NCERT Solutions For Class 10 Maths Chapter 14 Statistics Exercise 14.3

Exercise 14.3

Q1. The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality. Find the median, mean and mode of the data and compare them.

Monthly consumption (in units)	Number of consumers
65 – 85	4
85 – 105	5
105 – 125	13
125 – 145	20
145 – 165	14
165 – 185	8
185 – 205	4

Ans. For Median:

Monthly consumption (in units)	Number of consumers (f_i)	Cumulative Frequency
65 - 85	4	4
85 - 105	5	9
105 - 125	13	22
125 - 145	20	42
145 - 165	14	56
165 - 185	8	64
185 - 205	4	68
Total	$\sum f_i = n = 68$	

Here, $\sum f_i = n = 68$, then $\frac{n}{2} = \frac{68}{2} = 34$, which lies in interval $125 - 145$.

$\therefore$ Median class = $125 - 145$

So, $l = 125,\ n = 68,\ f = 20,\ cf = 22$ and $h = 20$

Now, Median $= l + \left[\dfrac{\frac{n}{2} - cf}{f}\right] \times h$

$= 125 + \left[\dfrac{\frac{68}{2} - 22}{20}\right] \times 20$

$= 125 + \dfrac{34 - 22}{20} \times 22 = 125 + 12 = 137$

For Mean:

Monthly consumption (in units)	No. of consumers (f_i)	Class Marks (x_i)	$u_i = \frac{x_i - a}{h}$	$f_i u_i$
65 - 85	4	75	- 3	- 12
85 - 105	5	95	- 2	- 10
105 - 125	13	115	- 1	- 13
125 - 145	20	135	0	0
145 - 165	14	155	1	14
165 - 185	8	175	2	16
185 - 205	4	195	3	12
	$\sum f_i = 68$			$\sum f_i u_i = 7$

From given data, Assume mean $(a) = 135$, Width of the class $(h) = 20$

$\therefore\ \bar{u} = \dfrac{\sum f_i u_i}{\sum f_i}$

$= \frac{7}{68} = 0.102$

Using formula, Mean $\left(\bar{x}\right) = a + h\bar{u}$ = 135 + 20

(0.102)

= 135 + 2.04 = 137.04

For Mode:

In the given data, maximum frequency is 20 and it corresponds to the class interval 125 – 145.

$\therefore$ Modal class = 125 – 145

And $l = 125,\ f_1 = 20,\ f_0 = 13,\ f_2 = 14$ and $h = 20$

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

$= 125 + \left[\frac{20 - 13}{2(20) - 13 - 14}\right] \times 20$

$= 125 + \frac{7}{40 - 27} \times 20$

$= 125 + \frac{140}{13}$

= 125 + 10.76923

= 125 + 10.77

= 135.77

Hence, median, mean and mode of given data is 137 units, 137.04 units and 135.77 units.

Q2. If the median of the distribution given below is 28.5, then find the values of x and y.

Class interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Total
Frequency	5	x	20	15	y	5	60

Ans.

Monthly consumption (in units)	Number of consumers (f_i)	Cumulative Frequency
0 - 10	5	5
10 - 20	x	$5+x$
20 - 30	20	$25+x$
30 - 40	15	$40+x$
40 - 50	y	$40+x+y$
50 - 60	5	$45+x+y$
Total	$\sum f_i = n = 60$	

Here, $\sum f_i = n = 60$, then $\frac{n}{2} = \frac{60}{2} = 30$, also, median of the distribution is 28.5, which lies in interval 20 – 30.

$\therefore$ Median class = 20 – 30

So, $l = 20,\ n = 60,\ f = 20,\ cf = 5 + x$ and $h = 10$

$\because\ 45 + x + y = 60$

$\Rightarrow\ x + y = 15$ .....(i)

Now, Median $= l + \left[\frac{\frac{n}{2} - cf}{f}\right] \times h$

$$\Rightarrow 28.5 = 20 + \left[\frac{30-(5+x)}{20}\right] \times 10$$

$$\Rightarrow 28.5 = 20 + \frac{30-5-x}{2}$$

$$\Rightarrow 28.5 = \frac{40+25-x}{2}$$

$$\Rightarrow 2(28.5) = 65 - x$$

$$\Rightarrow 57.0 = 65 - x$$

$$\Rightarrow x = 65 - 57 = 8$$

$$\Rightarrow x = 8$$

Putting the value of x in eq. (i), we get,

$$8 + y = 15$$

$$\Rightarrow y = 7$$

Hence the value of x and y is 8 and 7 respectively.

********** END **********