**Techno India NJR Institute of Technology**



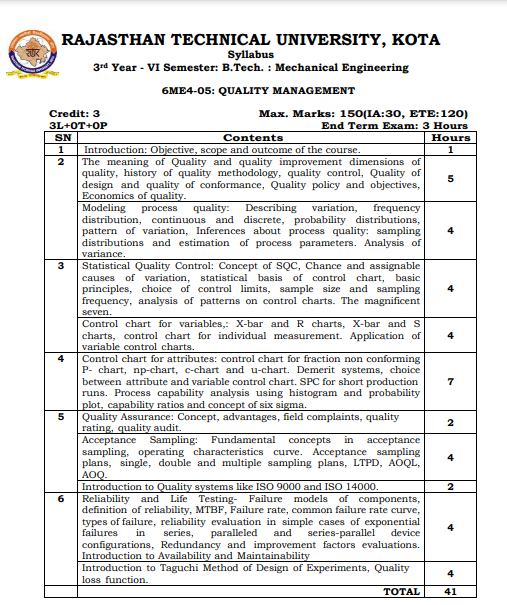
**Course File**

**Quality Management (6ME4- 05)**

Nisha Patel

(Assistant Professor)

**Department of ME**

**Course Overview:**

Student will learn basics of quality management from this 41 hours course. Quality management ensures that an organization, product or service is consistent. It has four main components: quality planning, quality assurance, quality control, and quality improvement. Quality management is focused not only on product and service quality, but also on the means to achieve it. Quality management, therefore, uses quality assurance and control of processes as well as products to achieve more consistent quality. What a customer wants and is willing to pay for it determines quality. It is a written or unwritten commitment to a known or unknown consumer in the market. Thus, quality can be defined as fitness for intended use or, in other words, how well the product performs its intended function.

**Course Outcomes:**

| **CO. NO.** | **Cognitive Level** | **Course Outcome** |
| --- | --- | --- |
| 1 | Synthesis | Student will be able to understand the role of statistical tools in quality improvement. |
| 2 | Synthesis | Student will be able to understand the different types of variability, rational subgroups, and how a control chart is used to detect assignable causes. |
| 3 | Design | Students will be able to Construct and interpret control charts for variables such as x-bar, r, s charts. |
| 4 | Design | Students will be able to Construct the sampling plan and OC curve etc. |

**Course Outcome Mapping with Program Outcome:**

| **Course Outcome** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CO1 | 3 | 2 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| CO2 | 3 | 2 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| CO3 | 2 | 2 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| C04 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| **Average** | 2.50 | 2.00 | 2.75 | 1.75 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 |

**Course Coverage Module Wise:**

| **Lecture No.** | **Unit** | **Topic** |
| --- | --- | --- |
| 1 | **1** | **INTRODUCTION:** Objective, scope and outcome of the course |
| 2 | **2** | **QUALITY:** student should be able to understand the meaning of Quality, Quality improvement, Dimensions of quality |
| 3 | 2 | Student should be able to understand history of quality methodology |
| 4 | 2 | Student should be able to understand Quality control, Quality of design and quality of conformance |
| 5 | 2 | Student should be able to understand Quality policy and objectives , Economics of quality |
| 6 | **2** | **MODELING PROCESS QUALITY:** Describing variation, frequency distribution |
| 7 | 2 | Student should be able to understand continuous and discrete, Probability distributions |
| 8 | 2 | Student should be able to understand probability distributions, Pattern of variation |
| 9 | 2 | Student should be able to understand inferences about process quality: Sampling distributions and estimation of process parameters |
| 10 | 2 | Student should be able to understand Analysis of variance |
| 11 | **3** | **STATISTICAL QUALITY CONTROL**: Student should be able to understand concept of SQC, Chance and assignable causes of variation |
| 12 | 3 | Student should be able to understand statistical basis of control chart and basic principles |
| 13 | 3 | Student should be able to understand choice of control limits, Sample size |
| 14 | 3 | Student should be able to understand sampling frequency and Analysis of patterns on control charts |
| 15 | 3 | Student should be able to understand the magnificent seven |
| 16 | **3** | **CONTROL CHART FOR VARIABLES:** X-bar and R charts |
| 17 | 3 | Student should be able to understand X-bar and R charts |
| 18 | 3 | Student should be able to understand X-bar and S charts |
| 19 | 3 | Student should be able to understand Control chart for individual measurement |
| 20 | 3 | Student should be able to understand Application of variable control charts |
| 21 | **4** | **CONTROL CHART FOR ATTRIBUTES:** Control chart for fraction non-conforming P- chart |
| 22 | 4 | Student should be able to understand P- chart, np-chart |
| 23 | 4 | Student should be able to understand C-chart and u-chart |
| 24 | 4 | Student should be able to understand demerit systems, choice between attribute and variable control chart |
| 25 | 4 | Student should be able to understand SPC for short production runs |
| 26 | 4 | Student should be able to understand process capability analysis using histogram and probability plot |
| 27 | 4 | Student should be able to understand capability ratios and concept of six sigma |
| 28 | **5** | **QUALITY ASSURANCE:** Student should be able to understand Concept, advantages, Field complaints, quality rating, Quality audit |
| 29 | **5** | **ACCEPTANCE SAMPLING:** Student should be able to understand Fundamental concepts in acceptance sampling, Operating characteristics curve |
| 30 | 5 | Student should be able to understand Operating characteristics curve |
| 31 | 5 | Student should be able to understand acceptance sampling plans, single, double and multiple sampling plans |
| **32** | **5** | Student should be able to understand **LTPD, AOQL, AOQ** |
| 33 | **5** | **INTRODUCTION TO QUALITY SYSTEMS** like ISO 9000 7 ISO 14000 |
| 34 | **6** | **RELIABILITY AND LIFE TESTING**- Student should be able to understand Failure models of components, Definition of reliability |
| 35 | 6 | Student should be able to understand MTBF, Failure rate, Common failure rate curve |
| 36 | 6 | Student should be able to understand types of failure, Reliability evaluation in simple cases of exponential failures in series |
| 37 | 6 | Student should be able to understand Paralleled and series-parallel device configurations |
| 38 | 6 | Student should be able to understand Redundancy and improvement factors evaluations |
| 39 | 6 | Student should be able to understand Introduction to Availability and Maintainability |
| 40 | **6** | **INTRODUCTION TO TAGUCHI METHOD OF DESIGN OF EXPERIMENTS** |
| 41 | 6 | Student should be able to understand Quality loss function |

**TEXT/REFERENCE BOOKS**

* STATISTICAL QUALITY CONTROL BY DOUGLAS C. MONTGOMERY
* STATISTICAL QUALITY CONTROL BY M. MAHAJAN ,  
  DHANPAT RAI & CO.

**Course Level Problems (Test Items):**

| **CO.NO.** | **Problem description** |
| --- | --- |
| **1** | 1. What is Quality. Explain the dimension of quality. 2. Explain the “Quality of Conformance” and “Quality of Design”. 3. Discuss the importance of Quality Control in the success of any organization. 4. Discuss the major aspects of effective management of Quality. |
| **2** | 1. Explain the concept of statistical quality control (SQC). 2. What are the objectives of control chart. 3. What do you understand by Control Charta for variables. 4. Difference between variable chart and attribute chart. |
| **3** | 1. Describe the types of attribute control chart in detail. 2. How can we improve the process using control chart. 3. Explain the concept of process capability. 4. Discuss relative advantages and disadvantages of single, double and multiple sampling plans. |
| **4** | 1. Explain Operating Characteristic (OC) curve. 2. Explain bath tub curve with neat diagram. 3. What are difference between MTTF and MTBF. 4. Define reliability also explain failure data analysis. |

**Assessment Methodology:**

1. Practical exam in lab where they have to write readings of statistical tools.
2. Assignments one from each unit.
3. Midterm subjective paper where they have to write numericals.
4. Final paper at the end of the semester subjective.

**Teaching and Learning resources unit-wise:**

**Unit-1**

A. Introduction, objective, scope of the quality management.

Video Tutorials: <https://www.youtube.com/watch?v=s4zr313edEI>

Theory concepts: <https://cyzotech.com/quality-management/>

Sample Quiz: <https://www.wisdomjobs.com/e-university/quality-management-interview-questions.html>

**Unit-2**

1. Meaning of quality improvement and quality policy and objectives

Video Tutorials: <https://youtu.be/K5vbIhUyqXU>

Theory concepts: <https://www.slideshare.net/AFAQAHMEDJAMADAR/introduction-to-quality-engineering-quality-control>

Sample Quiz:<http://www.yancypm.com/project_management/quality_sample_questions.html>

1. Modeling process quality

Video Tutorials: <https://youtu.be/eTG5NuTXBQg>

Theory concepts: <https://nptel.ac.in/courses/112/107/112107214/>

Sample Quiz: <http://www.yancypm.com/project_management/quality_sample_questions.html>

**Unit-3**

1. Statistical Quality Control

Video Tutorials: <https://youtu.be/L1ZuNUqyeMk>

Theory concepts: [https://www.sciencedirect.com/topics/engineering/statistical-quality- control](https://www.sciencedirect.com/topics/engineering/statistical-quality-%20%20control)

Sample Quiz:<http://www.yancypm.com/project_management/quality_sample_questions.html>

B. Control chart for variables

Video Tutorials: <https://youtu.be/dkSROYov-ow>

Theory concepts: [https://www.yourarticlelibrary.com/industrial-engineering-2/types-of- control-charts-with-diagram-industries/90321](https://www.yourarticlelibrary.com/industrial-engineering-2/types-of-%20%20%20%20%20%20control-charts-with-diagram-industries/90321)

Sample Quiz:<http://www.yancypm.com/project_management/quality_sample_questions.html>

**Unit-4**

1. Control chart for attributes

Video Tutorials: <https://youtu.be/ZDEteNQyTsE>

Theory concepts: <https://www.yourarticlelibrary.com/industrial-engineering-2/types-of-control-charts-with-diagram-industries/90321>

Sample Quiz: <http://www.yancypm.com/project_management/quality_sample_questions.html>

1. Concept of six sigma

Video Tutorials: <https://youtu.be/qH-btrXLai8>

Theory concepts: <https://www.henryharvin.com/blog/5-benefits-of-six-sigma-for-mechanical-engineers/>

Sample Quiz: <http://www.yancypm.com/project_management/quality_sample_questions.html>

1. Quality Assurance

Video Tutorials: <https://youtu.be/jTHZdfqRFUY>

Theory concepts: <https://en.wikipedia.org/wiki/Quality_assurance>

Sample Quiz: <http://www.yancypm.com/project_management/quality_sample_questions.html>

1. Acceptance sampling

Video Tutorials: <https://youtu.be/TdAimBiLOgA>

Theory concepts: <https://www.researchgate.net/publication/286900881_Acceptance_Sampling>

Sample Quiz: <http://www.yancypm.com/project_management/quality_sample_questions.html>

**Unit-5**

1. Reliability and life testing

Video Tutorials: <https://youtu.be/8-a3Cf0eZ90>

Theory concepts: <https://accendoreliability.com/mechanical-systems-reliability-testing/>

Sample Quiz:<http://www.yancypm.com/project_management/quality_sample_questions.html>

1. Taguchi method

Video Tutorials: <https://youtu.be/pEmiYcAlKHQ>

Theory concepts: <https://www.sciencedirect.com/topics/materials-science/taguchi-method>

Sample Quiz: <http://www.yancypm.com/project_management/quality_sample_questions.html>

Previous Year Question Papers:

