NCERT MOST IMPORTANT QUESTIONS CLASS – 11 Statistics for Economics CHAPTER – 5 Measures of Central Tendency

Q1.Define median.

Answer: Median is a value located centrally of a series in such a way that half of the value of the series is above it and the other half is below.

Q2.What is the mode?

Answer: The mode is a value that frequently occurs in the series. Which means the modal value has the highest frequency in the series.

Q3.Define the partition value.

Answer: The value that divides the series into more than two parts is known as a partition value.

Q4.Explain quartile.

Answer: The end value of the statistical series when divided into four parts is known as quartile.

Q5.What is positional average?

Answer: Positional average are those averages whose value is worked out on the basis of their position in the statistical series.

Q6.Define the central tendency.

Answer: All the methods of statistical analysis by which the average of the statistical series are analysed is known as a central tendency.

Q7.What are the purpose of average is the statistical method?

Answer: The purpose of the average is the statistical method are

- Brief description
- Comparison
- Formulation of policies
- Statistical analysis
- One value of all

Q8.What are the different kinds of statistical average?

Answer: The different kinds of statistical average are.

- Mathematical average
- Positional average

Q9.What are the two methods that can calculate the simple arithmetic mean in case of individual series?

Answer: The two methods that can calculate the simple arithmetic mean in the case of individual series are.

- Direct method
- Short-cut method

Q10.What are the methods calculating simple arithmetic mean?

Answer: The methods of calculating simple arithmetic mean are.

- Individual series
- Discrete series
- Frequency distribution

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Q11. If the arithmetic mean of the data given below is 28, find (a) the missing frequency, and (b) the median of the series:

Profit per retail shop (in Rs)	0-10	10-20	20-30	30-40	40-50	50-60
Number of retail shops	12	18	27	–	17	6

Answer
(a) Let the missing frequency be x
Arithmetic mean = 28 (given)

Profit per retail shop (in Rs) Class Interval	No. of retail shops Frequency (f)	Mid Value (m)	fm
0-10	12	5	60
10-20	18	15	270
20-30	27	25	675
30-40	x	35	$35x$
40-50	17	45	765
50-60	6	55	330
	$\Sigma f = 80 + x$		$\Sigma fx = 2100 + 35x$

Mean = $\Sigma fx / \Sigma f$

$\Rightarrow 28 = 2100 + 35x/80 + x \Rightarrow 2240 + 28x = 2100 + 35$

$\Rightarrow 2240 - 2100 = 35x - 25x \Rightarrow 140 = 7x \Rightarrow x = 140/7 = 20$ Missing frequency = 20

(b)

Class Interval	Frequency (f)	Cumulative frequency (CF)
0-10	12	12
10-20	18	30
20-30	27	57
30-40	x	77
40-50	17	94
50-60	6	100
Total	$\Sigma f = 100$	

Median = Size of $(N/2)$th item

$= 100/2 = 50$th item

It lies in class 20-30.

Q12. The following table gives the daily income of ten workers in a factory. Find the arithmetic mean.

Workers	A	B	C	D	E	F	G	H	I	J
Daily Income (in Rs)	120	150	180	200	250	300	220	350	370	260

Answer

Workers	Daily Income (in Rs) X
A	120
B	150
C	180
D	200
E	250
F	300
G	220
H	350
I	370
J	260
Total	$\Sigma X = 2400$

$$\text{Median} = L + \frac{\frac{N}{2} - CF}{f} \times i$$

$$= 20 + \frac{\frac{100}{2} - 30}{27} \times 10$$

$$= 20 + \frac{50 - 30}{27} \times 10$$

$$= 20 + \frac{20}{27} \times 10$$

$$= 27.407$$

$N = 10$

Arithmetic Mean $= \Sigma X / N$

$\qquad\qquad\quad = 2400/10$

$\qquad\qquad\quad = 240$

Arithmetic Mean $= 240$

Q13. Following information pertains to the daily income of 150 families. Calculate the arithmetic mean.

Income (in Rs)	Number of families
More than 75	150
More than 85	140
More than 95	115
More than 105	95
More than 115	70
More than 125	60
More than 135	40
More than 145	25

Answer

Income   No. of families   Mid Class
                             Frequency *(f)*

urn:uuid:1076b3c7-1f66-96c0-b5d2-96c01f661076*(x)fx*75-85108080085-952590225095-105201002000105-115251102750115-125101201200125-135201302600 135-145 151402100 145-155 251503750

150

17450 Arithmetic Mean = $\Sigma fx / \Sigma f$

          = 17450/150

          = 116.33

Q14. The size of land holdings of 380 families in a village is given below. Find the median size of land holdings.

Size of Land Holdings (in acres)	Less than 100	100-200	200-300	300-400	400 and above
Number of families	40	89	148	64	39

Answer

Size of Land Holdings Class Interval	Number of families*(f)*	Cumulative frequency *(CF)*
0-100	40	40
100-200	89	129
200-300	148	277
300-400	64	341
400-500	39	380
Total	Σf = 380	

$\Sigma f = N = 380$

Median = Size of ($N/2$)th item

     = 380/2 = 190th item

It lies in class 200-300.

Median size of land holdings = 241.22 acres

Q15. The following series relates to the daily income of workers employed in a firm. Compute (a) highest income of lowest 50% workers (b) minimum income earned by the top 25% workers and (c) maximum income earned by lowest 25% workers.

Daily Income (in Rs)	10-14	15-19	20-24	25-29	30-34	35-39
Number of workers	5	10	15	20	10	5

(Hint: Compute median, lower quartile and upper quartile.)

Answer

Daily Income (in Rs) Class Interval	No of workers(f)	Cumulative frequency (CF)
9.5-14.5	5	5
14.5-19.5	10	15
19.5-24.5	15	30
24.5-29.5	20	50
29.5-34.5	10	60
34.5-39.5	5	65
Total	Σf = 65	

(a) $\Sigma f = N = 65$

Median = Size of $(N/2)$th item

$= 65/2 = 32.5$th item

It lies in class 24.5-29.5.

Highest income of lowest 50% workers = Rs 25.12

(b) First, we need to find Q_1

Class interval of $Q_1 = (N/4)$th items

$= (65/4)$th items = 16.25th item

It lies in class 19.5-24.5.

Minimum income earned by the top 25% workers = Rs 19.92

(c) First, we need to find Q_3

Class interval of $Q_3 = 3 (N/4)$th items

$= 3 (65/4)$th items $= 3 \times 16.25$th item

$= 48.75$th item

$$\text{Median} = L + \frac{\frac{N}{2} - CF}{f} \times i$$

$$= 200 + \frac{190 - 129}{148} \times 100$$

$$= 200 + \frac{61}{148} \times 100$$

$$= 200 + 41.22$$

$$= 241.22$$

$$\text{Median} = L + \frac{\frac{N}{2} - CF}{f} \times i$$

$$= 24.5 + \frac{32.5 - 30}{20} \times 5$$

$$= 24.5 + \frac{2.5}{20} \times 5$$

$$= 25.125$$

$$Q_1 = L + \frac{\frac{N}{4} - CF}{f} \times i$$

$$= 19.5 + \frac{16.25 - 15}{15} \times 5$$

$$= 19.5 + \frac{1.25}{15} \times 5$$

$$= \text{Rs } 19.92$$

It lies in class 24.5-29.5.

Maximum income earned by lowest 25% workers = Rs 29.19

$$Q_3 = L + \frac{\frac{3N}{4} - CF}{f} \times i$$

$$= 24.5 + \frac{\frac{3 \times 65}{4} - 30}{20} \times 5$$

$$= 24.5 + \frac{\frac{195}{4} - 30}{20} \times 5$$

$$= 24.5 + \frac{48.75 - 30}{20} \times 5$$

$$= \text{Rs } 29.19$$

Q16. The following table gives production yield in kg. per hectare of wheat of 150 farms in a village. Calculate the mean, median and mode values.

Production yield (kg. per hectare)	50-53	53-56	56-59	59-62	62-65	65-68	68-71	71-74	74-77
Number of workers	3	8	14	30	36	28	16	10	5

Answer

Production Yield (kg. per hectare)	No. of farms Frequency *(f)*	Mid Class *(x)*	*fx*	Cumulative frequency *(CF)*
50-53	3	51.5	154.5	3
53-56	8	54.5	436	11
56-59	14	57.5	805	25
59-62	30	60.5	1815	55
62-65	36	63.5	2286	91
65-68	28	66.5	1862	119
68-71	16	69.5	1112	135
71-74	10	72.5	725	145
74-77	5	75.5	377.5	150
	Σf = 150		Σfx = 9573	

Mean = Σ*fx*/Σ*f* = 9573/150 = 63.82 hectare

Modal Class = 62-65

$$\text{Median} = L + \frac{\frac{N}{2} - CF}{f} \times i$$

$$= 62 + \frac{75 - 55}{36} \times 3$$

$$= 62 + \frac{20}{12} = \frac{191}{3}$$

$$= 63.667$$

$$\text{Mode} = L + \frac{d_1}{d_1 + d_2} \times i$$

$$= 62 + \frac{6}{6 + 8} \times 3$$

$$= 62 + \frac{9}{7} = \frac{443}{7}$$

$$= 63.286$$