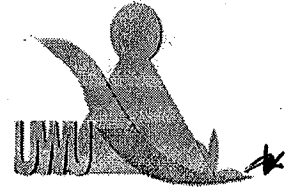


Uva Wellassa University, Sri Lanka
End Semester Examination – February/March 2012
SCT 419-2 Quality Assurance and Control

4th year 1st sem

Time: Two (02) Hours



Total 03 Questions
Answer all questions



Part A

1. Answer the following questions with about 200 words.

- I. Why do you think 5S is important for service sector?
(10 marks)
- II. Give your plan to implement 5S at your home?
(10 marks)
- III. What do you think about quality aspects of Toyota motor company?
(10 marks)
- IV. Explain the role of a Quality Control Manager in an ISO 9000 system.
(10 marks)
- V. What are the similarities and dissimilarities of ISO 9000 system and ISO 14000 system?
(10 marks)

Part B

2.

- I. Briefly explain the chance and assignable causes of variation in quality control?
(5 marks)
- II. Thirty samples each of size 7 have been collected to establish control over a process.
The following data were collected:

$$\sum_{i=1}^{30} \bar{x}_i = 2700$$

$$\sum_{i=1}^{30} R_i = 120$$

- a) On the assumption that the R chart is in control, estimate the process standard deviation.
- b) Suppose an S chart were desired. What would be the appropriate control limits and center line?

(15 marks)

3.

- I. A control chart is used to control the fraction nonconforming for a plastic part manufactured in an injection molding process. Ten samples, each of size 100 yield the following data.

Sample Number	1	2	3	4	5	6	7	8	9	10
No of nonconforming	10	15	31	18	24	12	23	15	8	8

- a) Find the three-sigma control limits for the control chart.
- b) After trial control limits were set up for this process, it was found that a point plots outside control limits. What actions should be taken if

Assignable cause can be found?

Assignable cause cannot be found?

- c) For the chart established in part (a), what is the probability of detecting a shift in the process, if the fraction nonconforming to 0.03 on the third sample after the shift has occurred?

(Hint: Use the Poisson approximation to Binomial)

(20 marks)

- II. A manufacturer wishes to set up a control chart at the final inspection station for a gas water heater. Defects in workmanship and visual quality features are checked in this inspection. For the last 22 working days, 154 water heaters were inspected and a total of 736 nonconformities were reported.

- a) What type of control chart would you recommended here?
- b) Using one water heater as the inspection unit, calculate the center line and control limits that are consistent with the past 22 days of inspection data.
- c) What is the probability of type I error for the control chart in part (b)?

(10 marks)

Cumulative Poisson Probabilities

		λ									
x	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
0	0.905	0.819	0.741	0.670	0.607	0.549	0.497	0.449	0.407	0.368	
1	0.995	0.982	0.963	0.938	0.910	0.878	0.844	0.809	0.772	0.736	
2	1.000	0.999	0.996	0.992	0.986	0.977	0.966	0.953	0.937	0.920	
3		1.000	1.000	0.999	0.998	0.997	0.994	0.991	0.987	0.981	
4				1.000	1.000	1.000	0.999	0.999	0.998	0.996	
5							1.000	1.000	1.000	0.999	
6										1.000	

		λ									
x	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	
0	0.301	0.247	0.202	0.165	0.135	0.111	0.091	0.074	0.061	0.050	
1	0.663	0.592	0.525	0.463	0.406	0.355	0.308	0.267	0.231	0.199	
2	0.879	0.833	0.783	0.731	0.677	0.623	0.570	0.518	0.469	0.423	
3	0.966	0.946	0.921	0.891	0.857	0.819	0.779	0.736	0.692	0.647	
4	0.992	0.986	0.976	0.964	0.947	0.928	0.904	0.877	0.848	0.815	
5	0.998	0.997	0.994	0.990	0.983	0.975	0.964	0.951	0.935	0.961	
6	1.000	0.999	0.999	0.997	0.995	0.993	0.988	0.983	0.976	0.966	
7		1.000	1.000	0.999	0.999	0.998	0.997	0.995	0.992	0.988	
8				1.000	1.000	1.000	0.999	0.999	0.998	0.996	
9							1.000	1.000	0.999	0.999	
10									1.000	1.000	

		λ									
x	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	
0	0.041	0.033	0.027	0.022	0.018	0.015	0.012	0.010	0.008	0.007	
1	0.171	0.147	0.126	0.107	0.092	0.078	0.066	0.056	0.048	0.040	
2	0.380	0.340	0.303	0.269	0.238	0.210	0.185	0.163	0.143	0.125	
3	0.603	0.558	0.515	0.473	0.433	0.395	0.359	0.326	0.294	0.265	
4	0.781	0.744	0.706	0.668	0.629	0.590	0.551	0.513	0.476	0.440	
5	0.895	0.871	0.844	0.816	0.785	0.753	0.720	0.686	0.651	0.616	
6	0.955	0.942	0.927	0.909	0.889	0.867	0.844	0.818	0.791	0.762	
7	0.983	0.977	0.969	0.960	0.949	0.936	0.921	0.905	0.887	0.867	
8	0.994	0.992	0.998	0.984	0.979	0.972	0.964	0.955	0.944	0.932	
9	0.998	0.997	0.996	0.994	0.992	0.989	0.985	0.980	0.975	0.968	
10	1.000	0.999	0.999	0.998	0.997	0.996	0.994	0.992	0.990	0.986	
11		1.000	1.000	0.999	0.999	0.999	0.998	0.997	0.996	0.995	
12				1.000	1.000	1.000	0.999	0.999	0.999	0.998	
13							1.000	1.000	1.000	0.999	
14										1.000	