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Statistics Department

Assignment – No. – 01 **Paper – STA - 303**

1 Define, population, sample, sample survey and census.

2 Explain "Simple Random Sample" and "Simple Random Sampling".

3 State the properties of good questionnaire.

4 In usual notations, prove for the simple random sampling under without replacement,

$$E(\bar{y}) = \bar{Y}, \; V(\bar{y}) = \frac{N-n}{N}\frac{S^2}{n}$$

5 Explain, in detail, simple random sampling for attributes.

6 In, usual notations, Show that $E(s^2) = S^2$

7 Derive confidence limits for population mean.

8 Write a note on sample size determination.

9 Why do we need stratification?

10 Define terms: Stratified Random Sampling, Stratified Random Sample

11 In usual notations show that stratified mean is unbiased for the population Mean.

12 In usual notations, prove following

$$V(\bar{y}_{st}) = \frac{1}{N^2}\sum_h N_h(N_h - n_h)\frac{S_h^2}{n_h}$$

13 Using the following information, obtain the variance of the stratified mean

In a certain school, 40 students of class X were divided according to the marks obtained below 60 and above 60.in a subject of Science, The number of students, average marks and standard deviation of marks in the category of marks below 60 are 25, 35.25 and 6.25 respectively and The number of students, average marks and standard deviation of marks in the category of marks above 60 are 15, 55.25 and 9.25 respectively. From both these categories two random samples, one of size 6 and the other is of size 5 were taken under SRS.

14 State different allocation procedures. Derive the variance of the stratified mean under proportional and Neyman allocation.

15 Show that variance of the stratified mean will be optimum if and only if $n_h \propto N_h S_h$

16 Derive the sample sizes under proportional and Neyman allocations for the data given in Q.13 on the marks of class X.

17 What is Stratification? When Stratification is required?

18 In Usual notations prove that (i) $E(\overline{y_{st}})=\bar{Y}$ (ii) $V(\overline{y_{st}})=\frac{1}{N^2}\sum_{h=1}^{k} N_h (N_h - n_h)\frac{S_h^2}{n_h}$

19 In usual notations prove that $V(\overline{y_{st}})_{opt} \leq V(\overline{y_{st}})_{propt} \leq V(\bar{y})_{ran}$

20 State different allocations used in stratified random sampling. Derive the variance of stratified mean under Neyman allocation.

21 In usual notations, prove that $v(\overline{y_{st}})=\frac{1}{N^2}\sum_{h=1}^{k} N_h (N_h - n_h)\frac{s_h^2}{n_h}$ is an unbiased estimate of $V(\overline{y_{st}})$