Answer 10

Marks	Frequency (f)	Mid Value (x)	$d_i = x_i - A$, $A = 45.5$	$u_i = \frac{x_i - A}{10}$	$f_i \times u_i$
11-20	2	15.5	–30	–3	–6
21-30	6	25.5	–20	–2	–12
31-40	10	35.5	–10	–1	–10
41-50	12	A = 45.5	0	0	0
51-60	9	55.5	10	1	9
61-70	7	65.5	20	2	14
71-80	4	75.5	30	3	12
	$\Sigma f_i = 50$				$\Sigma f u_i = 7$

A = 45.5

$$\text{Mean} = A + \frac{\Sigma f_i u_i}{\Sigma f_i} \times 10$$

$$= 45.5 + \frac{7}{50} \times 10$$

$$= 45.5 + 1.4 = 46.9$$

Question 11.

Calculate the mean of the following

Answer 9

Mean = 62.8

and sum of frequencies = 50

Class	Frequency (f_i)	Class mark (x_i)	$f_i \times x_i$
0-20	5	10	50
20-40	f_1	30	$30f_1$
40-60	10	50	500
60-80	f_2	70	$70f_2$
80-100	7	90	630
100-120	8	110	880
Total	$30 + f_1 + f_2 = 50$		$2060 + 30f_1 + 70f_2$

$\because$ Sum of frequencies = 50

$\therefore \; 30 + f_1 + f_2 = 50$

$\Rightarrow f_1 + f_2 = 50 - 30 = 20 \qquad ...(i)$

$$\text{Mean} = \frac{\Sigma f_i \times x_i}{\Sigma f_i}$$

$$62.8 = \frac{2060 + 30f_1 + 70f_2}{50}$$

$$\Rightarrow \frac{628}{10} = \frac{2060 + 30f_1 + 70f_2}{50}$$

$$\Rightarrow \frac{628}{1} = \frac{2060 + 30f_1 + 70f_2}{5}$$

$$\Rightarrow 2060 + 30f_1 + 70f_2 = 5 \times 628$$

$$\Rightarrow 2060 + 30f_1 + 70f_2 = 3140$$

$$\Rightarrow 30f_1 + 70f_2 = 3140 - 2060$$

$$\Rightarrow 30f_1 + 70f_2 = 1080$$

$$\Rightarrow 3f_1 + 7f_2 = 108 \qquad ...(ii)$$

(Dividing by 10)

Multiplying (i) by 7 and (ii) by 1

$$7f_1 + 7f_2 = 140$$
$$3f_1 + 7f_2 = 108$$

Subtracting $4f_1 = 32 \; f_1 = \frac{32}{4} = 8$

But $f_1 + f_2 = 20$

$\therefore \; 8 + f_2 = 20 \quad \Rightarrow f_2 = 20 - 8 = 12$

Hence $f_1 = 8, f_2 = 12$

Question 10.

Calculate the mean of the distribution given below using the short cut method.

Answer 10

Class	Frequency (f_i)	Class mark (x_i)	$f_i \times x_i$
0-20	7	10	70
20-40	p	30	$30p$
40-60	10	50	500
60-80	9	70	630
80-100	13	90	1170
Total	$39 + p$		$2370 + 30p$

$$\therefore \quad \text{Mean} = \frac{\Sigma f_i \times x_i}{\Sigma f_i} \Rightarrow 54 = \frac{2370+30p}{39+p}$$

$\Rightarrow 2106 + 54p = 2370 + 30p$

$\Rightarrow 54p - 30p = 2370 - 2106 \Rightarrow$

$24p = 264$

$p = \frac{264}{24} = 11$

Hence $p = 11$

Question 9.

The mean of the followi distribution is 62.8 and the sum all the frequencies is 50. Find the missing frequencies f_1 and f_2.

Answer 9

Mean = 62.8

and sum of frequencies = 50

Class	Frequency (f_i)	Class mark (x_i)	$f_i \times x_i$
0-20	5	10	50

C.I	Frequency f_i	Mid value x_i	A=87.50 $u=\frac{x-A}{h}$	fu_i
63-70	9	66 50	–3	–27
70-77	13	73.50	–2	–26
77-84	27	80.50	–1	–27
84-91	38	A=87.50	0	0
91-98	32	94.50	1	32
98-105	16	101.5	2	32
105-112	15	108.5	3	45
Total	150			29

Here A = 87.50 and h = 7

$$\bar{x} = A + h \times \frac{\sum f_i u_i}{\sum f_i}$$

$$= 87.50 + 7 \times \frac{29}{150} = 87.50 + 1.35$$

$$= 88.85$$

Question 5.

The mean of following frequenc
istribution is $21\frac{1}{7}$ Find the value o
' '.

Answer 5

$$\bar{x} = 21\frac{1}{7} = \frac{148}{7}$$

C.I.	Frequency	Mid value	fx_i

C.I.	Frequency f	Mid value x_i	$f_i x_i$
0-10	8	5	40
10-20	22	15	330
20-30	31	25	775
30-40	f	35	$35f$
40-50	2	45	90
Total	$63+f$		$1235+35f$

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{1235 + 35f}{63 + f}$$

$$\Rightarrow \quad \frac{148}{7} = \frac{1235 + 35f}{63 + f}$$

$$\Rightarrow \quad 9324 + 148f = 8645 + 245\ f$$

$$\Rightarrow \quad 9324 - 8645 = 245f - 148f$$

$$\Rightarrow \quad 679 = 97f.$$

$$\therefore \quad f = \frac{679}{97} = 7$$

Question 6.

Using step-deviation metho
calculate the mean marks of t
following distributi

Answer 6

Let Assumed mean = 72.5

C.I.	f	M.V.(x)	$d = x - A$	$f_i d_i$
50-55	5	52.5	–20	–100
55-60	20	57.5	15	–300
60-65	10	62.5	–10	–100
65-70	10	67.5	–5	–50
70-75	9	72.5	0	0
75-80	6	77.5	5	30
80-85	12	82.5	10	120
85-90	8	87.5	15	120
Total	80		–280	

$$\text{Mean} = A + \frac{\Sigma f_i d_i}{\Sigma f_i} = 72.5 + \frac{-280}{80} = 72.5 - \frac{7}{2} = 72.5 - 3.5 = 69$$

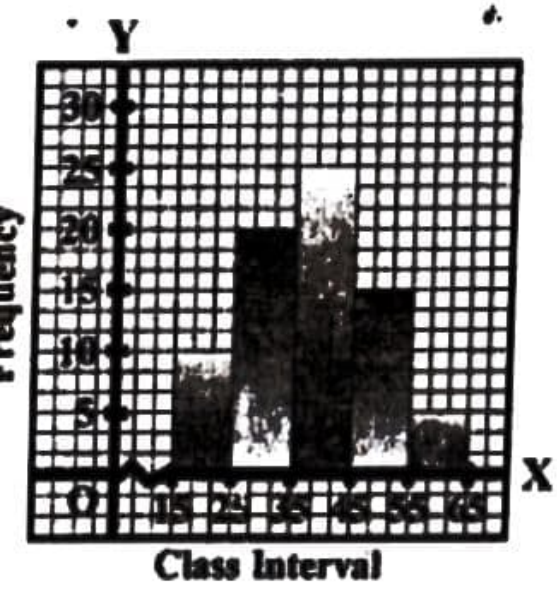
Question 7.

Using the information given in the adjoining histogram; calculate the mean.

Answer 7

C.I.	Frequency f	Mid value x	fx
15-25	10	20	200
25-35	20	30	600
35-45	25	40	1000
45-55	15	50	750
55-65	5	60	300
Total	75		2850

C.I.	Frequency f	Mid value x	fx
15-25	10	20	200
25-35	20	30	600
35-45	25	40	1000
45-55	15	50	750
55-65	5	60	300
Total	75		2850



$$\bar{x} = \frac{\sum fx}{\sum f} = \frac{2850}{75} = 38$$

uestion 8.

the mean of the following servations is 54, find the value of

nswer 8

(ii) Step – Deviation Method:

Marks	No. of Boys f_i	Mid value x_i	A=65 $u=\frac{x-A}{h_i}$	f_iui
30-40	10	35	–3	–30
40-50	12	45	–2	–24
50-60	14	55	–1	–14
60-70	12	A=65	0	0
70-80	9	75	1	9
80-90	7	85	2	14
90-100	6	95	3	18
Total	70		-	–27

Here A = 65 and h = 10

$$\bar{x} = A + h \times \frac{\Sigma f_i u_i}{\Sigma f_i} = 65 + \frac{10 \times (-27)}{70}$$

$$= 65 - \frac{270}{70} = 65 - \frac{27}{7} = 65 - 3.86 = 61.14$$

Question 4.

Find mean by 'step-deviation meth

:

Answer 4

C.I	Frequency f_i	Mid value x_i	A=87.50 $u=\frac{x-A}{h}$	f_iu_i
63-70	9	66 50	–3	–27
70-77	13	73.50	–2	–26
77-84	27	80.50	–1	–27
84-91	28	A=87.50	0	0

Marks	No. of Boys f_i	Mid value x_i	A=65 $u=\frac{x-A}{h_i}$	f_i
30-40	10	35	–3	–3
40-50	12	45	–2	–2
50-60	14	55	–1	–1
60-70	12	A=65	0	
70-80	9	75	1	
80-90	7	85	2	
90-100	6	95	3	
Total	70		-	–2

Here A = 65 and h = 10

$$\bar{x} = A + h \times \frac{\sum f_i u_i}{\sum f_i} = 65 + \frac{10 \times (-27)}{70}$$

$$= 65 - \frac{270}{70} = 65 - \frac{27}{7} = 65 - 3.86 = 61.14$$

Question 4.

Find mean by 'step deviation meth

Marks	No. of Boys f_i	Mid value x_i	A=65 d=x–A	$f_i \times d_i$
30-40	10	35	–30	–300
40-50	12	45	–20	–240
50-60	14	55	–10	–140
60-70	12	A=65	0	0
70-80	9	75	10	90
80-90	7	85	20	140
90-100	6	95	30	180
Total	70			–270

$$\bar{x} = A + \frac{\sum f_i d_i}{\sum f_i} = 65 + \frac{-270}{70} = 65 - \frac{27}{7}$$

$$= 65 - 3.86 = 61.14$$

(ii) Step – Deviation Method:

Marks	No. of Boys f_i	Mid value x_i	A=65 $u = \frac{x - A}{h_i}$	$f_i u_i$
30-40	10	35	–3	–30
40-50	12	45	–2	–24
50-60	14	55	–1	–14
60-70	12	A=65	0	0
70-80	9	75	1	9
80-90	7	85	2	14
90-100	6	95	3	18

(in Rs.)	f_i	x_i	$d=x-A$	
50-55	5	52.5	–20	–100
55-60	20	57.5	–15	–300
60-65	10	62.5	–10	–100
65-70	10	67.5	–5	–50
70-75	9	A=72.5	0	0
75-80	6	77.5	5	30
80-85	12	82.5	10	120
85-90	8	87.5	15	120
Total	80			–280

$$\bar{x} = A + \frac{\sum f_i d_i}{\sum f_i} = 72.5 + \frac{-280}{80}$$

Question 3.

The following are the marks obtained by 70 boys in a class test : Calculate the mean by :

(i) Short-Cut Method

(ii) Step Deviation Method

Answer 2

(i) Direct Method:

Weekly wages (in Rs.)	Mid value x_i	No. of worker f_i	$f_i \times x_i$
50-55	52.5	5	262.5
55-60	57.5	20	1150.0
60-65	62.5	10	625.0
65-70	67.5	10	675.0
70-75	72.5	9	652.5
75-80	77.5	6	465.0
80-85	82.5	12	990.0
85-90	87.5	8	700.0
Total		80	5520.0

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{5520.0}{80} = 69.0$$

(ii) Short cut method :

Weekly wages	No of workers	Mid value	A = 72.5	fxd

Age in years C.I.	x_i	Number of students (*fi*)	$x_i \times f_i$
16-18	17	2	34
18-20	19	7	133
20-22	21	21	441
22-24	23	17	391
24-26	25	3	75
Total		50	1074

$$\bar{x} = \frac{fixi}{\Sigma f} = \frac{1074}{50} = 21.48$$

Question 2.

The following table gives the weekly wages of workers in a factory. Calculate the mean by using :

(i) Direct Method

(ii) Short-Cut Method

Answer 2

(i) Direct Method:

Weekly wages	Mid value	No. of	$f \times x$