

**SIXTH SEMESTER B.C.A. (VOCATIONAL COURSE) DEGREE EXAMINATION
FEBRUARY/MARCH 2005**

Optional Subject—Statistics

Paper XI—SAMPLE SURVEY

Time : Three Hours

Maximum : 90 Marks

*Not more than 30 marks will be awarded from each of the three units.***UNIT I**

1. Explain the following terms : Sampling frame, Sampling design and Sampling unit. (6 marks)
2. Distinguish between Population and Sample. Also describe the need for census survey and sample survey giving illustrative examples. (6 marks)
3. What are the different stages in a sample survey ? Describe with examples. (4 marks)
4. Distinguish between Random sampling and Non-random sampling. Bring out the advantages and disadvantages of each. (6 marks)
5. Define a Simple random sample without replacement. Show that the probability of selecting a specified unit in any draw is the same in SRSWOR. (7 marks)
6. A population consists of 5 units with values 50, 52, 48, 58, 55. List all possible samples of size 2 by SRSWOR, Hence show that the sample mean is an unbiased estimator of the population mean. (7 marks)
7. In an SRSWOR from a finite population, show that the sample mean is unbiased for population mean. Derive the expression for the variance of the estimate. (8 marks)
8. Obtain the expression for the optimum sample size for a specified precision while estimating the mean under SRSWOR. (6 marks)

UNIT II

9. Explain the use of auxiliary information in sample surveys using an example. (5 marks)
10. What is the ratio estimate of the population ratio ? Obtain an expression for its bias. (6 marks)
11. Derive an expression for the relative bias of the ratio estimator in SRSWOR. (7 marks)

Turn over

12. Compare the ratio estimator with mean per unit and derive a condition under which the ratio estimator is superior to the mean per unit. (7 marks)
13. Under usual notation, show that $V_{\text{ran}}(\bar{y}) \geq V_{\text{prop}}(\bar{y}) \geq V_{\text{opt}}(\bar{y}_{st})$. (8 marks)
14. Explain the concept of stratified sampling. What are the principles of stratification? Bring out the advantages. (5 marks)
15. Find the expression for the variance of the estimator \bar{y}_{st} under stratified random sampling. (6 marks)
16. What is the usual regression estimator for the population mean? Obtain an expression for its sampling variance. (6 marks)

UNIT III

17. Distinguish between Linear and Circular systematic samples. (6 marks)
18. Explain how systematic sample can be regarded as a cluster sample. (5 marks)
19. Distinguish between Multistage and Multiphase sampling, through illustrative examples. (6 marks)
20. Obtain an expression for the variance of the unbiased estimator \bar{y}_{sy} under systematic sampling with $N = nk$. (7 marks)
21. Compare the efficiencies of the estimators of the population mean under stratified and cluster sampling. (6 marks)
22. Distinguish between Sampling and Non-sampling errors. How they are controlled? (6 marks)
23. A sample survey was conducted for estimating the number of palm trees in a Taluk with 72 villages. A sample of 8 villages was selected with SRSWOR and from each village a sample of 4 clusters of 20 fields with SRSWOR. The data is as given below.

Village	No. of clusters	Number of Palm trees in clusters			
		1	2	3	4
1	27	43	40	36	97
2	24	49	123	10	37
3	14	116	55	300	172
4	36	69	22	84	122
5	30	19	27	45	48
6	38	100	133	118	73
7	40	15	15	26	95
8	26	90	45	13	13

Obtain an unbiased estimator of the total number of palm trees in the Taluk. (7 marks)

24. Explain how a circular systematic sample is selected. Write down all circular systematic samples of size 4 from a population of 15 units. (7 marks)