Graphical Representation (Histograms, Frequency Polygon & Ogives)

Exercise 23

Question 1.

Draw histogram for the following distributions:

(i)

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	12	20	26	18	10	6

(ii)

Class Interval	10-16	16-22	22-28	28-34	34-40
Frequency	15	23	30	20	16

(iii)

Class Interval	30-39	40-49	50-59	60-69	70-79
Frequency	24	16	09	15	20

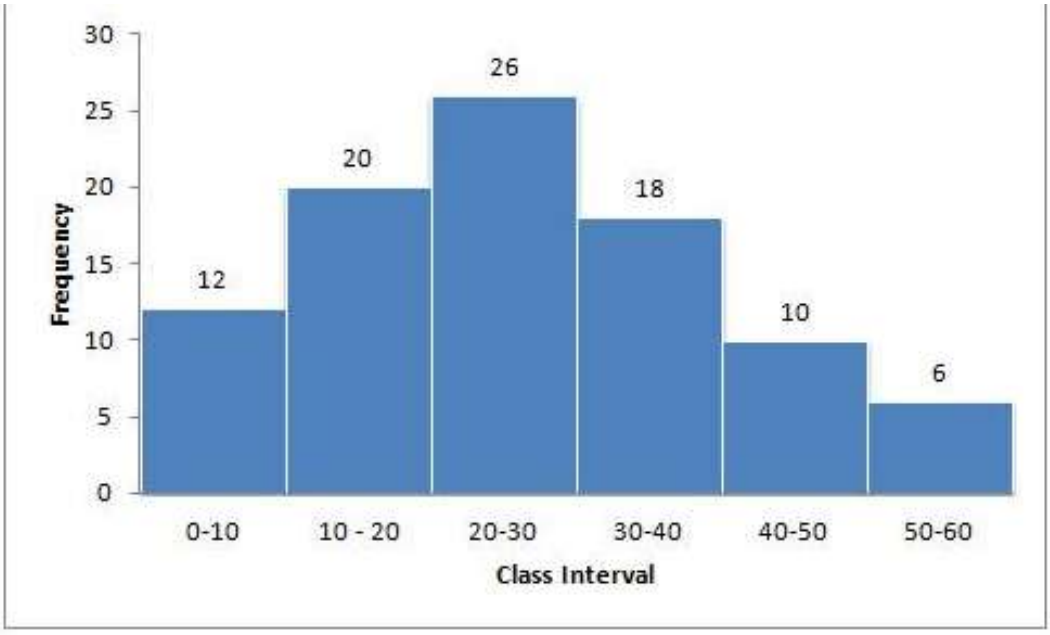
(iv)

Class Marks	16	24	32	40	48	56	64
Frequency	8	12	15	18	25	19	10

Solution:

(i)

Class Interval	Frequency
0-10	12
10-20	20
20-30	26
30-40	18
40-50	10
50-60	06



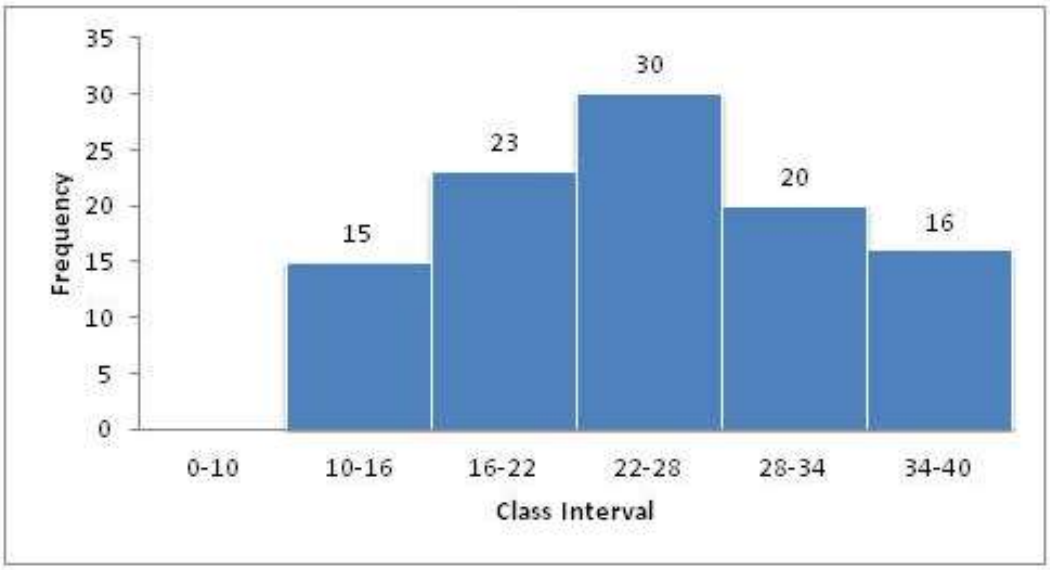
Steps of construction:

(a) Taking suitable scales, mark class intervals on x-axis and frequency on y-axis.

(b)Construct rectangles with class intervals as bases and corresponding frequencies as heights.

(ii)

Class Interval	Frequency
10-16	15
16-22	23
22-28	30
28-34	20
34-40	16



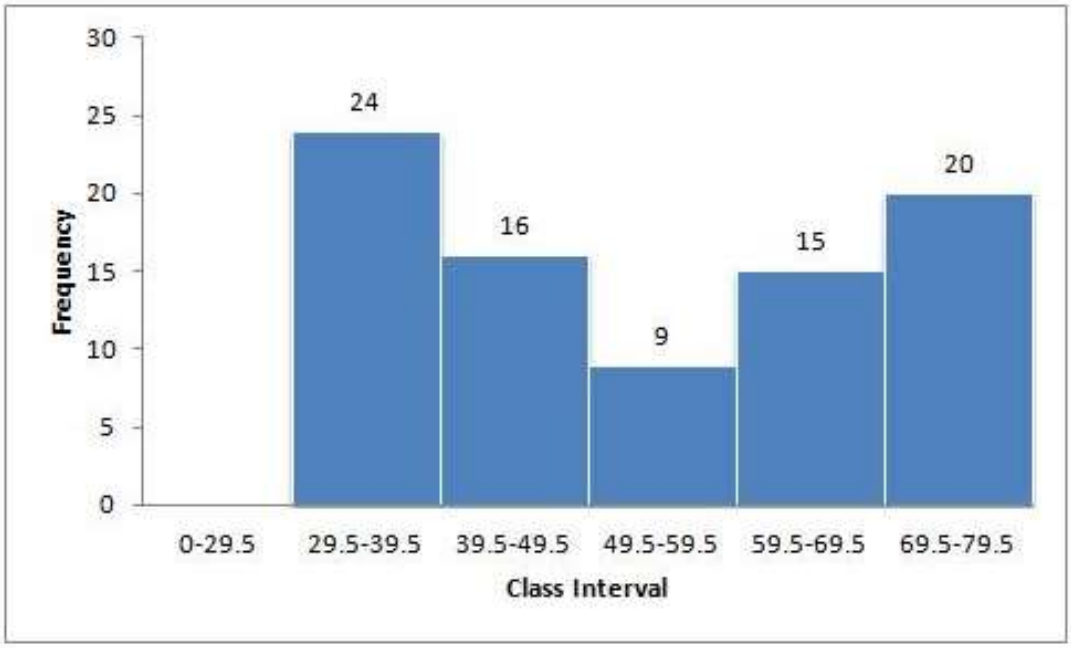
Steps of construction:

(a) Taking suitable scales, mark class intervals on x-axis and frequency on y-axis.

(b) Construct rectangles with class intervals as bases and corresponding frequencies as heights.

(iii)

Class Interval (Inclusive form)	Class Interval (Exclusive Form)	Frequency
30-39	29.5-39.5	24
40-49	39.5-49.5	16
50-59	49.5-59.5	09
60-69	59.5-69.5	15
70-79	69.5-79.5	20



Steps of construction:

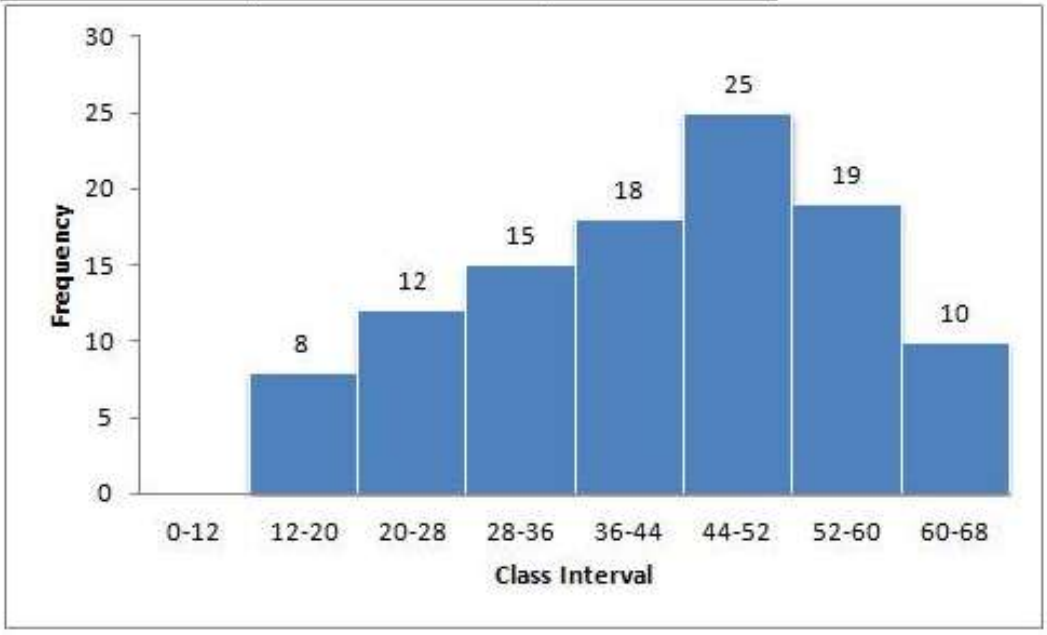
(a) Convert the data into exclusive form.

(b) Taking suitable scales, mark class intervals on x-axis and frequency on y-axis.

(c) Construct rectangles with class intervals as bases and corresponding frequencies as heights.

(iv)

Class Marks	Class Intervals	Frequency
16	12-20	08
24	20-28	12
32	28-36	15
40	36-44	18
48	44-52	25
56	52-60	19
64	60-68	10



Steps of construction:

(a) Convert the class marks into class intervals.

(b) Taking suitable scales, mark class intervals on x-axis and frequency on y-axis.

(c) Construct rectangles with class intervals as bases and corresponding frequencies as heights.

Question 2.

Draw cumulative frequency curve (ogive) for each of the following distributions:

(i)

Class Interval	10-15	15-20	20-25	25-30	30-45	35-40
Frequency	10	15	17	12	10	08

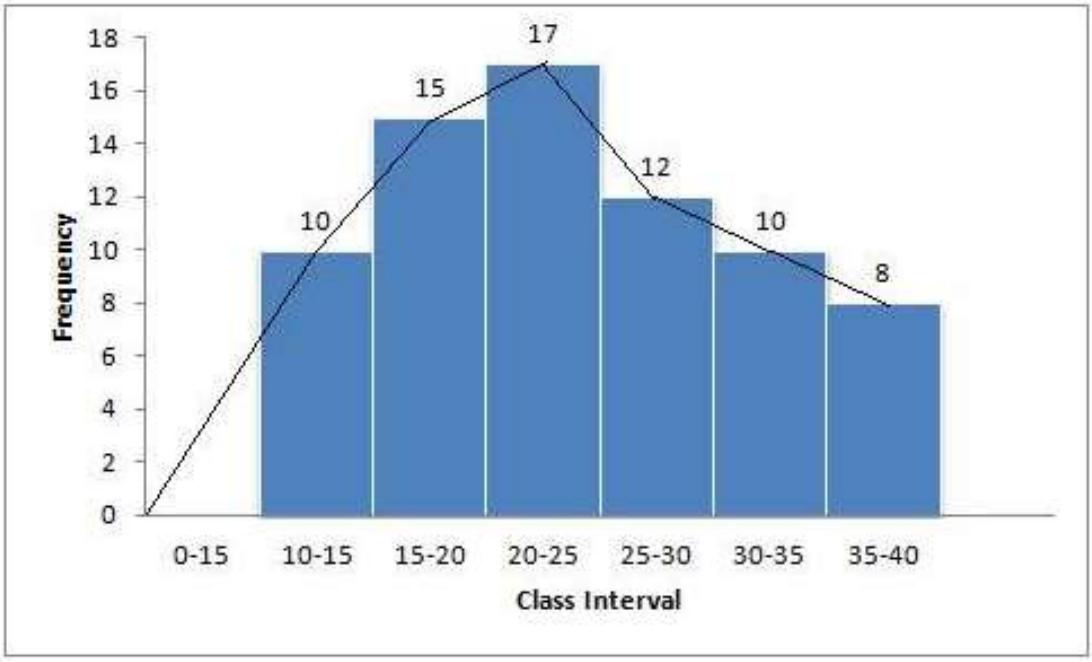
(ii)

Class Interval	10-19	20-29	30-39	40-49	50-59
Frequency	23	16	15	20	12

Solution:

(i)

Class Interval	Frequency
10-15	10
15-20	15
20-25	17
25-30	12
30-35	10
35-40	08



Steps of construction:

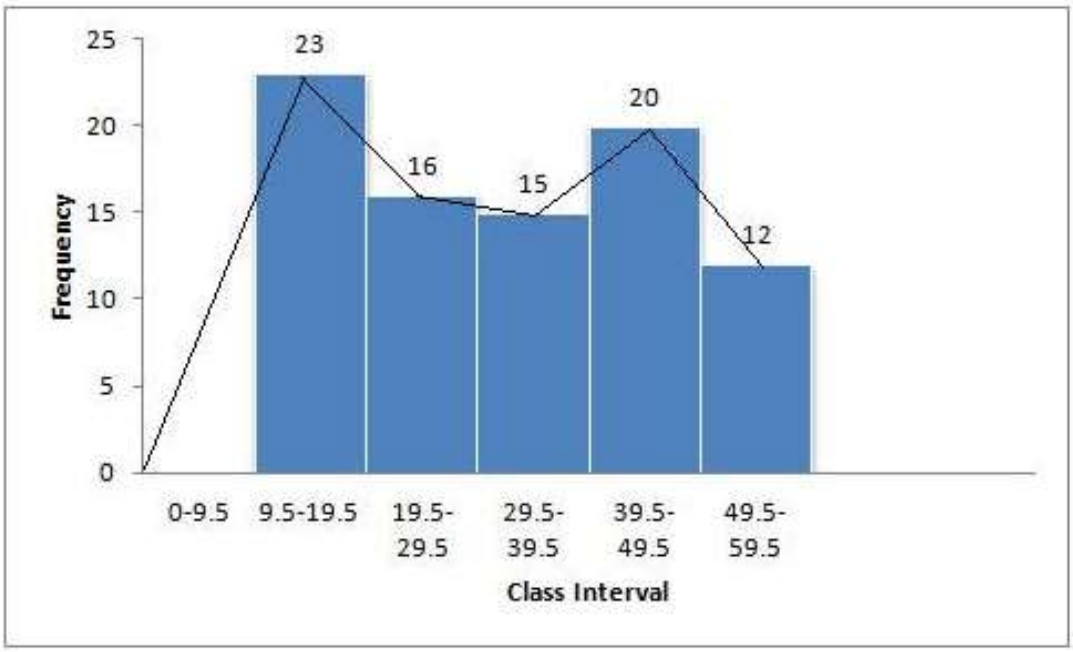
(a) Taking suitable scales, mark class intervals on x-axis and frequency on y-axis.

(b) Construct rectangles with class intervals as bases and corresponding frequencies as heights.

(c) Join the mid-points of the rectangle to obtain the ogive.

(ii)

Class Interval (Inclusive)	Class Interval (Exclusive)	Frequency	Cumulative Frequency
10-19	9.5-19.5	23	23
20-29	19.5-29.5	16	39
30-39	29.5-39.5	15	54
40-49	39.5-49.5	20	74
50-59	49.5-59.5	12	86
		Total	86



Steps of construction:

(a) Convert the data into exclusive form.

(b) Taking suitable scales, mark class intervals on x-axis and frequency on y-axis.

(c) Construct rectangles with class intervals as bases and corresponding frequencies as heights.

(d) Join the mid-points of the rectangle to obtain the ogive.

Question 3.

Draw an ogive for each of the following distributions:

(i)

Marks Obtained	less than 10	less than 20	less than30	less than 40	less than 50
No. of Students	8	25	38	50	67

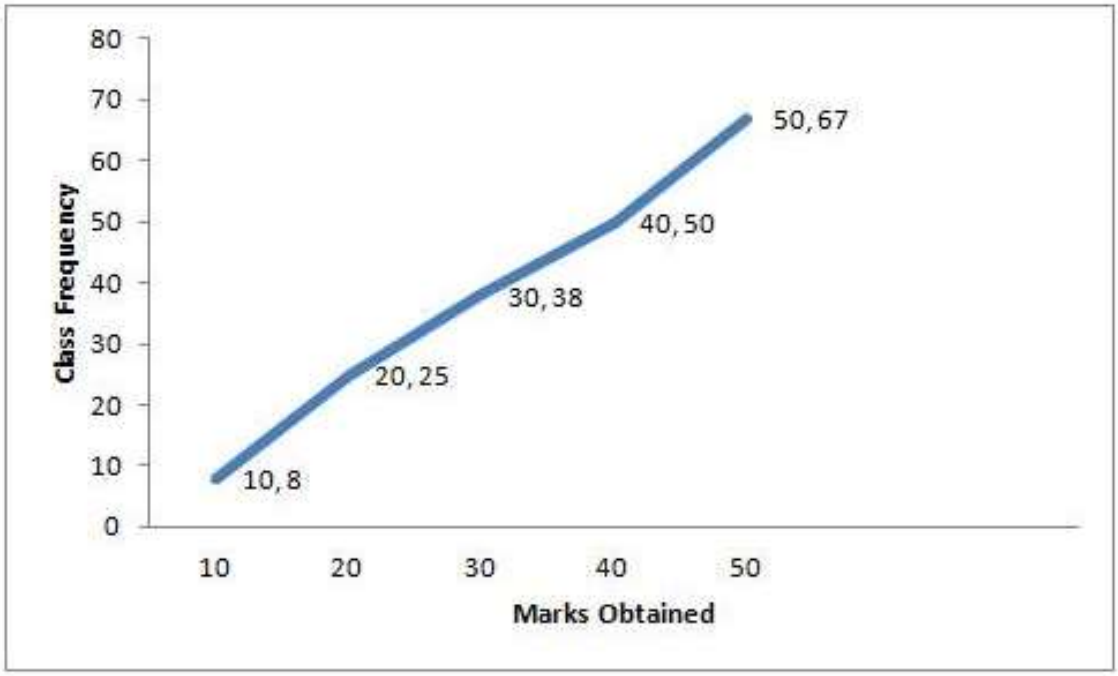
(ii)

Age in years (less than)	10	20	30	40	50	60	70
Cumulative Frequency	0	17	32	37	53	58	65

Solution:

(i)

Marks Obtained	No. of students (c.f.)
less than 10	8
less than 20	25
less than 30	38
less than 40	50
less than 50	67



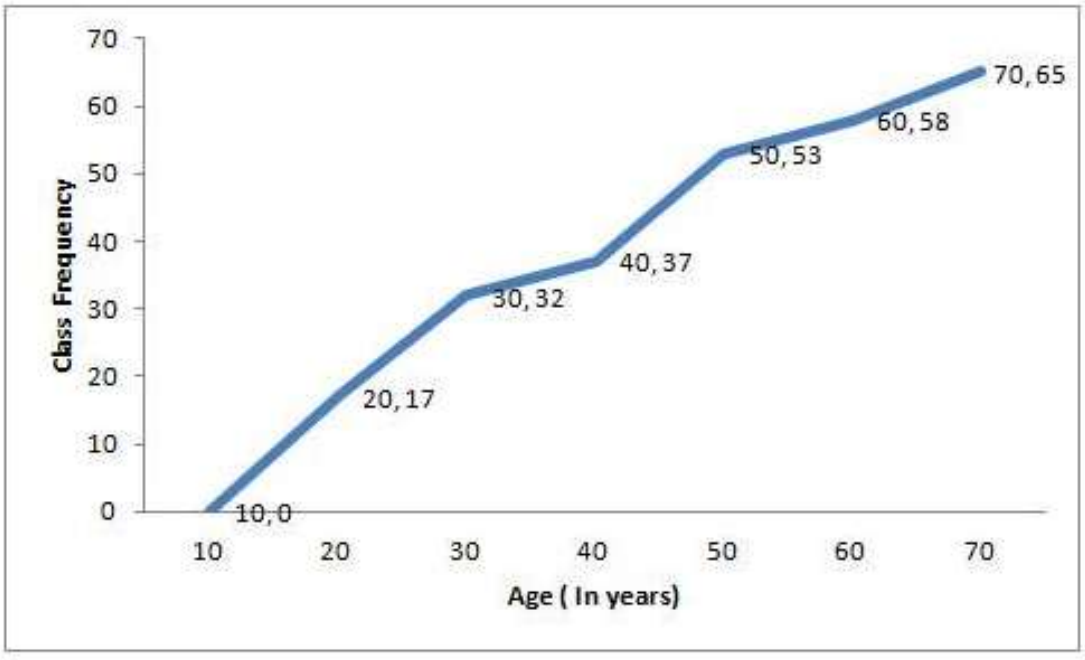
Steps Of construction:

(a) Plot the points (10,8), (20, 25), (30, 38), (40, 50) and (50, 67) on the graph.

(b) Join them with free hand to obtain an ogive.

(ii)

Age in years (less than)	Cumulative Frequency
10	0
20	17
30	32
40	37
50	53
60	58
70	65



Steps Of construction:

(a) Plot the points (10, 0), (20, 17), (30, 32), (40, 37), (50, 53), (60, 58) and (70, 65) on the graph.

(b) Join them with free hand to obtain an ogive.

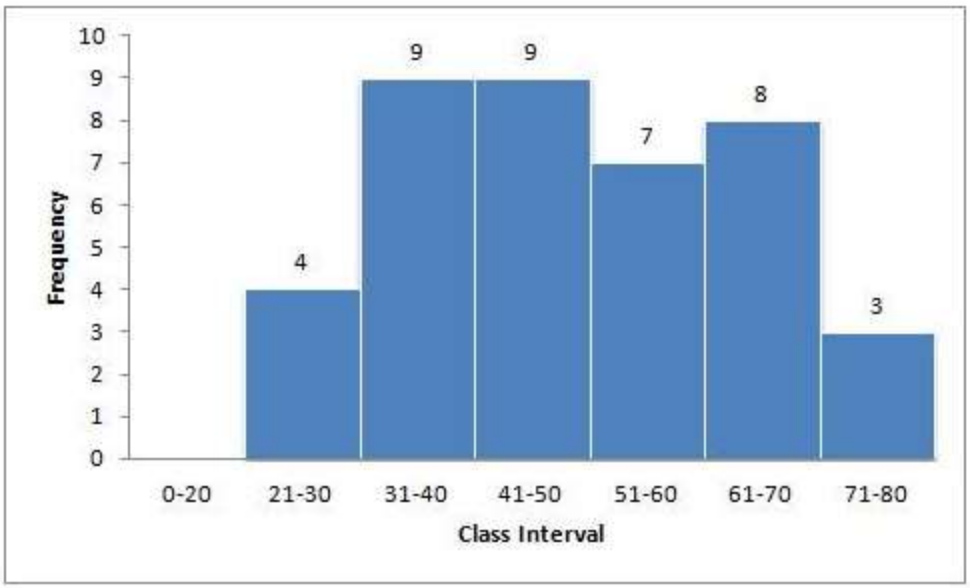
Question 4.
Construct a frequency distribution table for the number given below, using the class intervals 21-30, 31-40 … etc.

75, 67, 57, 50, 26, 33, 44, 58, 67, 75, 78, 43, 41, 31, 21, 32, 40, 62, 54, 69, 48, 47, 51, 38, 39, 43, 61, 63, 68, 53, 56, 49, 59, 37, 40, 68, 23, 28, 36, 47
Use the table obtained to draw:
(i) a histogram (ii) an ogive

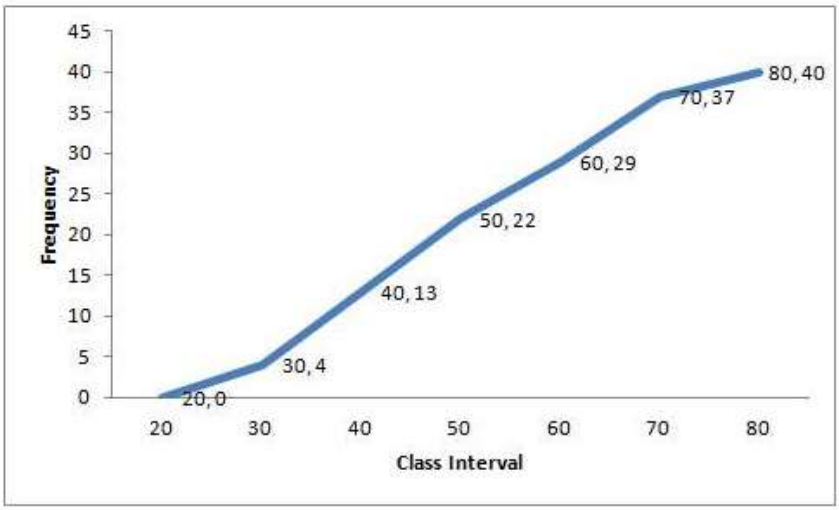
Solution:

Class Interval	Tally	Frequency	c.f.
21-30	||||	4	4
31-40	𝍸 ||||	9	13
41-50	𝍸 ||||	9	22
51-60	𝍸 ||	7	29
61-70	𝍸 |||	8	37
71-80	|||	3	40

(i)



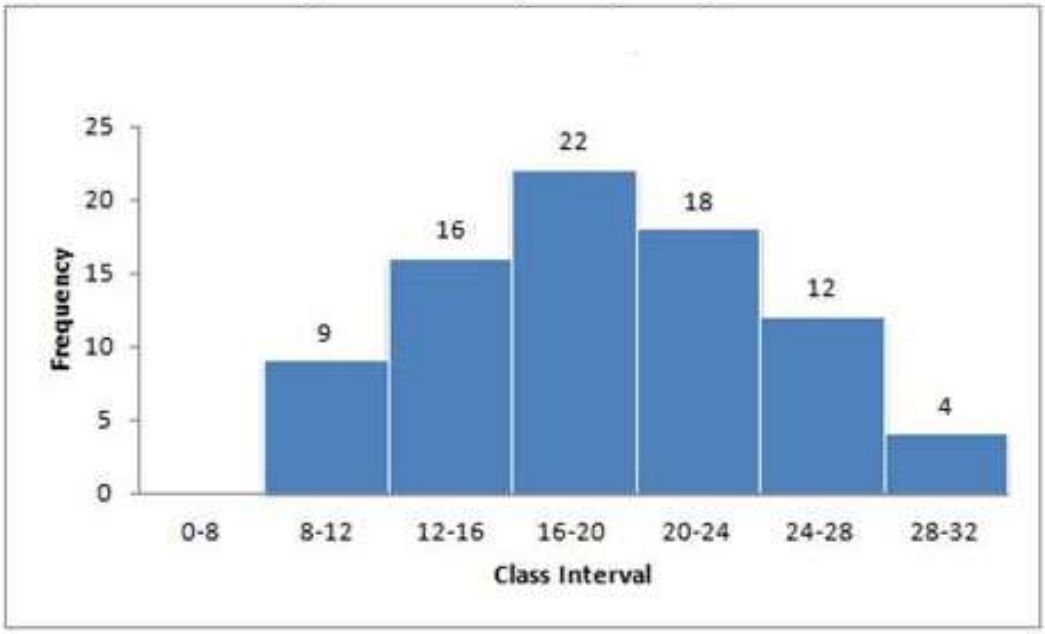
(ii)



Plot the points (30,4), (40,13), (50,22), (60,29), (70,37) and (80,40) on the graph and join them with free hand to obtain an ogive.

Question 5.

(a) Use information given in the adjoining histogram to construct a frequency table.



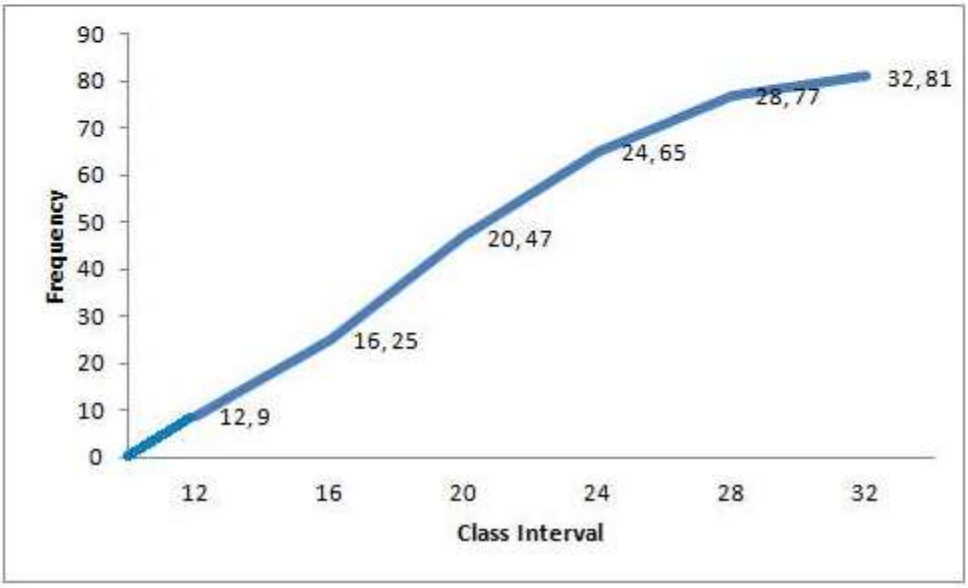
(b) Use this table to construct an ogive.

Solution:

(a)

Class Interval	Frequency	c.f.
8-12	9	9
12-16	16	25
16-20	22	47
20-24	18	65
24-28	12	77
28-32	4	81

(b) Now plot the points (12, 9), (16, 25), (20, 47), (24, 65), (28, 77), (32, 81) and join them to obtain an ogive.



Question 6.

Class Mark	12·5	17·5	22·5	27·5	32·5	37·5	42·5
Frequency	12	17	22	27	30	21	16

(a) From the distribution, given above, construct a frequency table.

(b) Use the table obtained in part (a) to draw: (i) a histogram, (ii) an ogive.

Solution:

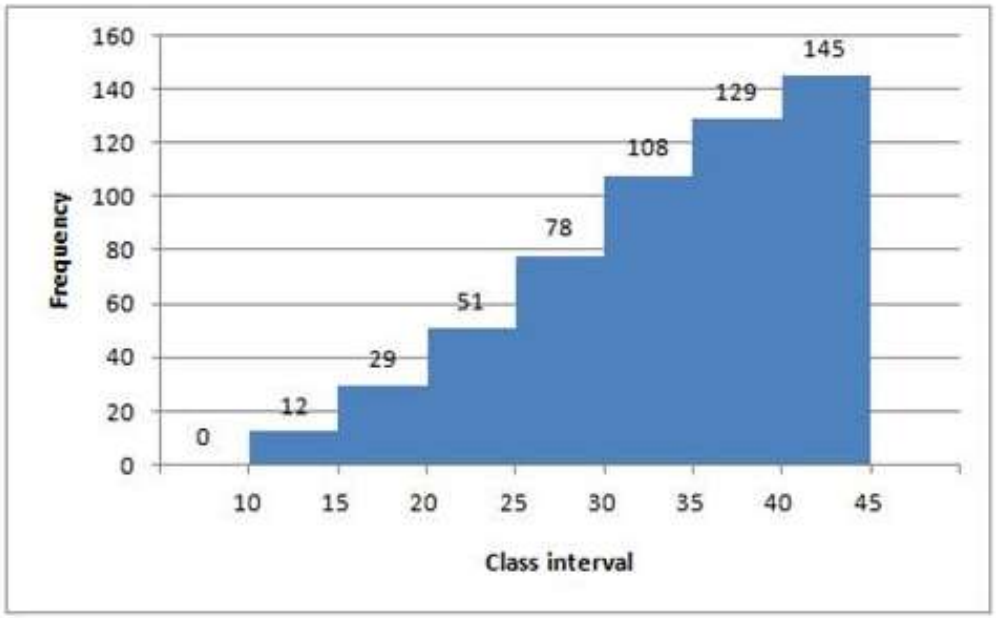
(a)

Difference in consecutive class marks = 17.5 - 12.5 = 5

⇒ first class interval will be 10-15 and so on.

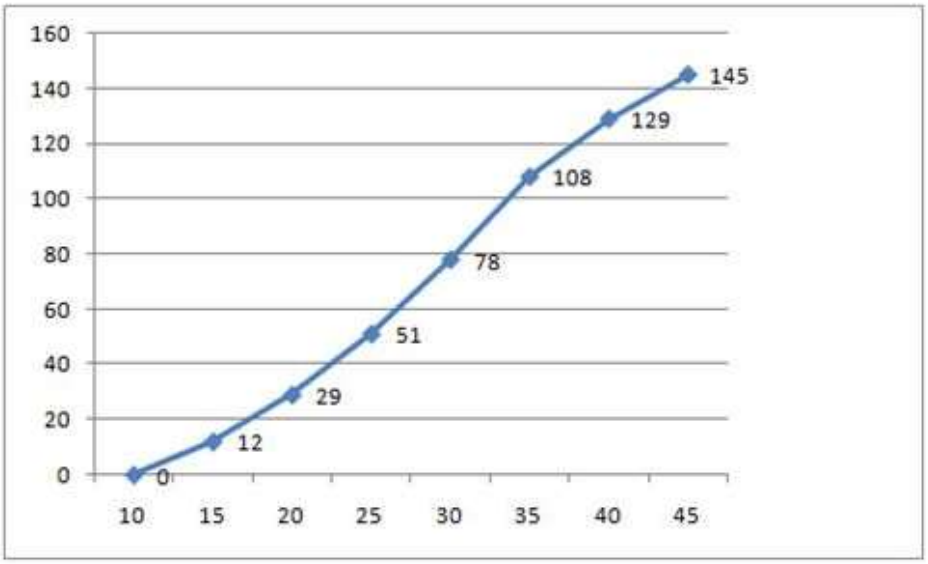
Class Mark	Class Interval	Frequency	c.f.
12.5	10-15	12	12
17.5	15-20	17	29
22.5	20-25	22	51
27.5	25-30	27	78
32.5	30-35	30	108
37.5	35-40	21	129
42.5	40-45	16	145

Total = 145



(b)

Now plot the points (15,12), (20,29), (25,51), (30,78), (35,108), (40,129), (45,145) and join them to obtain an ogive.



Question 7.

Use graph paper for this question.

The table given below shows the monthly wages of some factory workers.

(i) Using the table, calculate the cumulative frequencies of workers

(ii) Draw a cumulative frequency curve.

Use 2 cm = Rs 500, starting the origin at Rs 6500 on x-axis, and 2 em = IO workers on the y-axis.

Wages (in Rs)	6500 - 7000	7000 - 7500	7500 - 8000	8000 - 8500	8500 - 9000	9000 - 9500	9500 - 10000
No. of workers	10	18	22	25	17	10	8

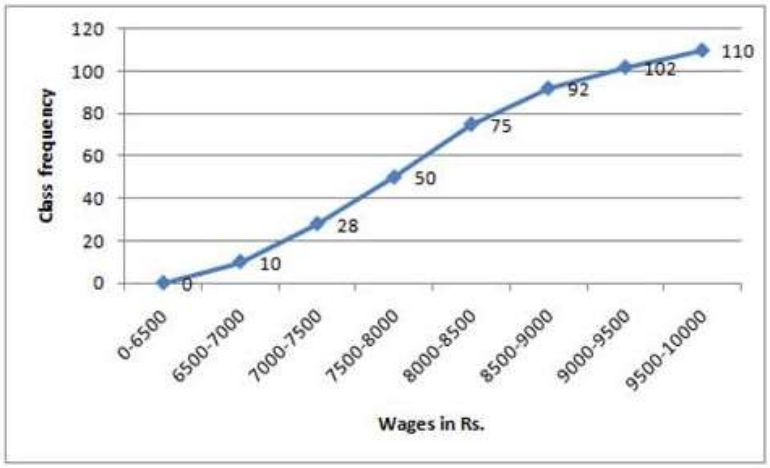
Solution:

(i)

Wages	No. Of workers	c.f.
6500-7000	10	10
7000-7500	18	28
7500-8000	22	50
8000-8500	25	75
8500-9000	17	92
9000-9500	10	102
9500-10000	8	110

Total = 110

Now plot the points (7000,10), (7500,28), (8000,50), (8500,75), (9000,92), (9500,102) and (10000,110) and join them to obtain an ogive.



Question 8.

The following table shows the distribution of the heights of a group of factory workers :

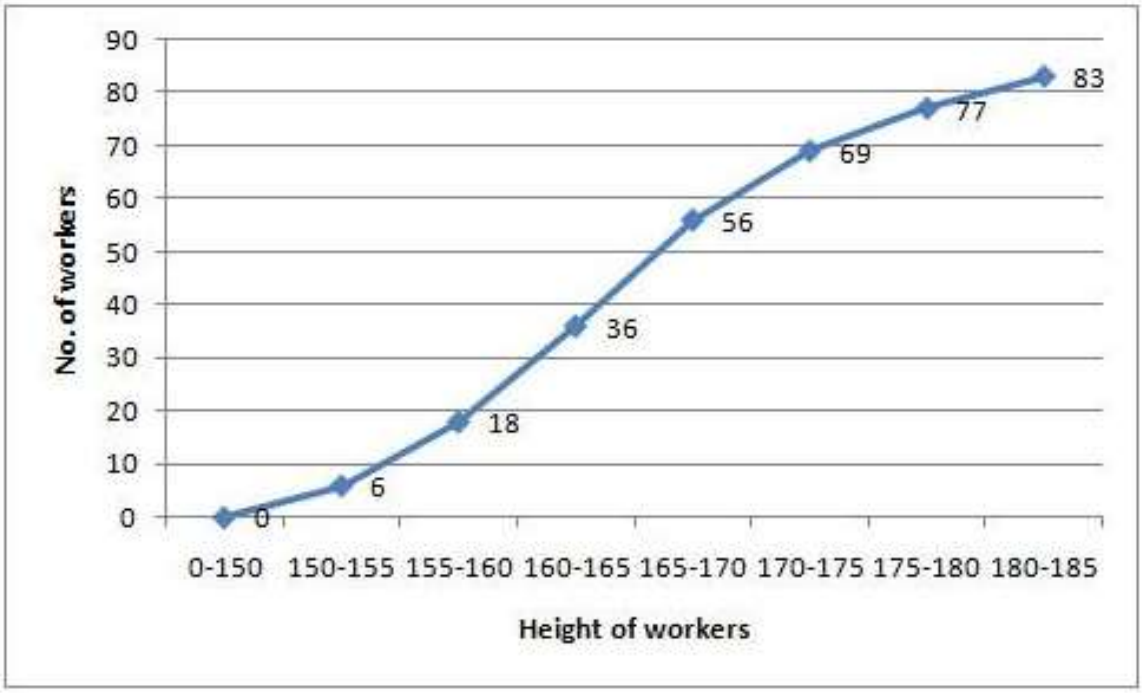
Ht.(cm):	150 - 155	155 - 160	160 - 165	165 - 170	170 - 175	175 - 180	180 - 185
No. of workers:	6	12	18	20	13	8	6

(i) Determine the cumulative frequencies.
(ii) Draw the 'less than' cumulative frequency curve on graph paper. Use 2 cm = 5 cm height on one axis and 2 cm = 10 workers on the other.

Solution:

Height (in cm)	No. Of workers	c.f.
150-155	6	6
155-160	12	18
160-165	18	36
165-170	20	56
170-175	13	69
175-180	8	77
180-185	6	83

We plot the points (155, 6), (160, 18), (165, 36), (170, 56), (175, 69), (180, 77) and (185, 83) on the graph and join them in free hand to obtain an ogive.



Question 9.

Construct a frequency distribution table for each of the following distributions:

(i)

Marks (less than)	0	10	20	30	40	50	60	70	80	90	100
Cumulative Frequency	0	7	28	54	71	84	105	147	180	196	200

(ii)

Marks (more than)	0	10	20	30	40	50	60	70	80	90	100
Cumulative Frequency	100	87	65	55	42	36	31	21	18	7	0

Solution:

(i)

Marks (less than)	Cumulative frequency	Frequency
0-10	7	7
10-20	28	28-7=21
20-30	54	54-28=26
30-40	71	71-54=17
40-50	84	84-71=13
50-60	105	105-84=21
60-70	147	147-105=42
70-80	180	180-147=33
80-90	196	196-180=16
90-100	200	200-196=4
Total		200

(ii)

Marks (more than)	Cumulative frequency	Frequency
0-10	100	13
10-20	87	22
20-30	65	10
30-40	55	13
40-50	42	6
50-60	36	5
60-70	31	10
70-80	21	3
80-90	18	11
90-100	7	7
Total		100