International Islamic University Chittagong
Department of Economics & Banking

Mid-Term Examination, Autumn 2022 — Program: BSS (Hons) in Economics & Banking
Course Code: ECON 3601 — Course Title: Basic Econometrics
Time: **1 hour 30 minutes** — Full Marks: **30**

[Answer all of the following questions. Figures in the right margin indicate full marks.]

QN	Description of Questions	Marks	CLOs & PLOs	Cognitive learning
1.	(a)What are the types of data available for empirical analysis in econometrics? Identify the following data into their types; (i) Daily stock price of a company for last three years (ii) Household consumer expenditure in Sitakunda area for the 2016. (iii) Exports from year 1990 to 2016 for eight countries in SAARC.	3	*CLO-1 & PLO- 1*	Understand & Analyze
	(b) Determine whether the following models are linear in parameter or the variables or both. Which of these are linear regression model? If not, by using suitable transformations convert them into linear models? (i) $ln\ Y_i = \beta_1 + \beta_2 \ln X_i + u_i$; *(ii)* $Y_i = e^{\beta_1+\beta_2 X_i+u_i}$; *(iii)* $ln\ Y_i = \beta_1 + \beta_2 X_{2i} + u_i$ *(iv)* $Y_i = \beta_1 + \beta_2 X_{2i} + u_i$	7		Evaluate
2.	a) Assume a simple regression model $Y_i = \beta_1 + \beta_2 X_i + u_i$; $E(u_i) = 0$ and $var(u_i) = \sigma^2$. (i) Estimate parameters by OLS method (ii) Prove that $\hat{\beta}_2$ is an unbiased estimator	8	*CLO- 2 & PLO- 2*	Evaluate
	(b) Given N=50, sum of squared error $\sum \hat{u}_i^2 = 1384.43$, $\sum(X_i - \overline{X})^2$=19.89; Determine the standard error of $\hat{\beta}_2$.	2		Evaluate
3.	(a) Define coefficient of determination for a simple linear regression model.	1		Remember
	(b) In a multinational company, the following data are obtained from a sample of 8 employees for the year 2016. The variables X and Y are the years of experience and salary in thousand BDT respectively: $\sum(X_i - \bar{X})(Y_i - \bar{Y})$= 442.50; $\sum(X_i - \bar{X})^2$= 85.50; $\sum(Y_i - \bar{Y})^2$= 2411.50; $\sum X_i$= 66; $\bar{X}$ =12; $\sum Y_i$ = 566; $\bar{Y}$ = 70.75; $\sum \hat{e}_i^2$=121.37 Considering an equation to estimate the quantitative impact of experience on salary; $Y_i = \beta_1 + \beta_2 X_i + e_i$, (i) Estimate the regression line of Y on X (ii) Estimate the variance of the slope coefficient β_2 (iii) Estimate the covariance of the coefficients β_2 and β_1 (iv) Estimate the coefficient of determination (r^2) and comment.	9	*CLO-2 & PLO-2*	Evaluate
	OR			
3.	(a) Define coefficient of determination for a regression model.	1		Remember
	(b) Let $\hat{\beta}_{XY}\hat{\beta}_{YX}$ represent the slopes in the regression of X on Y and Y on X, respectively. Prove that, $\hat{\beta}_{XY}\hat{\beta}_{YX} = r^2$.	3		Evaluate
	(c) Prove that, TSS = ESS + RSS Where, TSS = Total sum of squares ESS = Explained sum of squares RSS = Residual sum of squares	3	*CLO-2 & PLO-2*	Evaluate
	(d) Consider the following estimated regression line $\hat{Y}_i = 24.4545 + 0.5091 X_i$ SE = (6.4138) (0.0357) $Cov(\hat{\beta}_1, \hat{\beta}_2) = -0.2172$; $r^2 = 0.4621$ Interpret these results.	3		Evaluate