ONE SHOT REVISION

Chp14 Central Tendency and Dispersion

CA FOUNDATION DEC 2023

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Chapter 14

Measures of Central Tendency and Dispersion

Past Trends

Attempt	Theory	Practical	Total
May 2018	4	3	7
Nov 2018	2	10	12
Jun 2019	3	9	12
Nov 2019	7	10	17
Nov 2020	5	4	9
Jan 2021	5	4	9
Jul 2021	1	11	12
Dec 2021	5	6	11
Jun 2022	3	6	9
Dec 2022	3	13	16
June 2023	0	15	15

Central Tendency - Basics

Meaning	• Central Tendency is the **tendency** of a given set of observations to **cluster** around a single **central or middle value.** • The **single value** that **represents** the given set of observations is described as a measure of central tendency.
Different Measures of Central Tendency	• Arithmetic Mean (AM) • Median (Me) • Mode (Mo) • Geometric Mean (GM) • Harmonic Mean (HM)
Types of Formula based Questions	• Discrete Observations • Simple Frequency Distribution • Grouped Frequency Distribution

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Arithmetic Mean

Discrete Observations	$\bar{x} = \frac{x_1 + x_2 + x_3 + ... + x_n}{n}$ $\quad$ $\bar{x} = \frac{\sum x}{n}$
Frequency Distribution	$\bar{x} = \frac{\sum fx}{N}$ In case of simple frequency distribution: x = individual values In case of grouped frequency distribution: x = mid-point of class intervals N = total number of observations: $N = \sum f$
Assumed Mean / Step-Deviation Method	AM using assumed mean / step deviation method $\bar{x} = A + \frac{\sum fd}{N} \times C$ where $d = \frac{x - A}{C}$, A is assumed mean, C is class length
Property 1	If all the observations are constant, AM is also constant
Property 2	the algebraic sum of deviations of a set of observations from their AM is zero
Property 3	AM is affected both due to change of origin and scale If $y = a + bx$ then $\bar{y} = a + b\bar{x}$
Property 4	Combined AM $\quad \bar{x}_c = \frac{n_1\bar{x}_1 + n_2\bar{x}_2}{n_1 + n_2}$
General Review	• AM is best measure of central tendency • AM is based on all observations • AM is affected by sampling fluctuations • AM is amenable to mathematical property • AM cannot be used in case of open end classification

ICAI SM, MTP Nov 20

(1) A Two variables assume the values 1,2, 3,.. 5 with frequencies as 1, 2, 3, ..5 , then what is the AM ?

a. 11/3 b. 15/8
c. 4.86 d. 10

PYQ May 18

(2) A If each item is reduced by 15 A. M is

a. Reduced by 15
b. Increased by 15
c. Reduced by 10
d. None of these

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PYQ Jun 23

(3) B *Find the mean of the following data*

Class interval	*Frequency*
10-20	*9*
20-30	*13*
30-40	*6*
40-50	*4*
50-60	*6*
60-70	*2*
70-80	*3*

a. 23.7 *b. 35.7*
c. 39.7 *d. 43.7*

PYQ Nov. 18

(4) C *The mean of 20 items of a data is 5 and if each item is multiplied by 3, then the new mean will be*

a. 5 *b. 10*
c. 15 *d. 20*

MTP May 19, ICAI SM

(5) C *If the relationship between two variables u and v are given by 2u + v + 7 = 0 and if the AM of u is 10, then the AM of v is*

a. 17 *b. -17*
c. -27 *d. 27*

PYQ Nov. 18

(6) B *The algebraic sum of the deviation of a set of values from their arithmetic mean is*

a. >0 *b. = 0*
c. <0 *d. None of these*

MTP Oct 21

(7) C *Pooled Mean is also called*

a. Mean
b. Geometric Mean
c. Grouped Mean
d. none

MTP Nov 19, ICAI SM

(8) A *The average salary of a group of unskilled workers is Rs.10,000 and that of a group of skilled workers is Rs.15,000. If the combined salary is Rs.12,000, then what is the percentage of skilled workers?*

a. 40% *b. 50%*
c. 60% *d. None of these*

				MTP Nov 21
(9)	*At ABC ltd, the average age of employees is 36. Average age of male employees is 38 and that of females is 32. Find the ratio of female to male in the company.*			
C	*a.*	*1:3*	*b.*	*2:1*
	c.	*1:2*	*d.*	*3:1*
				PYQ June 19
(10)	*The AM of 15 observation is 9 and the AM of first 9 observation is 11 and then AM of remaining observation is*			
B	*a.*	*11*	*b.*	*6*
☆	*c.*	*5*	*d.*	*9*
				PYQ June 22
(11)	*When each value does not have equal importance then*			
D	*a.*	*A M*		
	b.	*G M*		
	c.	*H M*		
	d.	*Weighted Average*		
				PYQ June 22
(12)	*The mean of 20 observation is 38. If two observation are taken as 84 and 36 instead of 48 and 63 find new means.*			
C	*a.*	*38.45*	*b.*	*41.15*
☆	*c.*	*37.55*	*d.*	*40.05*
				MTP Nov 19
(13)	*The average weight of 8 person increases by 1.5 kg, if a person weighing 65 kg replaced by a new person, what would be the weight of the new person?*			
C	*a.*	*76 kg*	*b.*	*80 kg*
☆	*c.*	*77 kg*	*d.*	*None of these*

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Median

Discrete Observations	• If n = odd, then middle term • If n = even, average of two middle terms
Simple Frequency Distribution	• First make column of less than cumulative frequency • Apply same formula as discrete
Grouped Frequency Distribution	Median in case of grouped frequency distribution

Step 1	Prepare a less than type cumulative frequency distribution
Step 2	Calculate $\frac{N}{2}$ and check between which class boundaries it falls and call it as Median Class
Step 3	l_1: LCB of Median Class; N_u: Cum Freq. of Median Class; N_l: Cum. Freq. of Pre-Median Class; C: Class length of Median Class
Step 4	Apply Formula $Me = l_1 + \left(\frac{\frac{N}{2} - N_l}{N_u - N_l}\right) \times C$

Property 1	For a set of observations, the sum of absolute deviations is minimum, when the deviations are taken from the median. $\sum \lvert x - Me \rvert$ is minimum
Property 2	Median is also affected by both change of origin and scale.
General Review	• Median is also called as positional average • Median is not based on all observations • Median is not affected by sampling fluctuations • Median is best measure of central tendency in case of open-end classification

PYQ Jun 23

(14) B For a given data set: 5, 10, 3, 6, 4, 8, 9, 3, 15, 2, 9, 4, 19, 11, 4; what is the median?

a. 8 b. 6
c. 4 d. 9

PYQ Nov. 18

(15) A The median of the data 5, 6, 7, 8, 9, 10, 11, 12, 15, 18, 18 and 19 is

a. 10.5 b. 10
c. 11 d. 11.5

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PYQ June 19

(16) ***C*** *For the distribution*

x	1	2	3	4	5	6
f	6	9	10	14	12	8

The value of median is

a. 3.5 *b.* 3

c. 4 *d.* 5

PYQ Nov. 19

(17) ***B*** *Find the median of the following:*

Class	0-10	10-20	20-30	30-40	40-50
Freq.	5	15	28	10	2

a. 10.57 *b.* 23.57

c. 25 *d.* None of these

ICAI SM

(18) ***D*** *Find the median of the following:*

Marks	5-14	15-24	25-34	35-44	45-54	55-64
Freq.	10	18	32	26	14	10

a. 28 *b.* 30

c. 33.69 *d.* 32.94

MTP Nov 19

(19) ***C*** *For open-end classification, which of the following is the best measure of central tendency?*

a. AM *b.* GM

c. Median *d.* Mode

Partition Values

Meaning

- *These may be defined as **values dividing** a given **set of observations** into number of **equal parts***
- *When we want to divide the given set of observations into two equal parts, we consider median, similarly there are quartiles, deciles, percentiles*

Name of PV	***No. of equal parts***	***No. of PVs***	***Symbol***
Median	2	1	Me
Quartile	4	3	Q_1, Q_2, Q_3
Decile	10	9	$D_1, D_2, ..., D_9$
Percentile	100	99	$P_1, P_2, ..., P_{99}$

Formula – Discrete Observations

- *Rank Calculation* $(n+1)p^{th}$ *term*
- *Value of p depends on partition value*

#	Median	Quartile	Decile	Percentile
First	1/2	1/4	1/10	1/100
Second		2/4	2/10	2/100
…				
Last		3/4	9/10	99/100

Quartiles Grouped FD

Quartiles in case of Grouped Frequency Distribution: Steps are like median with few modifications.

1^{st} Quartile	3^{rd} Quartile
Find Q_1 class using $\frac{N}{4}$	Find Q_3 class using $\frac{3N}{4}$
$Q_1 = l_1 + \left(\frac{\frac{N}{4} - N_l}{N_u - N_l}\right) \times C$	$Q_3 = l_1 + \left(\frac{\frac{3N}{4} - N_l}{N_u - N_l}\right) \times C$

Deciles Grouped FD

Deciles in case of Grouped Frequency Distribution: Steps are like median with few modifications.

1^{st} Decile	9^{th} Decile
Find D_1 class using $\frac{N}{10}$	Find D_9 class using $\frac{9N}{10}$
$D_1 = l_1 + \left(\frac{\frac{N}{10} - N_l}{N_u - N_l}\right) \times C$	$D_9 = l_1 + \left(\frac{\frac{9N}{10} - N_l}{N_u - N_l}\right) \times C$

Percentiles Grouped FD

Percentiles in case of Grouped Frequency Distribution: Steps are like median with few modifications.

1^{st} Percentile	99^{th} Percentile
Find P_1 class using $\frac{N}{100}$	Find P_{99} class using $\frac{99N}{10}$
$P_1 = l_1 + \left(\frac{\frac{N}{100} - N_l}{N_u - N_l}\right) \times C$	$P_{99} = l_1 + \left(\frac{\frac{99N}{10} - N_l}{N_u - N_l}\right) \times C$

MTP May 19

(20) *What is the value of the first quartile for observations 15, 18, 10, 20, 23, 28, 12, 16?*

C *a. 17* *b. 16*
c. 12.75 *d. 12*

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PYQ June 22

(21) B *The 3rd decile for the numbers 15,10, 20, 25, 18, 11, 9, 12 is*

a. 13 *b.* 10.70
c. 11.00 *d.* 11.50

MTP Nov 21

(22) B *Find D_6 for the following observations. 7, 9, 5, 4, 10, 15, 14, 18, 6, 20*

a. 11.40 *b.* 12.40
c. 13.40 *d.* 13.80

ICAI SM

(23) A *The third quartile and 65th percentile for the following data are*

Profits	<10	10-19	20-29	30-39	40-49	50-59
No. of firms	5	18	38	20	9	2

a. 33.5 & 29.184 *b.* 33 & 28.68
c. 33.6 & 29 *d.* 33.25 & 29.25

Mode

Meaning	*Mode is the **value** that **occurs the maximum** number of times*
Special Thing about Mode	• *If two or more observations are having maximum frequency then there are **multiple modes** [multimodal distribution]* • *If there are **exactly two** modes then distribution is called as **Bimodal** Distribution* • *If all observations are having same frequency then distribution has **no mode*** • *We can say that Mode is **not rigidly defined***
Grouped Frequency Distribution	• *Find Modal Class: Class with highest frequency and obtain below values* f_{-1}: *frequency of pre modal class*; f_0: *frequency of the modal class*; f_1: *frequency of the post modal class* • *Apply Formula* $$Mo = l_1 + \left(\frac{f_0 - f_{-1}}{2f_0 - f_{-1} - f_1}\right) \times C$$
Property 1	*If all the observations are constant, mode is also constant*
Property 2	*Mode is also affected both due to change of origin and scale*
General Review	• *Mode is not based on all observations* • *Mode is not rigidly defined* • *Mode is not amenable to Mathematical Property*

PYQ Nov. 19

(24) **B** *Find the mode of the following:*

0-10	10-20	20-30	30-40	40-50	50-60
7	14	22	34	20	19

a. 32 *b.* 34.61
c. 25.42 *d.* 35

PYQ Jan. 21

(25) **C** ☆ *From the record on sizes of shoes sold in a shop, one can compute the following to determine the most preferred shoe size.*

a. Mean *b.* Median
c. Mode *d.* Range

MTP Oct 21

(26) **B** *If x and y are related by x–y–10 = 0 and mode of x is known to be 23, then the mode of y is*

a. 20 *b.* 13
c. 3 *d.* 23

MTP June 2023 Series I

(27) **C** *Mode is:*

a. Least frequent value
b. Middle Most value
c. Most frequent Value
d. None of these

Relationship between Mean, Median and Mode

In case of Symmetric Distribution	***Mean = Median = Mode***
In case of Moderately Skewed Distribution (Empirical relationship)	***Mean – Mode = 3 (Mean – Median)*** ***OR Mode = 3 Median – 2 Mean***

PYQ May 18

(28) **D** *Relation between mean, median and mode is*

a. mean-mode = 2 (mean-median)
b. mean-median = 3 (mean-mode)
c. mean-median = 2 (mean-mode)
d. mean-mode = 3 (mean-median)

PYQ Nov. 18

(29) **A** *If in a moderately skewed distribution, the values of mode and mean are 32.1 and 35.4 respectively, then the value of the median is*

a. 34.3 *b.* 33.3
c. 34 *d.* 33

PYQ June 19

(30) *For a symmetric distribution*

A

a. *Mean = Median = Mode*

b. *Mode = 3 Median = 2 Mean*

c. $Mode = \frac{1}{3}\ Median = \frac{1}{2}\ Mean$

d. *None of these*

PYQ Dec. 21

(31) *For a moderately skewed distribution the median is twice the mean, then the mode is* _____ *times the median.*

B ☆

a. 3 b. 2

c. 2/3 d. 3/2

MTP June 22

(32) *If the difference between mean and mode is 33, then the difference between Mean and Median will be* _____

C ☆

a. 63 b. 31.5

c. 11 d. None of these

Geometric Mean

Definition	*For a given set of n* ***positive observations****, the geometric mean is defined as the* n^{th} *root of the product of the observations*
Formula – Discrete	$G = \left(x_1 \times x_2 \times ... \times x_n\right)^{1/n}$
Formula – Frequency Distribution	$G = \left(x_1^{f_1} \times x_2^{f_2} \times ... \times x_n^{f_n}\right)^{1/N}$
Property 1	*Logarithm of G for a set of observations is the AM of the logarithm of the observations* $\log G = \frac{1}{n}\sum \log x$
Property 2	*If all the observations are constant, GM is also constant*
Property 3	*If* $z = xy$, *then* $GM\ of\ z = GM\ of\ x \times GM\ of\ y$
Property 4	*If* $z = x/y$, *then* $GM\ of\ z = \frac{GM\ of\ x}{GM\ of\ y}$

PYQ Nov. 18

(33) *The Geometric mean of 3, 6, 24 and 48 is*

B

a. 8 b. 12

c. 24 d. 6

MTP Nov 18

(34) *The Geometric mean of the series* $1, k, k^2, k^3, ..., k^n$ *where k is constant is*

A ☆

a. $k^{\frac{(n+1)}{2}}$ *b.* $k^{n+0.5}$

c. k^{n+1} *d.* k^{n+2}

MTP March 21

(35) *G.M is a better measure than others when,*

☆

A

a. Ratios and percentages given

b. Interval of scale is given

c. Both (a) and (b)

d. Either (a) or (b)

MTP Nov 21

(36) ***C*** ☆ *If the rates return from three different shares are 100%, 200% and 400% respectively. The average rate of return will be.*

a. 350% *b. 233.33%*

c. 200% *d. 300%*

Harmonic Mean

Definition	*For a given set of* ***non-zero*** *observations, harmonic mean is defined as the* ***reciprocal of the AM of the reciprocals of the observation***
Formula – Discrete	$H = \frac{n}{\Sigma(\frac{1}{x})}$
Formula – Frequency Distribution	$H = \frac{N}{\Sigma(\frac{f}{x})}$
Property 1	*If all observations are constant HM is also constant*
Property 2	$Combined\ HM = \frac{n_1 + n_2}{\frac{n_1}{H_1} + \frac{n_2}{H_2}}$

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PYQ Nov. 20

(37) C ☆ *Given the weights for the numbers 1, 2, 3 …….n are respectively $1^2, 2^2, 3^2 \ldots\ldots\ldots n^2$ then weighted HM is_____*

a. $\frac{2n+1}{4}$

b. $\frac{2n+1}{6}$

c. $\frac{2n+1}{3}$

d. $\frac{2n+1}{2}$

PYQ Nov. 20

(38) B ☆ *The harmonic mean A and B is 1/3 and harmonic mean of C and D is 1/5. The harmonic mean of ABCD is*

a. 8/15 *b.* 1/4

c. 1/15 *d.* 5/3

MTP May 18

(39) B *A man travels from Delhi to Agra at an average speed of 30km per hour and back at an average speed of 60 km per hour. What's the average Speed.*

a. 48 km/hr *b.* 40 km/hr

c. 45 km/hr *d.* 35 km/hr

MTP Nov 20

(40) A *If there are two groups with 75 and 65 as harmonic means containing 15 and 13 observation, then combined HM is given by*

a. 70 *b.* 72.25

c. 78 *d.* 76

Use of GM and HM

Both	*Both are used for calculating average rates*
GM	*Appropriate for rates having percentages*
HM	*Appropriate for rates other than percentages*

Relationship between AM, GM, and HM

Relation	***Scenario***	***Relation***
	When all the observations are same	$AM = GM = HM$
	When observations are distinct	$AM > GM > HM$
	In question is silent	$AM \geq GM \geq HM$

Special Relation	*If there are only two observations:* $AM \times HM = (GM)^2$

MTP May 19

(41) *Which of the following results hold for a set of distinct positive observations?*

C *a.* $AM \geq GM \geq HM$
b. $HM \geq GM \geq AM$
c. $AM > GM > HM$
d. $GM > AM > HM$

PYQ Nov. 20

(42) *If the AM and HM of two numbers are 6 and 9 respectively, then GM is*

A *a. 7.35* *b. 8.5*
c. 6.75 *d. None of these*

Weighted Average

When to use	*If the observations are not of equal importance and we need to treat observations according to their hierarchical importance, then we use Weighted Average*
Formulas	*Weighted AM:* $\frac{\sum wx}{\sum w}$ *Weighted GM:* $\left(x_1^{w_1} \times x_2^{w_2} \times x_3^{w_3} \times \ldots \times x_n^{w_n}\right)^{\frac{1}{\sum w}}$ *Weighted HM:* $\frac{\sum w}{\sum\left(\frac{w}{x}\right)}$

Measures of Dispersion

Meaning of Measure of Dispersion	• *Dispersion for a given set of observations may be defined as* • *the* ***amount of deviation*** *of the observations,* • *usually, from an* ***appropriate*** *measure of* ***central tendency***

Types of Measure of Dispersion	*Absolute Measures of Dispersion*	• *These are with units* • *These are not useful for comparison of two variables with different units.* • *Example: Range, Mean Deviation, Standard Deviation, Quartile Deviation*
	Relative Measures of Dispersion	• *These are unit free measures* • *These are useful for comparison of two variables with different units.* • *Example: Coefficient of Range, Coefficient of Mean Deviation, Coefficient of variation, Coefficient of Quartile Deviation*

Range

Discrete – Formula	$L - S$ *where L: Largest Observation, S: Smallest Observation*
Grouped Frequency Distribution – Formula	$L - S$ *where Largest Observation = **UCB** of last class interval, Smallest Observation = **LCB** of first-class interval*
Coefficient of Range	$\frac{L-S}{L+S} \times 100$
Property 1	• ***Not affected** by change of **origin*** • *Affected by **change of scale (only value)*** • ***No impact of sign** of change of scale* • *Note: **Measure of Dispersion can never be negative***
General Review	• *Not Based on All Observations* • *Easy to Compute*

h ***MTP May 19 Series II***

(43) *The range of 15, 12, 10, 9, 17, 30 is*

D *a. 5* *b. 12*

c. 13 *d. 21*

MTP Mar 21, MTP Apr 21

(44) *What is the coefficient of range for the following distribution?*

D

Class	*10-19*	*20-29*	*30-39*	*40-49*	*50-59*
Freq.	*11*	*25*	*16*	*7*	*3*

a. 22 *b. 50*

c. 75.82 *d. 72.46*

PYQ July 21

(45) D *If the relationship between x and y is given by 2x + 3y = 10 and the range of y is 10, then what is the range of x?*

a. 10 *b. 18*
c. 8 *d. 15*

PYQ Nov. 18

(46) C *If the range of a set of values is 65 and maximum value in the set is 83, then the minimum value in the set is*

a. 74 *b. 9*
c. 18 *d. None of these*

Mean Deviation

Meaning	• *Mean deviation is defined as the* • ***arithmetic mean*** *of the* • ***absolute deviations*** *of the observations* • *from an* ***appropriate measure*** *of central tendency*
Formula – Discrete	$MD_A = \frac{1}{n}\Sigma \lvert x - A \rvert$ *where, A = Appropriate Central Tendency Measure*
Formula – Frequency Distribution	$MD_A = \frac{1}{N}\Sigma f \lvert x - A \rvert$
Coefficient of Mean Deviation	*Coefficient of Mean Deviation:* $\frac{\text{Mean Deviation about } A}{A} \times 100$
Property 1	*Mean Deviation takes its* ***minimum value*** *when deviations are taken from* ***Median***
Property 2	*Change of Origin –* ***No Affect****, Change of Scale –* ***Affect of value not sign***
General Review	• *Based on* ***all observations*** • *Improvement over Range* • ***Difficult to compute*** • ***Not amenable to Mathematical Property*** *because of usage of* ***Modulus***

PYQ July 21

(47) C *The mean deviation of the numbers 3, 10, 6, 11, 14, 17, 9, 8, 12 about the mean is (correct to one decimal place):*

a. 8.7 *b. 4.2*
c. 3.1 *d. 9.8*

PYQ June 22

(48) *Mean Deviation of data 3, 10, 10, 4, 7, 18, 5 from mode is*

C *a. 4.39* *b. 4.70*

c. 4.14 *d. 5.24*

ICAI SM

(49) *Mean Deviation of data 82, 56, 75, 70, 52, 80, 68 from median is*

C *a. 16.49* *b. 12.45*

c. 87.14 *d. 78.45*

MTP Dec 22 – Series I

(50) *Which measure of dispersion is based on the absolute deviation only?*

C *a. Range*

b. Standard Deviation

c. Mean Deviation

d. Quartile Deviation

ICAI SM

(51) *What is the mean deviation about median for the following data?*

D

x	3	5	7	9	11	13	15
f	2	8	9	16	14	7	4

a. 2.50 *b. 2.46*

c. 2.43 *d. 2.37*

Standard Deviation

Meaning	• *Improvement over Mean Deviation* • *It is defined as the* ***root mean square deviation*** *when the deviations are taken from the AM of the observations*
Formula – Discrete	$\sigma_x = SD_x = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n}}$ $\sigma_x = SD_x = \sqrt{\frac{\Sigma x^2}{n} - (\bar{x})^2}$
Formula – Frequency Distribution	$\sigma_x = SD_x = \sqrt{\frac{\Sigma f(x-\bar{x})^2}{N}}$ $\sigma_x = SD_x = \sqrt{\frac{\Sigma fx^2}{N} - (\bar{x})^2}$
Coefficient of Variation	$\frac{SD_x}{\bar{x}} \times 100$
SD for any two numbers	$SD = \frac{Range}{2}$
SD for first n natural numbers	$s = \sqrt{\frac{n^2-1}{12}}$

Property 1	*If all the observations are constant, SD is **ZERO***
Property 2	*No effect of change of origin but affected by change of scale in the magnitude (ignore sign)*
Property 3	$SD_c = \sqrt{\frac{n_1 s_1^2 + n_2 s_2^2 + n_1 d_1^2 + n_2 d_2^2}{n_1 + n_2}}$ $d_1 = \bar{x}_c - \bar{x}_1, d_2 = \bar{x}_c - \bar{x}_2$

PYQ Nov. 18

(52) B *Standard Deviation for the marks obtained by a student in monthly test in mathematic (out of 50) as 30, 35, 25, 20, 15 is*

a. 25 *b.* $\sqrt{50}$

c. $\sqrt{30}$ *d.* 50

PYQ June 19

(53) D *S.D of first five consecutive natural numbers is*

a. $\sqrt{10}$ *b.* $\sqrt{8}$

c. $\sqrt{3}$ *d.* $\sqrt{2}$

PYQ Nov. 19

(54) D *SD from numbers 1, 4, 5, 7, 8 is 2.45. If 10 is added to each then SD will be:*

a. 12.45

b. 24.5

c. 12

d. Will not change

PYQ June 22

(55) C *Find the standard deviation and coefficient of variation for. 1, 9, 8, 5, 7*

a. 2.828, 49.32 *b.* 2.828, 48.13

c. 2.828, 47.13 *d.* 2.828, 50.13

PYQ Dec 22

(56) C *If the sum of square of the values equals to 3390, Number of observations are 30 and Standard deviation is 7, what is the mean value of the above observations?*

a. 14 *b.* 11

c. 8 *d.* 5

MTP May 18

(57) C *If the mean and SD of X are a and b respectively, then the S.D of* $\frac{x-a}{b}$ *is*

a. a/b *b.* -1

c. 1 *d.* ab

MTP May 19 Series II

(58) **C** *If the profits of a company remain the same for the last ten months, then the standard deviation of profits for these ten months would be?*

a. *positive*
b. *negative*
c. *zero*
d. *A or C*

ICAI SM, MTP May 19 Series II

(59) **C** *If x and y are related by y = 2x+ 5 and the SD and AM of x are known to be 5 and 10 respectively, then the coefficient of variation of y is*

a. *25* *b.* *30*
c. *40* *d.* *20*

MTP Nov 19

(60) **A** *If the values of all observations are equal then the Standard Deviation of the given observations is*

a. *0* *b.* *2*
c. *1* *d.* *None of these*

MTP March 21

(61) **C** ☆ *The sum of squares of deviation from mean of 10 observations is 250. Mean of the data is 10. Find the coefficient of variation*

a. *10%* *b.* *25%*
c. *50%* *d.* *0%*

hv ***MTP Dec 22 – Series I***

(62) **C** ☆ *What is the SD of the following series :*

Meas.	*0-10*	*10-20*	*20-30*	*30-40*
Freq.	*1*	*3*	*4*	*2*

a. *81* *b.* *7.6*
c. *9* *d.* *2.26*

Quartile Deviation

Formula	$QD_x = \frac{Q_3 - Q_1}{2}$
Calculation	*Quartiles are calculated same as we studied in Central Tendency*
Coefficient of Quartile Deviation	$\frac{Q_3 - Q_1}{Q_3 + Q_1} \times 100$
General Review	• *It is the **best measure** of dispersion for **open-end** classification* • *It is also **less affected** due to sampling fluctuations* • *Like other measures of Dispersion, **QD** is also not affected by change of origin but affected by scale ignoring sign*

Relationship between SD, MD and QD	$4SD = 5MD = 6QD$ *or* $SD : MD : QD = 15 : 12 : 10$

					MTP May 19
(63)	*The quartiles of a variable are 45, 52 and 65 respectively. Its quartile deviation is*				
A	*a.*	*10*	*b.*	*20*	
	c.	*25*	*d.*	*8.30*	
					PYQ June 23
(64)	*If the first quartile is 42.75 and the third quartile is 74.25, then the coefficient of quartile deviation is:*				
D	*a.*	*29.62*	*b.*	*15.75*	
	c.	*17.57*	*d.*	*26.92*	
					PYQ June 19
(65)	*Coefficient of quartile deviation is 1/4 then* Q_3 / Q_1 *is*				
A ☆	*a.*	*5/3*	*b.*	*4/3*	
	c.	*3/4*	*d.*	*3/5*	
					MTP Apr 21
(66)	*Interval Quartile Range is ____of Quartile Deviation*				
B ☆	*a.*	*Half*	*b.*	*Double*	
	c.	*Triple*	*d.*	*Equal*	
					MTP Dec 22 – Series I
(67)	*The approximate ratio of SD, MD, QD is*				
C	*a.*	*2:3:4*	*b.*	*3:4:5*	
	c.	*15:12:10*	*d.*	*5:6:7*	

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