PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Mid Term Examination : Semester II   **Academic Year :** 2008

Date : . December 21, 2008   **Time :** 13:30 - 16:30

Subject : 225-345 Quality Control   **Room :** หัวรุ่งเรนต์

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ทุจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น
และพักการเรียน 1 ภาคการศึกษา

Instructions :

1. **There are 5 questions, 100 points.**
2. **Attempt all questions.**
3. **Books, notes, dictionary and calculator are allowed.**
4. **Borrowing things from other student is prohibited.**

Problem no.	Full Score	Score
1	20	
2	15	
3	20	
4	20	
5	25	
Total	100	

Assoc. Prof. Dr. Sunchai   Klinpikul

Instructor

1. Control charts for $\overline{X}$ and R are maintained for an important quality characteristic. The sample size is n = 7, $\overline{X}$ and R are computed for each sample. After 35 samples, we found that :

$$\sum \overline{x}_i = 7805 \qquad \sum R_i = 1200$$

a. Set up 3 – sigma control charts. (5 points)

b. Assuming both charts exhibit control, estimate population mean and standard deviation.

(5 points)

c. If the quality characteristic is normally distributed and if the specifications are 220 ± 35, estimate the probability of out-of specification of this process.

(10 points)

2. A fraction nonconforming control chart with n = 400 has the following parameters :

$$\text{UCL} = 0.0962$$

$$\text{Center line} = 0.0500$$

$$\text{LCL} = 0.0038$$

a. **Find the width of the control limits in standard deviation units (ie. what is the value of k ?)**

(5 points)

b. **Suppose the process fraction nonconforming shifts to 0.06. What is the probability of detecting the shift on the first subsequent sample ?**

(10 points)

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3. Suppose that a vender ships components in lots of size 5,000. A single sampling plan with n = 50, c = 2 is being used for receiving inspection. Rejected lots are screened, and all defective items are reworked and returned to the lot.

      a. Find the level of lot quality that will be rejected 90% of the time.

                                                                      (5 points)

      b. Suppose that incoming lots are 0.75% nonconforming, what is the probability of rejecting this lot under this sampling plan ?

                                                                      (5 points)

      c. Calculate the average total inspection of the sampling plan for incoming lots on (a) and (b). Compare the results and explain.

                                                              (10 points)

5. Answer the following questions : (25 points)

(1) Why can you use normal distribution to estimate parameters from sampling of the unknown universe ?

(5 points)

(2) How can you observe any deviation while using control charts and all the points are not falling outside the control limits ?

(5 points)

(3) Given a lot size of 10000, AQL = 0.15%, general inspection level, reduced inspection, what is the single sampling plan ?

(5 points)

(4) What should be a proper rectified single sampling plan which gives the minimum ATI, given the lot size of 10000, process average of 1%, AOQL = 2.0%. Can you give the value of LTPD ?

(5 points)

(5) Given AOQL = 3.0 % and the number of consecutive units of product inspected which found to be free of defective of 70 units, what should be a proper continuous sampling plan ?

(5 points)

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