Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF TECHNOLOGY IN APPLIED CHEMISTRY

ACH 4303 : RESEARCH METHODOLOGY

SPECIAL/SUPPLEMENTARY EXAMINATION

FEBRUARY 2013 SERIES   2 HOURS

Instructions to candidates:

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

All statistical tests are at 5% level of significance

Question ONE

a) Define the following terms commonly used in research

   (i)   Parameter   **(1mark)**

   (ii)   Statistics   **(1mark)**

   (iii)   Experimental error   **(1mark)**

b) Distinguish between the following types of research

   (i)   Qualititative versus Qualitative   **(4marks)**

   (ii)   Conceptual versus Empirical   **(4marks)**

c) State the fundamental principles involved in carrying out a sample survey **(4marks)**

d) Describe the following sampling techniques

    (i)   Simple random sampling   **(5marks)**

    (ii)   Systematic sampling   **(5marks)**

e) State the factors to be considered in the design of a questionnaire   **(5marks)**

Question TWO

a) Discuss the following principles of experimental design

    i)   Replication of treatments   **(4marks)**

    ii)   Randomization   **(4marks)**

    iii)   Local control (blocking)   **(4marks)**

b) Weights for a sample of 18 cans of tinned vegetables were obtained to test the claim that the mean weight is 17 grams. The sample weights were obtained as follows

    12, 30, 20, 20, 19, 21, 13, 22, 23, 10, 15, 17, 18, 14, 18, 26, 11, 24.

    i)   State the null and alternate hypothesis to test the claim   **(2marks)**

    ii)   Determine if there is enough evidence to refute the claim. $t = 2.11$. **(6marks)**

Question THREE

a) (i)   State the assumptions made in the ANONA model   **(3marks)**

   (ii)   Outline the recommended steps in carrying out research   **(4marks)**

b) You are given the following data

X	3	5	7	8	10	11	12	12	13	15
Y	7	20	20	15	25	17	20	35	26	25

Calculate the correlation co-efficient   **(13marks)**

Question FOUR

a) The moisture content of uncooked hamburger was found to be 64.53%, 64.45%, 65.10% 64.78%. Calculate ;

    i)   Mean   **(1mark)**

ii) Range **(1mark)**

iii) Standard deviation **(2marks)**

iv) Co-efficient of variation **(2marks)**

b) In a certain research experiment, the cost of labour was compared when different planting methods were used for planting maize. The resulting data based on three replications for each treatment was as follows

Treatment

Method 1   496   477   467

Method 2   204   203   201

a) Set up an ANONA table for the data **(12marks)**

b) Determine whether there was a difference in the cost of labour between the two planting methods (F_{table} 7.71). **(8marks)**

Question FIVE

A study was conducted using 3 diets assigned for a period of 3 days to each of 6 subjects in an RCBO. The subjects, representing blocks, were assigned diet A, B and C. At the end of 3 days, each subject was put on a treadmill and the time of exhaustion in seconds was measured. The following data was recorded.

Subject (blocks)

Diet (treatment)	1	2	3	4	5	6
A	84	35	91	57	56	45
B	91	48	71	45	61	61
C	122	53	110	71	91	122

a) State the hypothesis for testing the difference between diets **(2marks)**

b) Use the data to set up an ANONA table **(14marks)**

c) Determine whether there are differences in;

i) Diets (F=4.10) **(2marks)**

ii) Subjects (F = 3.33) **(2marks)**