Statistics Ex 7.4 Q9

Answer :

(i) Let the missing frequencies be *x* and *y*.

First we prepare the following cummulative table.

Variable:	Frequency: (f_i)	Cumulative frequency $(c.f.)$
10-20	12	12
20-30	30	42
30-40	x	$42+x$
40-50	65	$107+x$
50-60	y	$107+x+y$
60-70	25	$132+x+y$
70-80	18	$150+x+y$
	$N=150+x+y$	

Here, $N = 230$

So, $\dfrac{N}{2} = 115$

It is given that the median is 46.

Therefore, $40-50$ is the median class.

$l = 40, f = 65, F = 42 + x$ and $h = 10$

We know that

$$\text{Median} = l + \left\{ \dfrac{\dfrac{N}{2} - F}{f} \right\} \times h$$

$$46 = 40 + \left\{ \dfrac{115 - (42 + x)}{65} \right\} \times 10$$

$$6 = \dfrac{(73 - x) \times 10}{65}$$

$$39 = (73 - x)$$

$$x = 73 - 39$$

$$x = 34$$

Also,

$$N = 230$$

$$150 + x + y = 230$$

Putting the value of x, we get

$$150 + 34 + y = 230$$

$$y = 230 - 184$$

$$y = 46$$

Hence, the missing frequencies are 34 and 46.

(ii)

We may prepare the table as shown.

Variable:	Midvalue (x_i):	Frequency: (f_i)	$d_i = x_i - A$ $= x_i - 45$	$u_i = \frac{1}{h}(d_i)$ $= \frac{1}{10}(d_i)$	$f_i u_i$
$10-20$	15	12	−30	−3	−36
$20-30$	25	30	−20	−2	−60
$30-40$	35	34	−10	−1	−34
$40-50$	45	65	0	0	0
$50-60$	55	46	10	1	46
$60-70$	65	25	20	2	50
$70-80$	75	18	30	3	54
		$\sum f_i = 230$			$\sum f_i u_i = 20$

We know that mean, $\overline{X} = A + h\left(\dfrac{1}{N} \sum f_i u_i \right)$

Now, we have $N = \sum f_i = 230$, $\sum f_i u_i = 20$, $h = 10$ and $A = 45$.

Putting the values in the above formula, we have

$$\overline{X} = A + h\left(\frac{1}{N}\sum f_i u_i\right)$$

$$= 45 + 10\left(\frac{1}{230} \times (20)\right)$$

$$= 45 + \frac{200}{230}$$

$$= 45 + 0.87$$

$$= 45.87$$

Hence, the mean is 45.87.

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