(*Knowledge for Development*)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

2019/2020 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER

MAIN EXAMINATION

FOR THE DEGREE OF BACHELOR OF EDUCATION AND

BACHELOR OF SCIENCE (MATHEMATICS)

COURSE CODE: STA 456

COURSE TITLE: STATISTICAL METHODS IN ECONOMETRICS

DATE: 06/11/2020   **TIME:** 2 PM -4 PM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

QUESTION ONE (30 MARKS)

(a) Explain five classical assumptions in a simple linear regression model (5mks)

(b) Describe the generalized linear model hence or otherwise show that its estimate is the best linear unbiased estimator (BLUE} (12 mks)

(c) 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) (6mks)

    (iii)   Calculate the 95% confidence interval for the predicted values of Y when X=10 (4mks)

QUESTION TWO (20 MARKS)

(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

$$E = a_0 + a_1 Y_i + a_2 CH + a_3 FA + u$$

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

(20 marks)

QUESTION THREE (20 MARKS)

(a) Define the following terms
  (i) Endogenous variables (1mk)
  (ii) Exogenous variables (1mk)
(b) Describe three types of identification procedure (5mks)
(c) 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 (2 marks)
  (ii) Derive the reduced form equation of this model (9marks)
  (iii) State the identification status of the both equations (2mks)

QUESTION FOUR(20 MKS)

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
X₁	3	3	0	2	3	2	0	3	2	1	3	2
X₂	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

QUESTION FIVE (20 MARKS)

For the model
$$Y = x\beta + \mu,$$
Where $E(\mu) = 0$
$$E(\mu'\mu) = \sigma^2 I$$
With other condition as standard as possible and with β satisfying a linear restriction condition

$R\beta = r$

Where R is unknown matrix and r is known

(a) Find the restricted OLS estimator of β (7 mks)

(b) Find its mean and variance   (8mks)

(c) For the residue vector of a GLM model show that
$$\delta^2 = \frac{e'e}{n-k-1}$$
   is unbiased estimator of δ^2 (5mks)