

**IV B.TECH - II SEMESTER**  
**QUALITY AND RELIABILITY ENGINEERING**

**Course Code: ME8T2C**

**Lecture: 3 periods/week**

**Tutorial: 1 period/week**

**Credits: 3**

**Internal assessment: 30 marks**

**Semester end examination: 70 marks**

---

**COURSE OBJECTIVES:**

- Demonstrate the approaches and techniques to assess and improve process and/or product quality and reliability.
- Introduce the principles and techniques of Statistical Quality Control and their practical uses in product and/or process design and monitoring
- Illustrate the basic concepts and techniques of modern reliability engineering tools.

**COURSE OUTCOMES:**

Upon completion of this course the student will be able to:

1. Attain the basic techniques of quality improvement, fundamental knowledge of statistics and probability
2. Use control charts to analyze for improving the process quality.
3. Describe different sampling plans
4. Acquire basic knowledge of total quality management
5. Understand the concepts of reliability and maintainability

**Prerequisites:**

Industrial Engineering and Management

**UNIT I**

**Quality value and engineering – quality systems**

Quality engineering in product design and production process – system design –parameter design – tolerance design, Quality costs – quality improvement.

**UNIT II**

**Statistical Process control**

X, R, p, c charts, other types of control charts, process capability, process capability analysis, process capability index.

**Acceptance sampling** by variables and attributes, design of sampling plans, single, double, sequential and continuous sampling plans, design of various sampling plan.

**UNIT III**

Loss function, tolerance design –

N type, L type, S type; determination of tolerance for these types. Online quality control–variable characteristics attribute characteristics, parameter design.

## **UNIT IV**

### **Quality function deployment –**

House of quality, QFD matrix, and total quality management concepts. Quality information systems, quality circles, introduction to ISO 9000 standards.

**Reliability**– Evaluation of design by tests - Hazard Models, Linear, Raleigh, Weibull. Failure Data Analysis, reliability prediction based on weibull distribution, Reliability improvement.

## **UNIT V**

### **Complex system-**

Reliability, reliability of series, parallel, standby systems, reliability prediction and system effectiveness.

### **Maintainability-**

Availability, economics of reliability engineering, replacement of items, maintenance costing and budgeting, reliability testing.

## **Learning Resources**

### **Text Books:**

1. Statistical Process Control, by Eugene Grant, Richard Leavenworth, McGraw Hill.
2. Quality Engineering in Production Systems, by G Taguchi , McGraw Hill, 1989.
3. Optimization & Variation Reduction in Quality, by W.A. Taylor, Tata McGraw Hill, 1991.

### **Reference Books:**

1. Juran's Quality Planning and Analysis, by Frank. M. Gryna Jr. McGraw Hill
2. Taguchi Techniques for Quality Engineering, (2<sup>nd</sup> Edition) by Philippos, McGraw Hill, 1996,.
3. Reliability Engineering, (3<sup>rd</sup> Edition), by LS Srinath, Affiliated East West Pvt Ltd, 1991.
4. Reliability Engineering, by E. Bala Guruswamy, Tata McGraw Hill, 1994.