TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

UNIVERSITY EXAMINATION FOR THE
BACHELOR OF MEDICAL LABORATORY SCIENCES
BACHELOR OF SCIENCE IN COMMUNITY HEALTH
(BMLS/BSCH)

AMA 4320/AMA 4362: BIOSTATISTICS

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2013
TIME: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **FOUR** printed pages

SECTION A (COMPULSORY)

Question One

a) Define the following terms:
  (i)   Statistics   **(1 mark)**
  (ii) Variable   **(1 mark)**
  (iii) Measurement   **(1 mark)**

b) State any **FOUR** methods of collecting data   **(4 marks)**

c) State any **THREE** properties of the median   **(3 marks)**

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d) Suppose a researcher, interested in obtaining an estimate of the average level of some enzyme in a certain human population, takes a sample of 10 individuals, determines the level of the enzyme in each and computes a sample mean of $\bar{x} = 22$. Suppose further it is known that the population of interest is approximately normally distributed with a variance of 45. Construct 95% confidence interval for μ

interval for s **(5 marks)**

e) Consider the following ages of pneumonia patient in some hospital:
42, 28, 28, 61, 31, 23, 50, 34, 37, 32
Determine:

    (i)   The mean   **(2 marks)**
    (ii)   The median   **(3 marks)**
    (iii)   The mode   **(1 mark)**

f) In a survey of nursing students pursuing a master's degree, 75 percent stated that they expect to be promoted to a higher position with one month after receiving their degree. If this percentage holds for the entire population, find for a sample of 15, the probability that the number expecting a promotion within a month after receiving degree is:
    (i)   six   **(3 marks)**
    (ii)   at least two   **(4 marks)**

g) State the role of a scatter diagram in analysis of relationship between variables.   **(2 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two

a) Suppose the ages at items of onset of certain disease are approximately normally distributed with a mean of 11.5 years and a standard deviation of 3 years. A child has just come down with the disease. What is the probability that the child is:
    (i)   Between the ages of $8\frac{1}{2}$ and $14\frac{1}{2}$ years?   **(3 marks)**
    (ii)   Over 10 years of age?   **(4 marks)**

b) (i) State the central limit theorem   **(2 marks)**
(ii) Suppose t is known that in a certain large human population cranial length is approximately normally distributed with a mean of 185.6mm and standard deviation of 12mm. What is the probability that a random sample of size 10 from this population will have a mean greater than 190?
                                                                            (5 marks)
c) Discuss any **THREE** methods of sampling   **(6 marks)**

Question Three

The table below shows the age distribution of chemotherapy patients at Jokn Hoopekins hospital

Class	Frequency
10 – 19	4
20 – 29	66
30 – 39	47
40 – 49	36
50 – 59	12
60 - 69	4

Using the above data calculate:
(i)	mean	**(4 marks)**
(ii)	median	**(3 marks)**
(iii)	mode	**(3 marks)**
(iv)	standard deviation	**(5 marks)**
(v)	coefficient of variation	**(2 marks)**
(vi)	the35th percentile	**(3 marks)**

Question Four

a) Define the following terms:
(i)	Hypothesis testing	**(1 mark)**
(ii)	Type 1 error	**(1 mark)**
(iii)	Type II error	**(1 mark)**

b) The objective of a study by Wilbur was to describe the menopausal status, menopausal symptoms, energy expenditure and aerobic fitness of healthy midlife women and to determine relationships among these factors. Among variables measured was maximum oxygen uptake with a mean score for a sample of 242 women 33.3 and a standard deviation of 12.14 can use conclude that the mean scone for a population of such women is greater than 30 at 5% level of significance   (7 marks)

c) The following table shows multi resistant enterobacter isolate and status with regard to previous use of antibiotics can we conclude that the two are variables are independent at 5%.

Multiresistant Enterobacter isolate

Antibiotic in past 2 weeks	Yes	No	Total
Yes	36	67	103
No	1	25	26
Total	37	92	129

Question Five

The following scores represent a nurse's assessment (x) and a physician's assessment (f) of the fluid level of 10 patients at a time of admission to a trauma centre

X	18	13	18	15	10	12	8	4	7	3
Y:	23	20	18	16	14	11	10	7	6	4

- (i)   Construct a scatter diagram for these data and interpret **(4 marks)**
- **(ii)** Calculate the correlation coefficient between the nurses' assessment and physician's assessment **(5 marks)**
- **(iii)** Does the physician vary fully on the nurses assessment **(3 marks)**
- **(iv)** Construct a linear regression model between the nurses' assessment and physician's assessment **(8 marks)**