MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

SECOND YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF ECONOMICS AND FINANCE

BACHELOR OF ECONOMICS

EES 405: NON-PARAMETRIC AND SEMI PARAMETRIC STATISTICS

DATE: 9/12/2019   **TIME: 2.00-4.00 PM**

INSTRUCTIONS:

   (i)   **Answer question one (Compulsory) and any other two questions**

   (ii)   **Show your working clearly**

   (iii)   **Where significance level is not provided, use 5%.**

   (iv)   **$H_{critical}=5.991$**

QUESTION ONE (COMPULSORY)(30 MARKS)

a)   Explain the differences between parametric, non-parametric and semi parametric in terms of estimation and type of data   (6 marks)

b)   State three examples of non-parametric tests   (3 marks)

c)   Explain main assumptions that have to be fulfilled before applying parametric tests

                                                                                                           (5 marks)

d)   Explain two types of decision errors in non-parametric statistics   (4 marks)

e)   The weights of leaves produced by plants from the same original source after an experiment comparing two artificial day lengths I and II were as follows;

I	172	51	123	69	82	135	133	112	116	142	108	71		
II	190	153	124	175	128	130	146	106	67	93	158	168	101	191

Test the hypothesis of equal medians at $\alpha = 0.02$ level of significance and

$$\propto \ =0.1$$ (10 marks)

f)   Clearly explain situations when spearman's rank correlation coefficient is applied (2 marks)

QUESTION TWO (20 MARKS)

a) What do you understand by the term 'level of significance?' (2 marks)

b) Explain your understanding of Mann-Whitney U-test in terms of the characteristics of the sample and observations (3 marks)

c) Explain three conditions under which non-parametric test may be applied (3 marks)

d) Suppose you are given the following observations of an individual's income (Y) and corresponding purchase of commodity (X).

Income (US$) (Y)	2556	2307	2348	2533	2613	2721	3075	3181
Commodity (X) (units)	1301	1332	1449	1272	1205	1264	897	1009

Calculate the Spearman's rank correlation coefficient between average income (Y) and consumption levels of commodity (X) and test whether significant negative Spearman's rank correlation exists. (10 marks)

e) Explain scenarios when a parameter enjoys 'statistical power' (2 marks)

QUESTION THREE (20 MARKS)

a) Explain three common levels of significance used in for either parametric, non-parametric and semi parametric hypothesis testing (3 marks)

b) Why do you think Wilcoxon signed rank test statistic is considered to be powerful than the ordinary sign test? (2 marks)

c) Explain the meaning of the term 'Parameter' as applied in in Non-parametric and Semi-Parametric statistics (2 marks)

d) Give three examples of parametric tests (3 marks)

e) Performance of Statistics and Economics units in Machakos University is observed and recorded out of 20. Do the data present sufficient evidence to indicate a difference in the performance level?

Group	1	2	3	4	5	6	7	8	9	10
Statistics (A)	12.1	14.3	13.5	15.1	13.9	11.7	14.8	14.2	12.9	14
Economics (B)	14.9	13.7	16.7	15	13.1	12.9	15.2	13.7	14.4	15.3

Test the claim at $\alpha = 0.05$ and 0.10 levels (10 marks)

QUESTION FOUR (20 MARKS)

a)   It is suggested that it is **NOT** advisable to apply parametric tests to the nominal and ordinal data. Explain two exceptions   (2 marks)

b)   Write clearly the steps of performing the Wilcoxon Signed Rank Test   (8 marks)

c)   Explain the meaning of the uniformly most powerful test as applied in statistics   (2 marks)

d)   The following observations were randomly obtained as a sample data for eight classes. The median class is claimed to be 4.

      2.3   4.5   3.4   7.8   3.4   6.6   6.1   9.5

   Using appropriate test, ascertain the claim at the $\alpha = 0.05$ level of significance   (8 marks)

QUESTION FIVE (20 MARKS)

a)   Using appropriate figure, explain the difference between directional and non-directional hypothesis.   (2 marks)

b)   Discuss four main advantages of non-parametric tests over parametric tests   (8 marks)

c)   A quality control chart has been maintained for the weights of paint cans taken from a conveyor belt at a fixed point in a production line. Sixteen (16) weights obtained today, in order of time, are as follows;

```
68.2   71.6   69.3   71.6   70.4   65.0   63.6   64.7
65.3   64.2   67.6   68.6   66.8   68.9   66.8   70.1
```

d)   Use the run test, at approximately a 0.01 level, to determine whether the weights of the paint cans on the conveyor belt deviate from randomness.   (10 marks)