Data Handling, Module-2/3

* RANGE – The difference between the highest value and the lowest value of the observations is called range of the distribution.
* Range = Highest value – Lowest value.
* It gives the idea about the spread of the observations.

* Example: Marks obtained by a student in 5 subjects are 68, 75,69,80,74.
* Here the highest marks scored = 80
* the lowest marks scored = 68
* Range = 80 – 68 = 12

MODE

* It is also one of the representative values. When we visit to a shoe shop, we have seen, a shopkeeper has a stock of shoes of different sizes for different age group people.
* The sizes of the shoes are like 1, 2,4,5,6,7,8,9 etc. It is not possible for the shopkeeper to keep equal number of shoes of all sizes in stock.

* He has to observe that which sizes of shoes are being sold in large number.
* Mode is that representative value which helps him to decide, which sizes of shoes should be kept in large number in stock.

* Mode: The observation having the highest frequency is called the mode of the distribution.

* Example: In a particular day in first half a shopkeeper sold the shoes of following sizes-

* 2,4,5,5,6,7,2,5,4,5,6,6,7,4,7,7,4,7.

* We arrange the data in increasing order
* 2,2,4,4,4,4,5,5,5,5,6,6,6,7,7,7,7,7
* We see that 7 occurs the most often or having the highest frequency.
* So, mode = 7.

* If large number of data is given then we have to make a frequency distribution table.
* Example: In a class test, marks obtained in Maths by the students out of 10 are as follows-
* 4,6,7,5,3,5,4,5,2,6,2,5,1,9,6,5,8,4,6,7

Marks obtained	Tally marks	Frequency
1	/	1
2	//	2
3	/	1
4	///	3
5	////	5
6	////	4
7	//	2
8	/	1
9	/	1

* Here we see that frequency of 5 is 5 which is the highest frequency.
* So mode = 5.

MEDIAN

Median is also one of the representative values. Why we need median, we have to observe the following situations.

* The run scored in a cricket match by 11 players are as follows. The coach of the team wants to divide the players into two equal groups for daily practice.
* 6,15,120,50,100,80,10,10,15,8,10.

* 1. Mean =

$$\frac{\text{sum of all the observations}}{total\ number\ of\ observations}$$

* $$= \frac{6+15+120+50+100+80+10+10+15+8+10}{11}$$

* $$= \frac{424}{11} = 38.5$$

* Nos. of players score more than 38.5 is 5.
* Nos. of players score less than 38.5 is 7.
* This is not equally divided. So mean is not applicable here.

* 2. Mode: We arrange the runs in increasing order.
* 6,8,10,10,10,15,15,50,80,100,120.
* So the mode is 10.
* Nos. of players score at the mode 10 is 9.
* Nos. of players score less than the mode 10 is 2.
* This is not equally divided. So mode is not applicable here.

* 3. We arrange the runs in increasing order.
* 6,8,10,10,10,15,15,50,80,100,120.
* Number of observations (n) = 11 (odd)
* $\frac{(n+1)}{2}$ th term = $\frac{11+1}{2}$ = 6th term = 15. (count 6 from the beginning or from the last in increasing order of the runs as written above)
* So, 15 is the middle value.

* So 5 players are there in each group. One player having runs 15 is extra and work as umpire.
* This middle value is called median.

* Median: When the given observations are arranged in increasing order or decreasing order, then the middle observation is called the median.

* To find the median first we arrange the observations in increasing order or decreasing order.
* Let the number of observations = n
* If number of observations= n is odd, then
* Median = $\frac{(n+1)}{2}$ **th term**

* If number of observations= n is **even**, then
* We find $\frac{n}{2}$th term and $\left(\frac{n}{2}+1\right)$ th term
* **Median** = $\frac{\frac{n}{2}\,th+\left(\frac{n}{2}+1\right)\text{th term}}{2}$

* Example-1; The marks obtained by some students in a class test are 6, 5, 14, 8,11, 13, 8,7,3,8.
* We arrange the marks in increasing order.
* 3,5,6,7,8,8,8,11,13,14

Here n = 10 (even)

* $\frac{n}{2}$th term= $\frac{10}{2}$ = 5^{th} term = 8
* $(\frac{n}{2} + 1)$ th term = 5+1= 6^{th} term= 8
* Median= $\frac{8+8}{2}$ =$\frac{16}{2}$ =8

❖ Interpretation- 50% of the students got more than 8 and 50% of the students got less than 8.

* Example-2: Find the median of the data 12,14,15,18,14,19,14,13,9.
* We arrange the observations in increasing order.
* 9, 12, 13,14,14,14,15,18,19
* n= 9 (odd)
* Median = $\frac{(n+1)}{2}$ th term = $\frac{9+1}{2} = \frac{10}{2}$ = 5^{th} term = 14.

* Example-3:Find the mean ,mode and median of the data 4,5,3,6,3,5,3,4,3.
* (i) Mean = $\frac{\text{sum of all the observations}}{total\ number\ of\ observations}$
* $= \frac{4+5+3+6+3+5+3+4+3}{9}$

$= \frac{36}{9} = 4.$

* (ii) We arrange the observations in increasing order.
* 3, 3, 3,3,4,4,5,5,6
* Here 3 has the highest frequency. So mode = 3.
* (iii) We arrange the observations in increasing order.
* 3, 3, 3,3,4,4,5,5,6
* n= 9 (odd)
* Median = ((n+1))/2 th term = (9+1)/2 = 10/2 = 5th term = 4

* Example-4: The ages (in year) of 8 people are 36, 72,48, 63, 75,39, 85and 63.
* (i) Find the range.
* (ii) Mean and median.
* Ans. The highest value = 85
* The lowest value = 36
* Range = 85 – 36 = 49.

* (ii) Sum of ages = 36+72+48+63+75+39+85+63= 480.
* Mean = $\frac{\text{sum of all the observations}}{total\ number\ of\ observations}$
* $= \frac{480}{8} = 60.$
* (b) We arrange the observations in increasing order.
* 36, 39,48,62,63,72,75,85.
* n = 8 (even)
* $\frac{n}{2}$th term = $\frac{8}{2}$= 4th term = 62.
* $(\frac{n}{2} + 1)$th term = 4+1= 5th term= 63.
* Median = $\frac{62+63}{2} = \frac{125}{2} = 62.5.$

What we have learnt

* (a) The difference between the highest value and the lowest value of the observations is called range of the distribution.
* Range = Highest value – Lowest value.
* (b)Mode of a set of observations is an observation which has the highest frequency.

* (c) Median of a set of observations is the middle value, when the observations are arranged in increasing or decreasing order.
* (d)If nos. of observations is odd, then
* Median = $\frac{n+1}{2}$th term.
* (e) If nos. of observations are even,then
* Median = $\frac{n}{2}$th+$(\frac{n}{2}+1)$th term)/2

ASSIGNMENT:

* 1.Fill in the blanks:- For the data 5,4,0,1,6,2,4,3,7 and 8.
* (i) Mean of the data is --------
* (ii)Range of the data is ---------.
* (iii) Median of the data is ----------.
* (iv) Mode of the data is ----------.

* Q2.Find range of the data:
* 89, 125, 100, 115, 80,180,160 and 115.
* Q3.Find the mode of the following data.
* 11,15,10,14,15,12,13,13,10,15,12,10,14,11, 10,15,13,15,11,12.

* Q4. Find the median of the following data.
* 110,140,130,120,140,120,120,130,120, 110.
* Q5. Find the median of the following marks obtained by some students out of 25.
* 20,25,18,18,10,8 and 14 and interpret the data.