

GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: MANUFACTURING ENGINEERING
SUBJECT NAME: QUALITY & RELIABILITY ENGINEERING
SUBJECT CODE: 2173407
B.E. 7TH SEMESTER

Type of course: Theoretical + Practical (Regular)

Prerequisite: NA

Rationale:

- To under the various principles, practices of TQM to achieve quality
- To learn the various statistical approaches for quality control and reliability concepts

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
		PA	ALA		ESE	OEP				
3	2	0	5	70	20	10	30	0	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction: Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.	05	10
2	TQM Principles: Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.	10	20

3	TQM Tools & Techniques: The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types. Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.	08	20
4	Quality Systems: Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors.	05	15
5	Maintenance Concepts: Objectives and functions – Tero technology – Reliability Centered Maintenance (RCM) – maintainability prediction – availability and system effectiveness- maintenance costs – maintenance organization. Minimal repair – maintenance types – balancing PM and breakdown maintenance.	06	15
6	Reliability Concepts: Reliability engineering fundamentals; Failure data analysis; Failure rate; mortality curve; Concept of burn in period; Useful life and wear out phase of a system; Mean time to failure (MTTF); Mean time between failure, (MTBF) and mean time to repair (MTTR); Reliability in terms of Hazard rate and failure density, Conditional probability and multiplication rules.	08	20
	Total	42	100%

Suggested Specification table with Marks (Theory):

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

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.

References Book:

1. Dale H. Besterfield, "Total Quality Management", Pearson Education Asia.
2. Poornima Charantimath, "Total Quality Management", Pearson Education Asia
3. Tapan Bose "Total Quality Management", Pearson Education
4. Reliability Engineering by Srinath L. S., Affiliated East West Press.
5. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning)
6. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, 3rd Edition
7. Suganthi, L and Anand Samuel, "Total Quality Management",
8. Janakiraman, B and Gopal, R.K, "Total Quality Management – Text and Cases".

List of Tutorials:

1. To study about TQM Principles
2. To study about TQM Tools & Techniques
3. To study about Quality Systems
4. To study about Maintenance Concepts
5. To study about Reliability Concepts

Course Outcome:

At the end of this course the student should be able to understand

- To understand Quality concepts
- To understand maintenance concepts
- To understand Reliability concepts
- To understand the modern practices in maintenance.

Major Equipments: NA

Review Presentation (RP):The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations.

List of Open Source Software/learning website:

1. www.nptel.ac.in/

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.