**QUANTITATIVE TECHNIQUES**

**ANSWER SCHEME**

**Section A**

*Answer any 10 questions. Each question carries 2 marks.*

1. Define Statistics.

Statistics in plural sense:

Horace Secrist defines statistics as ‘ aggregates of facts affected to a marked extent by multiplicity of causes numerically expressed, enumerated or estimated according to reasonable standards of accuracy, collected in a systematic manner for a pre- defined purpose and placed in relation to each other.

Statistics in singular sense:

Seligman defines statistics as ‘the science which deals with the methods of collecting, classifying,presenting, comparing and interpreting numerical data to throw some light on any sphere of enquiry’.

2. What is harmonic mean?

Harmonic mean is a mathematical averagewhich is calculated by dividing the number of observations by the reciprocal of each number in the series.

HM = /N

3 Find the median of the set of numbers: 1,2,3,4,5,6,7,8,9 and 10

ANSWER = 5.5 TH ITEM = 55

.4. Give 2 examples of positional average?

1. Median
2. 2) Mode

5. Define coefficient of variation.

CV is a relative measure of SD which is the ratio of SD to the actual mean expressed in percentages.

CV = SD/ mean \* 100

6. What are the uses of weighted average method?

weighted average method is used when:

a. Importance of all items in a series is not equal

b. Ratios, percentages or rates are being averaged.

c. Classes of the same group contain widely varying frequencies.

d. Birth rate, death rate, index numbers are calculated.

7. What are the reasons for distrust of statistics?

Reasons for distrust of statistics:

a. Easy to manipulate

b. Lacks accuracy

c. Inappropriate comparisons

d. Possible to deliberately twist facts

e. Inconsistent definitions

8. Find Q3from the following series: 10, 12, 27, 18, 8, and 20

ANSWER = Q3 = 3(N+1)/4 = 5.25 th item

5th item + .25( 6th -5th) = 21.75

9. What is skewness?

Skewness means the asymmetry in the shape of a frequency distribution.

10. What do you mean by interpolation?

Interpolation is defined as estimation of an unknown value between two known values orv drawing conclusion about missing information from the available information.

11. What is sampling?

Sampling is the technique of inspecting or studying only a selected representative and adequate fraction of the population and drawing conclusions for the universe.

12. What is cross tabulation?

Cross tabulation is a statistical tool to compare the relationship between two variables within the data which is not evident. **(10 X 2 = 20 marks)**

**Section B**

*Answer any 6 questions. Each question carries 5 marks.*

13. Find the mean, median, mode, and range for the following list of values:

13, 18, 13, 14, 13, 16, 14, 21, 13

Mean = 15(total frequency/total no. of fequency) Median = 14 (middle most item)Mode = 13(most repeated value) Range = 8(H-L)

14. Find the Geometric mean for the following

Weight of sorghum (x) No. of ear head(f)

50 4

65 6

75 16

80 8

95 7

100 4

15. Explain with example how median can be located graphically.

Ans) The median value of a series may be determinded through the graphic presentation of data in the form of Ogives.This can be done in 2 ways.

1. Presenting the data graphically in the form of 'less than' ogive or 'more than' ogive .

2. Presenting the data graphically and simultaneously in the form of 'less than' and 'more than' ogives.The two ogives are drawn together.

1. Less than Ogive approach

Steps involved in calculating median using less than Ogive approach -

1. Convert the series into a 'less than ' cumulative frequency distribution as shown above .

2. Let N be the total number of students who's data is given.N will also be the cumulative frequency of the last interval.Find the (N/2)th item(student) and mark it on the y-axis.In this case the (N/2)th item (student) is 200/2 = 100th student.

3. Draw a perpendicular from 100 to the right to cut the Ogive curve at point A.

4.From point A where the Ogive curve is cut, draw a perpendicular on the x-axis. The point at which it touches the x-axis will be the median value of the series as shown in the graph.

16. Arithmetic mean of 100 items is 50. At the time of calculation one item was misread as 78 instead of 87. Calculate the correct mean.

**ANSWER CORRECT MEAN = 50.09**

17. Distinguish between skewness and dispersion.

ANS)

|  |  |
| --- | --- |
| **DISPERSION** | **SKEWNESS** |
| Dispersion deals with the deviation of the items of a series around its central value. | Skewness deals with the nature of distribution, i.e., whether it is symmetrical or not. |
| Dispersion speaks of the amount of variation. | Skewness speaks of the direction of variation. |
| Dispersion indicates the general shape of a frequency distribution. | Skewness indicates how the dispersion on the two sides of the mode varies in the arrangement of frequencies. |
| Dispersion studies the degree of variation in the data. | Skewness studies the concentration of the data either in lower or higher values. |
| Dispersion is usually an absolute measure. | Skewness is always used as a relative measure. |

18. What are the merits and demerits of stratified random sampling?

Ans) MERITS:

* More representative
* More efficient
* More convenient
* More accurate
* Low cost and less time
* Easy to locate
* Appropriate weightage to each group
* Effective in tackling problems.

DEMERITS:

* The researcher may find find it difficult to stratify the universe into homogeneous strata.
* If proper stratification is not done, the sample will have the effect bias.
* A prior knowledge of the composition of the population and distribution of the population characteristics are required to adopt this method.
* It is not easy to determine the appropriate size of sample from each of the stratum.
* This method is also subject to stratification errors.
* Faulty stratification will yield biased results.
* This method is expensive and time consuming.

19. What is classification? What are the objectives of classification?

Ans) Classification is the process of arranging the data in groups or classes according to resemblances and similarities inorder to make the data clear and meaningful. In classification, the units having a common characteristic are placed in one class and in this way the whole data is divided into a number of classes.

OBJECTIVES:

* To condense the data for easy understanding.
* To facilitate comparison.
* To pinpoint the main features of the data.
* To eliminate unnecessary details.
* To enable further statistical treatment.
* To facilitate decision making.

20. Find the missing frequency from the following

Marks: 0-5 5-10 10-15 15-20 20-25 25-30 30-35

No of students: 10 12 16 ? 14 10 8

The average mark is 16.82.

ANSWER MISSING FREQUENCY = 18.2

21. What are the characteristics of statistics?

* Statistics are aggregates of facts.
* Statistics are affected to a marked extent by multiplicity of causes.
* Statistics are numerically expressed.
* Statistics are enumerated or estimated according to a reasonable standard of accuracy.
* Statistics are collected in a systematic manner.
* Statistics are collected for a pre-determined purpose.
* Statistics should be placed in relation to each other.

**(6 X 5 = 30marks)**

**Section C**

*Answer any 2questions. It carries 15marks.*

22. ANSWER AM= 37.88

23. Explain the various methods of sampling.

Answer Methods of sampling

* Simple random sampling. In this case each individual is chosen entirely by chance and each member of the population has an equal chance, or probability, of being selected. ...
* Systematic sampling. ...
* Stratified sampling. ...
* Clustered sampling. ...
* Convenience sampling. ...
* Quota sampling. ...
* Judgement (or Purposive) Sampling. ...
* Snowball sampling.

24. The scores of two batsmen Lara and Sachin in 10 innings during a certain season are as follows:

Sachin: 30, 90 ,70, 60 ,40, 120, 20 ,5, 3, 40

Lara: 60, 80, 100 ,50, 70, 30, 180, 60, 90 ,75

Who is a better run-getter? Who is more consistent?

**Answer: Sachine SD =35.61,CV -74.49%**

**Lara SD =38.36,CV =47.65%**

**Lara is the better run getter and also more consistent**

25. Particulars regarding the income of two towns are given below:

Town A Town B

Number of people 600 500

Average income 175 186

variance 100 81

1. In which town is the variation in income greater?

2. Which town mobilises larger amount as income?

3. What is the combined standard deviation of the two towns put together

**Answer: 1. S.D (A) 10**

**(B) 9**

**CV (A) 5.71**

**(B) 4.84**

**There is greater variability in town A as its C.V is greater**

**2. £x of A 1,05,000**

**£x of B 93000**

**Town A mobilizes larger amount as income.**

**3. combined mean = 180**  **(2 X 15 = 30 marks)**

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