



**UNIVERSITY OF NORTH BENGAL**  
B.Sc. Programme 3rd Semester Examination, 2020

**DSC3-STATISTICS**

**METHODS OF SAMPLING AND SAMPLING DISTRIBUTION**

Full Marks: 40

**ASSIGNMENT**

*The questions are of equal value.  
All symbols are of usual significance.*

**Answer Question No.1 and any four from the rest**

1. Answer any *two* questions from the following: 4×2 = 8
- (a) Distinguish between ‘standard error’ and ‘standard deviation.’
- (b) Explain parameter and statistic.
- (c) 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?
- $$\frac{\sqrt{2}X_1}{\sqrt{X_2^2 + X_3^2}}$$
- (d) What is random number and what are its uses?
- (e) Write down two uses of chi-square distribution.
2. Obtain the expectation and standard error of sample mean for a random sample of size  $n$  from a population of size  $N$  (i) with replacements, (ii) without replacements. 4+4 = 8
3. (a) State the formulae for standard error of sample proportion. 1+3+4=8
- (b) What is ‘bias’ and how does it arise in sampling?
- (c) Describe important characteristics of standard normal distribution and  $F$ -distribution.
4. What is meant by stratified random sampling? Explain the procedure, uses and advantages of stratification. 2+3+3=8

5. (a) 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? 4+4 = 8

(b) A simple random sample of size 5 is drawn without replacement from a finite population consisting of 41 units. If the population standard deviation is 6.25, what is the standard error of sample mean? (Use finite population correlation).

6. (a) Describe two techniques of sampling with their advantages and disadvantages. 4+4 = 8

(b) Derive the standard error of a statistic. Derive the standard error of sample proportion in case of simple random sampling without replacement.

7. (a) Write down the p.d.f. of  $t$ -distribution. 2+6 = 8

(b) If a random sample of size  $n$  is drawn from a normal population with mean  $\mu$  and S. D.  $\sigma$ , then show that

$$\frac{\bar{x} - \mu}{s/\sqrt{n-1}}$$

Follows  $t$ -distribution with  $(n-1)$  degrees of freedom.

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