CHAPTER-14
STATISTICS
DAY 1

INTRODUCTION

In 9th class, we have discussed about ungrouped frequency distributions (Individual Series) with their graphical representation and their Quantitative values like **Arithmetic Mean, Median and Mode**. In 10th class we shall discuss these values under grouped frequency distributions which are **Discrete Series and Continuous Series.**

ARITHMETICE MEAN

Arithmetic mean or simply the mean of values of a variable is their sum divided by the number of values of the variable. It is usually denoted by $\bar{X}$. In 9th class, we have studied Arithmetic Mean by Individual Series, here we shall discuss in Discrete Series and Continuous Series.

***Discrete series*:**

Discrete series is a series having variable and frequency.

- We multiply the variables by their corresponding frequencies
- Add the products obtained.
- The sum, then is divided by the sum of the frequencies.
- The result obtained is the mean of the distribution.

i.e. $\bar{X} = \frac{\Sigma fx}{\Sigma f}$, $i = 1, 2, 3, \ldots \ldots \ldots, n$

1. Find the mean of the following :

x	20	30	40	50	70
f	20	15	10	10	5

Sol:-

x	f	fx
20	20	$20 \times 20 = 400$
30	15	$30 \times 15 = 450$
40	10	$40 \times 10 = 400$
50	10	$50 \times 10 = 500$
70	5	$70 \times 5 = 350$
Total	60	2100

$\therefore \bar{X} = \frac{\Sigma fx}{\Sigma f} = \frac{2100}{60} = \mathbf{35}$

2. The distribution of heights of 50 students measured in CMS is as under:

Height (in cms)	110	112	115	116	119	120	124
No. of students	5	4	8	10	6	7	10

Sol:

x	f	fx
110	5	$110 \times 5 = 550$
112	4	$112 \times 4 = 448$
115	8	$115 \times 8 = 920$
116	10	$116 \times 10 = 1160$
119	6	$119 \times 6 = 714$
120	7	$120 \times 7 = 840$
124	10	$124 \times 10 = 1240$
Total	50	5872

$$\bar{X} = \frac{\Sigma fx}{\Sigma f} = \frac{5872}{50} = 117.44$$

CONTINUOUS SERIES

In continuous series, frequency distribution table contains class and corresponding class frequencies. In this series we have 3 methods to find Arithmetic Mean:

- Direct Method
- Assumed Mean Method
- Step Deviation Method

Direct Method

In this method, we need such values who represents corresponding intervals of the given series, so it is supposed that **Mid Value** of the corresponding intervals represented by x

Mid-value of a class-interval $= \frac{\text{lower limit} + \text{upper limit}}{2}$

and Mean $\bar{X} = \frac{\Sigma fx}{\Sigma f}$

3. Calculate the mean of the following distribution by Direct Method.

Daily pocket Expenses	0-10	10-20	20-30	30-40	40-50	50-60
No. of Students	6	9	12	8	5	10

Sol:-

Class Intervals	f	Mid-values x	fx
0-10	6	$\left(\frac{0+10}{2}\right)=5$	$6\times5=30$
10-20	9	$\left(\frac{10+20}{2}\right)=15$	$9\times15=135$
20-30	12	$\left(\frac{20+30}{2}\right)=25$	$12\times25=30$
30-40	8	$\left(\frac{30+40}{2}\right)=35$	$8\times35=280$
40-50	5	$\left(\frac{40+50}{2}\right)=45$	$5\times45=225$
50-60	10	$\left(\frac{50+60}{2}\right)=55$	$10\times55=55$
Total	$\Sigma f=50$		$\Sigma fx=1520$

$$\bar{X}=\frac{\Sigma fx}{\Sigma f}=\frac{1520}{50}=30.4$$

4. Find the mean of the following distribution:

Class Interval	**15-25**	**25-35**	**35-45**	**45-55**	**55-65**	**65-75**	**75-85**
Frequency	**6**	**11**	**7**	**4**	**4**	**2**	**1**

Sol:-

Class-Interval	f	Mid-value x	fx
15-25	6	20	120
25-35	11	30	330
35-45	7	40	280
45-55	4	50	200
55-65	4	60	240
65-75	2	70	140
75-85	1	80	80
Total	N=$\Sigma f=35$		$\Sigma fx=1390$

$$\bar{X}=\frac{\Sigma fx}{\Sigma f}=\frac{1390}{35}=39.7\ (\text{app.})$$

5. Find the mean of the following distribution:

Class Interval	**10-30**	**30-50**	**50-70**	**70-90**	**90-110**	**110-130**
Frequency	**15**	**16**	**19**	**15**	**18**	**17**

Sol:-

Class-Interval	f	Mid-value x	fx
10-30	15	20	300

30-50	16	40	640
50-70	19	60	1140
70-90	15	80	1200
90-110	18	100	1800
110-130	17	120	2040
Total	N=$\Sigma f = 100$		$\Sigma fx = 7120$

$$\bar{X} = \frac{\Sigma fx}{\Sigma f} = \frac{7120}{100} = 71.2 \text{ (app.)}$$

6. Find the mean of the following distribution:

Class Interval	**10-25**	**25-40**	**40-55**	**55-70**	**70-85**	**85-100**
Frequency	**6**	**12**	**8**	**9**	**10**	**5**

Sol:-

Class-Interval	f	Mid-value x	fx
10-25	6	17.5	105.0
25-40	12	32.5	390.0
40-55	8	47.5	380.0
55-70	9	62.5	562.5
70-85	10	77.5	775.0
85-100	5	92.5	462.5
Total	N=$\Sigma f = 50$		$\Sigma fx = 2675.0$

$$\bar{X} = \frac{\Sigma fx}{\Sigma f} = \frac{2675}{50} = 53.5$$

EXERCISE

1. Find the mean of the following distribution:

Variable	12	15	18	20	24	30
Frequency	5	10	9	8	5	3

2. Find the mean of the following distribution:

x	15	20	25	30	35	40
f	16	12	18	19	10	5

3. Find the mean of the following distribution:

x	70	74	78	80	85	90
f	13	12	4	10	5	6

4. Ex 14.1, Do Q 1,2,4,6,7,9 with direct method.