JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN PLANT ECOLOGY

1ST YEAR 2ND SEMESTER 2018/2019 ACADEMIC YEAR

MAIN CAMPUS - REGULAR

COURSE CODE: **SBT 802**

COURSE TITLE: **BIOMETRY**

EXAM VENUE: **STREAM: (MSC)**

DATE: **EXAM SESSION:**

TIME: 3 HOURS

Instructions:

1. **Attempt Questions 1 and any other three questions in Sections**
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**

Answer Question 1 and any other three questions

1. a) List four assumptions that must be considered before applying multiple regression in biostatistics. (2 marks)

   b) The following Climate data was obtained from 9 randomly selected days of the month:

Day	29	15	3	24	5	16	7	6	9
Rainfall	150mm	200mm	400mm	120mm	93mm	55mm	170mm	350mm	100mm

   From this sample data, calculate the Mean, standard deviation and the variance. (3 marks).

   c) i)Explain importance of the terms Probability; Confidence interval; Standard Error in biostatistics. (3 marks)

   ii)Assuming you have total of 90 cards, which are distributed as follows: Blue (20), Green (20), Yellow (40), Red (10). If the cards are randomly mixed, what is the probability of: i) Picking red or green? ii) Neither blue nor green? . (2 marks)

   d) Suppose two ecologist test the same hypothesis using the same data.

   i)Can they reach different conclusion? (1 mark)

   ii)Assuming that the procedures used by the two ecologists are correct, explain why they may reach different conclusions. (1 marks)

   e) i)Relate the concepts of interval estimation and hypothesis testing. State the types of errors that a confidence interval can cause. (3 marks)

2. A) An experiment was carried out on performance of local maize on new fertilizer variety. Of 200 farmers who used the new fertilizer, 20% of participants did not report any improvement in yield. What is the 99% confidence interval for the proportion of farmers who would still not report any improvement if they used the new fertilizer. (6 marks)

   b) Write an essay on three random sampling techniques. (9 marks)

3. The following data was obtained in a trial experiment on the rates of decomposition by two bacteria on sewage sludge.

Trial	A	B	C	D	E	F	G
Bacteria (a)	12	19	8	9	15	3	14
Bacteria (b)	30	25	20	19	9	7	13

   Using the following data: Test the null hypothesis $H_o \neq 0$ (15 marks)

4. A study was carried out to determine the effects of nutrients in grams on cereal productivity. The results were as follows:

replicate	Yield			Nutrients		
	Plot A	Plot B	Plot C	Plot A	Plot B	Plot C

1	126.7	117.7	58.3	6.6	8.5	7.5
2	136.5	129.3	72.3	7.1	5.6	6.3
3	128.36	142	95.3	4.3	5.2	8.5
4	146.4	123.5	88.7	3.9	6.2	4.2
5	142.57	135	101.3	5.7	6.9	8.9
6	114.7	94.7	57a	7.5	8.2	7.2

From the data, find:

a) Mean and variance for yield and nutrients in each plot (6 marks)

b) The correlation coefficient for three plots (9 marks).

5.The following data indicates the soil temperature as influenced by time of the day and soil moisture

Soil temperature (oC)	10	12	16	20	30	25	22
Soil Moisture (cm3)	15	10	8	7	5	8	4
Time of the day	6am	8am	10am	12noon	2pm	4pm	6pm

a) Using this data, determine the multiple linear equation. Explain your equation. (6 marks).

b) Compute the proportion of the variance due to regression (R square) (3 marks).

c) Test the significance of R^2. (6 marks)