GARISSA UNIVERSITY COLLEGE

(A Constituent College of Moi University)

UNIVERSITY EXAMINATION 2016/2017 ACADEMIC YEAR <u>THREE</u> <u>SECOND</u> SEMESTER EXAMINATION

<u>SUPPLEMENTARY/SPECIAL EXAMINATION</u>

SCHOOL OF BUSINESS AND ECONOMICS

FOR THE DEGREE OF BACHELOR OF BUSINESS MANAGEMENT

COURSE CODE: BBM 350:

COURSE TITLE: MANAGERIAL STATISTICS

EXAMINATION DURATION: 3 HOURS

DATE: 28/09/17   **TIME: 2.00-5.00 PM**

INSTRUCTION TO CANDIDATES

- **The examination has SIX (6) questions**

- **Question ONE (1) is COMPULSORY**

- **Choose any other THREE (3) questions from the remaining FIVE (5) questions**

- **Use sketch diagrams to illustrate your answer whenever necessary**

- **Do not carry mobile phones or any other written materials in examination room**

- **Do not write on this paper**

This paper consists of FIVE (5) printed pages   *please turn over*

QUESTION ONE (COMPULSORY)

(a) Define the following terms as used in statistics

    (i)   Population   **[1 mark]**

    (ii)   Representative sample   **[1 mark]**

    (iii)   random sample   **[1 mark]**

    (iv)   Census   **[1 mark]**

    (v)   Null hypothesis   **[1 mark]**

(b) For some given population, the value of the standard deviation is 2.45. A sample of 35 observations taken from this population produced the following data: 42 51 42 31 28 36 49 29 46 37 32 27 33 41

          44 41 28 46 34 39 48 26 35 37 38 46 48 37

             29 31 44 41 37 38 46

    (i)   What is the point estimate of μ **[3 marks]**

    (ii)   What is the margin of error associated with the point estimate   **[4 marks]**

(c)   (i) Briefly explain what sampling error refers to as used in management   **[1 mark]**

    (iii)   A population of 5 workers has their salaries, in thousands of shillings, as 17 24 35 35 and 43. A random sample of three salaries which includes 17, 35 and 43 is taken from this population. Compute the sampling error.

          Suppose 35 was mistakenly recorded as 37, compute the non-sampling error.   **[4 marks]**

(d) The mean family size in Kenya in 1991 was 3.17. An economist wanted to check if the current mean family size is less than 3.17. A sample of 900 families taken this year (2014) by this economist produced a mean family size of 3.13 with a standard deviation of 0.7. Using the 0.025 significance level, the economist wants to find out whether the mean family size has declined or not.

    i.   State the null and alternative hypotheses   **[2 marks]**

    ii.   State clearly, giving reasons, which test statistic to use   **[2 marks]**

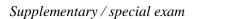   iii.   Determine the Rejection and Acceptance regions   **[4 marks]**

QUESTION TWO

(a) Longhorn has just published a new textbook. Before it decides the price at which to sell the book, it wants to know the average price of all such textbooks in the market. The research department at the company took a sample of 64 such textbooks and collected information on their prices. This information produced a mean of sh 96.80 for the sample. It is known that the standard deviation of the prices of all such textbooks is sh 9.00.

  i. What is the point estimate of the mean price of all such textbooks **[1 mark]**
  ii. What is the margin of error for this estimate **[4 marks]**
  iii. Construct a 90% confidence interval for the mean price of all such textbooks **[4 marks]**

(b) According to a recent survey by the Kenya National Bureau of Statistics, KNBS, the workers employed in the manufacturing industries in Nairobi earned an average of sh. 466.42 per week in July 1992. This mean was based on a random sample of 1000 workers selected from the manufacturing industries and the standard deviation of this sample is sh. 70. Find a 99% confidence interval for the mean weekly earnings of all workers in manufacturing industries in July 1992 **[6 marks]**

QUESTION THREE

(a) Define the phrase " unbiased estimator" **[2 marks]**

(b) When is sample size considered to be small compared to population size **[1 mark]**

(c) The mean wage per hour for all 5000 casual workers in a large company is sh. 13.50 with a standard deviation of sh. 2.90. Let
$\bar{X}$ be the mean wage per hour for a random sample of certain employees selected from this company. Find the mean and standard deviation of $\bar{X}$ for a sample of size 75 **[4 marks]**

(d) The rents of all houses in Karen have a probability distribution that is skewed to the right with a mean of sh. 157000 and a standard deviation of sh. 29500. Let $\bar{X}$ be the mean rent of a sample of 400 houses selected from Karen

  i. What is the probability that the mean rent obtained from this sample will be within sh. 3000 of the population mean **[4 marks]**
  ii. What is the probability that the mean rent obtained from this sample will be lower than the population mean by sh 2500or more **[4 marks]**

QUESTION FOUR

(a) State the three assumptions which must hold true to use one way ANOVA.　　　**[4 marks]**

(b) The research department of Post Bank observes various employees for work productivity. Recently, this department wanted to check whether the four tellers at a branch serve, on average, the same number of customers per hour. The research manager observed each of the four tellers for a certain number of hours. The table below gives the number of customers served by the four tellers during each of the observed hours.

Tellers

A	B	C	D
19	14	11	24
21	16	14	19
26	14	21	21
24	13	13	26
18	17	16	20
	13	18	

At the 5% significance level, test the null hypothesis that the mean number of customers served per hour by each of these four tellers is the same. Assume that all the assumptions required to apply the one-way ANOVA procedure hold true.　　　**[11 marks]**

QUESTION FIVE

(a) Random samples of four bags are taken every half hour from the output of a machine filling 0.5kg bags of flour. The bags are accurately weighed and their masses (less than 0.5kg) are given (in tenths of a gram) in the table below:

Sample

1	2	3	4	5	6	7	8	9	10
-2	-9	9	-1	9	9	8	2	-1	1
2	7	9	2	-9	-4	4	1	0	3
-2	0	-4	7	1	-7	-9	-9	-6	-1
9	9	4	3	1	-8	0	2	-9	0

Assuming that the standard deviation is unaltered, obtain an estimate of its value (in tenths of a gram). Draw a mean, range charts, and plot the given observations.

Is there evidence that the machine has gone out of control **[9 marks]**

(b) A certain type of goods is in batches of size 1000. The acceptable quality level (AQL) is 0.4% and the prescribed sample procedure is:

Take a sample of size 125 and reject the batch if the sample contains two or more defectives.

Determine the producer's risk and also the consumers risk in the case where the true proportion of defectives is 2%.96 **[6 marks]**

QUESTION SIX

(a) Define

    i.   a hypothesis

    ii.   power of a test **[3 marks]**

(b) The following table gives the 2002 US car market shares held by various auto companies.

Company	GM	Ford	Honda	Toyota	Chrysler	others	
Market shares	34.5	21.6	9.3	9.2	8.3	17.1	

A business organization wanted to investigate if the current US car market shares of these companies are the same as for 2002. A sample of 2000 recently sold new cars showed that 715 were manufactured by GM, 446 by Ford, 175 by Honda, 187 by Toyota, 178 by Chrysler and 299 by other companies.

Testing at 2.5% significance level, will you reject the null-hypothesis that the current US car market shares held by these companies are the same as for 2002 **[12 marks]**