



# GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering (Part Time)

Subject Code: 2971908

Semester –VII

Subject Name: Quality and Reliability Engineering

Type of course: NA

Prerequisite: Nil

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	<b>Introduction to Quality:</b> Concept, Different Definitions and Dimensions, Inspection, Quality Control, Quality Assurance and Quality Management, Quality as Winning Strategy, Views of different Quality Gurus.	04
2	<b>Total Quality Management (TQM):</b> Introduction, Definitions and Principles of Operation, Tools and Techniques, such as, Quality Circles, 5 S Practice, Total Quality Control (TQC), Total Employee Involvement (TEI), Problem Solving Process, Quality Function Deployment (QFD), Failure Mode and Effect analysis (FMEA), Fault Tree Analysis (FTA), Kizen, Poka-Yoke, 7QC Tools, PDCA Cycle, 7 New Quality Improvement Tools, TQM Implementation and Limitations.	08
3	<b>Introduction to Design of Experiments:</b> Introduction, Methods, Taguchi approach, Achieving robust design, Steps in experimental design.	07
4	<b>Just –in –Time, Quality Management, Total Productive Maintenance (TPM) and ISO:</b> Introduction to JIT production system, KANBAN system, JIT and Quality Production, TPM: Content, Methods and Advantages ISO 9000, ISO 14000 and QS 9000: Basic Concepts, Scope, Implementation, Benefits, Implantation Barriers.	08
7	<b>Contemporary Trends:</b> Concurrent Engineering, Lean Manufacturing, Agile Manufacturing, World Class Manufacturing, Cost of Quality (COQ) system, Bench Marking, Business Process Re-engineering, Six Sigma: Basic Concept, Principle, Methodology, Implementation, Scope, Advantages and Limitation of all as applicable.	09
8	<b>Reliability:</b> Introduction, Concepts of Reliability and failure: Reliability, Failure, Failure mechanism,	10



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	failure severity and consequences. Reliability basic functions: Probability density function, cumulative function and reliability function, conditional distribution and residual life, failure rate and cumulative hazard functions, relation between reliability basic functions. Life characteristics: Measure of life time, Dispersion of lifetime, Skewness and kurtosis of life dispersion. Reliability of repairable system: Failure repair process, Reliability measure, Reliability point process. Evolution of reliability over Product life cycle: Design reliability, Inherent reliability, Reliability at sale, field reliability.	
	<b>Total Hours</b>	<b>45</b>

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	25	20	15	15

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

### Reference Books:

1. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India
2. Introduction to Quality and Reliability Engineering, Jiang R, Springer Publication, 2015.
3. Quality Assurance and Total Quality Management (ISO 9000, QS 9000 ISO 14000) by K C Jain and A K Chitale, Khanna Publishers
4. Total Quality Management by Dale H. Besterfield, Carol Besterfield-Michna, Glen H. Besterfield and Mary Besterfield-Sacre, Pearson Educaiton
5. Total Quality Management – Dr. S. Kumar, Laxmi Publication Pvt. Ltd.
6. Reliability Engineering by Srinath L. S., Affiliated East West Press.
7. Total Quality Management by K C Arora, S K Kataria & Sons
8. Total Quality Management: Poornima M. Charantimath, Pearson education(Singapore) Pte. Ltd.
9. Managing for Total Quality: N. Logothetis, Prentice Hall of India Pvt. Ltd.
10. Managing Quality : Barrie G. Dole, Blackwell publishing
11. TQM – an integrated approach – Samuel K Ho, Crest publishing House.

**Course Outcomes:** Students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Interpret Quality and Total quality management	30
CO-2	Make use of design of experiments, concepts of just in time and quality management.	25
CO-3	Illustrate Total Productive maintenance and ISO.	20



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CO-4	Utilize knowledge of contemporary trends in quality engineering and Reliability Engineering in industry.	25

**Term Work:**

The term work shall be based on the topics mentioned above.