Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN FOOD TECHNOLOGY & QUALITY ASSURANCE TECHNOLOGY

BSFQ 12M$_2$ & 13M$_3$

AMA 4320: BIOSTATISTICS

SEMESTER EXAMINATION

<u>DECEMBER 2013 SERIES</u>   2 HOURS

Instructions to candidates:

This paper consists of **FIVE** questions
Answer question **ONE** (compulsory) and any other **TWO** questions

QUESTION ONE

a) Differentiate between

   (i)   Continuous and discontinuous variables.   **(2marks)**
   (ii)   Significance level and confidence level   **(2marks)**

b)   Explain how the following are applied in biostatistics

   (i)   Correlation coefficient   **(2marks)**
   (ii)   Regression coefficient   **(2marks)**

c) The following are measurements of protein levels (in milligrams) obtained from fifteen (15) food substances

   55, 40, 30, 35, 20, 15, 25, 33, 50, 40, 45, 30, 15, 42, 35

Compute:

    (i)   Median   **(1mark)**
    (ii)   Mode   **(1mark)**
    (iii)   Mean   **(2marks)**
    (iv)   Variance   **(3marks)**
    (v)   Standard deviation   **(1mark)**

d) (i)   A basket has 8 oranges and 6 mangoes. What is the probability that a mango will be picked?   **(2marks)**

    (ii)   40% of all adults in the USA have high cholesterol levels. If two adults are randomly chosen, what is the probability that both will have high cholesterol levels?   **(2marks)**

e) (i)   A sample of about 5000 rats obtained from Kongowea market were tested for the presence of plague pathogens. The mean pathogen count was 150 and the standard deviation was 15. Assuming normal distribution, find the number of rats;

        I.   With pathogen count exceeding 120   **(2marks)**
        II.   With pathogen count of between 90 and 130   **(2marks)**

f) (i)   Define the term "Non-parametric tests"   **(1mark)**

    (ii)   State the application of any TWO non-parametric tests in biostatistics **(2marks)**

g)   Outline the factors to consider when selecting an experimental design. **(3marks)**

QUESTION TWO

a) An experiment was conducted to test the efficacy of chloromycetin in checking typhoid of the Coast Provincial General Hospital. The drug was administered to 285 out of 392 patients suffering from typhoid. Out of those tested 250 got well, while 50 of those who were not given the drug were still positive for typhoid.

    (i)   Construct a contingency table to show the results of observed and expected values
                                                                          (5marks)
    (ii)   Using the chi-square, test the effectiveness of chloromycetin in checking typhoid
                                                                          (4marks)

b) A food industry advertised that it will deliver their products within 15 days of order. A sample of 49 past customers is taken and the average delivery time found to be 16.2 days with a standard deviation of 5.6 days.

(i) Test the hypothesis of delivery at 5% significance **(5marks)**

(ii) Differentiate between statistical significance and reality significance **(2marks)**

(iii) State the importance of degrees of freedom in statistical analysis **(1mark)**

QUESTION THREE

a) The data below shows results from a study where two groups of chicken were tested on TWO levels of a protein diet: high protein and low protein.

Diet	Weight of chicken (Ounces)						
High protein	12	15	11	16	14	14	16
Low Protein	8	10	14	10	13		

(i) Using the t-test at p=0.05, test whether there is significant evidence that additional protein increased the weight of chicken **(12marks)**

(ii) Explain why the t-test is not good test **(3marks)**

b) The table below shows nutrient values (in mg) obtained from five (5) pigs after feeding then on a new diet.

Pig No.	1	2	3	4	5
Carbohydrates	40	50	30	35	20
Proteins	45	55	25	30	15

Determine

(i) The slope, 'b' for predicting the amount of protein from carbohydrate measures

(2marks)

(ii) The intercept of the regression equation, 'a' based on the data. **(2marks)**

(iii) Write the regression equation for the data **(1mark)**

QUESTION FOUR

a) The data below shows weight (kg) obtained from a group of children at health centre.

25, 30, 35, 28, 27, 26, 18, 18, 20, 19, 16, 15, 12, 32, 23, 25, 20, 25, 17, 20,

(i)	Calculate the mean age for the children	**(2marks)**
(ii)	Draw a frequency distribution table for the data	**(2marks)**
(iii)	Draw a frequency polygon to represent the data	**(4marks)**
(iv)	Describe the kind of skewness demonstrated by this data	**(2marks)**

b) Using a class interval of 5 for the above data;

(i)	Draw a frequency distribution table for the data	**(7marks)**
(ii)	Determine the modal age and mean age for the data	**(3marks)**
(iii)	Draw a histogram to represent the data	**(4marks)**

QUESTION FIVE

A certain manure was tested on four plots of land labelled A, B, C and D.   Four beds were prepared in each plot and the manure tested. The output of the crop in the beds of the plots are given below:

Plot No.	Yields / plots (Tonnes)			
	A	B	C	D
1	9	8	3	3
2	4	12	8	7
3	7	1	2	8
4	1	3	5	2

a) Compute

(i)	The correction mean (CM) for the treatments	**(2marks)**
(ii)	The total sum of squares (SS Total) between treatments.	**(3marks)**
(iii)	The sum of squares among treatments (SST)	**(3marks)**
(iv)	The error sum of squares within treatments (SSE)	**(2marks)**
(v)	The mean sum of squares among treatments (MSS)	**(2marks)**
(vi)	The error mean of square within treatments (MSE)	**(2marks)**
(vii)	The F-ratio	**(1mark)**

b) Construct an ANOVA table for the test   **(3marks)**
c) Interprete the results based on the F-value at $p = 0.05$ **(2marks)**