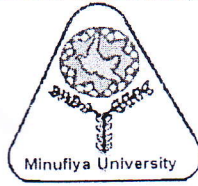


Minufiya University  
 Faculty of Engineering, Shebin El-Kom  
 Production Engineering and Mechanical  
 Design Department  
 2<sup>nd</sup> Semester Examination, 2014-2015  
 Date of Exam: 15 / 6 / 2015



Subject: Total Quality Control  
 Code: PRE 622  
 Year : M. Sc.  
 Time Allowed : 3 hours  
 Total Marks : 100 marks  
 Examiner: Dr. Omayma Nada

Answer all the following questions:

**Question 1 (30 marks)**

- According to the quality expert Feigenbaum, interpret the meaning of quality as well as the meaning of control in the phrase "quality control", and define total quality control. (9 marks)
- There are four basic jobs of quality control that are directly linked to the various phases of product or service development, explain these four jobs and discuss the following: "Does a quality control program always include all these four jobs?" (9 marks)
- The quality of products and services is directly influenced in nine basic areas; these have been recognized in literature as "9Ms". List only six of the 9Ms and provide a brief explanation for each one. (6 marks)
- Demonstrate the use of statistical tools in quality control. (6 marks)

**Question 2 (20 marks)**

The net weight (in grams) of a dry bleach product is to be monitored using control charts using a sample size of  $n = 4$ . Data for 20 preliminary samples are shown as in the table below.

- Decide which type of control charts can be used to monitor such a process.
- List the detailed steps necessary to construct the control chart Using Minitab 16.
- Explain how the chart can help in assessing whether the process is in control or out of control.

| sample number | x1 | x2 | x3 | x4 | sample number | x1 | x2 | x3 | x4 |
|---------------|----|----|----|----|---------------|----|----|----|----|
| 1             | 6  | 9  | 10 | 15 | 11            | 8  | 12 | 14 | 16 |
| 2             | 10 | 4  | 6  | 11 | 12            | 6  | 13 | 9  | 11 |
| 3             | 7  | 8  | 10 | 5  | 13            | 16 | 9  | 13 | 15 |
| 4             | 8  | 9  | 6  | 13 | 14            | 7  | 13 | 10 | 12 |
| 5             | 9  | 10 | 7  | 13 | 15            | 11 | 7  | 10 | 16 |
| 6             | 12 | 11 | 10 | 10 | 16            | 15 | 10 | 11 | 14 |
| 7             | 16 | 10 | 8  | 9  | 17            | 9  | 8  | 12 | 10 |
| 8             | 7  | 5  | 10 | 4  | 18            | 15 | 7  | 10 | 11 |
| 9             | 9  | 7  | 8  | 12 | 19            | 8  | 6  | 9  | 12 |
| 10            | 15 | 16 | 10 | 13 | 20            | 13 | 14 | 11 | 15 |

**Question 3 (25 marks)**

- a) Discuss the different characteristics of a total quality system. (5 marks)
- b) One of the purposes of using quality engineering analytical techniques is to examine the proposed product design. Explain only two of these techniques. (8 marks)
- c) Classify the following quality related costs as prevention costs, appraisal costs, internal failure costs, or external failure costs. (12 marks)
  - 1. Cost of scrap
  - 2. Product-design verification costs
  - 3. Warranty claims costs
  - 4. quality training costs
  - 5. Inspection costs
  - 6. Product liability costs

**Question 4 (25 marks)**

- a) Define quality engineering technology and illustrate the major groups of techniques used in quality engineering technology. (7 marks)
- b) There are many techniques employed by process control engineering technology. identify the major groups of these techniques. Select only one of these groups and provide two examples of the techniques in this group and explain the purpose of each technique. (8 marks)
- c) List the basic functions of quality information equipment, and demonstrate the criteria affecting the degree of automation of such equipment. (10 marks)

===== End of Questions =====

*With our best wishes*

| This exam measures the following ILOs |                                  |                    |      |      |                 |                     |               |      |      |               |                     |              |      |              |
|---------------------------------------|----------------------------------|--------------------|------|------|-----------------|---------------------|---------------|------|------|---------------|---------------------|--------------|------|--------------|
| Question Number                       | Q1-a.                            | Q3-a.b.<br>Q4-a.b. | Q4-a | Q1-c | Q1-a.b<br>Q3-a. | Q3-c,<br>Q4-b       | Q3-c,<br>Q4-c | Q2-b | Q3-b | Q2-c,<br>Q4-b | Q2-b                | Q2-c<br>Q4-c | Q3-c | Q2-b<br>Q4-c |
| Skills                                | a1-1                             | a1-2               | a2-1 | a2-2 | a5-1            | b2-1                | b2-2          | b4-1 | b6-1 | b6-2          | c3-1                | c3-2         | c4-1 | c4-2         |
|                                       | Knowledge & Understanding Skills |                    |      |      |                 | Intellectual Skills |               |      |      |               | Professional Skills |              |      |              |