(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

2019/2020 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER

SPECIAL/SUPPLEMENTARY EXAMINATION

FOR THE DEGREE OF BACHELOR SCIENCE

MATHEMATICS

COURSE CODE: **STA 456**

COURSE TITLE: **STATISTICAL METHODS IN ECONOMETRICS**

DATE: 11/02/2021 **TIME:** 11 AM -1 PM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

QUUESTION ONE(30 mks)

(a) Define econometrics and give its three objectives (5mks)

(b) Give any four basic assumptions of a simple linear regression model (4 mks)

(c) Explain the following terms as used in econometrics

(i) Stochastic relationship (2mks)

(ii) Simultaneous equation model (2mks)

(iii) Correlation coefficient (2mks)

(iv) Identification (2mks)

(d) The table below gives the quantity demanded of a commodity Y at various price X (holding everything else constant)

X	12	14	10	13	17	12	11	15
Y	5	11	7	8	11	7	6	19

(i) Estimate the regression equation of Y on X (3mks)

(ii) Test for the significance of the parameter estimates at 5% level of significance (t=2.45) (8mks)

(iii) Calculate the 95% confidence interval for the predicted values of Y when X=10 (5mks)

QUESTION TWO (20 mks)

For the following supply-demand model described below

$Q_t = \alpha_1 + \alpha_2 P_t + \alpha_3 Y_t + \mu_{1t}$

$Q_t = \beta_1 + \beta_2 P_t + \mu_{2t}$

Where Q is the equilibrium quantity

P is the price

Y is the income of consumer

$\alpha_2 \geq 0, \alpha_3 \geq 0, \beta_2 \geq 0$

(i) State the endogenous and exogenous variable (4 marks)

(ii) Derive the reduced form equation of this model (6 marks)

(iii) State the identification status of the both equations hence write the structural parameter in terms of the reduced form parameters where possible (10 marks)

QUESTION THREE (20 mks)

(a) Distinguish the following terms as used in econometrics

(i) Autocorrelation and auto regression

(ii) Cross-sectional data and time series data

(b) The ministry of education wishes to determine education expenditure in 43 towns in districts in Kenya on the basis of cross-sectional data. In this exercise, educational expenditure function is specified as follows

$$E=a_0+a_1Y_i+a_2CH+a_3FA+u$$

Where E=expenditure on education

Y =median income in the relevant town

CH= number of school age children

FA= government financial aid going into education

(i) Is heteroscedasticity likely in this model?

(ii) Explain how this problem is likely to arise.

(iii) Which method would you employ to test for its presence? Explain

QUESTION FOUR (20mks)

a) An econometrician scholar specifies model (a).He, however ,erroneously suspects that the stochastic term

$$Y_i=b_0+b_1X_t+\mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(a)$$

Suffers from autocorrelation of first order, i.e.

$$\mu_t=p\ \mu_{t-1}+V_t$$

on the basis of his suspicion, he transforms the original model and obtains the generalised difference regression model(b)

$$Y_t-pY_{t-1}=b_0(1-p)+b_1X_t-pX_{t-1}+V_t$$
$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(b)$$

Would (b) be free from autocorrelation? In other words, what are the properties of V_t?

b) Consider the following model:

$$Y_i=b_0+b_1X_1+b_2X_2+\mu$$

Where Y is the expenditure on ladies' clothing

X1 is income

X2 is the wealth and μ is the stochastic term

You are told that low incomes are normally associated with low wealth and high incomes, with abundant wealth.

(i) What problem is likely to manifest in this model

(ii) If the problem is severe, what are the likely consequences?

(iii) Under condition (ii) what would you suggest for remedy?

QUESTION FIVE (20mks)

The data with regard to the output of gram and the cost of seed and labour per hectare of 12 farmers' fields are given below

Y	4	3	0	4	3	4	0	4	3	1	3	1
X_1	3	3	0	2	3	2	0	3	2	1	3	2
X_2	12	4	18	10	14	10	18	12	15	16	14	13

Where Y is the cost of production, X_1 is the cost of seed and X_2 is the labour cost

a) State the best model that fit the above data

b) Find the partial correlation coefficients and give their econometrics interpretations