



'সমানো মন্ত্র: সমিতি: সমানী'

UNIVERSITY OF NORTH BENGAL
B.Sc. Programme 3rd Semester Examination, 2021

DSC1/2/3-P3-STATISTICS

METHODS OF SAMPLING AND SAMPLING DISTRIBUTION

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
All symbols are of usual significance.*

GROUP-A

1. Answer any **five** questions from the following: 1×5 = 5
- (a) Write down two uses of chi-square distribution.
 - (b) State the formula for standard error of sample mean.
 - (c) Distinguish between sample and population.
 - (d) State the situation with stratified samples which will be suitable.
 - (e) Explain two-stage sampling.
 - (f) What is random number?
 - (g) What is meant by stratified random sampling?

GROUP-B

2. Answer any **three** questions from the following: 5×3 = 15
- (a) Describe important characteristics of chi-square and t-distribution.
 - (b) What is 'bias' and how does it arise in sampling? Discuss the various methods of reducing bias.
 - (c) Explain what are meant by 'standard error' and 'sampling distribution' of a statistic.
 - (d) A random sample of two individuals is to be drawn from a population of size 40. What is the possible number of distinct samples when sampling is (i) with replacement and (ii) without replacement?
 - (e) If X_1, X_2, X_3 be a random sample from $N(0, \sigma^2)$ population, then what is the sampling distribution of the following statistic?

$$\frac{\sqrt{2}X_1}{\sqrt{X_2^2 + X_3^2}}$$

GROUP-C

3. Answer any *two* questions from the following: 10×2 = 20

(a) Derive the formulae for expectation and standard error of sample mean in both simple random sampling with replacement (SRSWR) and simple random sampling without replacement (SRSWOR) from a finite population.

(b) Show that Z_1, Z_2, \dots, Z_n if be n independent standard normal variates, then

$$Z_1^2 + Z_2^2 + \dots + Z_n^2 = \sum_{i=1}^n Z_i^2$$

follows chi-square distribution with n degrees of freedom.

(c) Describe the important characteristics of standard normal distribution and F-distribution.

(d) What is the need of taking a sample from a population? Describe the advantages of sampling over complete enumeration.

—×—