



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Bachelor of Engineering**  
**Subject Code: 3171929**  
**Semester –VII**  
**Subject Name: Quality and Reliability**  
**Engineering**

**Type of course: NA**

**Prerequisite: Nil**

**Rationale:**

The course aims to impart basic knowledge about various aspects of Quality and Quality Management. It also helps students to understand design of experiments. Latest advance in the area of Just in time and TQM has been covered with contemporary issues. This subject also gives knowledge about reliability and product life cycle.

**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 Wining 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



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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
5	<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.	08
6	<b>Reliability:</b> Introduction, Concepts of Reliability and failure: Reliability, Failure, Failure mechanism, 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.	10
	<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 Jainand A K Chitale, Khanna Publishers
4. Total Quality Management by Dale H. Besterfield, Carol Besterfield-Michna, Glen H. Besterfieldand 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



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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
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.

### Tentative List of Experiments:

1. Exercise on Quality Circle and 5S
2. Exercise on PDCA and Fault tree analysis
3. Exercise on Taguchi methods ( Small case problems)
4. Case study problems analysis on JIT, ISO and kanban
5. Problems on Failure repair process, Reliability measure
6. Problems on failure mechanism
7. Case study presentation on Six sigma
8. Case study on product life cycle