1. In 1995 out of total 2000 workers in a factory, 1550 were members of a trade union. The number of women workers employed was 250, out of which 200 did not belong to any trade union. In 2000, the number of union workers was 1725 of which 1600 were men. The number of non-union workers was 380, among which 155 were women.

Ans:-

Table No:-1

Title:- Trade union membership of factory workers (1995-2000).

Stub	Trade union			Non-Trade union			Total		
items	man	women	Total	man	women	Total	man	women	Total
1995	1500	50	1550	250	200	450	1750	250	2000
2000	1600	125	1725	225	155	380	1825	280	2105
total	3100	175	3275	475	355	830	3575	530	4105

Foot Note:- union and non-union workers are subdivided by gender based on given conditions. Total workers in 2000 are deduced from the given union and non-union counts.

Source:- CA/25/24/08/25

2. In a sample study about coffee habit in two towns, the following information was received: Town A: Females were 40%; Total coffee drinkers were 45% and males non-coffee drinkers were 20%. Town B: Males were 55%; Males non-coffee drinkers were 30% and Females coffee drinkers were 15%.

Ans:-

Table No:-2

Title:- Coffee drinking habits in Town A and Town B.

Stub	Coffee drinker			Non-coffee drinker			Total		
items	Males	Females	Total	Males	Females	Total	Males	Females	Total
Town A	40	5	45	20	35	55	60	40	100
Town B	25	15	40	30	30	60	55	45	100
Total	65	20	85	50	65	115	115	85	200

Foot Note:- Population percentages are converted to numbers assuming a base of 100 for each town.

Source:- Problem statement (Coffee habit survey data).

3. Out of a total number of 10,000 candidates who applied for jobs in a government department, 6854 were males, 3146 were graduates and others, non-graduates. The number of candidates with some experience was 2623 of whom 1860 were males. The number of male graduates was 2012. The number of graduates with experience was 1093 that includes 323 females.

Ans:-

Table No:-3

Title:- Profile of government job applicants.

Stub Items	Graduates			Non-Graduates			Total		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Experience	770	323	1093	1090	440	1530	1860	763	2623
Non-Experience	1242	811	2053	3752	1572	5324	4994	2383	7377
Total	2012	1134	3146	4842	2012	6854	6854	3146	10000

Foot Note:- Distribution by gender and education is based on the given figures. Cross-classification ensures consistency across graduates, non-graduate and experience categories.

Source:- Problem statement (government job application data).

4. In 1990, out of a total of 2000 students in a college, 1400 were enrolled for graduation and the rest for post-graduation (P.G.). Out of 1400 Graduate students, 100 were girls. In all, there were 600 girls in the college, out of which 250 were in P.G. In 1995, the number of Graduate students increased to 1700 of which 650 were girls. The number of P.G students fell to 500, of which only 50 were boys. In 2000, the total number of students was 2,200. The number of boys and girls in P.G. classes was equal. Out of 800 girls in the college, 650 were for Graduation. Represent the above information in a tabular form. Also calculate the percentage increase in the number of Graduate students in 2000 as compared to 1990.

Ans:-

Table No:- 4

Title:- Enrollment of Graduate and Post-Graduate students in a college. (1990-2000)

Stub Items	Graduation			Post-Graduation			Total		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
1990	1300	100	1400	350	250	600	1650	350	2000
1995	1050	650	1700	50	450	500	1100	1100	2200
2000	1250	650	1900	150	150	300	1400	800	2200
Total	3600	1400	5000	550	850	1400	4150	2250	6400

Foot Note:- Data is classified into Graduate and post-Graduate students, further divided into boys and girls, based on given conditions. Calculations assure distribution consistently with total counts provided.

Source:- Compiled from the given Problem Statement (Educational data interpretation exercise).

Graduate students (1990) = 1400
Graduate students (2000) = 1900
Increase = 1900 - 1400 = 500
Percentage increase = $\frac{500}{1400} \times 100$

$= 35.7\%$.

∴ Graduate students increased by 35.7% from 1990 to 2000.

⑤ In 2002, the number of workers in the trade union was 3,450 of which 3,200 were men. The number of non-trade union workers was 760, of which 330 were women. In 2003, out of a total of 4,000 workers in a factory, 3300 were members of a trade union. The number of women workers employed was 500, out of which 400 did not belong to any union. Present the above information in a suitable form.

Ans:-

Table No:- 5

Title:- Trade union membership of Factory workers (2002-2003)

Stub items	Trade union			Non-Trade union			Total		
	Men	women	Total	Men	women	Total	men	women	Total
2002	3200	250	3450	430	330	760	3630	580	4210
2003	3200	100	3300	300	400	700	3500	500	4000
Total	6400	350	6750	730	730	1460	7130	1080	8210

Foot Note:- Data is classified into union and non-union workers, further subdivided by gender. For 2003, the number of women (500) was used to split union (400) and non-union (400) groups. male counts were obtained by subtraction.

Source:- Problem Statement (Factory worker's union data, 2002-2003).

(6) In 2000, out of a total of 1750 workers of a factory, 1200 were members of a trade union. The number of women employed was 200, of which 175 did not belong to a trade union. In 2002, the number of union workers increased to 1580, of which 1290 were men. On the other hand, the number of non-union workers fell to 208, of which 180 were men. In 2004, there were 1800 employees who belonged to a trade union and so who did not belong to a trade union. of all the employees in 2004, 300 were women, of whom only 8 did not belong to a trade union. Present the above data in a suitable form.

Ans:-

Table No.:-6

Title:- Trade union membership of factory workers (2000, 2002, 2004).

Stub items	Trade union			Non-Trade union			Total		
	men	women	Total	men	women	Total	men	women	Total
2000	1175	25	1200	375	175	550	1550	200	1750
2002	1290	290	1580	180	28	208	1470	318	1788
2004	1508	292	1800	42	8	50	1550	300	1850
Total	3973	607	4580	597	211	808	4570	818	5388

Foot Note:- All missing gender counts are computed by subtraction from totals provided. Totals for each year equal the sum of union and non-union workers. Where only partial gender information was given, the complementary counts were derived as shown.

Source:- Compiled from the user-provided problem statements (factory trade-union data for 2000, 2002, 2004).

(7) In a trip organized by a college, there were 100 persons. The average cost works out to Rs. 15.60 per head. There were 80 students, each of whom paid Rs. 16 members of the teaching staff were charged at a higher rate. The number of servants was 6 (all males) and they were not charged. The number of ladies was 20% of the total, of which two were ladies staff members. Tabulate the above information in proper tabular form.

Ans:-

Table No:-7

Title:- College trip cost Breakdown (100 persons)

Stub items	No. of Persons			Amount Per Head (Rs.)	Total Amount collected (Rs.)
	male	Female	Total		
Students	62	18	80	16	1280
Teacher	12	2	14	20	280
Servants	6	0	6	0	0
Total	80	20	100	15.60	1560

Foot Note:- Servants were not changed. All calculations use the given average and category counts; teaching-staff rate was derived from the requirement that the overall average be ₹15.60.

Source:- Compiled from educational data interpretation exercises (college trip cost distribution)

⑧ Write any four types of diagrams used to present statistical data.

Ans:-

1. Bar Diagram:- uses rectangular bars to represent data; heights (or lengths) of the bars show the magnitude.
2. Pie Diagram (Pie Chart):- A circle divided into sectors (slices), each proportional to the data value it represents.
3. Histogram:- A type of bar diagram where adjacent rectangles show frequency distribution of continuous data.
4. Line Plot:- A line plot is a diagram that represents data points connected by straight line segments. It shows how a variable changes with respect to another variable (usually time).

⑨ Distinguish between primary and secondary data and discuss various methods of collecting primary data.

Ans:- Primary data is first-hand information collected directly by the investigator for a specific purpose, while secondary data is information already collected by others and used for reference.

Methods of collecting primary data:

1. Direct Personal Investigation:- investigator collects data personally.
2. Indirect oral Investigation:- data from witnesses/experts.
3. Questionnaires/schedules:- structured questions answered by respondents.
4. Observation/Experiments:- data collected through direct observation or experiments.

⑩ Write short notes on Box Plots and Probability Plots.

Box Plot:- A box plot is a graphical method of displaying the distribution of a dataset.

→ It shows the minimum, first quartile (Q1), median (Q2), third quartile (Q3) and maximum value.

→ The box represents the interquartile range (Q1-Q3), while the whiskers extend to the extremes.

→ outliers, if any are plotted separately.

→ It is helpful for comparing data distributions, identifying skewness and spotting outliers.

Probability Plot:-

A Probability plot is used to check whether a dataset follows a particular theoretical distribution (e.g., Normal distribution).

→ Data values are plotted against the expected values of the distribution.

→ If the points approximately form a straight line, the data fits the distribution.

→ Deviations from the line indicate departures from the assumed distribution.

→ It is commonly used in statistical quality control and reliability studies.

Stem and Leaf:-

1. 44, 46, 47, 49, 63, 64, 66, 68, 72, 72, 75, 76, 81, 84, 88

Ans:-

Stem	Leaf
4	4 6 7 9
6	3 4 6 8
7	2 2 5 6
8	1 4 8

Stem: Ten digit Place
Leaf: Unit Place

2. −23.678, −12.45, −3.4, 4.43, 5.5, 5.678, 16.87, 24.7, 56.8

Ans:-

Stem	Leaf
−23	678
−12	45
−3	4
4	43
5	5 678
16	87
24	7
56	8

Stem: Before decimal Place
Leaf: After decimal Place

3) 4.7, −30, 2.38, 13.7, 9.38, −11.324, −7.523, 18.198, 17.527, 32.55, 21, 17, 14, 28.382, 17.98.

Ans:- −30, −11.324, −7.523, 2.38, 4.7, 9.38, 13.7, 14, 17, 17.527, 17.98, 18.198, 21, 28.382, 32.55

Stem	Leaf
−30	0
−11	324
−7	523
2	38
4	7
9	38
13	7
14	0
17	0 527 98

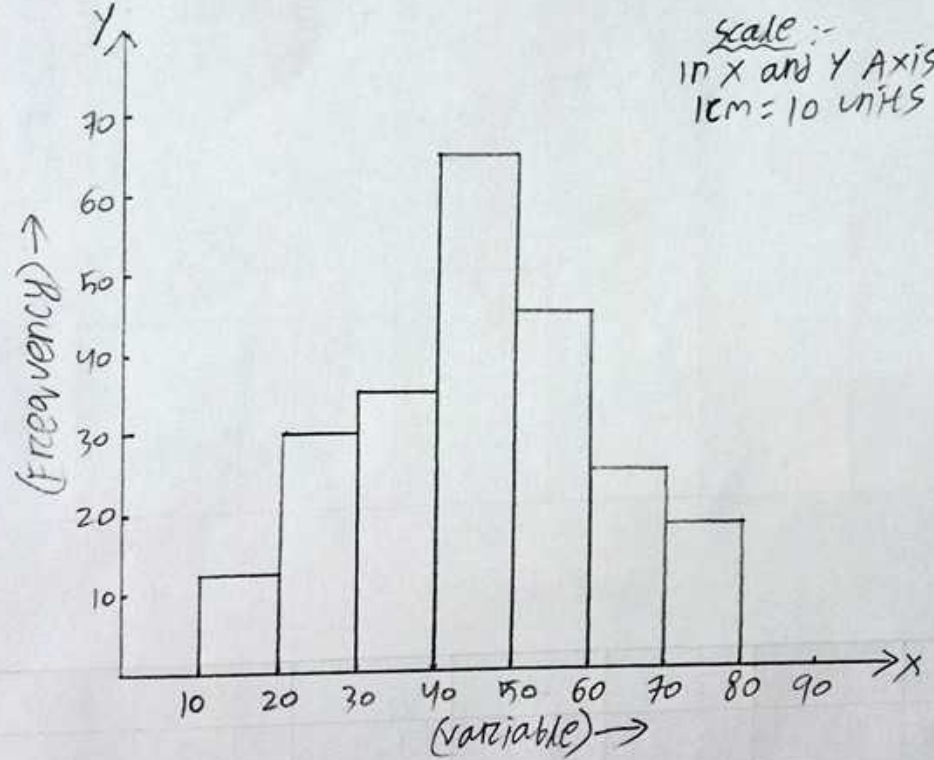
Stem	Leaf
18	198
21	0
28	382
32	55

Stem: Before decimal Place
Leaf: After decimal Place

Histogram :-

(1)

Variable	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	12	30	35	65	45	25	18



Scale :-
In X and Y Axis :-
1cm = 10 units

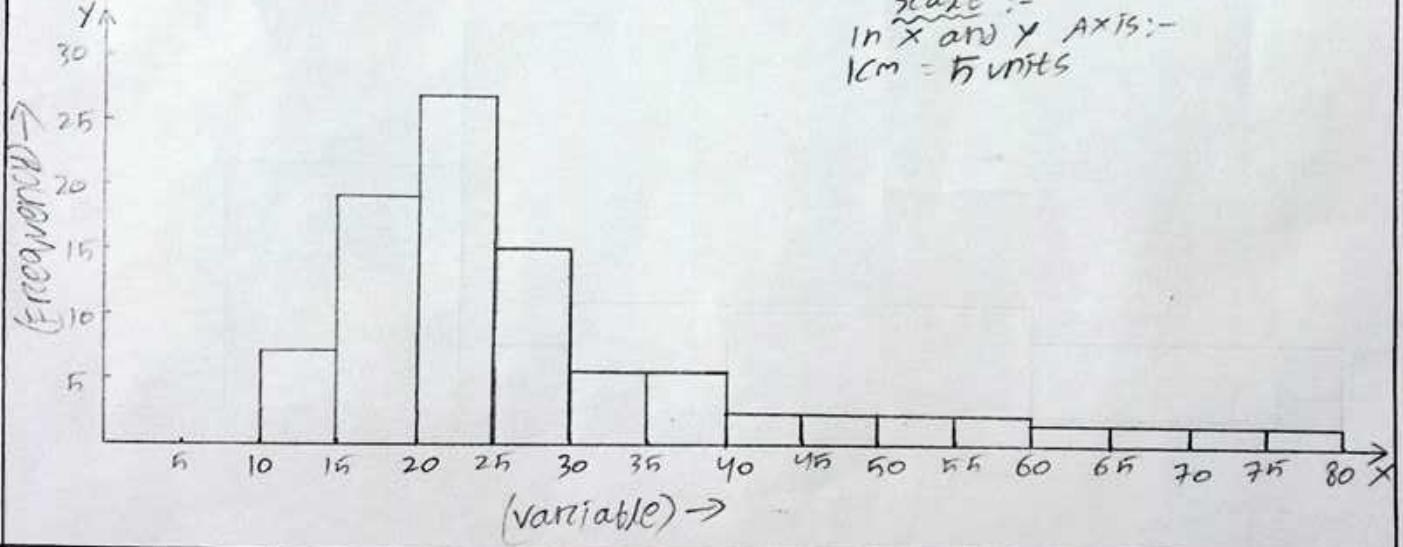
(variable) →

②

variable	10-15	15-20	20-25	25-30	30-40	40-60	60-80
Freqwency	7	19	27	15	12	12	8

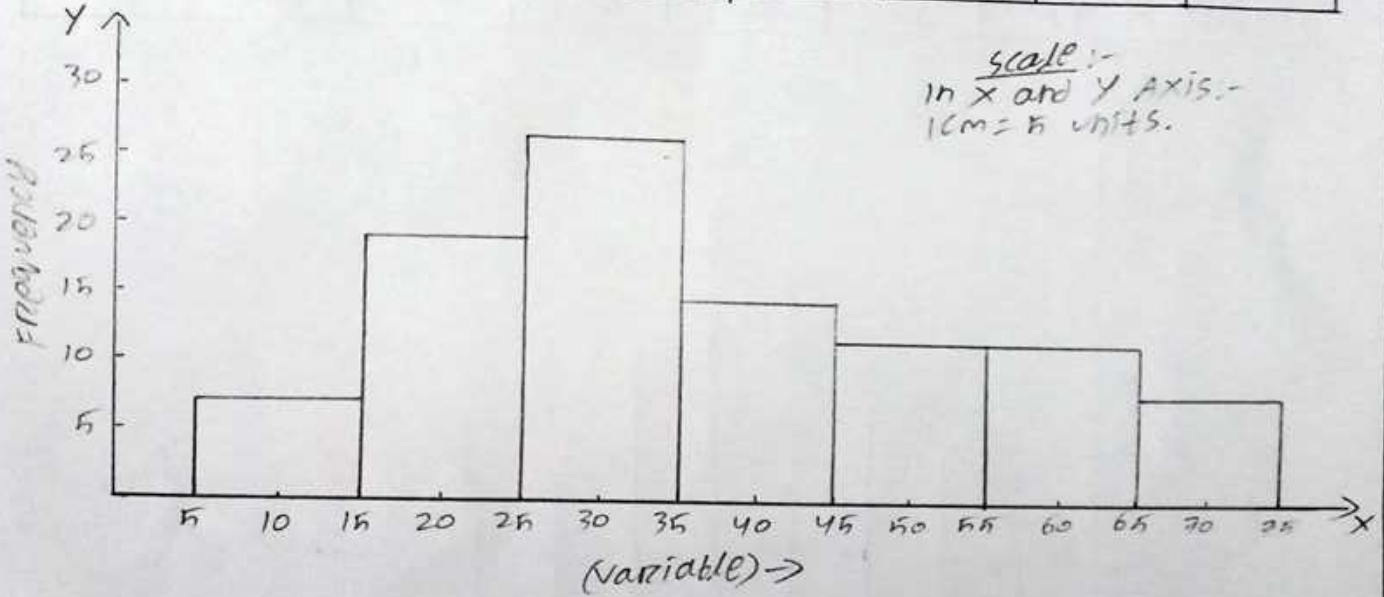
Variable	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80
Freqwency	7	19	27	15	6	6	3	3	3	3	2	2	2	2

Scale :-
In X and Y AXIS :-
1cm = 5 units



(3)

Mid value	10	20	30	40	50	60	70
variable	5-15	15-25	25-35	35-45	45-55	55-65	65-75
Frequency	7	19	27	15	12	12	8



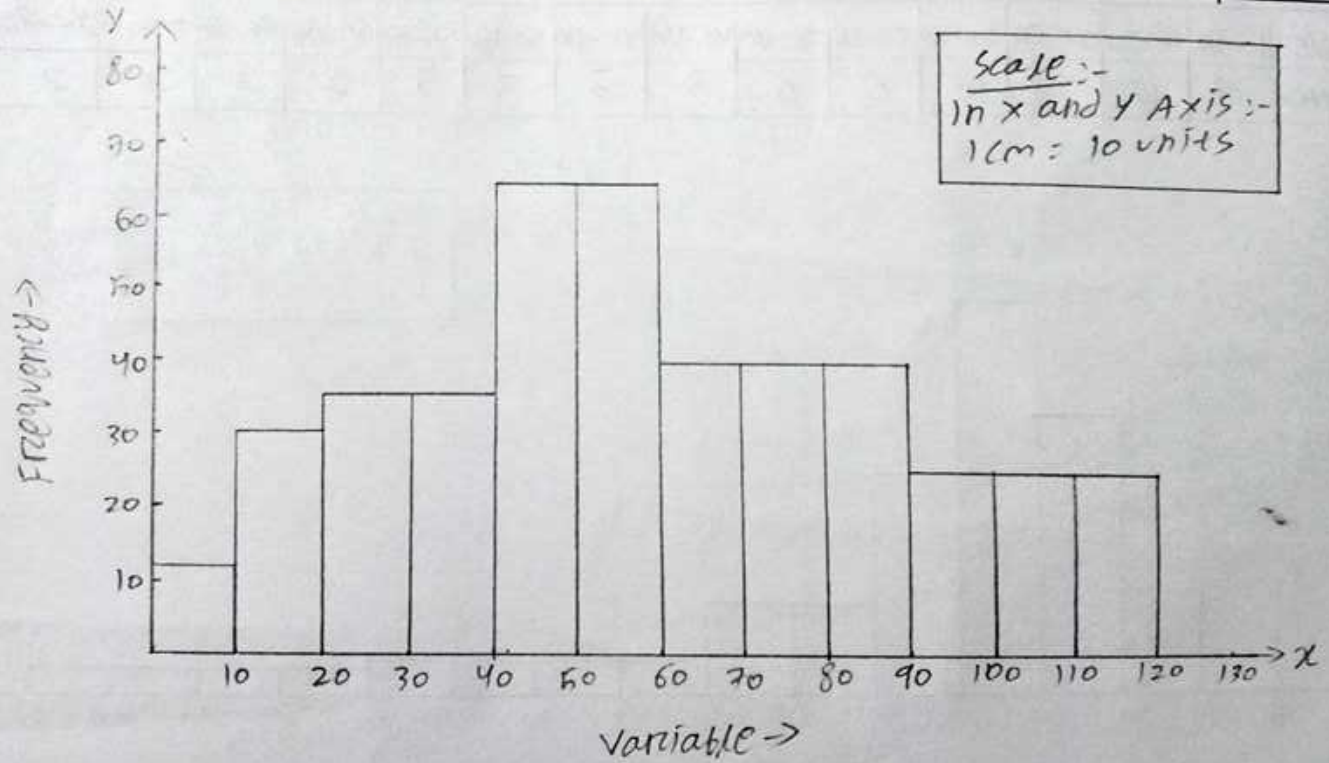
scale :-
In x and y axis :-
1cm = 5 units.

Variable →

④

Variable	10	20	40	60	90	120
Frequency	12	30	70	130	120	75

variable	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120
Frequency	12	30	35	35	65	65	40	40	40	25	25	25



Box Plots:-

① 70, 33, 50, 65, 30, 55, 65, 52

Ans:- 30, 33, 50, 52, 55, 65, 65, 70

min = 30

max = 70

$Q_2 = \frac{52+55}{2} = 53.5$

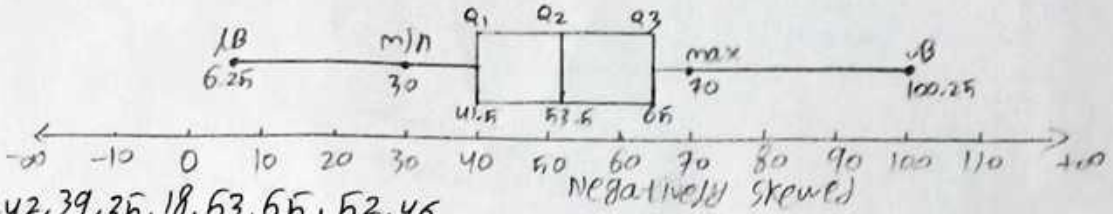
$Q_1 = \frac{33+50}{2} = 41.5$

$Q_3 = \frac{65+65}{2} = 65$

$IQR = Q_3 - Q_1$
$= 65 - 41.5$
$= 23.5$

$LB = Q_1 - (1.5 \times IQR)$
$= 41.5 - (1.5 \times 23.5)$
$= 6.25$

$UB = Q_3 + (1.5 \times IQR)$
$= 65 + (1.5 \times 23.5)$
$= 100.25$



Negatively skewed

② 53, 42, 39, 35, 18, 63, 65, 52, 46

Ans:- 18, 35, 39, 42, 46, 52, 53, 63, 65

min = 18

max = 65

$Q_2 = 46$

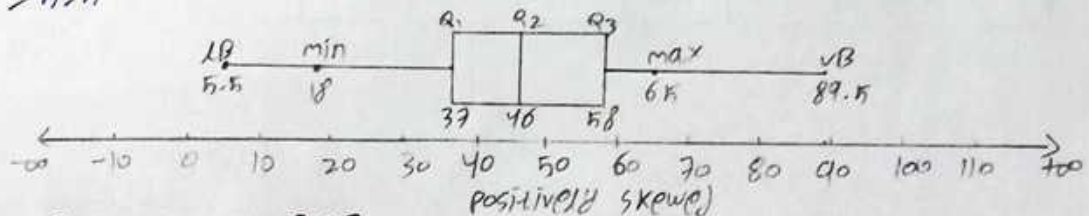
$Q_1 = \frac{35+39}{2} = 37$

$Q_3 = \frac{53+63}{2} = 58$

$IQR = Q_3 - Q_1$
$= 58 - 37$
$= 21$

$LB = Q_1 - (1.5 \times IQR)$
$= 37 - (1.5 \times 21)$
$= 5.5$

$UB = Q_3 + (1.5 \times IQR)$
$= 58 + (1.5 \times IQR)$
$= 89.5$



positively skewed

③ 43, 76, 87, 32, 30, 65, 43, 27

Ans:- 27, 30, 32, 43, 43, 65, 76, 87

min = 27

max = 87

$Q_2 = 43$

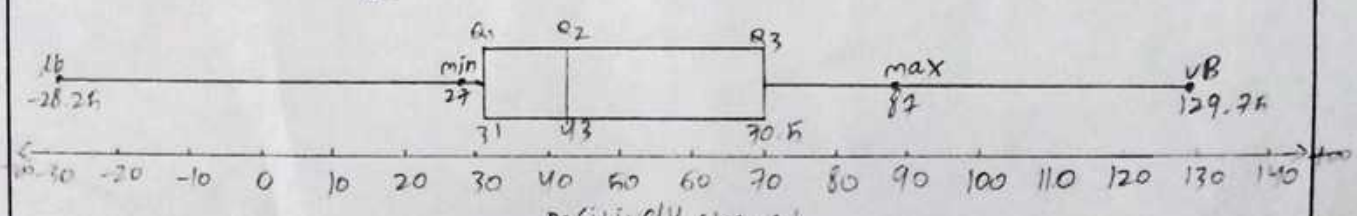
$Q_1 = \frac{30+32}{2} = 31$

$Q_3 = \frac{65+76}{2} = 70.5$

$IQR = Q_3 - Q_1$
$= 70.5 - 31$
$= 39.5$

$LB = Q_1 - (1.5 \times IQR)$
$= 31 - (1.5 \times 39.5)$
$= -28.25$

$UB = Q_3 + (1.5 \times IQR)$
$= 70.5 + (1.5 \times 39.5)$
$= 129.75$

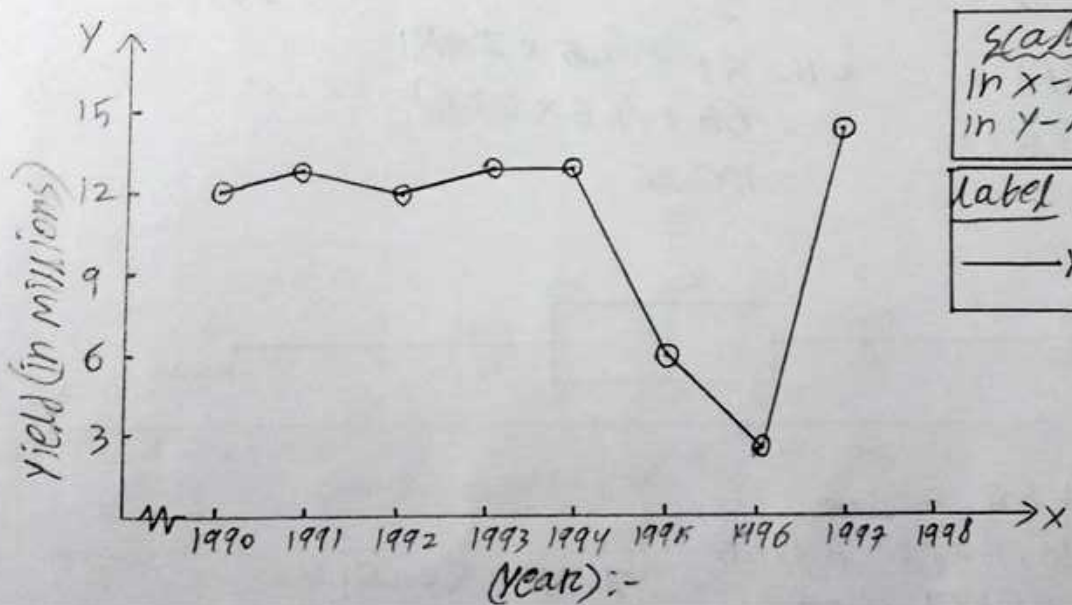


positively skewed

Time sequence plots :-

①

Year	1990	1991	1992	1993	1994	1995	1996	1997
Yield (in millions)	12.8	13.4	12.8	13.9	13.4	6.5	2.9	14.8

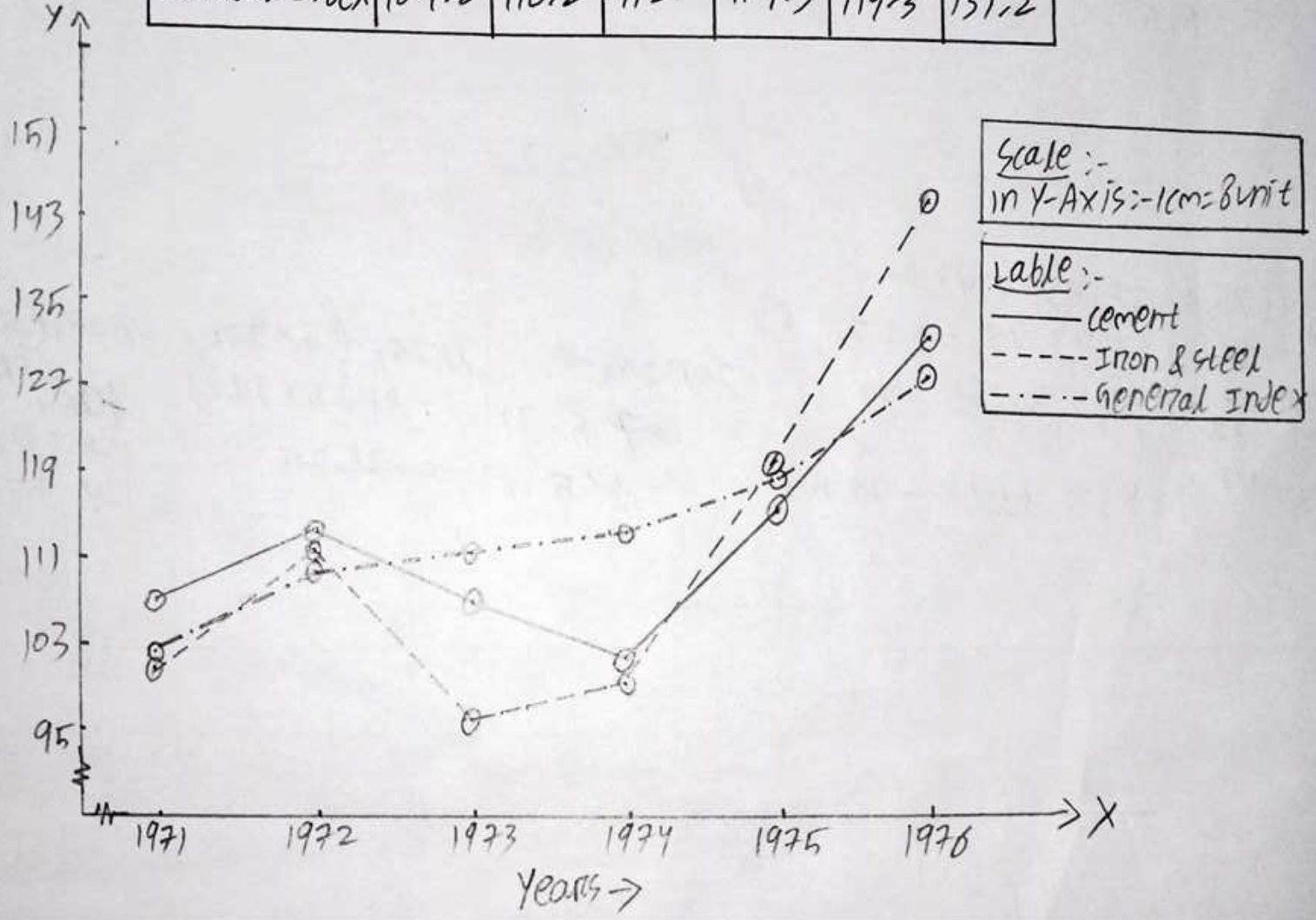


Scale :-
In X-Axis :- 1cm = 1 unit
In Y-Axis :- 1cm = 3 unit

Label :-
—— Yield (in millions)

②

Year	1971	1972	1973	1974	1975	1976
Cement	107	113.1	107.6	102.6	116.7	133.9
Iron & Steel	100.6	112	96.1	100.2	121.3	145
General Index	104.2	110.2	112	114.3	119.3	131.2

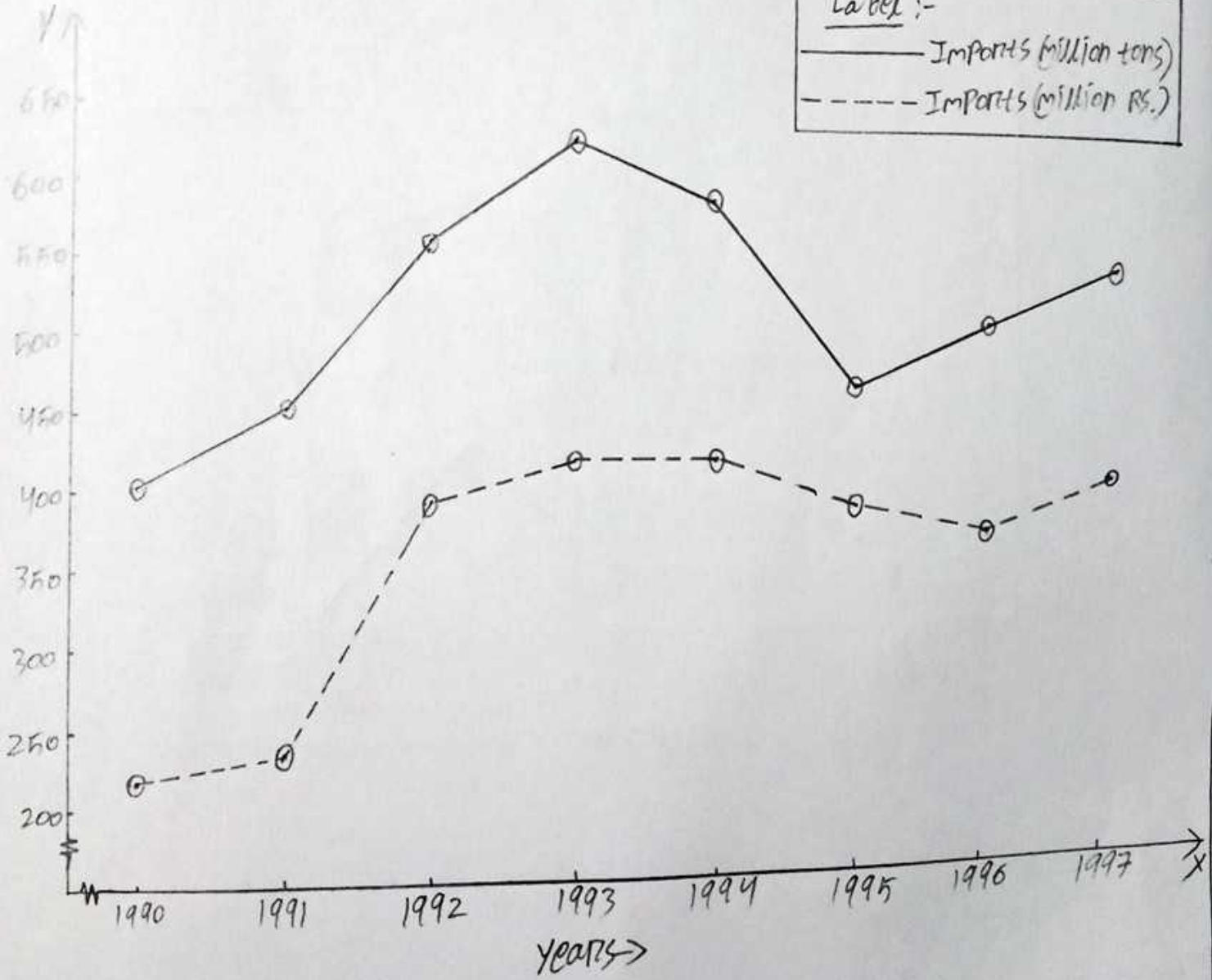


③

Year	1990	1991	1992	1993	1994	1995	1996	1997
Imports (million tons)	400	450	560	620	580	460	500	540
Imports (million Rs.)	220	235	385	420	420	380	360	400

scale :-
In Y-Axis :- 1cm = 50 units

Label :-
——— Imports (million tons)
- - - - - Imports (million Rs.)



⑨

Years	1970-71	1971-72	1972-93	1973-74	1974-75
Credits(C)	18.9	20.9	24.2	46.1	40.7
Debits(D)	22.2	24.9	26.7	33	47.2
Balance (C-D)	-3.3	-4.0	-2.5	13.1	-6.5

Scale
in Y-AXIS:- 1cm = 10unit

Lable
——— credits
- - - - debits
- · - · - Balance(C-D)