

CHUKA



UNIVERSITY

## RESIT/SPECIAL EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE,  
BACHELOR OF EDUCATION AND BACHELOR OF ARTS**

MATH 342: QUALITY CONTROL METHODS

STREAMS:

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 05/05/2021

11.30 A.M – 1.30 P.M

## INSTRUCTIONS:

**ANSWER ALL THE QUESTIONS****QUESTION ONE**

- a. Outline three classification (branches) of statistical quality control [6 marks]
- b. Control charts for  $\bar{X}$  and R are maintained on a certain dimension of a manufactures part, measured in inches. The subgroup size is 6. The values of  $\bar{X}$  and R are computed for each subgroup. After 25 subgroups

$$\sum \bar{X} = 500 \quad \text{and} \quad \sum R = 51.474$$

- Compute the values of the 3-sigma limits for  $\bar{X}$  and R charts and estimates the value of sigma on the assumption that the process is in statistical control. [10 marks]
- c. The following table gives the number of missing rivets at the final inspection of aircrafts:

Airplane No	No. of Missing Rivets	Airplane No	No. of Missing Rivets
1	10	12	16
2	1	13	9
3	6	14	11
4	7	15	15
5	8	16	8
6	10	17	23
7	5	18	6

8	13	19	7
9	0	20	4
10	19	21	9
11	4	22	12

- (i) Find  $\bar{c}$ , the average number of missing rivets per plane [4 marks]  
(ii) Construct a c charts for these data. Does the process appear to be in control?. If not, assume that assignable cause can be found for all points outside the control limits and calculate the revised control limits [10 marks]

### QUESTION TWO

- a. An X chart is used to control the mean of a quality characteristic. It is known that  $\sigma=6.0$  and  $n=4$ . The center line=200, UCL=209 and LCL=191. If the process mean shifts to 188, find the probability that this shift is detected on the first subsequent sample [10 marks]
- b. A control chart for the fraction nonconforming is to be established using a center line of  $p=0.10$ . what sample size is required if we wish to detect a shift in the process fraction nonconforming to 0.16 with probability of 0.50. [10 marks]

### QUESTION THREE

A double sampling plan, has parameters  $n_1=50$ ,  $c_1=3$ ,  $n_2=100$  and  $c_2=7$ . Consider a lot with exactly 5% defective. Find the probability of acceptance [20 marks]

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