MEASURES OF AVARAGES

EXERCISE - 5

1) Explain what is meant by central tendency of data. what are the common means central tendency. ?

A measure of central tendency is a summary means that attempts to describe a whole set of data with a single value that represent the middle or centre of its distribution.

The common means of central tendency are

1. Arithmetic mean
2. Arithmetic median
3. Arithmetic mode.

2. Discuss mean, median & mode & discuss their merits and demerits.

Arithmetic mean.

It is obtained by dividing the sum of observations by no of observations.

$$\bar{x} = \frac{\Sigma x}{n}$$

Merits

- Easy to understand & to calculate
- it is rigidly defined

Demerits

- Affected by extreme values (either low or high)
- it cannot be obtained even if a single value is missing.

Arithmetic Median

it is a positional average and referred to the middle value in a distribution. It divides the series into two two ways be first arranging the items in ascending / descending order of magnitude then locating the middle value

The no of observations = N

If N is an odd $\left(\frac{N+1}{2}\right)^{th}$ item

If N is an even $\left(\frac{N}{2}^{th}\right)$ & $\left(\frac{N}{2}+1\right)^{th}$ item

4. Define Geometric Mean & Harmonic Mean & mention their uses.

G.M

G.M is a set of N values of the same type is the n^{th} root of product of numbers

If $x_1, x_2, x_3 \ldots x_n$ denote a given set of 'n' observations

thus the geometric mean is given by

$$G.M = (x_1 . x_2 ... x_n)^{1/n}$$

if f is the frequency

$$GM = (x_1^{f_1} . x_2^{f_2} ... x_n^{f_n})^{1/n}$$

It is used in finance to calc. average growth rates and is referred to as the compound annual growth rate.

Harmonic Mean

It is defined as the reciprocal of the Arithmetic mean of the reciprocal of the given values.

$$H.M = \frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + ... + \frac{1}{x_n}}$$

it is used to find multiplicative or divisional relationships b/w fractions without worrying about common denominators.

80

Arithmetic Mean

Merits

- it is not affected by extreme values
- it can be easily worked even if the diff intervals in the series are unequal

Demerits

- it doesn't take into Account the actual value of item in the series.

Arithmetic mode

it refers to the most frequently occurry value in the data set.

$$\text{Mode} = l + \left(\frac{fi - fo}{2fi - fo - f_2} \right) \times c$$

Merits

- it is comparatively easy to understand
- it can be found graphically

Demerits

- it is not suitable for further mathematical functions.
- it is an unstable measure as it is affected to more by sampling fluctuations

6. Define Quartiles of distribution.

In a sample or dataset, the quartiles divide the data into four groups with equal no of observations
In a probability distribution the quartile divide the distribution range into four intervals with equal probability.

7. State the empirical relation b/w the averages.

ans: If the mode of frequency distribution cannot be determined it can be approximately evaluated by the following empirical Relationship.

Mode = 3 Median - 2 Mean
Mean - Mode = 3 Mean - 3 Median

8) The weekly wages of 10 workers are 25, 30, 32, 40, 41, 47, 48, 50, 55, 65. find the average wage per week

Avg = $\frac{25+30+32+40+41+47+48+50+55+65}{10}$

= 43.3

a) The following are the weights of 30 college students in kg. find the arithmetic mean.

49 52 44 85 46 49 41 48 54
50 40 42 39 52 48 39 45
37 44 48 41 47 38 46 49
52 49 50 51 44

Sol: $49+52+44+40+41+42+47+38+55+52+46+46+48+45+39+52+41+45+49+48+37+50+54+44+57+$

$$\bar{x} = \frac{50+48+44}{30}$$

$$= 46.5$$

b) Find the A.M from the following data.

Weights in(kgs) :	35	40	45	50	55	60
No of men :	12	18	24	16	6	4

Sol)

x	f	xf
35	12	420
40	18	720
45	24	1080
50	16	800
55	6	330
60	4	240
	80	3590

$\Sigma f_i = 80$

$\Sigma f_i x_i = 3590$

$$A.M = \frac{\Sigma x_i f_i}{\Sigma f_i}$$

$$= \frac{3590}{80} = 44.875$$

18. 8th

Q) Cal: the A M from the following frequency distribution

Age:	20-25	25-30	30-35	35-40	40-45	45-50
No of persons:	110	110	80	45	40	35

Age	f	Mid x	fx
20-25	110	22.5	2475
25-30	110	27.5	3025
30-35	80	33.5	2680
35-40	45	37.5	16875
40-45	40	42.5	1700
45-50	35	47.5	1662.5
	420		13230

$$AM = \frac{\Sigma xf}{\Sigma f} = \frac{13230}{420} = 31.5$$

~~[illegible]~~

Q. find the A.M from the following frequency distribution

Class:	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
	3	7	13	17	23	27	18	12	6	4

Class	f		
5-10.5	3	5.5	16.5
10.5-20.5	7	15.5	108.5
20.5-30.5	13	25.5	331.5
30.5-40.5	17	35.5	603.5
40.5-50.5	23	45.5	1046.5
50.5-60.5	27	55.5	1498.5
60.5-70.5	18	65.5	1179
70.5-80.5	12	75.5	906
80.5-90.5	6	85.5	513
90.5-100.5	4	95.5	382
	130		6585

$$A.M = \frac{\Sigma fx}{\Sigma f} = \frac{6585}{130} = 50.65$$

Q. find the A.M for the following distribution.

Marks	No of Students
Below 10	5
10-20	12
20-30	25
30-40	45
40-50	70
50-60	80
60-70	88
70-80	92
80-90	96
90-100	100

Marks	No of students	Mid x	Mid x	xf
0-10	5	5	5	25
10-20	12	15	15	180
20 30	25	25	25	625
30-40	45	35	35	1525
40 50	70	45	45	3150
50-60	80	70	55	4400
60-70	88	80	65	5720
70 80	92	88	75	6900
80-90	96	92	85	8160
90-100	100	96	95	9500
	613	613		40235

$$AM = \frac{\Sigma fx}{\Sigma f} = \frac{40235}{613} = 65.63$$