JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF HEALTH SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMMUNITY DEVELOPMENT AND PUBLIC HEALTH
4TH YEAR 1ST SEMESTER 2018/2019 ACADEMIC YEAR

KISUMU CAMPUS

COURSE CODE: **SBI 3415**
COURSE TITLE: **BIOSTATISTICS II**
EXAM VENUE: **STREAM: (BSc. CD & PH)**
DATE: **EXAM SESSION:**
TIME:

Instructions:

1. **Answer all the questions in Section A and ANY other 2 questions in Section B.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

SECTION A: Answer ALL questions in this section (30 marks)

1. What is a hypothesis? State the two statistical errors that can be committed during hypothesis testing (2 marks)
2. An unknown quantity, which we will call η, has an approximately t(9) distribution with μ = 3.1 and σ = 0.6. Find the 90% credible interval for the unknown quantity. (2 marks)
3. State three properties of the t-distribution (3 marks)
4. Differentiate between a point estimate and an interval estimate (2 marks)
5. The age distribution of 18 patients randomly selected from the university dispensary is as follows;

   15, 6, 9, 18, 29, 58, 2, 14, 18, 22, 25, 26, 21, 19, 18, 22, 19, 8

   Calculate the mean, median, mode, range, variance and Standard deviation for this set of data in that order (10 marks)
6. In a randomized experiment, 400 kids brushed with baking powder and 400 brushed with toothpaste. 52 of the baking powder kids (13%) got cavities and 40 of the toothpaste kids (10%) got cavities. Obtain a 95% credible interval for the true difference and determine whether the difference is significant (4 marks)
7. State the two statistical methods used in estimation (2 marks)
8. In a study cluster of 423 individuals, it is observed that 18 IV drug users are HIV positive. Can we conclude that fewer than 5% of the IV drug users in the sampled population are HIV positive? Let α = .05 (5 marks)

SECTION B: Answer any 2 Questions in this section (40 marks each)

1.

a. What is a p-value and how do we interpret p-values? (3 marks)

b. Four drug companies developed tranquilizers that were to be used in psychiatric wards. The doctors at Jaramogi Oginga Odinga Teaching and Referral hospital randomly assigned 6 patients to each of the four treatment groups (different drugs) and recorded the time in seconds it took the patients to fall asleep, see the data below. Use the correct statistical test to determine whether there was a difference in the mean time it took to fall asleep between the four drugs. (17 marks)

Drug A	**Drug B**	**Drug C**	**Drug D**
29	32	26	22
32	19	31	26
21	25	28	29
25	28	29	28
30	29	30	31
26	23	28	30

2.

a. A case-control study was done to investigate whether smoking shisha among the youth aged 18-34 years leads to Lung cancer. Of the 35 youths who developed lung cancer, 27 were heavy shisha smokers, whereas of the 12 who did not develop lung cancer, 5 were heavy shisha smokers.

   i. Display the data in form of contingency table (1 mark)

   ii. State the suitable hypothesis (1 mark)

   iii. Determine whether there is any association between smoking shisha and developing lung cancer. (8 marks)

b. The age distribution of 18 patients randomly selected from the university dispensary is as follows;
15, 6, 9, 18, 29, 58, 2, 14, 18, 22, 25, 26, 21, 19, 18, 22, 19, 8

   i. Calculate the mean, median and range (4 marks)

   ii. Construct the 95% confidence interval around the mean $\bar{x}$ (6 marks)

3.

a. Suppose that you have a sample of 81 values from a population with mean $\mu=500$ and with standard deviation $\sigma = 80$.

   i. What is the probability that the sample mean will be in the interval (490, 510)? (5 marks)

   ii. Give an interval that covers the middle 99% of the distribution of the sample mean. (5 marks)

c. A randomized trial was done with two groups of patients put under different respiration methods. The folic acid values were then measured and the following values reported.

Patient	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
***Method** A*	210	246	303	249	206	329	380	258	268	273	337	287
***Method** B*	256	276	372	310	256	201	259	279	305	220	365	239

Investigate if the researcher is right to assume that method B is better than method A. *Note: higher folic acid values indicate better respiration method.*

(10 marks)

4. Using the data below from 12 BSc. Public Health students,

Student number	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***	***12***
Height (Y)	160	158	148	170	173	162	160	155	179	149	159	164
Weight(X)	62	70	78	68	75	68	60	56	72	63	77	59

a. Calculate the regression equation showing the relationship between height and weight (15 marks)

b. Calculate the correlation coefficient. (5 marks)