

**PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING**

Final Examination : Semester I

Academic Year : 2009

Date : October 8, 2009

Time : 13:30 – 16:30

Subject : 225-345 Quality Control

Room : R 300, A201

ทฤษฎีในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น
และพักการเรียน 1 ภาคการศึกษา

PART A

Instructions :

1. There are 2 parts (A and B), 5 questions, 100 points.
2. Attempt all questions.
3. Books and notes are allowed.
4. A calculator is allowed.
5. Borrowing things from other students is prohibited.

Part	Problem no.	Full Score	Score
A	1	10	
	2	10	
	3	15	
	4	15	
B	1	10	
	2	12	
	3	10	
	4	18	
	Total	100	

Assoc. Prof. Dr. Sunchai Klinpikul

Asst. Prof. Dr. Nikorn Sirivongpaisal

Instructors

1. Control charts for \bar{X} and S are used for process control on a quality characteristic. The sample size is $n = 4$. After 30 samples, the following data are obtained.

$$\sum_{i=1}^{30} \bar{x}_i = 12,870 \quad \text{and} \quad \sum_{i=1}^{30} S_i = 410$$

(a) Find the 2-sigma control limits for the \bar{X} and S charts. (7 points)

(b) Find the probability of type I error of the \bar{X} chart (3 points)

2. Control charts for \bar{X} and R are to be established to control the tensile strength of a metal part. Assume that tensile strength is normally distributed. Thirty samples of size $n = 6$ parts are collected over a period of time with the following results.

$$\sum_{i=1}^{30} \bar{x}_i = 6,000 \quad \text{and} \quad \sum_{i=1}^{30} R_i = 150$$

- (a) Calculate the 3-sigma control limits for \bar{X} and R . (4 points)
- (b) For the above \bar{X} chart, find the β -risk when the true process mean is 199. (6 points)

3. A chemical ingredient is packed in metal containers. A large shipment of these containers has been delivered to a manufacturing factory. The mean bulk density of this ingredient should not be less than 0.15 g/cm^3 . Suppose that lots of this quality are to have a 0.95 probability of acceptance. If the mean bulk density is as low as 0.1450 g/cm^3 , the probability of acceptance the lot should be 0.10. Suppose that we know the standard deviation of bulk density is approximately 0.005 g/cm^3 . Obtain a variable sampling plan that could be used to sentence the lot.

(15 points)

4. MIL-STD-105E is being used to inspect incoming lots of size $N = 5,000$. Single sampling plan, general inspection level II, and AQL of 0.65% are being used.

(a) Find the normal, tightened, and reduced sampling plans. (5 points)

(b) Draw the OC curve of the normal, tightened, and reduced sampling plans on the same graph. Use the coordinates that are specified in the following table to draw the curve, also complete the value of P_a . Use the graph paper provided on the next page. (10 points)

Normal Plan		Tightened Plan		Reduced Plan	
p	P_a	p	P_a	p	P_a
0.35%		0.35%		0.35%	
0.65%		0.65%		0.65%	
1.00%		1.00%		1.00%	
5.00%		5.00%		5.00%	
10.00%		10.00%		10.00%	
20.00%		20.00%		20.00%	
40.00%		40.00%		40.00%	

(ใส่กระดาษกราฟ)



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PART B

Instructions :

1. There are 2 parts (A and B), 5 questions, 100 points.
2. Attempt all questions.
3. Books and notes are allowed.
4. A calculator is allowed.
5. Borrowing things from other students is prohibited.

Part	Problem no.	Full Score	Score
A	1	10	
	2	10	
	3	15	
	4	15	
B	1	10	
	2	12	
	3	10	
	4	18	
	Total	100	

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1. A manufacturing company is going to purchase high intensity lamps for outdoor use. The required average life time of the lamp is 25,000 hours with a probability of acceptance of 95% and the company will reject the lamp with average life time of 5,000 hours with a probability of 90%. The quality control department of the company decides to set up a test plan with replacement and testing period of 1,250 hours. What is the quality test plan of the company ?

(10 points)

2. Suppose you were appointed to be the CEO of the Royal Paradise Hotel and Resort established in Phuket. The location of the hotel is on the east-coast beach, safe from Tsunami. The hotel has 200 air-conditioned rooms, 10 bungalows, one kitchen which produces several kinds of delicious foods, one swimming pool, one health club and one spa.

Since the business is quite competitive, therefore you are interesting in developing a corporate strategy of the hotel in accordance with the four perspectives of Balanced Scorecards (BSC). Draw a corporate strategy of this hotel ?

(12 points)

3. Suppose you were the owner of a small travel service company located in Hat Yai. The company has two 40-seats air conditioned buses and seven 12-seats minibuses. The company staff consists of 12 drivers, 7 tour guides, one accountant, one secretary and two cleaners. The traveling routes of the company covers 14 provinces in Southern Thailand , Malaysia and Singapore.

Since the business is quite competitive, therefore the company has to apply TQM in doing business.

To be competent, you decide to develop proper Key Quality Indicators (KQI) to fulfill customer requirements and customer satisfaction.

**What are the KQI, and what should be the target for each KQI ?
(You can assume proper targets)**

(10 points)

4. Answer the following questions : (18 points)

**(1) List and explain major changes of ISO 9000 : 2000 from
ISO 9000 : 1994**

(5 points)

(2) List the procedure steps in implementing TIS 18001 : 2542

(5 points)

(3) What is HOQ ? What is it used for ? Draw a structure of HOQ for a manufacturing company.

(8 points)