



MACHAKOS UNIVERSITY

University Examinations for 2018/2019 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

THIRD YEAR SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRI-BUSINESS MANAGEMENT AND TRADE

EES 405: NON-PARAMETRIC AND SEMI PARAMETRIC STATISTICS

DATE: 26/7/2019

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

- i) Answer question one (Compulsory) and any other two questions
- ii) Do not write on the question paper
- iii) Show your working clearly

QUESTION ONE (COMPULSORY)(30 MARKS)

- a) Explain the differences between parametric and non-parametric tests (4 marks)
- b) State and explain three merits for non-parametric tests (6 marks)
- c) Highlight the parametric and their corresponding non-parametric tests (6 marks)
- d) Differentiate between type I and type II errors in non-parametric statistics. (4 marks)
- e) The assessment for nine patients are show in the table below.

Patient	1	2	3	4	5	6	7	8	9
Treatment A	36.3	48.4	40.2	54.7	28.7	42.8	36.1	39.0	36
Treatment B	35.1	46.8	37.3	50.6	29.1	41.0	35.3	39.1	36

Use the sign test to determine whether the data present sufficient evidence to indicate that one of the treatments tends to be consistently more efficient than the other, that is; $P(Y_A > Y_B) = 0.5$. Test by using $\alpha = 0.05$ (10 marks)

QUESTION TWO (20 MARKS)

- a) Differentiate between the most powerful test and Consistent test (2 marks)
- b) What do you understand by the term ‘level of significance?’ (2 marks)
- c) State any three assumptions of non-parametric test (3 marks)
- d) The Kenya National Human Rights Commission (KNHRC) is interested in the relationship between different counties’ average per capita income and their murder rate. A random sample of 8 counties produced the following values of average per capita income (in 1000 USD) and murder rate per 100,000 inhabitants;

Income	25.56	23.07	23.48	25.33	26.13	27.21	30.75	31.81
Murder Rate	13.01	13.32	14.49	12.72	12.05	12.64	8.97	10.09

- i) Calculate the Spearman’s rank correlation coefficient between average per capita income and murder rate. (5 marks)
- ii) Test whether significant negative Spearman’s rank correlation exists. (4 marks)
- e) Highlight the Wilcoxon signed rank procedure stating the null hypothesis to be tested. (4 marks)

QUESTION THREE (20 MARKS)

- a) State three assumptions of Mann-Whitney U-Test (3 marks)
- b) What is the term decision free mean in non-parametric tests (2 marks)
- c) What is the Power of a Test? (2 marks)
- d) An economics student from Machakos University obtained a sample data for 8 classes randomly. The median class is claimed to be 40.

23 45 34 78 34 66 61 95

- Using Wilcoxon Signed Rank Test, Test the claim at the $\alpha = 0.05$ level (7 marks)
- e) Write clearly the steps of performing the Wilcoxon Signed Rank Test (4 marks)
- f) What is the major difference between semi parametric tests and other tests? (2 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the meaning of the following terms;
- i) Parametric test (2 marks)
 - ii) Parameter (2 marks)
 - iii) Uniformly most powerful test (2 marks)
- b) Write brief notes on semi parametric test (8 marks)
- c) State the steps of conducting Kruskal-Wallis test (6 marks)

QUESTION FIVE (20 MARKS)

- a) Explain your understanding of the semi-parametric test (2 marks)
- b) Describe circumstances when semi-parametric test is said to be locally efficient (2 marks)
- c) State the procedures of Performing the Small-Sample Wilcoxon Matched Pairs Test (6 marks)
- d) Apply the Kruskal- Wallis test to determine whether different departments in Machakos University have different class sizes

Class Size (Maths, M)	Class Size (Economics, E)	Class Size (Business, B)
23	55	30
45	60	40
54	72	18
78	45	34
66	70	44

(10 marks)