TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF MATHS AND PHYSICS

UNIVERSITY EXAMINATION FOR THE DEGREE OF:

BACHELOR OF SCIENCE IN STATISTICS AND COMPUTER SCIENCE

AMA 4427: STATISTICAL METHODS FOR ECONOMETRICS

END OF SEMESTER EXAMINATION

SERIES: 2017

TIME ALLOWED: 2 HOURS

DATE: sept. 2017

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Attempt question ONE COMPULSORY and any other TWO from 2-5

Do not write on the question paper.

Question ONE (30 marks)

a. State TWO sources of internal data in Econometrics (2Marks)

b. Outline TWO sources of secondary data for a country. (2 Marks)

c. Let V_W be the variation within treatments and V_b be the variation within treatments. Show that

$E(Vb) = (a-1)\sigma^2 + b\sum_{j=0}^{n} \propto j^2$ (4 marks)

d. Outline three assumptions of the General Linear Model (3 Marks)

e. The following data relates to a practical experiment. Calculate the least squares regression line of y on W. Use $W = Log_2 x$ as the independent variable on a logarithmic scale. (6 Marks)

Number x of groups	$W = Log_2 x$	Time y (s)	W^2	Wy
1	0	27	0	0
2	1	42	1	42
4	2	55	4	110
8	3	100	9	300
16	4	125	16	500

f. Outline four general guidelines to be considered when estimating polynomial regression models (4marks)

g. A survey found that the average hotel room in Mombasa is $ 88.42 and the average rate in Nairobi is $ 80.61. Assume that the data was obtained from two samples of 50 hotels each and that the standard deviations were $5.62 and $ 4.83 respectively. At α=0.05, Can it be concluded that there is a significant difference in the rates (4 Marks)

h. $Data = Pattern + Residual$

From the above equation state a matrix for

I. Vector of response (1mark)

II. Vector of parameters (1mark)

III. Residual vector (1mark)

IV. Write down the design matrix (2 marks)

Question TWO (20 marks)

A research hypothesizes that the average number of sports that colleges offer for males is greater than the average number that colleges offer for females. A sample of the number of sports offered by colleges is shown. At α = 0.1, is there enough evidence to support the claim?

Males					Females				
6	11	11	8	15	6	8	11	13	6
6	14	8	12	18	7	5	13	14	6
6	9	5	6	9	6	5	5	7	5
6	9	18	7	6	10	7	6	5	5
15	6	11	5	5	16	10	7	8	5
9	9	5	5	8	7	5	5	6	10
8	9	6	11	6	9	18	15	7	6
7	5	11	5	8	7	8	5	7	7
7	7	5	10	7	11	4	6	8	5
10	7	10	8	11	14	12	5	8	8

a. State the hypothesis and identify the claim (3 Marks)

b. Calculate the test value (11 Marks)

c. Find the P-value (2Marks)

d. Make the decision (2 Marks)

e. Summarize the results (2marks)

Question THREE (20 Marks)

a. Suppose a researcher wishes to determine whether there is a difference in the average age of nursing students who enroll at a community college and those who enroll at a university. In this case the researcher is not interested in the average age of all beginning nursing students , instead he is interested in comparing the means of the two groups

   I. Construct the research question for the study (2 Marks)
   II. State the hypotheses and identify the claim (2 marks)

a. Describe methods of index number construction, give their relative advantages and disadvantages (9 Marks)

b. State three assumptions of the F-test for comparing three or more means (3 Marks)

c. Prove that $\sum_{jk}(X_{jk}-\bar{x})^2 = \sum_{jk}(X_{jk}-\bar{x}_{j.})^2 + \sum_{jk}(X_{j.}-\bar{x})^2$ (4marks)

Question FOUR (20marks)

The table below shows the yields in bushels per acre of a certain variety of wheat grown in a particular type of soil treated with chemicals A, B or C. Find ;

a. The mean yield for the different treatments (3 marks)
b. The grand mean for all treatments (2 marks)
c. The total variation (2 marks)
d. The variation between treatments (2 marks)
e. The variation within treatments (2 marks)
f. Test the null hypothesis of equal means
   I. At 0.05 significance level (3marks)
   II. At 0.01 significance level (2marks)
g. Represent the information in an ANOVA table (4 marks)

A	48	49	50	49
B	47	49	48	48
C	49	51	50	50

3	4	5	4
2	4	3	3
4	6	5	5

Question FIVE (20 marks)

d. State the purpose of Price indices (2Marks)
e. Using relevant examples from the Kenyan economy, discuss SIX sources of external data in Econometrics (12marks)
f. Explain three Limitations of index numbers (6marks)