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UNIVERSITY EXAMINATIONS 2023/2024

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ANIMAL HEALTH PRODUCTION

SMF 3164: BIOSTATISTICS

DATE: APRIL 2024 **TIME: 2 HOURS**

INSTRUCTIONS: Answer Question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

a) Differentiate between the following terms

i) Descriptive and inferential statistics (2 Marks]

ii) Primary and secondary data (2 Marks]

iii) Type I and type Il errors (2 Marks]

b) The following data shows the milk (litres) produced by animals in a large dairy firm

No of dairy cows f	2	4	8	12	8	5	1
Milk production x	9	11	14	20	25	28	30

i) Compute the mean and standard deviation of the milk production [5 Marks]

c) The percentages of fat in 12 pieces of sausages are as follow; 21 18 19 16 18 24 22 19 24 14 18 15. At Test the claim by a company's salesman that the percentage fat content in their sausages is less than 20. Use $t = 1.796$ [8 Marks]

d) The number of Injuries of farmworkers in an estate per working week is known to follow a Poisson distribution with mean 0.5. Find the probability that in a particular week there will be;

i) Less than 2 accidents [3 Marks]

e) The following data shows the acreage under Maize and Sugarcane in a constituency in three years. Represent the data with appropriate chart and comment [4 Marks]

Year	1995	2000	2005
Maize	30	60	80
Sugarcane	120	90	70

f) Briefly Explain two uses of Chi-square test in your field [4 Marks]

QUESTION TWO (20 MARKS)

a) Giving Examples, differentiate between the following terms as used in probability

i. Sample Space and Event [4Marks]

ii. Independent and mutually exclusive event [4 marks]

b) A bag contains the following avocado fruits in their varieties. If two avocado pieces are picked at random without replacement, compute the following probabilities

Variety	Reed	Fuerte	Bacon	Hass
Number	4	6	8	2

i. Probability of picking a reed and Hass avocado [2 Marks]

c) List three characteristics of a normal distribution [3 Marks]

d) The content, in milligrams, of vitamin C in a litre of cranberry juice can be modelled by a normal distribution with mean of 32 and a standard deviation of 2. Determine the probability that, for a carton chosen at random, the vitamin C content per litre is

i) Less than 30mg [3 Marks]

ii) Between 32 and 35mg [4 marks]

QUESTION THREE (20 MARKS)

a) Explain two probability and two non-probability sampling methods [8 marks]

b) 40 animals are sprayed with pesticides on a weekly basis. The data below shows a summary of the number of days it took to get rid of the pests.

Number of Days	2-4	5-7	8-10	11-13	14-16
Number of animals	5	11	14	8	2

Compute the following measures

i) Mean [2 Marks]
ii) Mode [2 Marks]
iii) Median [2 Marks]
iv) Standard deviation [3 Marks)
v) Use histogram to present the data [3 Marks)

QUESTION FOUR (20 MARKS)

a) In order to determine the possible effect of a chemical treatment on the rate of germination of cotton seeds a pot culture experiment was conducted. The results are given below

Chemical treatment and germination of cotton seeds

Chemical treatment	Germination of Seeds		
	Germinated	Not germinated	Total
Chemically Treated	118	22	140
Untreated	120	40	160
Total	238	62	300

Does the chemical treatment improve the germination rate of cotton seeds at 5 % level? Test and conclude on the necessary hypothesis (use chi-square test [6 Marks]

b) Reduced legume growth under acid soil conditions is often due to the toxicity of aluminum. The effect of aluminum on the growth of soybeans supplied with adequate inorganic nitrogen was investigated. The results are presented in the table below.

Al(m)	0	4	7	10	20	30	35
g/plant	0.59	0.61	0.51	0.47	0.35	0.31	0.19

i. Differentiate between Correlation and regression [2 Marks]

ii. Calculate person product moment correlation coefficient and interpret [7 Marks]

iii. Fit a Simple linear regression and estimate g/plant for 17Al(m) [5 Marks]

QUESTION FIVE (20 MARKS)

a) Briefly explain three data collection Methods [6 Marks]

b) An experiment is conducted to evaluate the impact of three different feed additives (Vitamin E, Probiotic, and a combination of both) on the growth performance of Beef cattle. Five observations are made under each feed additive. Making the usual assumptions for an analysis of variance, test the hypothesis that there is no difference in mean weight yield between the three feed additives. Use the 5% level of significance [14 Marks]

Vitamin E	Probiotic	Combination of Both
79.2	81.5	71.7
80.1	80.7	76.5
77.4	80.5	74.7