International Islamic University Chittagong (IIUC)

Department of Economics & Banking

Midterm Examination, Spring-2022

Program: BSS (Honours)

Course Code: **ECON 3601** Course Title: **Basic Econometrics**

Time: 1 Hour and 30 minutes Full Marks: 30

Answers any Three of the following questions. All parts of a question must be answered sequentially. Figures in the right margin indicate full marks.

1. (a) Define different types of data available for empirical analysis in economics. 03

(b) Write down the methodology of econometrics. 03

(c) Determine whether the following models are linear in the parameters, or the variables, or both. Are they linear regression models? 04

(i) $Y_i = \beta_1 + \beta_2 \left(\frac{1}{X_i}\right) + u_i$ (ii) $Y_i = \beta_1 + \beta_2 \, lnX_i + u_i$

(iii) $Y_i = \beta_1 + \beta_2{}^3 X_i + u_i$ (iv) $Y_i = \beta_1 + \beta_2 X_i + u_i$

2. (a) Consider the data given in the following table, which refers to a total population of 60 families in a hypothetical community and their weekly income (X) and weekly consumption expenditure (Y), both in dollars. The 60 families are divided into 10 income groups (from \$80 to \$260) and the weekly expenditures of each family in the various groups are as shown in the table. Therefore, we have 10 fixed values of X and the corresponding Y values for each of the X values. 08

WEEKLY FAMILY INCOME *X*, \$

Y ↓ \ *X* →	80	100	120	140	160	180	200	220	240	260
Weekly family consumption expenditure *Y*, \$	55	65	79	80	102	110	120	135	137	150
	60	70	84	93	107	115	136	137	145	152
	65	74	90	95	110	120	140	140	155	175
	70	80	94	103	116	130	144	152	165	178
	75	85	98	108	118	135	145	157	175	180
	–	88	–	113	125	140	–	160	189	185
	–	–	–	115	–	–	–	162	–	191

Collect a sample of your own choice and answer the following questions:

(i) Calculate the value of intercept coefficient $(\hat{\beta}_1)$ and slope coefficient $(\hat{\beta}_2)$.

(ii) Write down the regression function of Y on X.

(b) What is meant by statistical relationship? How it is different from deterministic relationship? Explain with example. 02

3. (a) Prove that: 03

(i) The mean value of the estimated Y $(=\hat{Y}_i)$ is equal to the mean value of the actual Y.

(ii) The mean value of the residuals $\hat{u}_i$ $(\underline{\hat{u}_i})$ is zero

(b) State the important assumptions of a classical linear regression model (CLRM). 04

(c) Why the disturbance term is used in regression mode? 03

4. Consider the following two-variable population regression function (PRF): 10

$$Y_i = \beta_1 + \beta_2 X_i + u_i \text{ and } k_i = \frac{(X_i - \underline{X})}{\sum (X_i - \underline{X})^2} = \frac{x_i}{\sum x_i^2}$$

Now prove that

(i) $\sum k_i = 0$ (ii) $\sum k_i^2 = \frac{1}{\sum x_i^2}$ (iii) $\sum K_i X_i =$ (iv) $E(\hat{\beta}_2) = \beta_2$

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