MACHAKOS UNIVERSITY

University Examinations 2019/2020 Academic Year

SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE BIOLOGY

SZL 300: BIOSTATISTICS

Date…… **Time……..**

INSTRUCTION: *Answer Question* ***ONE*** *which is compulsory and any other* ***TWO*** *Questions*

Question one (30 marks)

a) Highlight three properties of a binomial distribution (3 marks)

b) Differentiate the following terms as they apply in scientific research

i) Discrete random and continuous random variables

ii) Descriptive and inferential statistics (4 marks)

c) The number of motorbike accidents along mutituni road in Machakos town per week were 12, 8, 20, 2, 14, 10, 15, 6, 9, 4. Per week. Can it be concluded that these accidents frequencies were the same for the 10 weeks period. (6 marks)

d) Two different types of drugs A and B were tried on certain patients for increasing weight, 5 persons were given drug A and 7 persons were given drug B. The increase in weight (in Kgs) is given below:

Drug A	7	10	13	12	4	8	-	
Drug B	12	8	3	18	16	9	3	3

Determine whether the two drugs differ significantly with regard to their effect in increasing weight at $\alpha = 5\%$ (7 marks)

a) Suppose the time taken by students to leave a lecture hall is assumed to be normally distributed with mean time of 10 minutes and standard deviation 4minutes. If a student is randomly taken from the class determine the probability that

i. The student takes exactly 6 minutes

ii. If the class has 300 students, determine the number of students taking between 6 to 12 minutes to leave the lecture hall (6 marks)

e) Briefly describe any two principles of experimentation designs as used in the Biological Experiments (4 marks)

Question Two (20 marks)

a) The data below is a summary of copy typing speed per minute before and after a training.

Participant	A	B	C	D	E	F	G	H
Rate Before	85	124	172	123	111	139	99	77
Rate after	105	160	175	143	156	127	95	100

Test the hypothesis that on average the training did not result to any improvement on the typing speed. (8 marks)

b) Below is the daily milk production from a certain dairy farm in Machakos County during a particular week in the year 2017.

Milk Produced in litres	11-20	21-30	31-40	41-50	51-60
Frequency	3	6	11	3	2

Determine;

i. Average milk production per day
ii. Median
iii. Mode and
iv. Standard deviation. (12 marks)

Question Three (20 marks)

a) Highlight two properties of a good measure of data variation (2 marks)

b) The data below relates to the age of 10 employees of XYZ co. and sick off days in a particular month.

Age (years)	20	30	32	35	40	46	52	55	58	62
Sick off (days)	11	12	10	13	14	16	15	17	18	19

Calculate the Karl Pearson's coefficient of correlation and interpret its value. (8 marks)

Calculate the coefficient of determination and interpret its value. (2 marks)

c) Discuss any four types of test-statistics and highlight when appropriate to use each (8 marks)

Question Four (20 marks)

(a) Given below are the lifespan of two insects in hours but from two different mountain zones I and II

Zone	*n*	*Average lifespan in Hours*	*Standard deviation*
I	150	2,500	400
II	100	2,000	200

Determine; i) The zone with a higher dispersion

ii) The combined standard deviation (10 marks)

(b) From the data given below

i. Use the least square method to determine the equation connecting Y on X

ii. Determine the sum of the residues

X:	1	2	3	4	5
Y:	2	5	3	8	7

(10 marks)

Question Four (20 marks)

Question Five (20 marks)

a) Highlight three post hoc analysis techniques (3 marks)

b) By citing examples distinguish between parametric and non-parametric test statistic (6 marks)

c) A manufacturer wished to compare the performance of different machine brands, their performance difference is summarized in ANOVA table below.

Source of Variation	**Sum of Squares**	**Degrees of Freedom *d.f***	**Mean sum of Squares**	**F – value**
Between machines	42 – 27 = 15	3	y	$F = 1.67$

Error	66 – 42 = 24	*x*	*z*	
Total	*w*	11		

i) Based on the table above state the number of machine brands compared (1marks)

ii) Explain the two sources of variation in column one of the table (2 marks)

iii) When is it appropriate to use ANOVA and F-test for data analysis (4 marks)

iv) Was there a significant difference in their performance at α=5% (4 marks)