UNIVERSITI SAINS MALAYSIA

Second Semester Examination
Academic Session 2000/2001

February/March 2001

APP373 - Productivity And Quality Control

Time: 3 hours

Index Number: _____ (COMPULSORY)

INSTRUCTIONS

Please ensure this examination paper consists of **SIXTEEN** printed pages before the start of the exam.

Answer **TEN** questions. Answer **ALL** questions in Section A and answer **ONE (1)** question from Section B.

Section A (70%) COMPULSORY - Answer all questions

1.   Management wants to give **value** to customers. What is **value**?

[4 marks]

2.   Most **value-added** concepts are subjective. Give an objective view on the **value-added** concept.

[4 marks]

3.   Describe the relationship between productivity and quality.

[4 marks]

4.   The World Trade Organization encourages trade without tariffs. This will push countries to identify their strengths, weaknesses, and environmental opportunities and threats to forge a competitive edge. What is meant by a competitive country?

[4 marks]

5.   Quality Function Deployment (QFD) can be confusing. How would you prioritize the many customer requirements in QFD?

[6 marks]

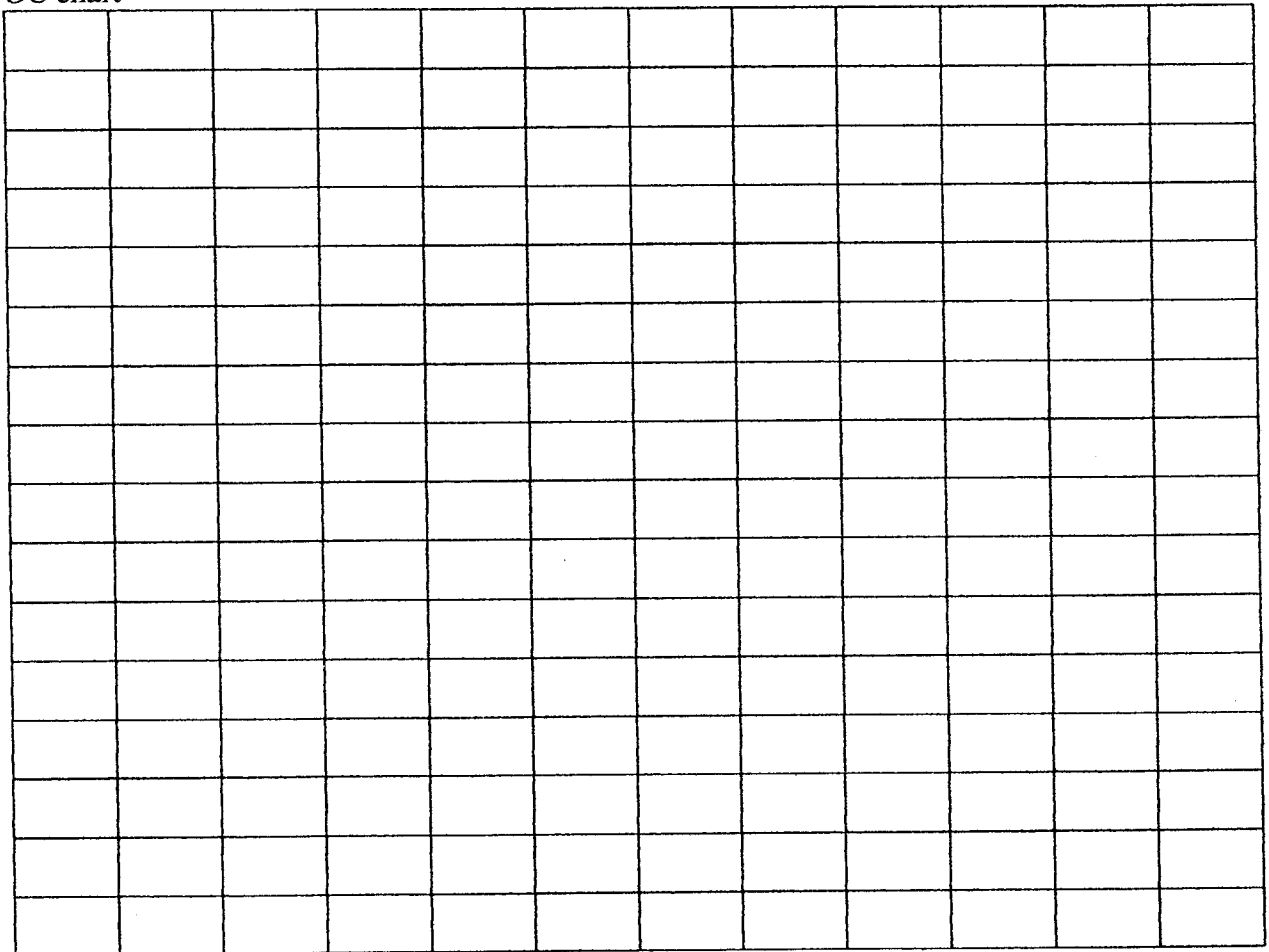6.   What is a quality system? Name four (4) types of quality system.

[4 marks]

7.   Give 4 external factors which drive improvements.

[4 marks]

8a.   Draw an OC curve (referred to as the **first** OC curve) for a sampling scheme n=10, c=2, at p=0.01, 0.02, and 0.03. Use the graph paper below.

[25 marks]

OC chart

8b.	Now draw another OC curve (referred to as the **second** OC curve) for an acceptance sampling scheme of n=5, c=1 at p = 0.01, 0.02, and 0.03. Draw this OC curve on the above graph paper also. Use a different color pen.

8c.	Comment on the above two (2) OC curves.

8d.	What is AQL and LTPD?

	AQL:

	LTPD:

8e.   If the AQL is 0.01 and LTPD is 0.03 for the **first** OC curve, what is the producer's risk (alpha) and the consumer's risk (beta)?

Alpha value:

Beta value:

8f.   Name the zone between p = 0.01 and 0.03

8g.   What is meant by the zone between p = 0.01 and 0.03?

9.   An automatic shampoo bottling machine fills 800 ±2 ml of shampoo into the shampoo bottle. Under or over filling of shampoo into the bottle will incur a cost of RM0.75

[15 marks]

9a.   What is the k value in the Taguchi loss function?

9b.   If the filling averages 800ml with a standard deviation of 0.8ml, what is the expected loss per bottle?

Section B (30%). Answer one (1) question only.

10a. PWE Company makes wires with a USL of 9.10 cm and an LSL of 8.3 cm which are set by the company engineer. The following is a set of data collected from the wire making process.

[30 marks]

Time	Length in cm								
	1	2	3	4	5	6	7		
9.00 am	8.1	9.6	9.2	8.8	9.1	9.9	8.5		
10.00 am	9.2	9.5	8.5	9.5	9.2	9.4	8.5		
11.00 am	9.7	8.4	9.5	8.9	9.5	9.8	8.5		
12.00 noon	8.4	8.4	6.5	9.9	8.8	9.9	8.9		
1.00 pm	9.9	9	8.1	8	9.6	8.5	8.1		
2.00 pm	8.2	8.4	9	8.5	9.5	8.9	8.4		
3.00 pm	9.4	9	6.3	9.1	8.7	9.9	8.6		
4.00 pm	9.3	9	8.3	9.3	9.8	8.4	8.9		
5.00 pm	9.3	9.9	8.6	9.6	9.8	8.6	8.9		
6.00 pm	9.2	8.6	9.7	8.3	9.7	8.9	8.2		

Draw the R and x-bar charts

R chart

In/Out of control (Delete one)

Comments

....10/-

X-bar chart

In/Out of control (Delete one)

Comments

What is the Cpk of the wire making process?

10b.   Briefly describe the requirements of "quality manual" in ISO 9001:1994.

10c.   What is the major difference between ISO 9001 and ISO 9002?

10d.   What is the major difference between the Malcolm Baldrige National Quality Award and MS ISO 9000?

10e.   Briefly describe three types of quality system audits.

11a. The Sugar Mountain Company packs 50 kg of sugar into bags. Data collected from a time measurement study on packing is tabulated as follows. The company gives a time allowance of 20% for each worker.

ACTIVITY	Samples					Performance rating (%)
	1	2	3	4	5	
	CYCLE TIME (secs)					
Take and put bag	8	9	8	11	7	110
Fill bag	36	41	39	35	112*	85
Close bag	15	17	13	20	18	105
Put bag on conveyor	8	6	9	30+	35+	90

* Broken bag
+ Jammed conveyor

(i) Calculate the standard time for completing this task.

(ii)   How many samples are required if we wish to achieve 5% accuracy with a confidence level of 99%.

11b. You have advised Sugar Mountain Company not to conduct 100% inspection upon incoming sugar. Instead you have suggested using MIL-STD 105D.

   (i)   Give the reasons for suggesting using acceptance sampling.

   (ii)   Explain the follow up actions after a nonconforming lot is discovered during acceptance sampling in 11b (i).

   (iii) Give two reasons for calculating the probability of acceptance for a lot with a known average process percent defective?

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