**2022**

# STATISTICS

( Honours Elective )

Paper : STA–HE–6016

***( Econometrics )***

*Full Marks : 60*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

1. Answer ***any seven*** from the following questions : 1×7=7

*(a)* Give the full form of BLUE.

*(b)* In usual notation, $r^2$ means ______ . *(Fill in the blank)*

(c) The Econometric theory is the quantitative relationship among economic phenomena. *(Write True or False)*

(d) Mathematical Economics + Statistics = ________. *(Fill in the blank)*

(e) Economic model refers to a set of equations which describes the relationships among the ________ variables. *(Fill in the blank)*

(f) All OLS estimators are linear estimators. *(Write True or False)*

(g) If $E(U_i U_j) = \sigma_u^2$ for $i = j, \forall i, j$ in the linear model $Y_i = \alpha + \beta X_i + U_i$, then the disturbance terms are known as ________. *(Fill in the blank)*

(h) When two variables are said to be heteroscedastic?



(i) In the regression equation $Y = \alpha + \beta X$, $\beta$ is called

(a) slope of $X$

(b) intercept of $X$

(c) intensity of $X$

(d) coefficient of $X$

*(Choose the correct option)*

(j) What are the properties of least squares estimators?

2. Answer **any four** from the following questions: 2×4=8

(a) What is linear regression model?

(b) Write the objectives of econometrics.

(c) What are the assumptions for a three variable linear regression model?

(d) Write *two* limitations of econometrics.

(e) What is the significance of $b_{yx}$, the regression coefficient of $y$ on $x$?

(f) Write a note on economic model.

(g) In a two variate regression model write down the least squares estimate of the parameters.

(h) Write the null and alternative hypothesis for testing the significance of the regression coefficient of the explanatory variable in the model $Y = \alpha + \beta X + U$.

3. Answer **any three** from the following questions : 5×3=15

(a) Write a note on the scope of econometrics.

(b) Write a note on multiple linear regression model.

(c) Describe the test for testing the significance of the intercept $\alpha$ in the linear model $y = \alpha + \beta x + u$.



(d) Write a note on multicollinearity.

(e) Show that the least squares estimates are unbiased estimators.

(f) Write an explanatory note on coefficient of determination in connection to goodness of fit of a linear model.

(g) ANOVA in econometrics. Explain.

(h) Describe the methodology involved in an econometric model.

4. Answer **any three** from the following questions : 10×3=30

(a) (i) Explain what you mean by the term 'econometrics'. 5

(ii) State completely the assumptions of the linear model. 5

(b) Prove that ordinary least square estimators are best, linear and unbiased estimators. 10

(c) Estimate the regression parameters by OLS method in a linear regression model. 10

(d) How will you test the significance of regression coefficient in the linear model $Y = \alpha + \beta X + U$ ? 10

(e) Considering a three variable linear model estimate the parameters by ordinary least square (OLS) method. 10

(f) State and prove Gauss-Markov theorem. 10

(g) Write short notes on : 5×2=10

(i) Heteroscedasticity

(ii) Autocorrelation



(h) Explain how you would construct 95% confidence intervals for the three unknown parameters $\alpha$, $\beta$ and $\sigma_u^2$ in the simple linear model. Mention utility of confidence interval in testing of hypothesis. 3+3+3+1=10



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