(2) Discrete Series or Frequency Array and Mean Deviation.

following steps may be noted in the calculation of mean deviation for the discrete series:

(i) Find out central tendency of the series from which deviation are to be taken.

(ii) Deviation of different items in the series are taken from central tendency, and sign (+) or (-) of the deviation are ignored. It is expressed as $|dx|$ or $|dm|$.

(iii) Each deviation value is multiplied by the frequency facing it, and the sum of these multiples is obtained. This is expressed as $\Sigma f|d|$.

(4.) $\Sigma f|d|$ is divided by the sum of total frequency, that is Σf or N. The resultant value would be mean deviation.

Thus,

$$MDm = \frac{\Sigma f|dm|}{N}$$

Illustration: Using median and arithmetic mean respectively, calculate mean deviation and its coefficient from following data.

Size	5	6	7	8	9	10	11	12	13
freq	4	5	6	7	8	9	10	11	12

Soln.

Calculation of Mean deviation from Median.

Size of items (x)	frequency f	cf	$\lvert d_m \rvert = \lvert x - m \rvert$, $m = 10$	Multiple of Deviation as the corresponding frequency. $f\lvert d_m \rvert$
5	4	4	5	20
6	5	9	4	20
7	6	15	3	18
8	7	22	2	14
9	8	30	1	8
10	9	39	0	0
11	10	49	1	10
12	11	60	2	22
13	12	72	3	36
	$N = 72$			$\Sigma f\lvert d_m \rvert = 148$

(a) Median = Size of $\frac{N+1}{2}$ th items.

$= \frac{72+1}{2}$ th item $= \frac{73}{2} = 36.5$

$= 10$.

(b) Mean deviation from Median

$$MD_m = \frac{\Sigma f\lvert d_m \rvert}{N} = \frac{148}{72} = 2.05$$

Coefficient of Mean Deviation from Median.

$$\frac{MD_m}{M} = \frac{2.05}{10} = 0.205$$

Calculation of Mean Deviation from Mean

$\bar{x} = 9.83$

x	f	fx	dx	$f\|dx\|$
5	4	20	4.83	19.32
6	5	30	3.83	19.15
7	6	42	2.83	16.98
8	7	56	1.83	12.81
9	8	72	0.83	6.64
10	9	90	0.17	1.53
11	10	110	1.17	11.70
12	11	132	2.17	23.87
13	12	156	3.17	38.04
	N = 72	Σfx = 708		Σf|dx| = 150.04

(a) $\bar{x} = \frac{\Sigma fx}{N} = \frac{708}{72} = 9.83$

(b) Mean Deviation from $\bar{x}$

$= MD_{\bar{x}} = \frac{\Sigma f|dx|}{N} = \frac{150.04}{72}$

$= 2.08$

(c) Coefficient of M.D. from Mean.

$\frac{MD_{\bar{x}}}{\bar{x}} = \frac{2.08}{9.83} = 0.21$