KISII UNIVERSITY

UNIVERSITY EXAMINATIONS

MATH 342: QUALITY CONTROL METHODS

(SEP - DEC 2023)

INSTRUCTIONS:

1. Do not write anything in this question paper

2. Answer Question **ONE a**nd any other **THREE** questions

QUESTION ONE: (25mks)

a). What is statistical quality control (3mks)

b). Explain two ways of controlling the quality of a product. (4mks)

c). State the importance of statistical quality control in industrial world. (6mks)

d).Distinguish between process control and product process. (4mks)

e). What sampling (2mks)

f). Give advantages of sampling. (6mks)

QUESTION TWO (15mks)

a). The quality department of a wire manufacturing company periodically selects a sample of a wire specimens in order to test for breaking strength. Past experience has shown that the breaking strengthens of a certain type of a wire are normally distributed with standard deviation of 450Kg. A random sample of 81 specimens gave a mean of 7500Kg. Find out the population mean at 95% level of confidence. (8mks)

b). Differentiate between point estimation and interval estimation. (2mks)

c) Give the merits of probability sampling   (3mks)

QUESTION THREE. (15mks)

A machine is set to deliver packets of a given weight. 10 samples of size 5 each were recorded. Below are given relevant data.

Sample No	1	2	3	4	5	6	7	8	9	10
Mean (X)	15	17	15	18	17	14	18	15	17	16
Range	7	7	4	9	8	7	12	4	11	5

Calculate the values of central line and the control limits for mean charts and comment on the state of control.

(Conversion factors for n = 5, are $A_2 = 0.58$, $A_3 = 0$, $A_4 = 2.11$)

QUESTION FOUR (15mks)

a) A restranaunt is going to set up a cream tea stall at a local gala. On the morning of the gala, she visits a wholesalers market and has to decide whether to buy large, medium, and small quantities of strawberry, scones, cream and other materials. Her profits depend on the number of people attending the gala and in turn depend on the weather. If her conditions are given below, what quantity of material should she buy? (7mks)

Alternative to buy

Event Weather

	Good	Average	Poor
Large Quantity	50	54	-20
Medium quality	67	66	62
Small quantity	64	61	64

b). HJ Symonds logistics provides a third party transport and storage services. It usually sign long term contracts to develop close working relationship with customers. Recently it did bid for a contract to move newspapers and magazines from a point of printing works to

wholesellers. This distribution market is dominated by two companies and it might be useful area for expansion. The whole decision was complicated but part of analysis showed that Symond could submit one of the three tenders, a low one that assumes newspaper sales will increase and unit transport cost will go down, a medium one that will give reasonable returns if newspaper will decrease and unit cost goes up. The probabilities of the newspaper and profit (£ 1000) are summarized below.

Newspaper Sales

	Decrease	Stay put	Increase
	P = 0.3	p = 0.3	p = 0.4
Low tender	50	55	56
Medium tender	65	80	70
High tender	74	72	74

Required

Select the best alternative with the highest with best alternative with the highest expected profit. (8mks)

QUESTION FIVE (15mks)

a). Write short notes on   (6mks)

i). Stratified sampling

ii) Multi stage sampling

iii). Judgement sampling

iv). Quota sampling

b). Discuss the criteria for a good estimation.   (4mks)

c).Give sources of bias in sampling   (5mks)