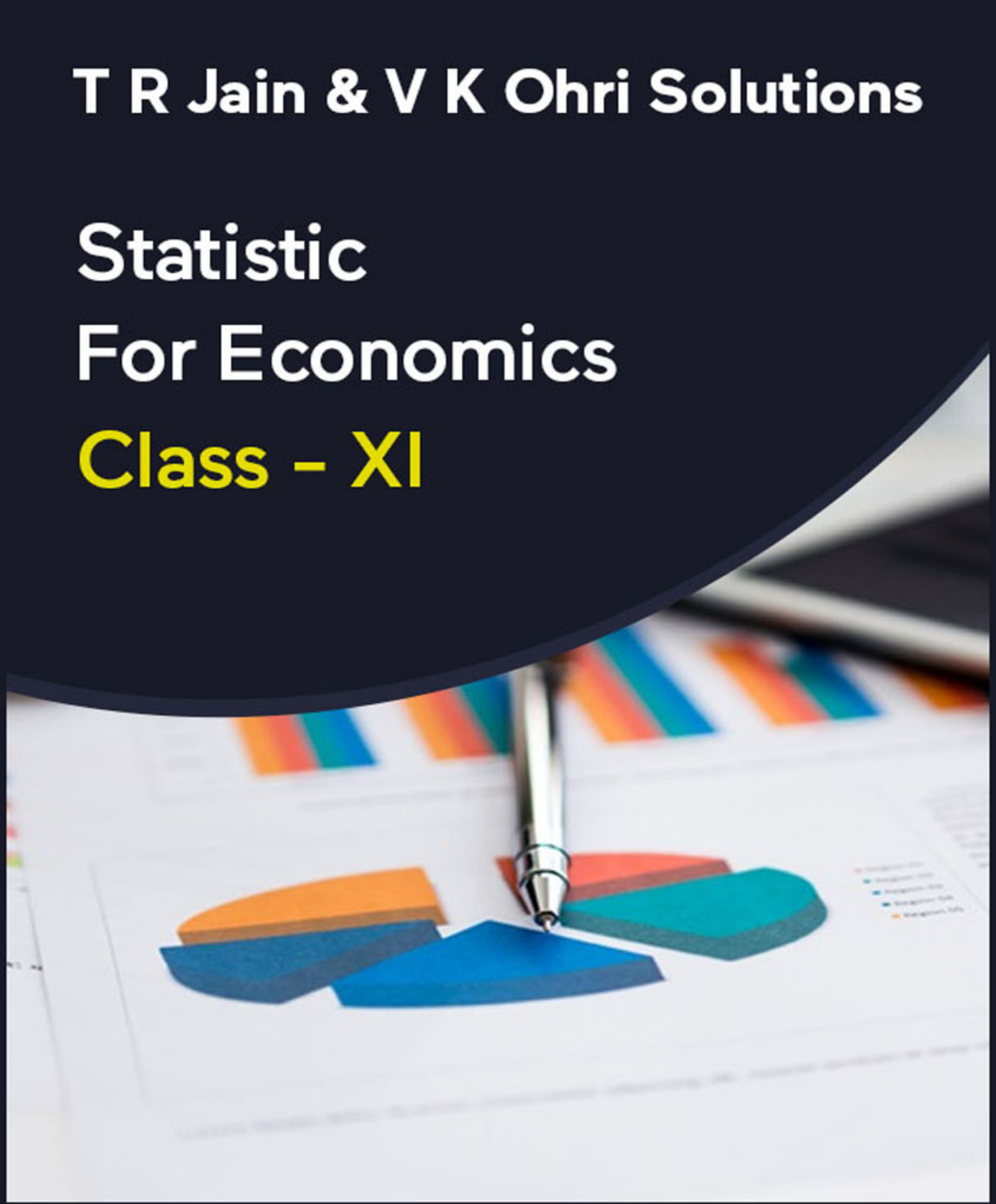
T R Jain & V K Ohri Solutions

Statistic For Economics

Class – XI



Statistics for Economics

CLASS - XI

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Essential Practicals

Solutions

Contents

Chapter – 1

Concept of Economics and Significance of Statistics in Economics

Essential Practical:

Q.1. Complete the following observation:

a. Statistics means

b. Statistics and economics are

c. The term population refers to

d. Descriptive Statistics means those methods

Solution:

i. Statistics means **quantitative information.**

It deals with quantitative information only and does not take qualitative data into consideration. Qualitative variables such as beauty, honesty and kindness cannot be studied.

ii. Statistics and economics are **complementary to each other**.

Statistics plays a significant role in Economics. It

- Expresses economic problems quantitatively.
- Facilitates inter-sectoral and inter-temporal comparison.
- Helps in studying the cause and effect relationship between different economic variables which leads to construction of economic theories.

iii. The term population refers to the **aggregate of all items relating to statistical study.** Thus, if statistical study comprises 200 items, then population is 200.

iv. Descriptive statistics means those methods **which are used for collection, presentation and analysis of data**. Under this, following estimations are done:

- Measurement of central tendencies such as mean, median, mode, quartiles, deciles and percentiles
- Measurement of dispersion such as range, quartile deviation, mean deviation and standard deviation
- Measurement of correlation through a scatter diagram and correlation coefficient.

Q.2. Prepare a list of statistical information that will facilitate comparison of academic performance of your school with the other schools in your neighbourhood.

Solution:

List of statistical information which will be required to facilitate comparison of academic performance of my school with the other schools in my neighbourhood:

i) Data of the total number of schools and the total number of students in each school

ii) Average marks obtained by students in each class in each school

iii) Average marks of all students in each school

iv) Coefficient of variation of marks

Academic performance of a school is better when average marks are highest and coefficient of variation is lowest.

Q.3. Write two such pairs of statistical variables that show cause and effect relationship with each other.

Solution:

The following are two pairs of statistical variables that show 'cause and effect relationship' with each other:

i) ***Unemployment rate and inflation rate***: Unemployment and inflation are negatively related to each other. In other words, with a decrease in unemployment rate, the inflation rate rises and vice-versa. For instance, with the decrease in the unemployment, the income of people increases. This results in an increase in the demand for goods and services, which in turn leads to an increase in the general price level (inflation).

ii) ***Wage rate and price level****:* Wage rate and price level are positively related to each other. In other words, an increase in the general wage rates, results in a rise in the general price level. With an increase in the wage rate of workers, the cost of production increases. To maintain their level of profit margins, the producers pass on this increase in the cost of production to consumers in the form of higher prices.

Chapter – 2
Collection of Data

Essential Practical:

Q.1. Frame five two-way questions and five 'multiple choice' questions relating to a questionnaire that you intend to design for collecting primary data on the Level and Composition of expenditure of the people in your locality.
Example: Two-way question: Does your monthly expenditure ever exceed your monthly income during a year?

Yes	No

Multiple choice questions: Which of the following is your major item of expenditure during the month?

School Fee	Tuition Fee	Food
Clothing	House Rent	Others

Solution:

QUESTIONNAIRE
on
Level and Composition of Expenditure of People
Two-way Questions

Name: _____
Age: _____
Address: _____

1. Does your monthly expenditure exceed Rs 20,000?
   Yes ☐ No ☐
2. Do you save anything from your monthly income?
   Yes ☐ No ☐
3. How much do you spend on food and clothing?
   Less than 50% ☐ More than 50% ☐
4. Does your basket of goods contain luxury items?
   Yes ☐ No ☐
5. Does your monthly expenditure include educational expenses?
   Yes ☐ No ☐

QUESTIONNAIRE
on
Level and Composition of Expenditure of People
Multiple Choice Questions

Name: _____
Age: _____
Address: _____

1. **What percentage of your income do you spend on purchasing goods and services?**
   a. **10-30%**
   b. **30-50%**
   c. **50-70%**
   d. **70-100%**

2. **What percentage do you save from your monthly income?**
   a. **0-10%**
   b. **10-20%**
   c. **20-30%**
   d. **30% and above**

3. **How many times in a month do you go for an outing?**
   a. **Never**
   b. **Once**
   c. **Twice**
   d. **Thrice and above**

4. **Which of the items account for maximum monthly expenditure?**
   a. **Food**
   b. **Clothing**
   c. **Rent**
   d. **School fees**
   e. **Others (specify) _____**

5. **How much do you spend on luxury items?**
   a. **0-10%**
   b. **10-20%**
   c. **20-30%**
   d. **30% and above**

Q.2. Complete the following observations:

i) **Secondary data is the data_____.**
ii) **Sources of secondary data are_____.**
iii) **Primary data are always collected directly from the individuals____.**
iv) **Pilot survey is conducted to assess_____.**

Solution:

i) Secondary data is the data ***collected by other persons***. That is, secondary data is collected by an individual or a group of individuals or any agency in the past for their own purpose but later on used by some other party for some other or same purpose. If the data is collected on a special request then it will be treated as primary data rather than secondary data.

ii) Sources of secondary data are ***government publications, semi-government publications and private publications.*** Data collected from such sources are not original as they have not been collected directly by the investigator rather they had been collected by someone else in the past. The secondary sources of data can be in published or unpublished form.

iii) Primary data are always collected directly from the individuals ***who constitute the universe of study***. Primary data means collecting data directly from the actual source of information.

iv) Pilot survey is conducted to assess ***the quality of questionnaire***. Pilot survey are conducted before the final statistical investigation is done. It is a form of pre-testing of the questionnaire on a small sample of the universe that helps in judging the quality of the questionnaire and accordingly, getting to know if any modifications are required in it before the final survey takes place.

Chapter – 3
Census and Sample Methods of Collection of Data

Essential Practical:

Q.1. There are 10 students in your school who excel in the game of cricket. All are equally brilliant, but you have to select only 3 out of 10 for representing your school in the inter-zonal cricket tournament. How would you do it? Give details with reason.

Solution:

Lottery method of random sampling should be adopted to select 3 students out of 10 students. This is because all are equally brilliant, and thus, all of them should get an equal chance of being selected in the sample. Thus,

Selection process:

1. Write the name of each student on paper slips.
2. Put the slips in a box and shuffle them.
3. Select 3 slips one by one.
4. Students with their names written on the slips will be selected for the inter-zonal tournament.

Q.2. There are 40 students in your school who are cricket players. You are to form a team of 11 players. How would you do it? Would you resort to random sampling technique? Give reasons in support of your answer.

Solution:

We can use the random sampling technique if and only if all the students of the school are equally brilliant in the game of cricket, otherwise, if no such information is available non-random sampling technique can be used. In this regard, any of the non-random sampling, namely, judgement, quota or convenience sampling technique can be used. For instance, in accordance to the judgement sampling, based on your own opinion and judgement, any 11 students that in your opinion are the best, can be selected out of the total 40 students.

Q.3. You want to conduct a survey on the popularity of noodles among the students of different schools in your town. How would you design and choose your sample of study? Give reasons in support of your answer.

Solution:

To conduct a survey on the popularity of noodles among students of different schools in my town, the sample of study would be designed as follows:

1. Quota sampling method will be adopted.
2. Population will be divided into different groups according to different characteristics of population. Characteristics of students will include age-group, school in which the student studies etc.
3. A sample will be taken from each group.

Q.4. In a village comprising 300 small and big farmers, you are to select a sample of 10% farming households. The idea is to study the cropping pattern in the village. How would you take your decisions on selecting the sample?

Solution:

Stratified or mixed sampling will be used to study the cropping pattern in the village. According to this method, the population will be divided into different strata comprising different characteristics. Thus, in the given case, two groups will be formed of small farmers and big farmers. A sample will be selected from each stratum. Hence, the required sample will be received by combining the samples from both strata.

Q.5. How would you use the random sampling method when you are to select a sample of 3 out of 10 students in your class?

Solution:

Using the random sampling method (lottery method) to select 3 students out of 10 in the class:

i) Make ten paper slips of equal size and write the name of each student on each slip.
ii) Put all the slips in a box and mix them.
iii) Draw three slips at random without replacement.
iv) Students whose names are written on the slips are selected.

Chapter – 4
Organisation of Data

Essential Practical:

Q.1.

In an examination, 25 students secured the following marks:

23	28	30	32	35	35	36	40	41	43	44	45	45
48	49	52	53	54	56	56	58	61	62	65	68	

i. Arrange these data in the form of a frequency distribution using the following class as intervals: 20-29, 30-39, 40-49, 50-59, and 60-69.

ii. Arrange the data with cumulative frequencies.

Solution:

i. Datain the form of a frequency disribution :

Marks	Tally Bars	No. of students
20 - 29	II	2
30 - 39	𝍸	5
40 - 49	𝍸 III	8
50 - 59	𝍸 I	6
60 - 69	IIII	4
		$\sum f = 25$

ii. Data with cumulative frequencies:

Marks	No. of Students	Marks	No. of Students
Less than 29	0 +2 =2	More than 20	25
Less than 39	2 + 5 =7	More than 30	25 - 2 =23
Less than 49	7 + 8 =15	More than 40	23 - 5 =18
Less than 59	15 + 6 =21	More than 50	18 - 8 =10
Less than 69	21 + 4 =25	More than 60	10 - 6 =4

Q.2.

The following data is of the age of 25 students of Class XI.

Arrange these data in the form of a frequency distribution.

15	16	16	17	18	18	17	15	15	16	16	17	15
16	15	16	16	18	15	17	17	18	10	16	15	

Solution:

Data in the form of frequency distribution:

Age	Tally Bars	Frequency
10	I	1
15	𝍸 II	7
16	𝍸 III	8
17	𝍸	5
18	IIII	4
		$\sum f = 25$

Q.3.

Students of Class XI obtained following marks in economics. Classify the data in the form of individual series, discrete series, continuous series and cumulative frequency series.

15	16	16	17	18	18	17	15	15	16	16	17	15
16	15	16	16	18	15	17	17	18	10	16	15	

Solution:

Individual series:

15	15	15	15	16	16	16	17	18	18	18	18	19	20	20
20	21	22	22	22	22	23	24	24	24	25	25	25	25	25

Discrete series :

Marks	Tally Bars	No.of students
15	IIII	4
16	III	3
17	I	1
18	IIII	4
19	I	1
20	III	3
21	I	1
22	IIII	4
23	I	1
24	III	3
25	𝍸	5
		$\Sigma f = 30$

Continuous series :

Marks	Tally Bars	No. of Students
12 - 15	IIII	4
16 - 19	𝍸 IIII	9
20 - 23	𝍸 IIII	9
24 - 27	𝍸 III	8
		$\Sigma f = 30$

Cumulative frequency series:

Marks	No. of Students	Marks	No. of Students
Less than 15	0	More than 12	30
Less than 19	9 + 4 =13	More than 16	30 - 4 =26
Less than 23	13 + 9 =22	More than 20	26 - 9 =17
Less than 27	22 + 8 = 30	More than 24	17 - 9 =8

Q.4.

Arrange the following data in the form of an exclusive frequency distribution, using 5-10 as the initial class interval:

12	36	40	30	28	20	19	10	10	19	27	15	26	10
19	7	45	33	26	37	5	20	11	17	37	30	20	

Solution: Exclusive frequency distribution:

Class Interval	Tally Bars	Frequency
5 - 10	II	2
10 - 15	𝍸	5
15 - 20	𝍸	5
20 - 25	III	3
25 - 30	IIII	4
30 - 35	III	3
35 - 40	III	3
40 - 45	I	1
45 - 50	I	1
		$\Sigma f = 27$

Q.5.

Weight of 20 students is given in kilograms. Using class interval of 5, make a frequency distribution.

30	45	26	25	42	33	15	35	45	45
45	39	42	40	18	35	41	20	36	48

Solution:

Frequency distribution:

Weight (kg)	Tally Bars	No. of Students
15 - 20	II	2
20 - 25	I	1
25 - 30	II	2
30 - 35	II	2
35 - 40	IIII	4
40 - 45	IIII	4
45 - 50	I 𝍸 I	5
Total		$\sum f = 20$

Q.6.

Convert the following data in a simple frequency distribution:

5 students obtained less than 3 marks
12 students obtained less than 6 marks
25 students obtained less than 9 marks
33 students obtained less than 12 marks

Solution:

Given data can be written as:

Marks	Cumulative Frequency (c.f)
Less than 3	5
Less than 6	12
Less than 9	25
Less than 12	33

Simple frequency distribution:

Marks	Frequency (f)
0 - 3	5
3 - 6	7 (= 12 - 5)
6 - 9	13(= 25 - 12)
9 - 12	8(= 33 - 25)
	$\sum f = 33$

Q.7.

In the following statement, take the number of letters in a word a items and numbers of times a word (of the same size) repeats itself as frequencies. Prepare a discrete series.

"Success in the examination confers no absolute right to appointment unless government is satisfied after such an enquiry as may be considered necessary that the candidate is suitable in all respects for appointment."

Solution:

Discrete series:

Size of item	Tally Bars	Frequency
2	𝍸 IIII	9
3	𝍸	5
4	II	2
5	II	2
6	I	1
7	III	3
8	III	3
9	III	3
10	II	2
11	III	3
Total		$\sum f = 33$

Q.8.

An economics survey revealed that 30 families in a town incur following expenditure in a day (rupees)

11	12	14	16	16	17	18	18	20	20	20	21	21	22	22
23	23	24	25	25	26	27	28	28	31	32	32	33	36	38

i. Convert these data in the form of a frequency distribution, using the following class intervals 10-14, 15-19, 20-24,25-29,30-34 and 35-39.

ii. How many families spend more than 29 rupees a day?

Solution:

i. **Frequency distribution:**

Expenditure	Tally Bars	No. of Families
10-14	III	3
15-19	𝍸	5
20-24	𝍸 𝍸	10
25-29	𝍸 I	6
30-34	IIII	4
35-39	II	2
		$\sum f = 30$

ii. Families spending more than Rs 29 per day = 4 + 2 = 6

Percentage of families spending more than Rs 29

$$= \frac{\text{Families spending more than Rs 29}}{\text{Total families}} \times 100$$

$$= \frac{6}{30} \times 100 = 20$$

Hence, 20% of the families spend more than Rs 29 per day.

Q.9.

From the following data related to the weight of college students in kg, prepare a frequency distribution with a class interval of 10 on exclusive and inclusive basis:

40	70	63	53	85
92	72	65	53	79
49	42	43	47	50
52	50	48	65	42
69	60	54	82	55

Solution:

Frequency distribution on exclusive basis:

Weight (in kg)	No. of students (f)
40 - 50	7
50 - 60	7
60 - 70	5
70 - 80	3
80 - 90	2
90 - 100	1
	∑f = 25

Frequency distribution on inclusive basis:

Weight (in kg)	No. of students (f)
40 - 50	9
51 - 61	6
62 - 72	6
73 - 83	2
84 - 94	2
95 - 105	0
	∑f = 25

Q.10.

Construct the sample frequency distribution from the following data:

Mid-value	5	15	25	35	45	55
Frequency	2	8	15	12	7	6

Solution:

Lower limits and upper limits of class intervals are calculated using the following formula.

$$\text{Lower limit}(l_1) = m - \frac{1}{2}i$$

$$\text{Upper limit}(l_2) = m + \frac{1}{2}i$$

where m is mid value and i is the difference between mid-values.

Mid-value	Class-interval	Frequency (f)
5	0 - 10	2
15	10 - 20	8
25	20 - 30	15
35	30 - 40	12
45	40 - 50	7
55	50 - 60	6
		∑f = 50

Q.11.

Classify the following data by taking class interval such that their mid-values are 17,22,27,32 and so on:

30	42	30	54	40	48	14	17	51	42	25	41
30	27	42	36	28	28	37	54	44	31	36	40
36	22	30	31	19	48	16	42	32	21	22	40
33	41	21	16	17	36	37	41	46	47	52	53

Solution:

Lower limits and upper limits of class intervals are calculated using the following formula.

$$\text{Lower limit}\,(l_1) = m - \frac{1}{2}i$$

$$\text{Upper limit}\,(l_2) = m + \frac{1}{2}i$$

Where m is mid value and i is the difference between mid-values.

Mid-value	Class-interval	Frequency (f)
12	9.5 - 14.5	1
17	14.5 - 19.5	5
22	19.5- 24.5	4
27	24.5 - 29.5	4
32	29.5 - 34.5	8
37	34.5 - 39.5	6
42	39.5 - 44.5	11
47	44.5 - 49.5	4
52	49.5 - 54.5	5
		∑f = 48

Chapter – 5

Presentation of Data- Textual and Tabular Presentation

Essential Practical:

Q.1. In 2009-10, the contribution of primary, secondary and tertiary sector to India's GDP was17.6%, 28.2% and 54.2% respectively. In 2010-11 these shares were 17.7%, 27.0% and 55.3% respectively. This information is based on the India 2013 (EPW Research Foundation). Present this information in the form of a table.

Solution:

Contribution of primary, Secondary and Tertiary Sector to India's GDP

(in percentage)

Sector	2009-10	2010-11
Primary Sector	17.6	17.7
Secondary Sector	28.2	27
Tertiary Sector	54.2	55.3
Total	100	100

Source: India 2013, EPW Research Foundation

Q.2. Prepare a sketch of such a table that exhibits the following types of information on the numbers of students of your college:

i) Faculty-wise: Art, Commerce and Science'
ii) Class-wise: XI; B.A (I); B.A (II); and B.A (III).
iii) Sex-wise: Boys and Girls.

Solution:

Distribution of Students (according to faculty, class and sex)									
	ARTS			**Commerce**			**Science**		
Class	**Boys**	**Girls**	**Total**	**Boys**	**Girls**	**Total**	**Boys**	**Girls**	**Total**
XI									
B.A (I)									
B.A (II)									
B.A (III)									
Total									

Q.3. Following information related to the exports from India to USSR and UK in the years 2011, 2012, 2013 and 2014. Present it in the form of a table.

Year	**2011**	**2012**	**2013**	**2014**
Exports to USSR (Rs crore)	209	416	1,305	1,655
Exports to UK (Rs crore)	170	421	550	670

Solution:

Exports from India to USSR and UK		
	(2011-2014)	
Year	**Export to USSR (Rs crore)**	**Export to UK (Rs Crore)**
2011	209	170
2012	416	421
2013	1305	550
2014	1655	670

Q.4. Point out the mistakes in the following table. Rearrange it correctly.

Number of students	Subjects			
	Economics	English	Hindi	History
Boys				
Girls				

Solution:

Mistakes in the given table:

1. Title and head note are not provided.
2. Sub-entries and the captions are not written correctly.
3. Total of the rows and the columns is missing.

Number of Students (according to subject and sex)			
Number of Students			
Subjects	**Boys**	**Girls**	**Total**
Economics			
English			
Hindi			
History			
Total			

Q.5. Following information related to the marks secured by 50 students in Economics. Present the information in the form of a table.

Marks	0-10	10-20	20-30	30-40
Students	15	12	18	5

Solution:

Marks Secured by Students in Economics

Marks	Number of Students
0 - 10	15
10 - 20	12
20 - 30	18
30 -40	5

Q.6. Following information related to the marks secured by 50 boys and girls in their paper in Economics. Present the information in the form of a two-way table.

Marks	0-10	10-20	20-30	30-40
Boys	10	7	6	1
Girls	5	5	12	4

Solution:

Marks Secured by Students in Economics

Marks	Numbers of Students		Total
	Boys	**Girls**	
0 - 10	10	5	15
10 - 20	7	5	12
20 - 30	6	12	18
30 - 40	1	4	5
Total	24	26	50

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