



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2022

STSACOR10T-STATISTICS (CC10)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.*

Answer any *four* questions from question nos. 1-6

5×4 = 20

1. How is the average sample number (ASN) different from average total inspection (ATI)? Discuss with an example. 5
2. Write a short note on modified control chart. 5
3. A 3σ control chart for the mean is set up for a quality characteristic which follows a normal distribution with mean μ and known variance σ^2 . The specified value of μ is μ_0 . Find an expression for the probability that of the subsequent 5 sub-samples, at least 2 would be out of control if the variance of the process is tripled. 5
4. You are provided with the lifetimes of n bulbs manufactured and collected from each of m machines in a factory. How can you utilize these data to comment on the state of control of the manufacturing process? 5
5. Discuss different patterns of non-randomness in the context of control chart. 5
6. Write down the flowchart of a double sampling acceptance-rectification plan. 5

Answer any *two* questions from question nos. 7-9

10×2 =20

7. For a very large lot of size $N = 1000$, a double inspection acceptance rectification plan is designed as follows: First inspect $n_1 = 5$ items. Accept the lot if the number of defectives $x_1 = 0$ or 1 and reject if $x_1 = 4$ or 5. If $x_1 = 2$ or 3, draw a second sample of size $n_2 = 2$ and accept the lot if the number of defectives $x_2 = 0$, rejecting it otherwise. Find the 10
 - (i) Producer's risk for a process average of 0.1.
 - (ii) The consumer's risk for LTPD 20%.
 - (iii) The AOQ for fraction defectives 0.1 and 0.2.
 - (iv) ASN for fraction defective 0.2.

8. (a) What is Shewhart's control chart technique? 3+3+4=10
(b) Compare between probability limit and $k\text{-}\sigma$ limit.
(c) What are the statistical bases of taking $k = 3$ in the context of $k\text{-}\sigma$ limit?
9. Describe the (\bar{X}, R) chart in details. Which chart will you perform at first and why? How do you modify the lower control limit of R chart if it turns out to be a negative quantity? 10

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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