MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING, APPLIED SCIENCES & TECHNOLOGY

DEPARTMENT OF APPLIED STATISTICS

MODULE: ECONOMETRICS

CODE: HAST 421

SESSIONAL EXAMINATIONS
APRIL 2023

DURATION: 3 HOURS

EXAMINER: NYAKUAMBA T

INSTRUCTIONS

1. Answer **All** in Section A
2. Answer **three** questions in Section B.
3. Start a new question on a fresh page
4. Total marks 100

Additional material(s): Non-programmable electronic scientific calculator, Statistical Tables

SECTION A (40 Marks)

ANSWER ALL QUESTIONS

A1 (a) Define the following terms

   I.   Heteroscedasticity   [3]

  II.   Endogenous variable   [2]

   (b) Briefly explain the main goals of econometrics.   [5]

A2. (a) Under what condition is a process $\{X_t, t \in T \}$ said to be

   I.   Strictly stationary   [2]

  II.   Second order stationary   [2]

   (b) Suppose that an econometric model satisfies the second order autoregressive model.

$$Y_t = 0.3Y_{t-1} + 0.7Y_{t-2} + e_i$$

   Show that $\{Y_t\}$ is $I(1)$ [4]

   State the model for ΔY_t [2]

A3. In Frisch's Confluence Analysis when is a variable

   (a) Useful   [3]

   (b) Detrimental   [3]

   (c) Superflous   [4]

A4. Consider the following expenditure data

Income (X)	Expenditure (Y)
2	2.0
3	2.5
4	2.6

5	2.9
6	3.0

(a) Using the fitted regression

Y = 1.64 + 0.24 X

Compute the residual series

(b) Hence test the first order serial correlation.

Use a 5% level of significant

[5; 5]

SECTION B [60 marks] ANSWER ANY 3 QUESTIONS

B5

(a) What is the difference between economics and statistics [6]

(b) Briefly explain the 4 main stages in econometric modelling [6]

(c) Consumer demand theory states that the quantity demand of a commodity D is a function of or depends on, its price P, consumer's income Y, and the price of others related commodities, say, commodity Z (i.e. Pz)

Assuming that the consumer's tastes remain constant during the period of analysis, state the proceeding theory in;

(i)   Specific or explicit linear form or equation and

(ii)   In stochastic form.

(iii)   Which are the coefficients to be estimated and what are they called.

[8]

B6.

The following data shows a segment of the series on percentage wage change Y, unemployment X_1 and percentage price changes ie, inflation X_2.

Y   X1   X2

3	3	5
1	1	4
8	5	6
3	2	4
5	4	6

Given that

$$(X'X)^{-1} = \begin{bmatrix} 26.7 & 4.5 & -8.0 \\ 4.5 & 1.0 & -1.5 \\ -8.0 & -1.5 & 2.5 \end{bmatrix}$$

(a) Fit a general model
$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \mu \quad \text{to the data using OLS}$$

Write down the estimated regression model. [5]

(b) Calculate the fitted values Y [5]
(c) Hence compute the residuals [5]
(d) Set up an analysis of variance table hence test the significant of the G. L. M
Use 10% significant level. [5]

B7 (a)

I. Define time series [3]
II. State the four components of a time series. [4]

(b). Suppose that an economic time series satisfies the second order autoregressive model

$$Y_t = 1.5Y_{t-1} - 0.5Y_{t-2} + a_t$$
Show that $\{Y_t\}$ is $I(1)$ [3]

(c) Multicollinearity implies inter correlation between explanatory variables.

If $rX_1X_2 = 1\ in$ the model $Y = b_0 + b_1X_1 + b_2X_2 + \mu$

Where $X_2 = kX_1$ Show that the estimates of b_1 and b_2 become indeterminate.

[10]

B8

(a) (i). Briefly describe the two stage least square (2SLS) parameter estimation procedure [6]

(ii). State the four assumptions of the 2SLS parameter estimates [4]

(b). The following data show production (P) in tones, labor (L), i.e. number of workers and capital (K) in millions of dollars.

Suppose the labor and capital are the only variable factors and that there are no charges in the techniques of production i.e., the inter-preneureship quality variable is assumed to be fixed or constant.

Production (P)	Labor (L)	Capital (K)
2.8	1	2
4.3	2	2
6.7	3	3
8.0	4	3
10.5	5	4
11.7	6	4

(a) fit an appropriate linear form of the Cobb – Douglas model $P = aL^b k^c$ to these data. [6]

(b)suppose that an economic theory specifies that output P can be adequately described by the Cob Douglas function and that any change of scale yields constant returns to scale. Test this hypothesis at 5% level of significant   [4]

END OF EXAMINATION PAPER