CHAPTER 14
STATISTICS
SYNOPSIS

1. The ***Mean*** for grouped data can be found by:

(i) The direct method: $\bar{x} = \frac{\sum fx}{\sum f}$

(ii) The assumed mean method: $\bar{x} = a + \frac{\sum fd}{\sum f}$, where $d = x - a$

(iii) The step deviation method: $\bar{x} = a + \frac{\sum fu}{\sum f} \times h$, where $u = (x - a)/h$

2. The ***Mode*** for grouped data can be found by using the formula:

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

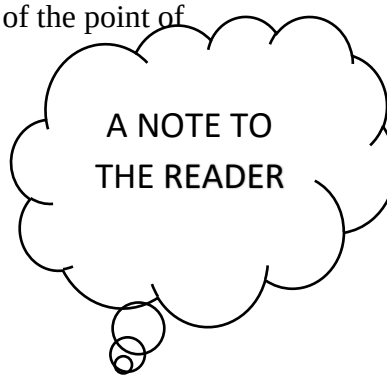
3. The cumulative frequency of a class is the frequency obtained by adding the frequencies of all the classes preceding the given class.

4. The ***Median*** for grouped data is formed by using the formula:

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$$

5. Representing a cumulative frequency distribution graphically as a cumulative frequency curve, or an ogive of the less than type and of the more than type.

6. The median of grouped data can be obtained graphically as the *x*-coordinate of the point of intersection of the two ogives for this data.



For calculating mode and median for grouped data, it should be ensured that the class intervals are continuous before applying the formulae. Same condition also applies for construction of an ogive. Further, in case of ogives, the scale may not be the same on both the axes

MULTIPLE CHOICE QUESTIONS (1mark)

1. One of the methods for determining mode is
(a) Mode = 2 Median -3 Mean
(b) Mode = 3 Median – 2 Mean
(c) Mode = 2 Mean – 3 Median
(d) Mode = 3 Mean – 2 Median

2. 2. Mode is the
(a) middle most frequent value
(b) least frequent value
(c) maximum frequent value
(d) none of these

3. 3. The algebraic sum of the deviations of a frequency distribution from its mean is always,
(a) greater than zero
(b) less than zero
(c) zero
(d) a non-zero number

4. 6. Which of the following can not be determined graphically?
(a) Mean
(b) Median
(c) Mode
(d) None of these

5. 5. Construction of a cumulative frequency table is useful in determining the
(a) mean
(b) median
(c) mode
(d) none of these

6. The absccissa of the point of intersection of the less than type and of the more than type cumulative frequency curves of a grouped data gives its
(a) Mean
(b) Median
(c) Mode
(d) None of these

7. For the following distribution

C.I.	0-10	10-20	20-30	30-40
f	20	30	24	40

the sum of lower limits of the modal class and the median class is
(a) 20
(b) 30
(c) 40
(d) 50

8. For the following distribution

C.I.	0-5	6-11	12-17	18-23	
f	26	20	30	16	

the upper limit of the median class is
(a) 18.5
(b) 18
(c) 17.5
(d) 17

9. For the following distribution

Cl	0-5	5-10	10-15	15-20	
f	10	15	12	20	

the difference of the upper limit of the median class and the lower limit of the modal class is
(a) 0
(b) 5
(c) 10
(d) -5

10. For the following distribution

Marks	0-10	10-20	20-30	30-40	
No. of students	3	9	13	10	

the number of students who got marks less than 30 is
(a) 13

(b) 25
(c) 10
(d) 12

A. Very Short Answer Questions (VSA) (1 Mark)

1 Find the class mark of the class 10 – 25. C

2 If the point of intersection of the two ogives (more than and less than type) is (20.5, 30.7), then find the median. C

3 The mean of the following distribution is 2.6: U

X	1	2	P	4	5
f	3	3	1	1	2

Find the value of p.

4 If x' s are the mid-points of the class intervals of grouped data, f' s are the corresponding frequencies and $\bar{x}$ is the mean, then find the value of $\sum(fx - \bar{x})$. U

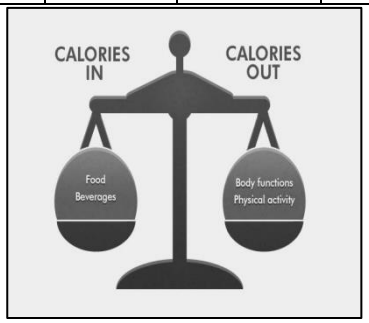
5 In an arranged series of an even number of 2n terms which term is median? HOT

B. Short Answer Questions (SA) (2 marks) level

1 The class marks of a frequency distribution are 6, 10, 14, 18, 22, 26, 30. Find the class size and find the first-class interval. C

2 Construct a more than cumulative frequency distribution table for the given data U

Weight in Kg	50 - 60	60 – 70	70 – 80	80 – 90	90 - 100	100 - 110
No. of students	13	15	17	21	23	19

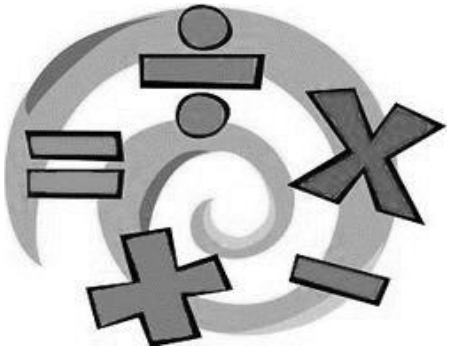


3 The arithmetic mean of a set of 40 values is 65. If each of the 40 values is multiplied by 5, what will be the mean of the set of new values. U

4 Find the value of a, b, c, d in the following distribution: U

Class interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 - 60
Frequency	A	6	9	c	3	d
C. F.	8	b	23	31	34	36

5 Modal class marks distribution of 30 students in mathematics examination is 40 – 55. Frequency of the class preceding the modal class is 3 and the frequency of the class succeeding the modal classis 6. Find the frequency of the modal class if mode is 52. HOT



6 Mr. Sharma saves some money every month. Arithmetic mean of his savings in a year is Rs. 225. Now for the next year he increases each of his monthly saving by Rs. 20. What will be the new mean saving? What value is depicted by Mr. Sharma? MD

C. Long Answer Questions (LA) (3 Marks)

1 A student noted the number of cars passing through a spot on a road and summarized it in the table given below. Find the mode of the following data C

class	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Frequency	4	7	9	11	6	2

2  Find the median of the distribution: U

Class Interval	Frequency
40 – 45	2
45 – 50	3
50 – 55	8
55 – 60	6
60 – 65	6
65 – 70	3
70 – 75	2

3  Find the mean using assumed mean method: U

Weight in Kg	30 - 35	35 – 40	40 – 45	45 – 50	50 - 55	55 - 60
No. of students	4	16	40	22	10	8

4  The median of the following data is 26. Find the value of x and y if the total frequency is 80. HOT

Class interval	0 - 8	8 - 16	16 - 24	24- 32	32 – 40	40 - 48
Frequency	8	10	x	24	y	7

5  Compute the median from the following data: HOT

Mid value	115	125	135	145	155	165	175	185	195
Frequency	6	25	48	72	116	60	38	22	3

6  The mode of a distribution is 55 & the modal class is 45-60 and the frequency preceding the modal class is 5 and the frequency after the modal class is 10. Find the frequency of the modal class. MD

D. V Long Answer Questions (VLA) (4 Marks)

1 The mode of the following distribution table is 36. Find the missing frequency. U

Class Interval	0–10	10-20	20-30	30–40	40–50	50–60	60-70
Frequency	8	10	f	16	12	6	7

2 The annual profits earned by 30 shops of a shopping complex in a locality give rise to the following distribution: U

Profit (in lakhs)	No of shops
More than or equal to 5	30
More than or equal to 10	28
More than or equal to 15	16
More than or equal to 20	14
More than or equal to 25	10
More than or equal to 30	7
More than or equal to 35	3

3 The table below gives the distribution of villages under different height from sea level in a certain region. U

Height in meters	0-400	400-800	800-1200	1200-1600	1600-2000	2000-2400

No of villages	142	265	560	271	89	16

(i) Compute the mean height of the region.

(ii) Which mathematical concept is used in this problem?

(iii) What is the value of village in modern times?

4  Use step deviation method to calculate the arithmetic mean of the following grouped distribution: U

Class	Frequency
10 –30	5
30 – 50	8
50 – 70	12
70 – 90	20
90 – 110	3
110 – 130	2
Total	50

5  The mean of the following data is 57.6 and the sum of the observations is 50. Find the missing frequencies f_1 and f_2. HOT

Class Interval	Frequency
0 – 20	7
20 – 40	f_1
40 – 60	12
60 – 80	f_2
80 – 100	8

		100 - 120	5

6 The health awareness campaign was organized in a school by paramedics of school clinic. The weights of the students of grade 10 were taken and recorded as follows: MD

Weight (Kg)	No of Students
38 - 40	3
40 – 42	2
42 – 44	4
44 – 46	5
46 – 48	14
48 - 50	4

Draw a less than type and a more than type ogive from the given data. Hence obtain median weight from the graph.

7 The following table gives production yield per hectare of wheat of 100 farms of a village: MD

Production yield (in Kg/hec)	Number of Farms
50 – 55	2
55 - 60	8
60 – 65	12
65- 70	24
70 – 75	38

75 - 80	16

Change the distribution to more than type and draw an ogive.

Statistics
SEC-A MCQ 1. B 6) B 2. C 7) D 3. C 8) C 4. A 9) A 5. C 10) B
SECTION A
1)15 2)17.5 2) 20.5 3) 3 4) 0 5) The mean of nth and (n + 1) th terms
SECTION B
1) class size - 4, first class interval = 4 - 8 3) 325 4) a = 8, b = 14, c = 8, d = 2
5) 7 6) Rs. 245, value= economical, responsible SECTION C
1) 52.86 2) 56.67 3) 44.6 4) x = 16, y = 15 5) 153.8 6) 15
SECTION D
1) 10 2) 17.5 Lakhs 3) 984.51 4) 65.6
5) f1 = 8, f 2 = 10

Lesson- Statistics

Learning Objective	Achieved 	Working towards 	Needs reinforcement 
I can understand and examine the various measures of central tendency, namely, mean, median and mode.			
I can evaluate and find these measures from grouped data and the relation between them.			
I can represent a given data graphically as cumulative frequency graph or Ogive.			
I can relate my learning to real life when I look at any statistical data given which can be used to analyze what is happening in the world around us.			

Teacher's feedback: _____

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Student's feedback: _____

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Next step in Learning:

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