TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN FOOD TECHNOLOGY AND QUALITY ASSURANCE (BSFQ 13S & $14S_2$)

AMA 4320: BIOSTATISTICS – PAPER 1

END OF SEMESTER EXAMINATION

SERIES:APRIL2016

TIME:2HOURS

DATE: Pick DateMay 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE (30 marks)

a) Differentiate between

(i) Continuous and discontinuous variables (2 marks)

(ii) Significance level and confidence level (2 marks)

b) Explain the application of the following in Biostatistics;

(i) Correlation coefficient (2 marks)

(ii) Regression coefficient (2 marks)

c) The following are protein levels (in mg) obtained in a sample of 15 foodstuffs:

23, 15, 25, 33, 40, 17, 30, 50, 30, 55, 40, 35, 42, 20, 45

Determine the;

i) Median (1 mark)

ii) Mode (1 mark)

iii) Mean (2marks)

iv) Standard deviation (3 marks)

d) A sample of 2000 rats arrested from Mwenmbe Tayari food market were tested for the presence a viral pathogen. The mean viral count was found to be 100 and the standard deviation was 10. Assuming normal distribution, find the number of rats;

i) with a viral count exceeding 125 (2 marks)

ii) with a viral count of between 90 and 130 (2 marks)

iii) If 95% of the rats were declared harmless, determine the minimum viral load for a rat to be declared harmless (2 marks)

e) In an experiment to determine the performance of a new yeast formulation, 5% of 1000 samples taken were poor performers. If the mean number of budding cells was 100 and the standard deviation was 2, determine the minimum number of budding cells a sample should have to be chosen. (3 marks)

f) Outline the application of Chi-square analysis (2 marks)

g) Explain how any TWO non-parametric tests are applied in statistical tests (2 marks)

h) Name the **TWO** factors to consider when selecting an experimental design (2 marks)

Question TWO

The following are protein values (in mg) obtained from ten rabbits at the Kaa Chonjo Animal Farm after feeding them on a newly formulated diet based on Omena.

Rabbit no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Diet amount (kg)	2.0	3.5	4.5	3.0	4.8	3.8	6.0	5.5	5.0	4.0
Protein Level (mg)	35	40	45	38	50	42	55	52	51	43

a) i) Compute the Pearson Correlation Coefficient (r_{xy}) between the amount of diet provided and the protein level (7 marks)

(ii) Explain the value of the correlation coefficient above (2 marks)

b) Compute

i) the slope, "b", for predicting the amount of protein from the amount of diet provided (4 marks)

ii) the intercept, "a" for the regression line and explain the value (2 marks)

iii) Write the equation for predicting protein levels from diet amount (1 mark)

c) Determine,

(i) the predicted protein level when the amount of diet given is 6.5 kg (2 marks)

(ii) the amount of diet to be provided to obtain a protein level of 90 mg (2 marks)

Question THREE

a) Discuss THREE types of Probability sampling (6 marks)

b) Two groups of young children were tested on TWO nutritional supplements, one a high protein and the other a low protein. The weights (kg) were taken at the end of a 12 months period and the results are shown below.

Child no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Weight of Children (kg) on high protein supplement (Grp A)	8	9	7	10	11	9	10	12	8	10
Weight of Children (kg) on high protein supplement (Grp B)	6	7	5	9	8	7	8	9	6	8

i) Using the *t* -test at p = 0.05, determine whether there is sufficient evidence to feed the children on high protein diet (12 marks)

ii) Explain why the *t*-test is not a good test (2 marks)

Question FOUR

a) The following is a set categorical data showing incidence THREE types of Hepatitis in three tropical regions.

Hepatitis Type	India	Kenya	Colombia
A	31	14	45
B	2	5	53
C	53	45	2

Using the Chi-Square, test the hypothesis that there is no relationship between location and type of Hepatitis at 5% significance level. (10 marks)

b) A pharmaceutical company advertises that it will deliver drugs within 15 days of order. A sample of 49 past customers was taken and the average delivery time in the sample was 16.2 with a standard deviation of 5.6 days. Test the hypothesis that they will keep the promise at the 5% level of significance (8 marks)

c) Explain TWO ways of reducing experimental error (2 marks)

Question FIVE

A farmer grew maize in THREE fields, A, B and C. On Field A he put KSh.1000 worth of manure per acre, on Filed B he put KSh. 2000 worth of manure, and on Field C he did not put any manure. The three fields were treated similarly for all other things and the returns after selling the maize, exclusive of the cost of manure in the three fields in 5 five years, are shown below;

Year	**1**	**2**	**3**	**4**	**5**
Field A returns (KSh. '000 per acre)	34	28	42	37	44
Field B returns (KSh. '000 per acre)	36	33	48	38	50
Field C returns (KSh. '000 per acre)	30	26	28	35	40

Using the ANOVA test at 5% significance level, show whether the farmer can be advised to continue with the more expensive fertilizer by;

a) computing the:
   (i) correction mean (CM) for the treatments (2 marks)
   (ii) sum of squares (SS Total) between treatments (3 marks)
   (iii) sum of squares among treatments (SST) (3 marks)
   (iv) error sum of squares within treatments (SSE) (2 marks)
   (v) mean sum of squares among treatments (MST) (2 marks)
   (vi) error mean squares within treatments (MSE) (2 marks)
   (vii) F-ratio (1 mark)
b) Constructing an ANOVA table for the test (3 marks)
c) Interpreting the results based on the F-value for the advise (2 marks)