B.A. (Honours) Examination, 2018
Semester-VI
Economics
Paper-H-13 (Core)
(Quantitative Methods-II)

Time: Three Hours **Full Marks: 40**

Questions are of value as indicated in the margin.
Answer ***any four*** of the following questions

1. (a) Explain the terms parameter, statistic, sampling distribution and standard error of a statistic. 4
   (b) Obtain mean and standard error of the sample mean in the case of SRSWOR. 6
2. (a) Describe the maximum likelihood method of estimation. What are the properties of maximum likelihood estimator? 3+3
   (b) Considering some iid observations based on a sample from $N\left(\mu,\sigma^2\right)$ distribution, where μ is known, find the maximum likelihood estimator of the population variance σ^2. 4
3. (a) When an estimator is said to be unbiased? 2
   (b) If X_1, X_2, ..., X_n are iid observations based on a sample from a population with variance σ^2 and $\bar{X}$ in the sample mean, show that $\frac{1}{n}\sum_{i=1}^{n}(X_i-\bar{X})^2$ is a biased estimator of σ^2. 4
   (c) If X_1, X_2, ..., X_n are iid observations based on a sample from poisson $\left(\theta\right)$ distribution, show that $\frac{1}{n}\sum_{i=1}^{n}X_i$ is a consistent estimator of θ. 4
4. Define the followings, without any example/explanation : hypothesis regarding a parameter, null hypothesis and alternative hypothesis (in the contest of the comment: the population mean μ is less than μ_0 (a specified value), test, critical region, type-I error, type-II error, size of a test, power of a test, MPT, principle of testing of hypothesis. 10
5. (a) Consider the population distribution to be $N\left(\mu,1\right),\mu$ being unknown. State MPT of size $\alpha, 0<\alpha<1,$ for testing $H_0:\mu=0$ VERSUS $H_1:\mu\neq 0$ and show that your test has really size α. 2+3
   (b) Consider the population distribution to be $N\left(0,\sigma^2\right),\sigma^2$ being unknown. State MPT of size $\alpha, 0<\alpha<1,$ for testing $H_0:\sigma^2=1$ VERSUS $H_1:\sigma^2>1$ and examine the size of your test. 2+3
6. (a) State the assumptions of the CLRM (2-variable case) 5
   (b) Obtain the OLS estimators of the parameters of the model in (a) above. 5
7. Explain utilities of regression analysis with suitable examples. 10
8. Write short note (***any two***): 5+5=10
   (i) Stratified Random Sampling.
   (ii) Degrees of freedom.
   (iii) Chi-square distribution.
   (iv) Neyman-Fisher Factorization theorem.
