JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF HEALTH SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN PUBLIC HEALTH/EPIDEMILIGY AND BIOSTATISTICS

1ST YEAR 1ST SEMESTER 2018/2019 ACADEMIC YEAR

KISII CAMPUS

COURSE CODE: HMP 5114

COURSE TITLE: BIOSTATISTICS

STREAM: MSc. PH/BIOSTATISTICS

TIME: 3HRS

Instructions

1. Answer question 1 (compulsory) and any other 3 questions

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

Question One.

a) In a survey where workers express opinions of their working conditions, Descrbe the following variables: (i) length of service (ii) staff grade (iii) salary amount (3 marks)

b) In 36 randomly selected seawater samples, the mean sodium concentration was 23 cc and the standard deviation was 6.7 cc. Construct a 95% confidence interval for the population mean (3 marks)

c) Let x have a normal distribution with $\mu = 10$ and $\sigma = 2$. Find the probability that an x value selected at random from the distribution is between;

i) x is between 9 and 11 (4 marks)

d) Distinguish between p-value and α-level of significance. (2mks)

e) Blood cholesterol levels of ten patients was recorded: 240, 260, 290, 245, 255, 288, 272, 263, 277, and 250. Calculate the;

i) Sample variance (3mks)

Question Two (15 marks)

Given the data set below;

.x	0	1	2	3	4	5	6
.y	2.2	2.4	3.3	5.4	9.4	14.5	19.9

i. Draw a scatter plot of this data
ii. Determine the correlation coefficient (r)
iii. Comment on the relationship between x and y
iv. Using the least square method, determine $\bar{x}$ *and* $\bar{y}$, a and b for the equation, $y = a + bx$
v. Estimate y when $x = 5$ and $x = 10$.
vi. Estimate r^2 and comment on it

Question 3.

a) Food and drug administration is examining the effects of different doses of a new drug on the pulse rate drop of human beings. The results of study of six people is given below:

Dosage in mg (x)	2.50	3.00	3.50	4.50	5.50	6.50
Drop (y)	8	11	9	16	19	20

i) Draw the scatter diagram of the data (3mks)

ii) Find the equation of linear regression (6mks)

iii) If a dosage of 2.75mg is administered. What is the expected pulse rate drop (2mks?)

b) A pharmaceutical company makes tranquilizers that are claimed to have a mean effective period of 2.8 hours. Researchers in a hospital used the drug on a random sample of 16 patients and found the mean effective period to be 2.5 hours with standard deviation of 0.4 hours. Does this indicate that the company's claim is too high (use 0.05 level of significance) (4mks)

Question Four: (15 marks)

The Dry weight (mg) of fungal mycelia in samples obtained in two strains of the sample species are as follows:

Strain # 1	Strain # 2
246.3	246.2
247.1	244.8
244.9	249.9
239.2	251.5

(i) Formulate the Hypotheses to be tested:

ii) Calculate and establish whether there is a difference in Dry weight (mg) of fungal mycelia in samples obtained in two strains at 0.05 level of significance

ii) From the calculation what will be the decision and conclusion?

Question Five: (15 marks)

(a) i) poison distribution is used to compute the probability for the number of occurrences of a given event during a specific time period. State three conditions that need to be satisfied for Poisson process to be applied. (3mks)

ii) The mean number of dogs infected with rabies per month in a certain town is 3. What is the probability that in any given month 4 dogs will be infected with rabies? (4mks)

iii) Differentiate the terms acceptance and rejection region (2mks)

b) A clinical officer carried out a research on economic status and severity of respiratory infection on 8 people. The data below shows the ranks awarded.

patient	Social E. status	Severity of illness
A	6	5
B	7	8
C	2	4
D	3	3
E	5	7
F	4	1
G	1	2
H	8	6

i) Calculate the spearman's rank correlation coefficient and comment on the research outcome (6mks)

Question Six: (15 marks)

A regression model is fitted to data collected from a study on the relation between patient satisfaction and the patients age in years, severity of illness (an index) and the anxiety level (an index) for 30 patients selected at random. For the data collected larger values of patient satisfaction, severity of illness and anxiety level are respectively associated with more satisfaction, increased severity in illness and more anxiety.

The parameter estimates of the fitted model were:

	Estimate	Std. Error
Intercept	168.60	16.53
Age	-1.27	0.24
Severity	-o.85	0.46
Anxiety	-6.00	6.21

i) Write out the estimate regression model and interpret the parameters

ii) Test at 0.05 level which of the three predictor variables are individually significantly related to patients satisfaction.

iii) What is the predicted level of satisfaction of a patient who is 45 years, has severity level of 55 and an anxiety level of 2.6?