



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIFTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 502: QUALITY MANAGEMENT

DATE: 9/8/2021

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer question ONE and any other two questions.

QUESTION ONE (30 MARKS)

- a) Define the following terms as used in quality management
 - i. Quality (1 mark)
 - ii. Control (1 mark)
 - iii. Inspection (1 mark)
- b) In any organization or production process, quality standards may be any one or a combination of attributes and variables of the product or service being manufactured or offered. Briefly explain any four attributes of quality and state any two variables relating to products and services. (8 marks)
- c) Explain the benefits of ISO 14000 at global and organizational levels (4 marks)
- d) Briefly explain the pareto diagram and state its uses (3 marks)
- e) Table Qn 1 (d) shows data collected from a given production process. After investigation the poor quality of products has been associated with the following errors; A- Poor Design, B- Defective Parts, C- Operator Error, D-Wrong Dimensions, E- Surface Abrasion. A total of 2,165 components were inspected. For each of the errors, find;
 - i. The failure percentage (%) (2 marks)
 - ii. The relative failure percentage (%) (2 marks)

- iii. Hence or otherwise construct a pareto diagram and state the error (problem) to be addressed first in order to improve the production process (8 marks)

Table Qn. 1 (d)

Error type	Number of errors
A- Poor Design	198
B- Defective Parts	25
C- Operator Error	103
D- Wrong Dimensions	18
E- Surface Abrasion	72
Total	416

QUESTION TWO (20 MARKS)

- a) Briefly discuss the following quality control methods.
- i. Quality assurance (2 marks)
 - ii. Failure testing (2 marks)
 - iii. Statistical control (2 marks)
- b) Discuss ANY FOUR of the nine fundamental factors (**9 M's**) affecting the quality of products and services (8 marks)
- c) To make rational decisions using data obtained on the product, or process, or from the consumer, organizations use certain graphical tools often referred to as the tools for quality control. With the help of sketches, explain how the following tools are used to keep check on the quality of products and services.
- i. Cause and effect diagram (3 marks)
 - ii. Control charts (3 marks)

QUESTION THREE (20 MARKS)

- a) Define the term Total quality management (TQM) (1 mark)
- b) Briefly explain the two paths to TQM stating the merits of one over the other (4 marks)
- c) The Quality Journey firmly believes in tearing down outdated management pyramids, arguing instead for the need to build a whole new management pyramid—one which can live up to the vision and challenges inherent in the definition of TQM.
- i. State the five principles of TQM (5 marks)
 - ii. Using a well labeled diagram explain the proposed TQM pyramid (10 marks)

QUESTION FOUR (20 MARKS)

- a) Define the term quality audit (1 mark)
- b) Explain at least FIVE benefits of ISO 9000 series (5 marks)
- c) Briefly discuss the seven elements for the implementation & operations of ISO 14001 (7 marks)
- d) In an interview with Dr. W. Edwards Deming, he was quoted saying that “*it will take about thirty years for the United States to catch up with Japan in the area of quality control and management*”. This is a somewhat pessimistic view of the United States, however, it has some degree of truth. With reference to his statement, explain the SEVEN (7) “deadly diseases” in an organization that may contribute make it difficult for the projected catch up (7 marks)

QUESTION FIVE (20 MARKS)

- a) Briefly describe the Deming system of profound knowledge towards quality management (4 marks)
- b) “*It is important to underline that benchmarking is not the same as copying.*” “*It is a hazard to copy and thus it is necessary to understand the theory of what one wishes to do*”. These are excerpts from a cooperate meeting discussions on benchmarking. From these statements and in relation to entrepreneurial leadership and management
 - i. Define the term benchmarking (2 marks)
 - ii. Discuss the three types of benchmarking stating what can be benchmarked in each category (6 marks)
- c) Mr. Salim has recently established Al Dhakiliya painting shop in Dhiwa. He has received complaints from customers that the *Car doors* are not having the same color shades. After a detailed analysis, he came up with the following causes for difference in color shades: *Improper spray nozzle; Untrained personnel; Wrong paint; Viscosity errors; Incorrect distance; Too much pressure; Temperature out of control; Thickness measurements and Incorrect distance*. Advice Mr. Salim explaining the importance of Fishbone diagram and draw a diagram by showing causes under SIX key heading including **Machinery, People, Methods, Measurements, Environment, and Materials**. (8 marks)