**CHUKA**  **UNIVERSITY**



# UNIVERSITY EXAMINATIONS

## EXAMINATION FOR THE AWARD OF DEGREE OF MASTERS OF AGRICULTURAL ECONOMICS

**AGEC 851: ECONOMETRICS METHODS**

**STREAMS: M (AGEC)** **TIME: 3 HOURS**

**DAY/DATE: MONDAY 03/12/2018** **2.30 PM – 5.30 PM**

**INSTRUCTIONS:**

**Answer Question One and any other Three**

**Question One**

(a) Given the following regression model $y=\hat{\beta}_0+\hat{\beta}_1 x_1+\hat{\beta}_2 x_2+\varepsilon$

Required:

(i) Derive the residue sum of squares (RSS) and the resulting first order normal equations. [6 marks]

(ii) Represent the normal equations derived in (i) above in matrix format. [4 marks]

(b) Explain two assumption of generalized linear regression model (GLS) [4 marks]

(c) Given the following vector of stochastic terms:

$$\left[\varepsilon_1 \varepsilon_2 \ldots \varepsilon_n\right]$$

Prove that

(i) $E(\varepsilon)=0$ and that [10 marks]

(ii) $E(\varepsilon'\varepsilon)=\sigma^2 I_n$

(d) (i) Explain the meaning of an integrated series and four properties of an integrated series. [6 marks]

(ii) Discuss three properties of a white noise process in time series. [10 marks]

**Question Two**

(a) You are given the following econometric model

$$\underset{nx1}{Y} = \underset{nxk}{x}\ \underset{kx1}{\beta} + \underset{nx1}{\varepsilon}$$ (matrix representation)

Required:

(i) Derive the OLS estimator $\hat{\beta}$ [5 marks]

(ii) Prove that $E(\hat{\beta}) = \beta$ [5 marks]

(iii) Prove the Gauss Markov Theorem (Minimum variance of $\hat{\beta}$ [10 marks]

**Question Three**

(a) Faced with a dummy dependent variable, explain the consequences of using OLS estimation method. [10 marks]

(b) Given the following time series process $y_t = C + \varepsilon_t + \theta \varepsilon_{t-1}$

Where C and $\theta$ are constants and $\varepsilon_t$ is a white noise process.

(i) What type of data generation process does it represent? [2 marks]

(ii) Find mean and variance of $y_t$ [8 marks]

**Question Four**

(a) Briefly explain the major difference between OLS (Ordinary Least Square) and MLE (Maximum Likelihood Estimation) methods. [6 marks]

(b) State the four main dummy dependent variable models. [8 marks]

(c) Discuss the six types of data generation processes in time series. [6 marks]

**Question Five**

(a) State and explain advantages of panel data. [10 marks]

(b) Explain the following terms as used in econometrics:

| | | |
|---|---|---|
| (i) | Heteroscedasticity | [2 marks] |
| (ii) | Unit root | [2 marks] |
| (iii) | Autocorrelation | [2 marks] |
| (iv) | Stationarity | [2 marks] |
| (v) | Disturbance /error term | [2 marks] |

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