TECHNICAL UNIVERSITY OF MOMBASA

UNIVERSITY EXAMINATION FOR:

AMA 4320: BIOSTATISTICS

END OF SEMESTER EXAMINATION

SERIES:MAY SERIES

TIME:2HOURS

DATE:MAY 2016

Instructions to Candidates
You should have the following for this examination
-*Answer Booklet, examination pass and student ID*
This paper consists of 5 questions. Attempt ONE AND ANY TWO.
Do not write on the question paper.

QUESTION ONE

a. In a length of hospitalization study conducted by several cooperating hospitals, a random of sample of 64 peptic ulcer patients was drawn from a list of all peptic ulcer patients ever admitted to the participating hospitals and the length of hospitalization per admission was determined for each. The mean length of hospitalization was found to be 8.25days. If the population standard deviation is known to be three days, find the 99% confidence interval for the population. (5marks)

b. Compute the mean of the following weights (3marks)

Weight	83.9	99.0	63.8	71.3	65.3	79.6	70.3	69.2	56.4	66.2	88.7	59.7	64.6	78.8

c. State the properties of the median (3 marks)

d. State the various scales of measurements (3 marks)

e. The length of a certain type of automatic washer is approximately normally distributed with a mean of 3.1 years and a standard deviation of 1.2 years. If this type of washer is guaranteed for one year, what fraction of original sales will require replacement? (4marks)

f. List any four methods of sampling (4marks)
g. Using the random sample data, below determine chi square test to test the hypothesis that flavor preference is independent of age at 5% levels among some patients. (5marks)

Candy flavor	Age levels		
	Under 18	18-40	Over 40
Sweet fruit	50	35	35
Tart fruit	19	32	30
Mint	45	38	16

h. The number of people entering the intensive care unit at a particular hospital on any one day possesses a Poisson probability distribution with mean equal to five persons per day. What is the probability that the number of people entering the intensive care unit on a particular day is equal to two?   (3marks)

QUESTION TWO

The following scores represent a nurses' assessment (X) and a physicians' assessment (Y) of the condition of 10 patients at 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.   Draw a scatter diagram between X and Y and interpret(3 marks)
ii.   Compute the correlation coefficient between X and Y (6 marks)
iii. Determine the coefficient of determination and interpret your answer (3marks)
iv.   Construct a linear regression model between X and Y. (6 marks)
v.   Estimate the physician's assessment given that the nurses' assessment is 11 (2 marks)

QUESTION THREE

a. If the uric acid values in normal adult males are approximately normally distributed with a mean and standard deviation of 5.7 and 1 mg percent respectively, find the probability that a sample of size 9 will yield a mean greater than 6. (5 marks)

b. Some studies of Alzheimer's disease have shown an increase in carbon dioxide production in patients with the disease. In one such study the following carbon dioxide values were obtained from 16 neocortical biopsy samples from Alzheimer's disease patients;

1009, 1280, 1180, 1255, 1547, 2352, 1956, 1080, 1776, 1767, 1680, 2050, 1452, 2857, 3100, 1621

Estimate;

i.   The sample mean (2 marks)

ii. The sample variance (2 marks)

iii. A 95% confidence interval estimate for the population if the population of such values is normally distributed with a standard deviation of 350. (4 marks)

c. Following a week long hospital supervisory training program, 16 assistant hospital administrators made a mean score of 74 on a test administered as part of the evaluation of the training program. If the population standard deviation is assumed to be 12, can it be concluded from this data that the population mean score is greater than 70 at 5% level of significance. (7marks)

QUESTION FOUR

a. In a survey of nursing students pursuing a master's degree, 75% stated that they expect to be promoted to a higher position within one month after receiving their degree. If this percentage holds for the entire population, find, for a sample of size 15, the probability that the number expecting a promotion within after receiving their degree is at least three. (4marks)

b. In a study of the effectiveness of an insecticide against a certain insect, a large area of land was sprayed. Later the area was examined for live insects by randomly selecting squares and counting the number of insects per square. Past experience has shown the average number of live insects per square to be 0.5. If the number of live insects per square follows a Poisson distribution, what is the probability that a selected square will contain no live insect? (4marks)

c. Suppose the average length of stay in a chronic disease hospital of a certain type of patients is 60 days with a standard deviation of 15. If it is reasonable to assume approximately normal distribution of length of stay, find the probability that a randomly selected patient from this group will have a length of stay greater than 50 days(4 marks)

d. Explain the properties of a good estimator (8 marks)

QUESTION FIVE

The following table summarizes bed capacities of some hospitals in Mombasa

Bed capacity	Number of hospitals
0-49	2
50-99	8
100-149	9
150-199	6
200-249	3
250-299	2

Using the above calculate

a. Mean (4marks)
b. Median (3marks)
c. Mode (3marks)
d. Variance (4mark)
e. 65th percentiles (3marks)
f. Pearson coefficient of skewness' (3marks)