Applied Statistics

Unit – 1 – Data Description and Representation

Present the following information in tabular form.

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.
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%.
3. Out of a total number of 10,000 candidates who applied for jobs in a government department, 6,854 were males, 3,146 were graduates and others, non-graduates. The number of candidates with some experience was 2,623 of whom 1,860 were males. The number of male graduates was 2,012. The number of graduates with experience was 1,093 that includes 323 females.

Stem and Leaf

Draw the stem and leaf diagram of given observations:

1. 44, 46, 47, 49, 63, 64, 66, 68, 72, 72, 75, 76, 81, 84, 88
2. -23.678, -12.45, -3.4, 4.43, 5.5, 5.678, 16.87, 24.7, 56.8
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

Histogram

1. Draw the histogram for the following frequency distributions:

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

2. Draw the histogram for the following frequency distributions:

Variable	10 – 15	15 – 20	20 – 25	25 – 30	30 – 40	40 – 60	60 – 80
Frequency	7	19	27	15	12	12	8

3. Draw the histogram for the following frequency distributions:

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

4. Draw the histogram for the following frequency distributions:

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

Box Plots

Draw the box plot of the following data:

1. 70, 33, 50, 65, 30, 55, 65, 52
2. 53, 42, 39, 35, 18, 63, 65, 52, 46
3. 43, 76, 87, 32, 30, 65, 43, 27

Time Sequence Plots

1. Draw the graph for the following:

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

2. Draw the graph for the following:

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. Draw the graph for the following:

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

4. Draw the graph for the following:

Years	1970 – 71	1971 – 72	1972 – 73	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

Probability Plots

1. Let n = 5 and P = ½ = q. Draw the graph of Binomial Mass function B (5, x) where x = 0, 1, 2, 3
2. Let a = 1, b = 3. Draw the graph of Uniform Density function $P(x) = \begin{cases} (1 / (3 - 1)), & 1<x<3 \\ 0, & \text{otherwise} \end{cases}$
3. Draw a graph of Normal Density function with $\mu = 0$ and $\sigma = 1$

Unit – 2 – Descriptive Statistics

Find the Arithmetic Mean of the following data.

1. The intelligence quotients (IQ's) of 10 boys in a class are given below: 70, 120, 110, 101, 88, 83, 95, 98, 107, 100
2. The following is the frequency distribution of the no. of telephone calls received in 245 successive 1-minute interval at an exchange, calculate the mean.

No. of calls	0	1	2	3	4	5	6	7
Frequency	14	21	25	43	51	40	39	12

3. For given frequency distribution, calculate the mean.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
No. of students	6	5	8	15	7	6	3

4. Find mean using Step – Deviation method.

Class	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59
Frequency	8	8	15	11	8

Find the AM using its properties.

5. The average daily wage of all workers in a factory is Rs. 444 if average daily wage paid to male and female workers are Rs. 480 and Rs. 360 respectively. Find the percentage of male and female workers employed by the factory.
6. The mean of the marks in statistics of 100 students in a class was 72. The mean of boys was 75 while their number was 70. Find the mean of marks of girls.
7. Arithmetic Mean height of 50 students of a college is 5,8 inches. The height of 30 of these is given in frequency distribution below. Arithmetic Mean height of 20 students is to be found.

Height (inch)	5'4"	5'6"	5'8"	5'10"	6'0"
Frequency	4	12	4	8	2

Find the Weighted Arithmetic Mean of the following data.

8. The following are the percentage of marks in an examination.

Subject	Marks (X_i)	Weight (W_i)
English	60	1
Hindi	75	2
Math	63	1
Physics	59	3
Chemistry	55	3

9. Show that the Weighted Arithmetic Mean of the first 'n' natural number whose weights are equal to the corresponding number is equal to $(2n+1)/3$.

Find the missing frequencies.

10. Given mean is 1.46 for the following frequency distribution

No. of accidents	0	1	2	3	4	5	Total
Frequency (No. of Days)	46	?	?	25	10	5	200

11. For the following data given mean is 15.38

Size	10	12	14	16	18	20
Frequency	3	7	?	20	8	5

Find the Median for the following data.

12. 35, 12, 40, 60
13. 35, 12, 40, 60, 50
14. 8 coins are tossed the no. of head results was noted and operation was repeated 256 times.

No. of Heads	0	1	2	3	4	5	6	7	8
Frequency	1	9	26	59	72	52	29	7	1

15. Age distribution of a particular region. Find the median.

Age (in years)	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 and over
No. of persons	2	3	4	3	2	1	0.5	0.1

16. In the frequency distribution of 100 families, given below are the number of families corresponding to expenditure group are missing from the table. Median is known to be 50. Find the missing frequency.

Expenditure	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
No. of families	14	?	27	?	15

Find the quartiles, deciles and percentile.

17. Q_2, D_8 and P_{85}

Income ('00 Rs)	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40
No. of families	75	250	350	192	68	35	24	6

18. Q_3, D_6 and P_{70}.

Class	Less than 10	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79
Frequency	5	13	20	32	60	80	90	100

Mode

19. Find the mode.

X_i	1	2	3	4	5	6	7	8	9
F_i	3	1	18	25	40	30	22	10	6

20. Find the mode for the frequency distribution.

Weight (in kg)	93 – 97	98 – 102	103 – 107	108 – 112	113 – 117	118 – 122	123 – 127	128 – 132
No. of students	3	5	12	17	14	6	3	1

21. Find the mode using grouping method.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
F_i	4	2	18	22	21	19	10	3	1

Find the Geometric Mean and Harmonic Mean.

22. Calculate the G.M and H.M of 31 persons.

Weight (in kg)	130	135	140	145	146	148	149	150	157
No. of persons	3	4	6	6	3	5	2	1	1

23. For given frequency distribution, calculate G.M and H.M.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of students	5	7	15	25	8

Solve the following.

24. Find the Inter Quartile Range, Quartile Deviation and Coefficient of Quartile Deviation.

Class	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90	90 – 105
Frequency	8	26	30	45	20	17	4

25. Find the following for the above data.

- 10 – 90 Percentile Range
- 10 – 90 Semi – Percentile Range
- Coefficient of 10 – 90 Percentile Range

Mean Deviation

26. Calculate the M.D for mean and median.

Class Interval	2 – 4	4 – 6	6 – 8	8 – 10
Frequency	3	4	2	1

27. Calculate the M.D for mean and median.

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	8	12	10	8	3	2	7

28. Calculate the Standard Deviation and Variance.

Value	90 – 99	80 – 89	70 – 79	60 – 69	50 – 59	40 – 49	30 – 39
Frequency	2	12	22	20	14	4	1

29. Calculate the first four moments about mean for the following and comment the nature of the distribution.

x_i	1	2	3	4	5	6	7	8	9
f_i	1	6	13	25	30	22	9	5	2

30. Plot a Scatter Plot for the following are the heights and weight of 10 students of a class

Height	62	72	68	58	65	70	66	63	60	72
Weight	50	65	63	50	54	60	61	55	54	65

31. Calculate Karl Pearson's Coefficient of correlation between expenditure on advertising and sales from the data given below:

Expenditure ('000 Rs)	39	65	62	90	82	75	25	98	36	78
Sales (Lakh Rs)	47	53	58	86	62	68	60	91	51	84

32. Calculate Spearman's Rank Correlation.

X_i	39	65	62	90	82	75	25	98	36	78
Y_i	47	53	58	86	62	68	60	91	51	89

33. Calculate Line of Regression Equation

Sales (X_i)	91	97	108	121	67	124	51	73	111	57
Purchases (Y_i)	71	75	69	97	70	91	39	61	80	47