

B.A. (Honours) Examination, 2023**Semester-VI****Economics****Course- CC-14****(Introduction to Econometrics)****Time: 3 hours****Full Marks: 60****Questions are of value as indicated in the margin.****Question No. 1 is compulsory and answer any three questions from the rest.****1. Select the Correct answer from the following questions: - 15x1=15**

- (i) The number of explanatory variables in a simple regression is....
- a) One b) Zero c) Two d) More than Two
- (ii) In a two-variable regression, Y is the dependent variable and X is the independent variable. The correlation coefficient between Y and X is 0.8. For this, which of the following is correct?
- a) 8% of variations in Y are explained by X
- b) 64% of variations in Y are explained by X
- c) 0.8% of variations in Y are explained by X
- d) 80% of variations in Y are explained by X
- (iii) $E(U_i, U_j) = 0$, when $i \neq j$ is termed as,
- a) Heteroscedasticity b) Multi-Collinearity
- c) No Auto-Correlation d) Homoscedasticity
- (iv) The book 'Principles of Econometrics: A Modern Approach using EVIEWS' was authored by.....
- (a) Sankar Kumar Bhaumik (b) Arther S Goldberger (c) H. Theil d) J R N Stone
- (v) Explanatory Variable is also known as.....
- a) ~~g~~ Regressor b) Explained Variable
- c) Response Variable d) Dependant Variable

(vi) The assumption of Homoscedasticity was expressed as....

- a) $E(U_i)^2 = \sigma_i^2$
- b) $E(U_i)^2 = \sigma^2$
- c) $E(U_i)^2 = 0$
- d) $E(U_i) = 0$

(vii) Choose the correct one from the following

- a) $0 \leq r^2 \leq 1$
- b) $0 < r^2 < 1$
- c) $0 \geq r^2 \geq 1$
- d) $0 > r^2 > 1$

(viii) The combination of Time series and Cross section data is termed as.....

- (a) Primary data
- (b) Secondary data
- (c) Panel data
- (d) None of these.

(ix) The problem of Heteroscedasticity was expressed as.....

- a) $E(U_i)^2 = \sigma_i^2$
- b) $E(U_i)^2 = \sigma^2$
- c) $E(U_i) \neq 0$

(a) $E(U_i^2) = \sigma_i^2$
 (b) $E(U_i^2) = \sigma^2$
 (c) $E(U_i) = \sigma_i$

(x) Linear Regression is estimated through:

- a) WLS
- (b) OLS
- (b) MLE
- (c) Both (b) & (c)
- (d) None of the above

(xi) Given regression co-efficient $b=2$ and standard error of 0.5, the value of t ratio is:

- a) 2
- b) 4
- c) 1
- d) 2.5

(xii) Student 't' test was formulated by

- a) William Sealy Gosset
- b) Carl Friedrich Gauss
- c) Durbin Watson
- d) Both b and c

(xiii) The statistical properties of OLS estimators are

- (a) Linearity, Unbiasedness, and minimum variance
- (b) Linearity and Unbiasedness
- (c) Unbiasedness, and minimum variance
- (d) Linearity and minimum variance

(xiv) Multicollinearity is used to denote,

- (a) The presence of linear relationships among explanatory variables
- (b) The presence of non-linear relationships among explanatory variables
- (c) The presence of linear relationships among dependent variables
- (d) The presence of linear relationships among endogenous variables

(xv) Specification bias or specification error means

- a) Leaving out important explanatory variables
- b) Including unnecessary variables
- (c) Choosing the wrong functional form between Y and X variables
- d) All of the above

(3)

(1)

2. In the context of two variable linear model, prove that OLS estimators are BLUE.

(i) Consider the following regression model

$$Y_i = \beta X_i + \epsilon_i \quad \epsilon_i$$

Find out the estimate of β .

iii) Proof that $r^2 = 1 - \frac{RSS}{TSS}$, $r^2 =$ Coefficient of determination.

5+5+5=15

3. Define the following with explanations –

(i) null hypotheses

(ii) alternative hypotheses

(iii) critical region

(iv) type I error

(v) type II error

(vi) power of a test.

2+2+3+2+2+4=15

4. (i) What is Neyman-Fisher factorization theorem?

ii) If X_1, X_2, \dots, X_n is a i.i.d random sample from $N(\mu, \sigma^2)$ where σ^2 is known. Find the sufficient estimator of μ and σ^2 .

iii) What do you mean by degrees of freedom?

iv) Evaluate degrees of freedom for a given sample of sequence $X = 3, 6, 2, 8, 4, 2, 9, 7, 12$

3+7+3+2=15

5. (i) Explain the maximum likelihood method of point estimation. State the properties of maximum likelihood estimator.

ii) Consider some i.i.d observations based on a sample from $N(\mu, \sigma^2)$ where μ and σ^2 are both unknown. Find the maximum likelihood estimators of population mean μ and population variance σ^2 .

3+4+8=15

6. (i) What do you mean by "sampling fluctuation"?

ii) If X_1, X_2, \dots, X_n is a simple random sample of size n from a finite population of size N units with mean μ and variance σ^2 , show that

(i) $E(\bar{X}) = \mu$ and (ii) $\text{Var}(\bar{X}) = \frac{\sigma^2}{n}$ in SRSWR and $\frac{\sigma^2 (N-n)}{n(N-1)}$ in SRSWOR.

3+(4+8)=15

(4)

7. A political party is investigating whether spending in marketing (me_t) (measured in thousand Euros) is an appropriate strategy in order to gain more members in the parliament (M_t) for the next elections:

$$M_t = \beta_0 + \beta_1 me_t + u_t$$

In order to estimate the above regression model, data of the last five elections is collected obtaining the following estimated regression:

$$M_t = 2.684 + 0.025 me_t, p=0.000, \text{ absolute value of the } t = 5 \text{ and}$$

$$R^2 = 0.392$$

- (i) Interpret the intercept term, estimated slope coefficient and the determination coefficient of Determination.
- (b) Find the predicted members in the parliament if the political party is thinking of spending about 750,000 Euros in marketing for the next elections. Also find the values of estimated parameter. (5+10)