(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
MAIN EXAM

2022/2023 ACADEMIC YEAR

FIRST YEARFIRST SEMESTEREXAMINATION FOR THE MASTER OF PUBLIC HEALTH

COURSE CODE: **PHC 815**

COURSE TITLE: BIOSTATISTICS

DATE: 15TH DECEMBER 2022 **TIME: 2.00PM-5.00PM**

INSTRUCTIONS TO CANDIDATES:
Answer Question one and any other three questions
TIME: 3 Hours

Paper Consists of 4 Printed Pages. Please Turn Over

Question One (Compulsory) (25 MARKS)

a. State and explain two types of estimators. (4 marks)

b. Let $x_1, x_2, ---, x_n$ denote a random sample of size n from a normal distribution with mean μ and variance σ^2 both unknown. For a random sample of size 25, it was found that $\sum xi = 3700$, $\sum xi^2 = 573000$.

i. Obtain unbiased estimate of μ and σ^2 (4 marks)

ii. Obtain 95% CI for μ (3 marks)

c. 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

i. Estimate the relative risk and the 95% confidence interval for the relative risk. Interpret your results. (6 marks)

ii. Calculate the Chi-square statistic , test the hypothesis and interpret your results. Compare with your answer in (i). above. (8 marks)

Question Two (Compulsory) (25 MARKS)

a. Ten competitors in a voice test are ranked by 3 judges in the following data;

First judge	1	6	5	10	3	2	4	9	7	8
Second judge	3	5	8	4	7	10	2	1	6	9
Third judge	6	4	9	8	1	2	3	10	5	7

Use the method of rank correlation to gauge which pair of judges have the nearest approach to common likings of voice. (16 marks)

b. A firm manufactures two grades of vehicle tyres; the Dulex and the Symplex types. The firm believes that there is no significant difference in the quality of the two types of tyres. The following data was collected to ascertain the claim.

	Dulex	Symplex
Sample size	56	70
Sample mean	12,000	12,930
Sample standard deviation	500 Km	620 Km

Test at 0.05 level of significance whether the claim is correct. (9 marks)

Question Three (25 MARKS)

A company appoints 4 salesmen A, B, C and D and observes their sales 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

Using ANOVA, test for equality of the means of the sales performance for the three seasons. (25 marks)

Question Four (25 MARKS)

a. The following table gives the distribution of weekly wages of workers in a factory.

Weekly wages	200-249	250-299	300-349	350-399	400-449	450-499	500-549
No. of weeks	7	19	27	15	12	12	8

Determine the following;

i. Mean using assumed mean method (6 marks)
ii. Variance (6 marks)

b. Fit least square regression model to the data below. (13 marks)
(x,y); (2,3), (6,50), (1,8), (3,4), (8,5)

Question Five (25 MARKS)

a. Differentiate between the terms below; (6 marks)
i. Morbidity and mortality
ii. Primary sterility and secondary sterility
iii. Age specific fertility rate and Total fertility rate

b. State and explain 5 determinants of fertility (5 marks)

c. Discuss 7 measures of fertility (14 marks)