MACHAKOS UNIVERSITY

UNIVERSITY EXAMINATIONS FOR 2016/2017 ACADEMIC YEAR

SCHOOL OF PURE AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICS AND STATISTICS

THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF

BACHELOR OF SCIENCE IN STATISTICS AND PROGRAMMING

SST300: ECONOMETRICS I

Date: Time:

Instruction: Answer Question One and any other Two Questions

QUESTION ONE

(a) Define the following terms

    (i) Gross domestic products   [2 marks]

    (ii) Gross national income   [2 marks]

    (iii) Per capital income   [2 marks]

(b) Briefly discuss the income and expenditure approaches in determination of gross domestic product   [4 marks]

(c) Outline FOUR assumptions of the linear regression model   [4 marks]

(d) Data from the Taiwanese agricultural sector for the period 1995-2009 were analyzed for the variables Real Gross product Y (in millions of NT \$), labour days X_1 (in days) and Real Capital Input X_2 (in millions of NT \$). From a computer print out, the fitted model is given as:-

$$Y_t = -3.3384 + 1.4988X_{1t} + 0.4899X_{2t}$$

$$Se(\beta_0) = 2.4495, Se(\beta_1) = 0.53388), Se(\beta_2) = 0.10200) \text{ and } R^2 = 0.8890$$

Using this information to,

    (i) Identify and interpret the regression coefficients of labour and capital   [4 marks]

    (ii) Determine if each regression coefficients is significant   [5 marks]

(iii)Test for the overall regression coefficient [3 marks]

(e) Clearly, highlight the objectives of time series [4 marks]

QUESTION TWO

The savings function of a random sample of ten families is given as

$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \mu_i$ where Y denotes aggregate savings, X_1 denotes disposable income and X_2 denotes real interest rate. The sample data are given in the following table:-

Y	20	25	25	30	35	40	43	42	50	55
X_1	100	110	115	120	140	145	145	140	150	160
X_2	2	2	3	2	3	4	3	4	5	5

Required:

(a) Find the regression equation of the savings on disposable income and real interest rates [5 marks]

(b) Obtain the standard errors of the regression coefficients [4 marks]

(c) Test the significance of the individual regression coefficients at 5% level of significance [5 marks]

(d) Estimate the savings when the disposable income is 180 and real investment is 6 hence obtain its confidence limits at 95% confidence level [4 marks]

(e) Test the overall significance of regression at 5% level [2 marks]

QUESTION THREE

(a) Discuss steps involved in an economic research [8 marks]

(b) Briefly explain FOUR components of time series [8 marks]

(c) The data below gives the average quarterly prices of a commodity in 4 years

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
2009	40.3	44.8	46.0	48.0
2010	50.1	53.1	55.3	59.5
2011	47.2	50.1	52.1	55.2
2013	55.4	51.0	61.6	65.3

Use method of simple averages to obtain seasonal variation indices for the four quarters and interpret the results [4 marks]

QUESTION FOUR

(a) (i) What multico-linearity? [2 marks]

(ii) Discuss two types of multico-linearity [4 marks]

(b) The demand for item is often related to the price of the item. ABC Electronics Company has come up with a new electronic toy for children and is trying to estimate the demand function for this toy at various prices. The quantity of new toy sold and the corresponding price charged at six store chain for a one week period is shown in the table:-

Quantity demanded (Y)	325	265	210	165	125	110
Price (X)	3	4	5	6	7	8

(i) Fit the demand function $Y_i = \beta_0 X_i^{\beta_1} e^{u_i}$ [7 marks]

(ii) Estimate the value the Quantity of demand when the price is 10 [2 marks]

QUESTION FIVE

(a) What is serial correlation? [2 marks]

(b) An autoregressive model of order one AR(1) is given by

$$X_t = \frac{1}{3} X_{t-1} + e_t$$

Use backshift operator to obtain the auto covariance function of the above process. Hence obtain the autocorrelation function [8 marks]

(c) The data below gives the average quarterly sales of a commodity in 5 years

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
2009	30	40	36	34
2010	34	52	50	44
2011	40	58	54	48
2013	54	76	68	62
2014	80	92	86	82

(i) Using the method of least squares, obtain the trend line for the data [3 marks]

(ii) Use the method of ration to trend, obtain the seasonal indices hence comment on the results [4 marks]

(d) State various sources of data in economics