The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Master of Technology in Industrial Engineering - LEVEL 07
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX7214 – Quality & Reliability Engineering**
Academic Year	:	2015/2016
Date	:	05th December , 2016
Time	:	0930 – 1230 hrs
Duration	:	3 hours

General instructions

1. Read the questions carefully before answering.
2. Please note that you should write your registration number and your index number in each pages of your answer book. Do not write your name.
3. In case of doubt, please consult the supervisor or an invigilator conducting the examination.
4. This paper consists of Eight (08) questions. Answer only five (05) Questions.

1.

a)

Quality is a team that has been defined in many ways. Individuals, group of companies and international organizations have attempted to define "quality". Discuss two such definitions. You should select one definition defined by an individual and one defined by an organization.

b)

Explain in a step wise manner how you would achieve design quality and quality of conformance. You may select one of the definitions of quality to support your answer.

2.

a)

Specification of a product should be clear and detailed enough in order to achieve quality. Discuss the importance of this statement in achieving quality of manufacture.

b)

Explain how standard practices at an organization help to maintain product quality.

3.

a)
Explain "Failure Mode and Effect Analysis (FMEA)".
How does this analysis help in redesigning of an existing product?

b)
Define "Reliability" and explain the important terms associated with the definition.

c)
A washing machine requires 30 minutes to clean a load of clothes. The mean time between failures of the machine is 50 hours. Assuming a constant failure rate, what is the chance of the machine in completing a cycle without failure?

4.

a)
Explain the concept of "internal customer". Use an example to support your explanation.
b)
Explain the concept and practices associated with control and improvement in relation to quality. Also discuss the differences between control and improvement?

5.

A certain process produces metal pieces having a length normally distributed with standard deviation 1.2mm. These metal pieces are used for the assembly of the end product. Pieces less than 100mm length are undesirable for the assembly process. However, a temporary concession has been given to accept 0.5% pieces having lengths less than 100mm.

a)
Under the temporary concession what should be the mean value of process?
b)
In the above process pieces having lengths greater than 105mm are unacceptable and no concession can be allowed. If the upper specification limit is considered critical, is the process capable of meeting the upper specification limit?
c)
If the process is to be improved so that the pieces meet specification limits, what should be the minimum standard deviation?

6.

a)
"Process Approach" and "Statistical Approach" are two important aspects in quality. Explain the basic elements of these two approaches. How do these approaches contribute to the control and improvement of quality?

b)
Explain a quality tool used in statistical approach in order to discover and analyse quality problems.

7.

a)
In solving quality problems it is important to narrow down a problem and then find root causes. Describe a quality tool for each of those purposes.

b)
To maintain quality it is important to motivate factory floor workers continuously. However, motivation is not the only answer to errors and defects caused by factory workers. How do you approach to analyse the situation of errors and defects caused by factory workers? What are the remedial actions you would suggest to minimize errors and defects?

8.

a)
Setting up Fraction defective control chart (p-control chart) is an important step of a process. Explain in a step-wise manner how you would proceed to setup the control chart.
If the company has decided on a maximum allowable fraction defective level, how you would validate the control chart for future use?

b)
A fraction defective control chart has been set up at a particular step of a process. In setting up the control chart 50 items were inspected each time. The central line of the control chart is 0.02. An inspector took 50 items and found 5 items defective. In terms of statistical control, what is yours opinion about the state of the process at this time?

If the company specification for defective is 6% maximum, what is your opinion regarding the use of this control chart for future use?