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Page No.: 1.

Sub- Engg math.

Govt. poly. Dazbhangra.

Sem - I/II (Electrical, mech, etc) Statistics

Basic:-

Data — (1) Ungrouped data.

Class marks = $\frac{\text{Upper limit} + \text{Lower limit}}{2}$

$$= \frac{l_2 + l_1}{2} = \frac{u_1 + u_2}{2}$$

(2) Grouped data

(i) Discrete frequency distribution.

(ii) Continuous frequency distribution.

→ Measure of Central Tendency

Types of averages are:-

1. Arithmetic mean
2. Median
3. Mode
4. Geometric mean
5. Harmonic mean.

Mean (Arithmetic Mean).

Arithmetic mean of Raw data.

(A.) Direct method: If x_1, x_2, \dots, x_n are 'N' number of observations of a variable 'x',

Then the mean value

$$\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{\text{Total No. of observation}} = \frac{\sum_{i=1}^n x_i}{N}$$

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Ex. The monthly income of 10 employees in an office:
 2300, 2500, 3000, 3500, 1500, 2000, 2500, 2350, 2900
 3150 -

Soln. let \bar{x} = arithmetic mean

$$\therefore \bar{x} = \frac{\sum_{i=1}^n x_i}{N} = \frac{\sum_{i=1}^{10} x_i}{10} = \frac{x_1 + x_2 + \dots + x_{10}}{10}$$

$$\therefore \bar{x} = \frac{2300 + 2500 + 3000 + 3500 + 1500 + 2000 + 2500 + 2350 + 2900 + 3150}{10}$$

$$\therefore \bar{x} = \frac{25700}{10} = 2570 \text{ Rs.}$$

(B) Short Cut method: In this method we assume certain value of mean and then perform actual calculation of mean.

$$\therefore \bar{x} = A + \frac{\sum d_i}{N}$$

A = assumed mean

$$d_i = x_i - A$$

N = Total Number of observations.

Ex. Calculate mean of the data using short cut method.

11, 13, 16, 12, 14, 18, 19, 15.

Soln. The total number of observations = N = 8

The least value in the distribution = 11

The maximum value in the distribution = 19

\therefore The approximate centre = A = 15

$$\therefore d_i = x_i - A$$

| | | | | | | | | |
|-------|----|----|----|----|----|----|----|----|
| x_i | 11 | 13 | 16 | 12 | 14 | 18 | 19 | 15 |
| d_i | -4 | -2 | 1 | -3 | -1 | 3 | 4 | 0 |

$$\therefore \sum d_i = -4 - 2 + 1 - 3 - 1 + 3 + 4 = -2$$

$$\begin{aligned} \therefore \bar{x} &= A + \frac{\sum d_i}{N} \\ &= 15 - \frac{2}{8} \\ &= 15 - 0.25 \\ &= 14.75. \end{aligned}$$

mean of ungrouped data.

(A.) Direct method: let x be variate and f be the frequency.

let x_1, x_2, \dots, x_n value of variate x be distribution with frequencies $f_1, f_2, f_3, \dots, f_n$ say.

$$\text{Then, mean} = \bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{\sum f_i x_i}{N}$$

$N = \sum f_i = \text{Total Number of observation.}$

Ex: Calculate mean of following distribution

| | | | | | |
|-------|----|----|----|----|----|
| x_i | 1 | 3 | 5 | 7 | 9 |
| f_i | 14 | 23 | 27 | 21 | 15 |

Solu:

| x_i | f_i | $f_i x_i$ |
|-------|-------|-----------|
| 1 | 14 | 14 |
| 3 | 23 | 69 |
| 5 | 27 | 135 |
| 7 | 21 | 147 |
| 9 | 15 | 135 |

$$\text{mean} = \bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{500}{100}$$

$$\bar{x} = 5$$

Maharaza

$$\sum f_i = 100 \quad \sum f_i x_i = 500$$