63, 72, 91, 85, 82

Arranging them in ascending order:

29, 35, 51, 55, 60, 63, 72, 82, 85, 91

Number of terms, N =10

Median $=\frac{1}{2}\left\{\left(\frac{N}{2}\right)\text{th observation}+\left(\frac{N}{2}+1\right)\text{th observation}\right\}$

$\text{Median } = \frac{1}{2}(5\,\text{th observation } +6\,\text{th observation})\,\text{Median } =\frac{1}{2}(60+63)\,\therefore \text{ Median}=61.5$

Question:18

Find the median of first 15 odd numbers.

Solution:

First 15 odd numbers are 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27 and 29.

Number of terms, N = 15

It is an odd number.

Median $=\left(\frac{N+1}{2}\right)\text{th observation}$

$\text{Median } =\left(\frac{15+1}{2}\right)\text{th observation}\,\text{Median } =15$

Question:19

Find the median of first 10 even numbers.

Solution:

First 10 even numbers are 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20.

Number of terms, N=10

Median $=\frac{1}{2}\left\{\left(\frac{N}{2}\right)\text{th observation}+\left(\frac{N}{2}+1\right)\text{th observation}\right\}$

$\text{Median } =\frac{1}{2}(5\,\text{th observation}+6\,\text{th observation})\,\text{Median } =\frac{1}{2}(10+12)=11$

Question:20

Find the median of first 50 whole numbers.

Solution:

First 50 whole numbers are 0, 1, 2, 3, 4 ... and 49.

Number of terms, N= 50

It is an even number.

$\text{Median } =\frac{1}{2}\left\{\left(\frac{N}{2}\right)\text{th observation}+\left(\frac{N}{2}+1\right)\text{th observation}\right\} \quad =\frac{1}{2}\{25\,\text{th observation } +26\,\text{th observation}\} \quad =\frac{1}{2}\{24+25\} \quad =2$

Question:21

The marks of 15 students $out of 50$ in an examination are
20, 22, 26, 31, 40, 19, 17, 19, 25, 29, 23, 17, 24, 21, 35

Find the median marks.

Solution:

Marks of the students $out of 50$ in an examination are given below:

20, 22, 26, 31, 40, 19, 17, 19, 25, 29, 23, 17, 24, 21, 35

Arranging the marks in ascending order:

17, 17, 19, 19, 20, 21, 22, 23, 24, 25, 26, 29, 31, 35, 40

Number of terms, *N*=15
This is an odd number.

$\text{Median } = \left(\frac{N+1}{2}\right)\text{th observation}\text{Median} = \left(\frac{15+1}{2}\right)\text{th observation}\text{Median } = 8\,\text{th observation}\text{Median } = 23$

Hence, the median marks are 23.

Question:22
The ages $in years$ of 10 teachers in a school are
34, 37, 53, 46, 52, 43, 31, 36, 40, 50.

Find the median age.
Solution:
Ages $in years$ of 10 teachers in a school are given below:

34, 37, 53, 46, 52, 43, 31, 36, 40, 50

Arranging them in ascending order:

31, 34, 36, 37, 40, 43, 46, 50, 52, 53

Number of terms, *N*=10
It is an even number.

$\text{Median} = \frac{1}{2}\left\{\left(\frac{N}{2}\right)\text{th observation} + \left(\frac{N}{2}+1\right)\text{th observation}\right\}\text{Median } = \frac{1}{2}\{5\,\text{th observation } + 6\,\text{th observation}\}\text{Median } = \frac{1}{2}\{40+43\}\text{Median } = 41$

Hence, the median age is 41.5 years.

Question:23
Find the median weight for the following data:

Weight $inkg$	45	46	48	50	52	54	55
Number of boys	8	5	6	9	7	4	2

Solution:
Cumulative frequency table:

Weight (in kg) (x)	Number of boys (f)	Cumulative frequency
45	8	8
46	5	13
48	6	19
50	9	28
52	7	35
54	4	39
55	2	41

Number of terms, *N* = 41
It is an odd number.

$\text{Median } = \left\{\left(\frac{N+1}{2}\right)\text{th observation}\right\} = \left\{\left(\frac{41+1}{2}\right)\text{th observation}\right\} = \{21\,\text{th observation}\} = 50\ \text{kg}$

Hence, the median weight is 50 kg.

Question:24
Calculate the median for the following data:

Marks	17	20	22	15	30	25
Number of students	5	9	4	3	10	6

Solution:

Arranging the terms in ascending order, we have:

Marks	15	17	20	22	25	30
Number of students	3	5	9	4	6	10

Cumulative frequency table:

Marks (x_i)	Number of students (f_i)	Cumulative frequency
15	3	3
17	5	8
20	9	17
22	4	21
25	6	27
30	10	37

Number of terms, $N = 37$

$$\text{Median} = \left\{\left(\frac{N+1}{2}\right)\text{th observation}\right\} = \left\{\left(\frac{37+1}{2}\right)\text{th observation}\right\} = 19\,\text{th observation} = 22$$

Hence, the median is 22.

Question:25

The heights $in cm$ of 50 students of a class are given below:

Height $in cm$	156	154	155	151	157	152	153
Number of students	8	4	10	6	7	3	12

Find the median height.

Solution:

Arranging the terms in ascending order:

Height (in cm)	151	152	153	154	155	156	157
Number of students	6	3	12	4	10	8	7

Cumulative frequency table:

Height (in cm) (x_i)	Number of students (f_i)	Cumulative frequency
151	6	6
152	3	9
153	12	21
154	4	25
155	10	35
156	8	43
157	7	50

Number of terms, $N = 50$

$$\text{Median} = \frac{1}{2}\left\{\left(\frac{N}{2}\right)\text{th observation} + \left(\frac{N}{2}+1\right)\text{th observation}\right\} = \frac{1}{2}\{25\,\text{th observation} + 26\,\text{th observation}\} = \frac{1}{2}\{154+155\}$$

Median =154.5

Question:26

Find the mode of the data:

i 10, 8, 4, 7, 8, 11, 15, 8, 6, 8

ii 27, 23, 39, 18, 27, 21, 27, 27, 40, 36, 27

Solution:

We have to find the mode of the given data.

Mode - It is that value of the variables that occurs most frequently.

i 10, 8, 4, 7, 8, 11, 15, 8, 6, 8

Here, 8 occurs most frequently. Hence, the mode of the data is 8.

ii 27, 23, 39, 18, 27, 21, 27, 27, 40, 36, 27

Here, 27 occurs most frequently. Hence, the mode of the data is 27.

Question:27

The ages $in years$ of 11 cricket players are given below:
28, 34, 32, 41, 36, 32, 32, 38, 32, 40, 31.

Find the mode of the ages.

Solution:

Following are the ages $in years$ of 11 cricket players:

28, 34, 32, 41, 36, 32, 32, 38, 32, 40, 31

Mode is the value of the variable that occurs most frequently.

Here, 32 occurs maximum number of times.

Hence, 32 is the mode of the ages.

Question:28

Daily wages of 45 workers in a factory are given below:

Daily wages $in Rs$	100	125	150	175	200
Number of workers	6	8	9	12	10

Find the median and the mean.
Using empirical formula, calculate its mode.

Solution:

Daily wages (in Rs.) (x_i)	Number of workers (f_i)	Cumulative frequency	$(f_i \times x_i)$
100	6	6	600
125	8	14	1000
150	9	23	1350
175	12	35	2100
200	10	45	2000
	$N=\sum f_i=45$		$\sum (f_i \times x_i)=7050$

$\text{Here, } N \text{ is } 45, \text{ which is odd. Median } = \left\{\left(\frac{N+1}{2}\right)\text{th observation}\right\} = \left\{\frac{45+1}{2}\right\}\text{observation} = 23 \text{ th observation} \text{Median } = 150 \text{Mean } =$

Hence, the median is 150, the mean is 156.67 and the mode is 136.6.

Question:29

The following table shows the marks obtained by 41 students of a class.

Marks obtained	15	17	20	22	25	30
Number of students	2	5	10	12	8	4

Find the median and mean marks.
Using empirical formula, calculate its mode.

Solution:

Marks obtained (x_i)	Number of students (f_i)	Cumulative frequency	$(f_i \times x_i)$
15	2	2	30
17	5	7	85
20	10	17	200
22	12	29	264
25	8	37	200
30	4	41	120
	$N=\sum f_i=41$		$\sum (f_i \times x_i)=899$

$\text{Number of terms } \left(N\right) \text{ is } 41, \text{ which is odd. Median } = \left\{\left(\frac{N+1}{2}\right)\text{th observation}\right\} = \{21\text{th observation}\} = 22 \text{Median } = 22 \text{Mean } = \frac{\sum(}{\sum}$

Hence, the median is 22, the mean is 21.92 and the mode is 22.16.

Question:30

The following table shows the weight of 12 players:

Weight $inkg$	48	50	52	54	58
Number of players	4	3	2	2	1

Find the median and mean weights.

Using empirical formula, calculate its mode.

Solution:

We will prepare the table given below:

Weight (in kg) (x_i)	Number of players (f_i)	Cumulative frequency	$(f_i \times x_i)$
48	4	4	192
50	3	7	150
52	2	9	104
54	2	11	108
58	1	12	58
	$N=\sum f_i=12$		$\sum (f_i \times x_i)=612$

$\text{Number of terms } \left(N\right) \text{ is } 12, \text{ which is an even number. Median } = \frac{1}{2}\left\{\left(\frac{N}{2}\right)\text{th observation} + \left(\frac{N}{2}+1\right)\text{th observation}\right\} \quad = \{6\,\text{th observation} -$

Hence, the median is 50, the mean is 51 and the mode is 48.