Statistics for Economics Class 11 NCERT Solutions Chapter 2 Collection of Data

Question 1.
Frame at least four appropriate multiple choice options for following questions
(i) Which of the following is the most important when you buy a new dress?
(ii) How often do you use computers?
(iii) Which of the newspapers do you read regularly?
(iv) Rise in the price of petrol is justified.
(v) What is the monthly income of your family?
Answer:
(i) Which of the following is the most important when you buy a new dress?

- Price of the dress
- Fabric of the dress
- Colour of the dress
- Brand of the dress

(ii) How often do you use computers?

- At least once a day
- At least once a week
- At least once in fortnight
- Occasionally

(iii) Which of the newspapers do you read regularly?

- Times of India
- Hindustan Times
- Indian Express
- The Hindu

(iv) Rise in the price of petrol is justified.

- Strongly agree
- Strongly disagree
- Neither agree nor disagree
- Somewhat agree

(v) What is the monthly income of your family?

- Less than ₹ 10,000
- More than ₹ 10,000 but less than ₹ 25,000
- More than ₹ 25,000 but less than ₹ 50,000
- More than ₹ 50,000

Question 2.
Frame five two-way questions (with Tes' or 'No').
Answer:

- Are you an Indian? (Yes/No)
- Do you live in Delhi? (Yes/No)
- Are you graduate? (Yes/No)
- Do you know swimming? (Yes/No)
- Have you ever been convicted by a court of law? (Yes/No)

Question 3.
State whether the following statement are true or false.
(i) There are many sources of data. (True/False)
Answer:
False
There are mainly two sources of data : Primary and Secondary.

(ii) Telephone survey is the most suitable method of collecting data, when the population is literate and spread over a large area. (True/False)
Answer:
False
Mailing questionnaires would be more suitable as the population is literate. Telephonic survey is most suitable in case of illiterate population spread over a large area.

(iii) Data collected by investigator is called the secondary data. (True/False)
Answer:
False
Investigator may collect the data by conducting an enquiry or an investigation. Such data are called primary data, as they are based on first hand information.

(iv) There is a certain bias involved in the non-random selection of samples. (True/False)
Answer:
True
In a non-random sampling method all the units of the population do not have an equal chance of being selected and convenience or judgement of the investigator may create a bias.

(v) Non-sampling errors can be minimised by taking large samples. (True/False)
Answer:
False
It is difficult to minimise non-sampling error even by taking a large sample as they include Errors in Data Acquisition, Non-Response Errors and Sampling bias.

Question 4.
What do you think about the following questions. Do you find any problem with these questions? If yes, how?
(i) How far do you live from the closest market?

Answer:

This question is ambiguous people will not be able to answer this question as the different measures of distance like meters, kilometers, yards etc will complicate the analysis. It should be made specific as Flow many kilometers away is your home from the closest market?

- Less than 5 km
- Between 5-10 km
- More than 10 km

(ii) If plastic bags are only 5 per cent of our garbage, should it be banned?
Answer:

This question is a leading question, which gives a clue about how the respondent should answer by trying to point that 5% is a small percentage which can be tolerated. Better question would be Do you think plastic bags should be banned? (Yes)

(iii) Wouldn't you be opposed to increase in price of petrol?
Answer:

This question comprises of two negatives which creates confusion to the respondents and may lead to biased response. Better question would be Would you opposed the increase in price of petrol?

(iv)
(a) Do you agree with the use of chemical fertilizers?
(b) Do you use fertilizers in your fields?
(c) What is the yield per hectare in your field?
Answer:

The order or sequence of questions is incorrect. The series of questions should move from general to specific. The correct order would be
(a) What is the yield per hectare in your field?
(b) Do you use fertilizers in your fields?
(c) Do you agree with the use of chemical fertilizers?

Question 5.
You want to research on the popularity of vegetable atta noodles among children. Design a suitable questionnaire for collecting this information.
Answer:
Questionnaire
Name ....
Age ....
Address ....
....
....
Gender: Male □ Female □
Question 1.

Do you eat noodles?
(a) Yes □
(b) No □

Question 2.
Do you like noodles more than other snacks?
(a) Yes □
(b) No □

Question 3.
How many packets do you consume in a month?
(a) Less than 2 packets □
(b) 3-5 packets □
(c) 5-8 packets □
(d) More than 8 packets □

Question 4.
Do you prefer atta noodles over maida noodles?
(a) Yes □
(b) No □

Question 5.
Do you like vegetables in your noodles?
(a) Yes □
(b) No □

Question 6.
Do you think more vegetables should be added in vegetable atta noodles?
(a) Yes □
(b) No □

Question 7.
Which vegetables according to you should be added in vegetable atta noodles?
....

Question 8.
Do you think it should be spicier?
(a) Yes □
(b) No □

Question 9.
When do you prefer to have vegetable atta noodles?
(a) In breakfast □
(b) In lunch □
(c) As evening snacks □
(d) In dinner □

Question 10.
Do your parents also like vegetable atta noodles?
(a) Yes □
(b) No □

Question 6.
In a village of 200 farms, a study was conducted to find the cropping pattern. Out of the 50 farms surveyed, 50% grew only wheat. Identify the population and the sample here.
Answer:
The population or the Universe in statistics means totality of the items under study. It is a group to which the results of the study are intended to apply. In this case, the population is 200 farms in the village.

A sample refers to a group or section of the population from which information is to be obtained. A good sample (representative sample) is generally smaller than the population and is capable of providing reasonably accurate information about the population. In this case, the sample is 50 farms which are surveyed.

Question 7.
Give two examples each of sample, population and variable.
Answer:
Example 1 A study was conducted to know the average weight of students of class seventh in Delhi. The total number of students in class seventh was 2860. Out of these 200 students were randomly selected and their weight was recorded.
In this example

- Population is, the no of students of class seventh in Delhi, the total number of which is equal to 2860.
- Sample is, the 200 students selected whose weight was recorded.
- Variable under study, is the weight of the students.

Example 2 A person suffering from weakness and fatigue was advised by the doctor to have his blood test done for detection of anaemia. The pathologist took 2 ml of his blood for the test and tested the haemoglobin level in the blood.
In this example

- Population is the total amount of blood in the person's body.
- Sample is, the 2 ml blood tested.
- Variable under study, is the haemoglobin in the blood sample.

Question 8.
Which of the following methods give better results and why?
(a) Census
(b) Sample
Answer:

(b) In terms of accuracy of results, census is better as it studies all the units of population but this method is very time consuming, expensive and sometimes not feasible to use. Hence, sampling is better due to following reasons

- Economical Sampling involves study, of a fraction of population and hence the cost involved In sampling is relatively low.
- Time Saving Huge amount of time is required to conduct a census survey while sample studies do not take that much time.
- Lesser Effort As only a part of the population is studied, it entails lesser effort on the part of the investigator than that required in census.
- Considerable Accuracy Results from sampling may not be as accurate as in case of sampling but the level of accuracy of these results can be established through statistical tests of significance and hence can be applied in general to the whole population if found significant.

Question 9.
Which of the following errors is more serious and why?
(a) Sampling error
(b) Non-sampling error
Answer:
(b) Sampling error refers to the difference between the sample estimate and the actual value of a population characteristic. This type of error occurs when one makes an observation from the sample taken from the population. It is possible to reduce the magnitude of sampling error by taking a larger sample.

Non-sampling errors are more serious than sampling errors because a sampling error can be minimised by taking a larger sample but it is difficult to minimise non-sampling error, even by taking a large sample. Even a Census can contain non-sampling errors. These include errors in data acquisition, non-response errors and sampling bias.

Question 10.
Suppose there are 10 students in your class. You want to select three out of them. How many samples are possible?
Answer:
In general, you use combinations to determine the number of ways you can select a sample of size n from a population of size N. The formula for the number of such combinations is
N! (n!) (N – n)!
where N! (spoken "Nfactorial") equals N(N — 1)(N – 2)...(3)(2)(1)
(e.g., 5! = (5) (4) (3) (2) (1) = 120
In this problem, our population size is N = 10 students, and our sample size is n = 3 students. Number of samples possible can be calculated as follows
Number of samples = 10! (3!) (10 – 3)!
= 10!(3)!(7)! = 10×9×8×7!3×2×1×7!
= 120 possible random samples

Question 11.
Discuss how you would use the lottery method to select 3 students out of 10 in your class?
Answer:
A representative (random) sample of 3 students can be taken out of 10 through lottery method. The names of all the 10 students of the class are written on 10 separate pieces of paper of equal size and all the slips are folded in a similar manner. These slips are then mixed well and 3 slips with these names are selected one by one so that all the students have equal chance of being selected in the sample.

Question 12.
Does the lottery method always give you a random sample? Explain.
Answer:
Lottery method always gives a random sample if it is used in the proper manner without any bias. If the slips are prepared properly and drawn out one by one so that all the slips have equal chance of being selected in the sample, it will definitely give a random sample. But, if the slips are not mac . of identical size and identification is possible of the names or numbers on the slips, the selection will become biased.

Similarly, if the same name or number is written on more than one slip and if some name or number is missed then also the chances of selection of different units of population in the sample will not be equal. In such cases even lottery method will not give random sample.

Question 13.
Explain the procedure of selecting a random sample of 3 students out of 10 in your class, by using random number tables.
Answer:
Random number tables have been devised to guarantee equal probability of selection of every individual unit in the population according to their listed serial number in the sampling frame. They are available either in a published form or can be generated by using appropriate software packages.
The procedure of selecting a random sample of 3 students out of 10 in a class, by using random number tables is as follows

- Assign a specific number between 1 and 10 to all the 10 students.
- Here, the largest serial number is 10 which is a two digit number and therefore we consult two digit random numbers in sequence.
- We can start using the table from anywhere, i.e., from any page, column, row or point and select the first number randomly. We need to select a sample of 3 students out of 10 total students.
- We will select two more numbers from the table according to sequence. We will skip the random numbers greater than 10 since there is no student number greater than 10. Thus, the 3 selected students are with serial numbers.

Question 14.
Do samples provide better results than surveys? Give reasons for your answer.
Answer:

A survey, which includes every element of the population, is known as Census or the Method of Complete Enumeration. On the other hand, when a part of the population is studied and predictions are made about the population based on this part, it is called sampling.

In terms of accuracy of results, census is better as it studies all the units of population but this method is very time consuming, expensive and sometimes not feasible to use. Hence, sampling is better due to following reasons

- Economical Sampling involves study of a fraction of population and hence the cost involved in sampling is relatively low. Census costs are high especially in case of large population with wide coverage in terms of area.
- Time Saving Huge amount of time is required to conduct a census survey if the population size is large or spread over a wide area while sample studies do not take that much time to be conducted.
- Lesser Effort As only a part of the population is studied, it entails lesser effort on the part of the investigator than that required in census.
- Inappropriateness of Census In certain case, when the population is infinite or exhaustible, census cannot be done and hence sampling is the only choice, e.g., one cannot burn all the units of coal available to know their calorific value; sample is the only means of testing it.
- Considerable Accuracy Results from sampling may not be as accurate as in case of sampling but the level of accuracy of these results can be established through statistical tests of significance and hence can be applied in general to the whole population if found significant.