GARISSA UNIVERSITY

UNIVERSITY EXAMINATION 2017/2018 ACADEMIC YEAR THREE FIRST SEMESTER EXAMINATION

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: 05/12/17 **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 FOUR (4) printed pages ***please turn over***

QUESTION ONE (COMPULSORY)

(a) Define the following terms as used in managerial statistics

i. Null hypothesis **[1 mark]**

ii. Type I error **[1 mark]**

iii. Point estimate **[1 mark]**

iv. Interval estimate **[1 mark]**

(b) Let x be a continuous random variable that has a normal distribution with a mean of 80 and a standard deviation of 12. Find

i. $p(70 \leq x \leq 135)$ **[3 marks]**

ii. $p(x < 27)$ **[2 marks]**

(c) Define

i. population **[1 mark]**

ii. Sample **[1 mark]**

(d) A machine cuts metal tubing into pieces. It is known that the lengths of the pieces have a normal distribution with a standard deviation of 4 mm. After the machine has undergone a routine overhaul, a random sample of 25 pieces is found to have a mean length of 146 cm. assuming that the overhaul has not affected the variance of the tube lengths, determine a 99% symmetric confidence interval for the population mean length. **[3 marks]**

(e) A random variable x, is normally distributed with a mean of 40 and a variance of 25. Find $p(x < 49)$ **[4 marks]**

(f) Toyota Kenya manufactures a toy racing car. The assembly time for this toy follows a normal distribution with a mean of 55 minutes and a standard deviation of 4 minutes. The company closes at 1700hrs every day. Suppose a worker starts assembling a racing car at 1600hrs, what is the probability that he will finish before the company closes for the day **[5 marks]**

(g) Differentiate between type I error and type II error **[2 marks]**

QUESTION TWO

(a) A continuous random variable is normally distributed with a mean of 25 and a standard deviation of 4. Find the

i. Area from $x = 25\ to\ x = 32$ **[3 marks]**

ii. $p(18 \leq x \leq 34)$ **[4 marks]**

(b) Let x be random variable with mean of 40 and standard deviation of 5. Find

i. $p(x > 55)$ **[4 marks]**

ii. $p(x < 49)$ **[4 marks]**

QUESTION THREE

Hupper Cooperation produces many types of soft drinks, including Orange Cola. The filling machines are adjusted to pour $120\ ml$of soda in each$120ml$ can of Orange Cola. However, the actual amount of soda poured into each can is not exactly $120\ ml$, it varies from can to can. It is found that the net amount of soda in such a can has a normal distribution with a mean of $120\ ml$ and a standard deviation of $0.15\ ml$

(a) What is the probability that a randomly selected can of Orange Cola contains $119.7\ ml\ to\ 119.9\ ml$ of soda. **[7 marks]**

(b) What percentage of the Orange Cola cans contain $120.2\ ml\ to\ 120.7\ ml$ of soda **[8 marks]**

QUESTION FOUR

A random sample of 36 observations is to be taken from a distribution with variance 100. In the past, the distribution has had a mean of 83.0, but it is believed that recently the mean may have changed.

Using a 5% significance level, determine an appropriate test of the null hypothesis, H_o that the mean is 83.0. When the sample is actually taken, it is found to have a mean of 86.2. Does this provide significant evidence against H_0 **[15 marks]**

QUESTION FIVE

To test the lifetime of batteries, 12 toy drummers are fitted with new batteries of one of three types: Amazing, Super long and Endurance. The lengths of time (in hours) that the drummers continue to drum are summarized in the table below

Amazing	4.7, 5.1, 5.2,
Supelong	4.8, 5.1 5.4 5.4
Endurance	5.1 5.2 5.2 5.4 5.6

Determine whether there is significance evidence at the 5% level, of a difference between the mean life times of the three types of batteries and summarize the findings in an ANOVA table.

QUESTION SIX

Ten students independently performed an experiment to estimate the value of π.Their results were as follows: 3.12, 3.16, 2.94, 3.33, 3.00, 3.11, 3.50, 2.81, 3.02, and 3.10.

i. Calculate the sample mean and the value of s^2 **[4 marks]**

ii. Stating any necessary assumption that you make, calculate a 95% symmetric confidence interval for π based these data, giving the confidence limits correct to two decimal places **[4 marks]**

iii. Estimate the minimum number of results that would be needed if it is required that the width of the resulting 95% symmetric confidence interval should be at most 0.02. **[7 marks]**