

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE
OF BACHELOR OF COMMERCE

BCOM 447: STATISTICAL QUALITY CONTROL METHODS

STREAMS: BCOM Y4S1

TIME: 2 HOURS

DAY/DATE: FRIDAY 8/12/2017

2.30 P.M - 4.30 P.M.

INSTRUCTIONS:

- Answer Question ONE and any other TWO Questions

QUESTION ONE [30 MARKS]

- (a) State the main objective of statistical quality control methods. [2 Marks]
- (b) Outline the objectives of control chart and acceptance sampling in quality control. [4 Marks]
- (c) A process sampled 20 times with a sample of size 8 resulted in $\bar{\bar{X}} = 28.5$ and $\bar{R} = 1.6$. Compute the trial control limit for \bar{X} and R chart for this process. [4 Marks]
- (d) Summarize the quality control technicians on a flowchart. [7 Marks]
- (e) A machine is turning out steel rods with a process average of 6cm and standard deviation of 0.005 cm. Construct the $3 - \delta$ control limit for the range of length of samples of five rods. [4 Marks]
- (f) Find the probability of acceptance in a single sampling plan with $n = 80$ and $C = 3$. The lot fraction defective is 1%. [5 Marks]
- (g) Samples of size $n = 4$ are collected from a process every two hours. After 25 samples have been collected, the computed statistics are $\sum \bar{X}_i = 12509.5$ and $\sum R_i = 98.35$. Assuming that both charts exhibit control, determine whether a machine manufacturing springs is in control. [4 Marks]

QUESTION TWO [20 MARKS]

- (a) Outline the (5) advantages of acceptance sampling. [5 Marks]
- (b) A double sampling plan has $n_1 = 50, C_1 = 2, n_2 = 100, C_2 = 6$. Compute the probability of acceptance of a 5% defective lot. [15 Marks]

QUESTION THREE [20 MARKS]

(a) Control charts for \bar{X} , R and S are to be maintained on samples of size $n = 10$ from a normal distribution process where it is known that the population mean and variance are known to be $\mu = 80$ and $\sigma^2 = 100$ respectively. Find the centre line and controls for each of these control charts. [10 Marks]

(b) The sample fraction defective for 27 samples of size 50 are given below

0.24	0.30	0.16	0.20	0.20	0.10	0.22
0.14	0.32	0.18	0.28	0.12	0.26	0.14
0.10	0.20	0.30	0.18	0.16	0.24	0.12
0.34	0.26	0.24	0.08	0.36	0.18	

Calculate the control limit for the p-chart. [10 Marks]

QUESTION FOUR [20 MARKS]

(a) Outline 5 advantages of statistical quality control. [5 Marks]

(b) Outline 3 approaches to lot sentencing in acceptance sampling. [3 Marks]

(c) Summarize the acceptance sampling procedure on a flow chart. [9 Marks]

(d) Chuka Central Stores test its checkout clerks by randomly examining the printout receipt for servicing errors. The following numbers are the errors on each receipts for 3rd December 2016

0 1 1 0 0 1 1 0 1 1 0

Construct a control chart for this process and make conclusions. [3 Marks]

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