



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

MATHEMATICS AND PHYSICS

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE

AMA 4228: NON PARAMETRIC METHODS

END OF SEMESTER EXAMINATION

SERIES:MAY SERIES

TIME:2 HOURS

DATE:MAY 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of 5 questions. Attempt ONE AND ANY TWO.

Do not write on the question paper.

Question ONE

- a. State the advantages of non-parametric methods (3marks)
- b. A random sample of 10 students nurses was given test to measure their level of authoritarianism with the following results

Score	75	90	85	110	115	95	132	74	82	104
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If we wish to test the null hypothesis that the median score for the population sampled is different from 100, determine the p value. (5marks)

- c. State three uses of chi square test (3 marks)
- d. Ten laboratory animals were fed a special diet from birth through age 12 weeks. Using their weights given below, compute Wilcoxon rank test if the hypothetical mean is 70. (5 marks)
- 63, 68, 79, 65, 64, 63, 65, 64, 76, 74
- e. State the assumptions of the Mann- Whitney Test (4marks)
- f. The weights at autopsy of the brains of 10 adults suffering from a certain disease are given as follows: 859,962,973,904,920,1073,1051,1001,1012,1039. Determine the Kolmogorov Smirnov Goodness of Fit test if the population mean is 1050 and a standard deviation of 50. (5marks)

- g. The following table shows communities ranked by DMF teeth per 100 children and fluoride concentration in ppm in the public water supply.

X	8	9	7	3	2	4	1	5	6	10
Y	1	3	4	9	8	7	10	6	5	2

Compute the Spearman rank Correlation coefficient. (5marks)

Question TWO

- a. The following table shows the distribution of uric acid determination taken on 250 patients. Using chi square test, test the goodness of fit of these data to a normal distribution with $\mu = 5.74$ and $\sigma = 2.01$ at 1% level of significance (10 marks)

Uric acid determination	Observed frequency
<1	1
1 to 1.99	5
2 to 2.99	15
3 to 3.99	24
4 to 4.99	43
5 to 5.99	50
6 to 6.99	45
7 to 7.99	30
8 to 8.99	22
9 to 9.99	10
10 or higher	5

- b. A sample of 500 college students participated in a study designed to evaluate the level of college students' knowledge of a certain group of common diseases. The following table shows the students classified by major field of study and level of knowledge of the group of diseases. Test the hypothesis that there is no relationship between these two variables (10marks)

Major	Knowledge of diseases		
	Good	Poor	Total
Premedical	31	91	122
Other	19	359	378
Total	50	450	500

QUESTION THREE

- a. Fifteen patients records from each of two hospitals were reviewed and assigned a score designed to measure level of care. The scores were as follows

Hospital A	98	85	73	98	86	88	99	80	74	91
Hospital B	78	74	69	79	57	78	79	68	59	91

Would you conclude that at the 5% level of significance using the median test that that the two populations' medians are different? (10marks)

- b. A sample of 15 patients suffering from asthma participated in an experiment to study the effects of a new treatment on pulmonary function. Among the various measurements recorded were those of FEV before and after application of the treatment. On the basis of the below data can we conclude that the treatment is effective in increasing the FEV level at 5% level of significance using sign test? (10marks)

Before	1.69	2.77	1	1.66	3	1.42	2.82	2.58	1.84	1.89	1.91	1.75	2.46	2.35	0.85
After	1.69	2.22	3.07	3.35	3	2.74	3.61	5.14	2.44	4.17	2.42	2.94	3.04	4.62	4.42

QUESTION FOUR

- a. IQs of a sample of 10 adolescents arrested for drug abuse in a certain metropolitan jurisdiction were as follows ; 95,98,92,101,100,104,106,91,95,105. Using Kolmogorov-Sminorv Goodness of fit test, do these data provide sufficient evidence that the sampled population of IQ scores is not normally distributed with a mean of 105 and a standard deviation of 10? (10 marks)
- b. A study was done to investigate the level of CD4+T cells among CVI group and control group. Using Mann Whitney test, determine whether CVI patients have reduced level of CD4+T cells at 0.01 alpha level (10 marks)

CVI	623	437	370	300	330	527	290	730	1000			
Control	710	1260	717	590	930	995	630	977	530	710	1275	825

QUESTION FIVE

- a. Zung depression scores were obtained for three samples of men complaining of fatigue with brain injury, brain injury with no fatigue and control. Using the Kruskal Wallis test can we conclude that the depression scores vary across the groups at 1% level? (10marks)

BI, Fatigue	46	61	51	36	51	45	54	51	69	54	51	38	64
BI, no fatigue	39	44	58	29	40	48	65	41	46				
Control	36	34	41	29	31	26	33						

- b. Ten patients with a history of congestive heart failure participated in a study to assess the effects of exercise on various bodily functions. The following data were collected on the percentage change in plasma norepinephrine (Y) and Oxygen consumption (X)

Y	500	475	390	325	325	205	200	75	230	50
X	525	130	325	190	90	295	180	74	130	60

May we conclude on the basis of these data that the scores on the two variables are correlated at 1% level of significance? (10 marks)