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(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
(MMUST)
MAIN CAMPUS

UNIVERSITY EXAMINATIONS
MAIN EXAM

2021/2022 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE IN EPIDEMIOLOGY AND BIOSTATISTICS (BSc EPIMED)

COURSE CODE: **HEM 224**
COURSE TITLE: PARAMETRIC AND NON PARAMETRIC TESTING

DATE: **20/02/2022** **TIME: 3.00-5.00 PM**

INSTRUCTIONS TO CANDIDATES:
Answer all Questions from section A and any other two questions from section B
TIME: 2 Hours

Paper Consists of 3 Printed Pages. Please Turn Over

SECTION A (40 MARKS)-COMPULSORY- SHORT ANSWER QUESTIONS

Instruction: attempt all question in this section

1. State and compare three types of correlation; (6 marks)

2. Give the assumptions that are normally considered in the analysis of variance. (4marks)

3. The table below shows data collected during an investigation into attempted suicides and show suicidal intent and a depression rating score for a sample of 91 cases. Compute Kendal's tau statistic and interpret its meaning. (11 marks)

	Depression rating (X)			
		19	20-29	30-39	>39
Suicidal intent (Y)	Did not want to lie	10	14	8	2
	Unsure	2	4	7	2
	Wanted to lie	5	9	11	17

4. The table below shows daily energy intake of 11 healthy women with rank order of differences (ignoring their signs) from the recommended intake of 7725kJ. Carry out the Wilcoxon's signed rank test. (7 marks)

Subject	1	2	3	4	5	6	7	8	9	10	11
Daily energy intake (kJ)	5260	5470	5640	6180	6390	6515	6805	7515	7515	8230	8770
Difference from 7725 (kJ)	2465	2255	2085	1545	1335	1210	920	210	210	-505	-1045

5. Outline the 5 steps involved in carrying out any hypothesis testing. (5 marks)
6. A firm believes that the tyres produced by process A on average lasts longer than tyres produced by process B. To test this belief, random samples of tyres produced by the two processes were tested and the results were as shown below;

Process	Sample size	Average lifetime (in Kms)	Standard deviation (in Kms)
A	50	222,400	1000
B	50	211,800	1000

Is there evidence at 5% level of significance that the firm is correct in its belief? (7 marks)

SECTION B (30 MARKS)- LONG QUESTIONS
Instruction: attempt any two questions in this section

Question 1 (15 marks)

A company appoints 4 salesmen A, B, C and D and observes their sale performance in three seasons, summer, winter and monsoon. The figures are in Ksh'000'.

	A	B	C	D
Summer	13	16	16	14
Winter	17	16	17	16
Monsoon	13	14	15	15

Carry out an analysis of variance and discuss your results exhaustively as a consultant to this company. (15 marks)

Question 2 (15 marks)

a. In an Appraisal exercise, two auditors awarded marks to 7 employees as follows;

Worker	A	B	C	D	E	F	G
Auditor I	67	65	67	75	90	58	67
Auditor II	72	80	81	62	75	81	55

Using the idea of Karl Pearson Product Moment correlation coefficient, what would you say regarding the objectivity of the two auditors? (7 marks)

b. You are an analyst for Chef-Boy-R-Dec. You have asked 7 people to rate a new Ravioli on a 5-point scale (1=terrible ,..., 5=excellent). The ratings are; 2,5,3,4,1,4,5. Is there any evidence that the median rating is at least 3? (8 marks)

Question 3 (15 marks)

a. A hypothetical cohort study in which 5000 women who used oral contraceptives and the same number who did not were followed for 10 years. The number of deaths due to myocardial infarction (heart disease) in each group was recorded. 200 oral contraceptives users and 175 non-contraceptive users were lost during the follow up period due to migration and other causes.

	Death from heart disease	
Oral Contraceptive use	Yes	No
Yes	7	4793
No	2	4823

Calculate the Chi-square statistic, test the hypothesis and interpret your results. (9 marks)

b. A packaging device is set to fill detergent powder packets with a mean weight of 5kg. The standard deviation is known to be 0.01kg. These are known to drift upwards over a period of time due to machine fault which is not tolerable. A random sample of 25 packets is taken and weighed. This sample has a mean weight of 5.03 kg and a standard deviation of 0.21kg. Can we conclude that the mean weight produced by the machine has changed? (6 marks)