



UNIVERSITY OF NORTH BENGAL

B.Sc. General Part-II Examination, 2021

STATISTICS

PAPER-V (NEW SYLLABUS)

Full Marks: 50

ASSIGNMENT

*The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.*

1. Answer **all** questions: 1×10 = 10
 - (a) What is unbiased estimator?
 - (b) What are the sufficient conditions for consistency?
 - (c) What are the different optimum properties of good point estimators?
 - (d) What is Likelihood function?
 - (e) What is power of a test?
 - (f) What is efficiency?
 - (g) What do you mean by interval estimation?
 - (h) What is level of significance?
 - (i) When a test is called unbiased?
 - (j) What is type-I error?

2. Answer **all** questions: 6×4 = 24
 - (a) A simple random sample (x_1, x_2, x_3, x_4) of size 4 is drawn from an infinite population with mean μ and sd δ . Given the two estimators of μ as follows: $T_1 = (x_1 + 2x_2 + 3x_3 + 4x_4)/10$ and $T_2 = (x_1 + x_2)/3 + (x_3 + x_4)/6$. Which one is better? Why?
 - (b) Prove that the sample variance s^2 is consistent estimate of the population variance σ^2 but it is not unbiased estimate of σ^2 .
 - (c) Consider the normal (μ, σ) population where σ is known. Obtain the best critical region at significance level α for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu = \mu_1$ on the basis of the random sample x_1, x_2, \dots, x_n of size n drawn from normal (μ, σ) population.
 - (d) In analysis of variance (ANOVA), prove that $TSS = SSW + SSB$.

3. Answer *all* questions:

8×2 = 16

- (a) (i) Define likelihood function stating it is a function of which variable or variables. Find the MLE of the parameter of a Poisson population.
- (ii) Prove that $\sum_{i=1}^n \frac{(x_i - \bar{x})^2}{n-1}$ is an unbiased estimator of population variance σ^2 .
- (b) (i) What is large sample test? In a big city, 325 men out of 600 were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers?
- (ii) 10 individuals are chosen at random from a normal (m, σ) population and their heights in inch are found to be 63, 66, 63, 67, 68, 69, 70, 71, 72, 71. On the basis of the above data, obtain 95% confidence interval for the parameter m when σ is unknown.

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