Solution:

C.I	f	Mid point (x)	fx	$X - \bar{X}$	$(X - \bar{X})^2$	$f(X-\bar{X})^2$
20 – 22	3	21	63	–6	36	108
23 – 25	6	24	144	–3	9	54
26 – 28	12	27	324	0	0	0
29 – 31	9	30	270	3	9	81
32 – 34	2	33	66	6	36	72
	32	$\Sigma fx = 867$			90	315

$$\bar{X} = \frac{\Sigma fx}{n} = \frac{667}{32} = 27.093 = 27 \text{ approx.}$$

$$S.D = S^2 = \sqrt{\frac{\Sigma(X-\bar{X})^2}{n}} = \sqrt{\frac{315}{32}}$$

$$= \sqrt{9.84375} = 3.137$$

7. For the following distribution of marks calculate Range.

Marks in, percentage	Frequency/ (No
33 — 40	28
41— 50	31
51 — 60	12
61 — 70	9
71 — 75	5

Solution:

C.I	Class Boundaries	f
33 – 40	32.5 – 40.5	28
41 – 50	40.5 – 50.5	32
51 – 60	50.5 – 60.5	12
61 – 70	60.5 – 70.5	9
71 – 75	70.5 – 75.5	5

Here, $X_{max} = 75.5$

$X_{min} = 32.5$

Range $= X_{max} - X_{min}$

$= 75.5 - 32.5$

$= 43$

SOLVED MISCELLANEOUS EXERCISE - 6

1. Multiple Choice Questions

Three possible answers are given for the following question. Tick (✓) the correct answer.

(i) A grouped frequency table is also called

(a) data (b) frequency distribution (c) frequency polygon

(ii) A histogram is a set of adjacent
(a) squares (b) rectangles (c) circles

(iii) A frequency polygon is a many sided:
(a) closed figure (b) rectangle (c) square

(iv) A cumulative frequency table is also called
(a) frequency distribution (b) data
(c) less than cumulative frequency distribution

(v) In a cumulative frequency polygon frequencies are plotted against
(a) midpoints (b) upper class boundaries (c) class limits

(vi) Arithmetic mean is a measure that determines a value of the variable under study by dividing the sum of all values of the variable by their
(a) number (b) group (c) denominator

(vii) A Deviation is defined as a difference of any value of the variable from a
(a) constant (b) histogram (c) sum

(viii) A data in the form of frequency distribution is called
(a) Grouped data (b) Ungrouped data (c) Histogram

(ix) Mean of a variable with similar observations say constant k is
(a) negative (b) k itself (c) zero

(x) Mean is affected by change in
(a) value (b) ratio (c) origin

(xi) Mean is affected by change in
(a) place (b) scale (c) rate

(xii) Sum of the deviations of the variable X from its mean is always
(a) zero (b) one (c) same

(xiii) The n^{th} positive root of the product of the $x_1, x_2, x_3, \ldots\ldots, x_n$ observations is called
(a) Mode (b) Mean (c) Geometric mean

(xiv) The value obtained by reciprocating the mean of the reciprocal of $x_1, x_2, x_3, \ldots\ldots, x_n$ observations is called
(a) Geometric mean (b) Median (c) Harmonic mean

(xv) The most frequent occurring observation in a data set is called
(a) mode (b) median (c) harmonic mean

(xvi) The measure which determines the middlemost observation in a data set is called
(a) median (b) mode (c) mean

(xvii) The observations that divide a data set into four equal parts are called
(a) deciles (b) quartiles (c) percentiles

(xviii) The spread or scatteness of observations in a data set is called:

(a) average (b) dispersion (c) central tendency

(xix) The measures that are used to determine the degree or extent of variation in a data set are called measures of

(a) dispersion (b) central tendency (c) average

(xx) The extent of variation between two extreme observations of a data set is measured by:

(a) average (b) range (c) quartiles

(xxi) The mean of the squared deviations of x_i (i = 1, 2,.....,n) observations from their arithmetic mean is called

(a) variance (b) standard deviation (c) range

(xxii) The positive square root of mean of the squared deviations of X_i, (i = 1, 2, ... n) observations from their arithmetic mean is called

(a) harmonic mean (b) range (c) standard deviation

Answers:

(i)	b	(ii)	b	(iii)	a	(iv)	c	(v)	b
(vi)	a	(vii)	a	(viii)	a	(ix)	b	(x)	c
(xi)	b	(xii)	a	(xiii)	c	(xiv)	c	(xv)	a
(xvi)	a	(xvii)	b	(xviii)	b	(xix)	a	(xx)	b
(xxi)	a	(xxii)	c						

2. Write short answers of the following questions:

(i) Define class limits.

Ans. The minimum and the maximum values defined for a class or group are called class limits.

(ii) Define class mark.

Ans. The mid-point of a class interval is also called class mark. It is obtained by dividing the sum of upper and lower limit by 2.

(iii) What is cumulative frequency.

Ans. The total of frequency up to an upper class limit or boundary is called the cumulative frequency.

(iv) Define a frequency distribution.

Ans. A table showing frequencies against the class intervals is called a frequency distribution table.

(v) What is a Histogram?

Ans. A histogram is a graph of adjacent rectangles constructed on XY – plane.

(vi) Name two measures of central tendency.

Ans. (i) Arithmetic mean.
(ii) Geometric mean
(iii) Harmonic mean

(vii) Define Arithmetic mean.

Ans. Arithmetic mean is a measure that determines a value of the variable under study by dividing the sum of all values of the variable by the number of values.

(viii) Write three properties of Arithmetic mean.

Ans. (i) mean is affected by change in origin.
(ii) mean is affected by change in scale.
(iii) sum of deviations of the variable x from its mean is always zero.

(ix) Define Median.

Ans. Median is the middle most observation in an arranged data set. It divides the data set into two equal parts.

(x) Define Mode.

Ans. The most frequent occurring observation in the data is mode.

(xi) What do you mean by Harmonic mean?

Ans. Harmonic mean refers to the value obtained by reciprocating the mean of the reciprocal of $x_1, x_2, x_3, \ldots x_n$, observations.

(xii) Define Geometric mean.

Ans. Geometric mean of a variable x is the nth positive root of the product of the $x_1, x_2, x_3, \ldots x_n$, observations.

(xiii) What is Range?

Ans. Range measures the extent of variation between two extreme observations of a data set.

(xiv) Define Standard deviation.

Ans. Standard deviation is the positive square root of mean of the squared deviations of x_i ($i = 1, 2, 3, \ldots, n$) observations from their arithmetic mean.

SUMMARY

- Range is the difference between maximum and minimum observation.
- The minimum and the maximum values defined for a class or group are called class limits.
- The total of frequency up to an upper class limit or boundary is called the cumulative frequency.
- A frequency distribution is a tabular arrangement classifying data into different groups.
- A Histogram is a graph of adjacent rectangles constructed on xy-plane, A cumulative frequency polygon or give is a graph of less than cumulative frequency distribution.
- Arithmetic mean is a measure that determines a value of the variable under study by dividing the sum of all values of the variable by their number.
- A Deviation is defined as 'a difference of any value of the variable from any constant. $D_i = x_i - A$.
- Geometric mean of a variable X is the n' positive root of the product of the x_1, x_2, x_3,..... x_n, observations.
- Harmonic mean refers to the value obtained by reciprocating the mean of the reciprocal of x_1, x_2, x_3,..... x_n, observations.
- Mode is defined as the most frequent occurring observation of the variable or data.
- Median is the measure which determines the middlemost observation in a data set.
- Statistically, Dispersion means the spread or scatterness of observations in a data set.
- Range measures the extent of variation between two extreme observations of a data set.
- Variance is defined as the mean of the squared deviations of x_i, (i = 1, 2, ... n) observations from their arithmetic mean.
- Standard deviation is defined as the positive square root of mean of the squared deviations of x_i (i = 1, 2, ... n) observations from their arithmetic mean.

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