(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
(MMUST)

UNIVERSITY MAIN EXAMINATIONS

2023/2024 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER EXAMINATION

FOR THE DEGREE
OF
BACHELOR OF COMMERCE

COURSE CODE: BCB 318

COURSE TITLE: MANAGERIAL STATISTICS

DATE: TUESDAY 9TH APRIL 2024 **TIME: 3.00- 5.00 PM**

INSTRUCTIONS TO CANDIDATES
*Answer question **ONE** and any other **TWO** questions*

TIME: **2 HOURS**

QUESTION ONE COMPULSORY (30 MARKS)

a) "The control charts makes it possible to distinguish between those variations which are due to chance causes and those due to assignable causes" explain the terms 'chance causes' and 'assignable causes' and elucidate the statement. (5 marks)

b) A marketing company claims that it receives 8% responses from its mailing. It seems that the company is giving an exaggerated picture and the said percentage is less. To test this claim, a random sample of 500 was surveyed with 30 responses. Test the company's claim at the $\alpha = 0.05$ significance level against that the company is giving an exaggerated picture. (5 marks)

c) A company is interested in knowing if there is a significant difference in the average salary received by foremen in two divisions. Accordingly, samples of 12 foremen in the first division and 10 foremen in the second division are selected at random. Based upon experience, foremen's salaries are known to be approximately normally distributed and standard deviations are about the same. (5 marks)

	First division	**Second division**
Sample size	12	10
Average weekly salary of foremen (Kshs)	10,500	9,800
Standard deviation of salaries (Kshs)	680	740

d) Distinguish the following terms as applied in managerial statistics

i) Critical region and acceptance region

ii) One tailed and two tailed test

iii) Null and alternative hypothesis

iv) Population and a sample

v) Parameter and a sample statistic (10 marks)

e) A sample of 150 items from machine A had an average life of 1400hrs. a similar sample of 100 items from machine B had a mean life of 1200hrs. Past records indicate that the standard deviation of the items produced by machine A is 120hrs, and by machine B is 80hrs. Find at 95% confidence limits on the difference in the average lifetimes of the populations of the items produced by the two machines. (5 marks)

QUESTION TWO 20 MARKS

a) In a public opinion survey, 60 out of a sample of 100 high income voters and 40 out of a sample of 75 lower income voters supported a decrease in sales tax. Can we conclude at the 5% level of significance that the proportion of voters favoring a sales tax decrease differs between high and low income voters? (5 marks)

b) Safaricom company limited wishes to test whether its three sales agents Kakamega, Murang'a and Kitui tend to make sales of the same size or whether they differ in their selling ability as measured by the average size of their sales. During the last week out of 14 sales Kakamega made 5, Murang'a made 4 and Kitui made 5 sales. The following are weekly sales in millions of Kenya shillings record of three sales agents.

Kakamega	Murang'a	Kitui
300	600	700
400	300	300
300	300	400
500	400	600
0	-	500

Test whether the three sales agents average sales differ in size. (15 marks)

QUESTION THREE 20 MARKS

a) Unilever East Africa wishes to estimate with a maximum allowable error of 0.05 and a 95% level of confidence, the proportion of consumers who prefer its product. How large a sample will be required in order to make such an estimate if the preliminary sales reports indicate that 25% of all consumers prefer the firm's product? (5 marks)

b) Use chi square test to test if the two attributes in the following contingency table are independent: (15 marks)

Performance	Training		
	Intensive	Good	Average
Above average	100	150	40
Average	100	100	100
Poor	50	80	150

QUESTION FOUR (20 MARKS)

a) Describe the various steps involved in testing of hypothesis. What is the role of standard error in testing of hypothesis (10 marks)

b) A market research firm used a sample of individuals to rate the purchase potential of a particular product before and after the individuals saw a new television commercial about the product. The purchase potential ratings were based on 0 to 10 scales, with higher values indicating a higher purchase potential. Test the hypothesis that the commercial improved the mean purchase potential rating. Use level of significance 5% and comment on the value of the commercial. (10 marks)

Individual	1	2	3	4	5	6	7	8
Purchase rating after	6	6	7	4	3	9	7	6
Purchase rating before	5	4	7	3	5	8	5	6

QUESTION FIVE (20 MARKS)

a) State five characteristics of non-parametric tests. (5 marks)

b) During an examination of equal length of cloth, the following number of defects are observed: 2, 3, 4, 0, 5, 6, 7, 4, 3, and 2. Draw a control chart for the number of defects and comment whether the process is under control or not. (15 marks)