4/4 B.Tech. EIGHTH SEMESTER

ME8T2C QUALITY AND RELIABILITY ENGINEERING Credits: 4

Lecture:- 4 periods/week **Internal assessment: 30marks**
Tutorial: -- **Semester end examination: 70 marks**

Objectives:

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

Learning outcomes:

At the end of course the students 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 control charts, process capability, process capability analysis, process capability index.

UNIT-III:
ACCEPTANCE SAMPLING BY VARIABLES AND ATTRIBUTES,
design of sampling plans, single and double sampling plans, design of various sampling plans.

UNIT-IV:
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-V:
QUALITY FUNCTION DEPLOYMENT-HOUSE OF QUALITY,
QFD matrix, total quality management concepts, quality information systems, quality circles, introduction to ISO 9000 standards.

UNIT-VI:
RELIABILITY-
Evaluation by design tests-Hazard modes, Linear models. Failure data analysis, reliability prediction based on weibull distribution, Reliability improvement.

UNIT-VII:
COMPLEX SYSTEM,
Reliability, Reliability of series, parallel and standby systems & complex systems & Reliability prediction and system effectiveness.

UNIT-VIII:
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. Jurans Quality Planning and Analysis, by Frank. M.Gryna Jr. McGraw Hill
2. Taguchi Techniques for Quality Engineering, (2nd Edition) by Philipposs, McGraw Hill, 1996,.
3. Reliability Engineering, (3rd Edition), by LS Srinath, Affiliated East West Pvt Ltd, 1991.
4. Reliability Engineering, by E.Bala Guruswamy, Tata McGraw Hill, 1994.