

**LOK JAGRUTI UNIVERSITY (LJU)**  
**INSTITUTE OF ENGINEERING & TECHNOLOGY**

Department of Mechanical Engineering  
Bachelor of Engineering (B.E.) – Semester - VI

Course Code:	017104601
Course Name:	Quality and Reliability Engineering
Category of Course:	Professional Elective Course (PEC-1)
Prerequisite Course:	Mathematics 2 (017101291)

Teaching Scheme				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Total Hours
3	0	0	3	30

Syllabus				
Unit No.	Topic	Prerequisite Topic	Successive Topic	Teaching Hours
01	<b>Introduction</b>			3 (10%)
	1.1 Quality concept, cost of quality	---	---	
	1.2 History of TQM	---	---	
	1.3 Definition, Concept and Features of TQM	---	---	
	1.4 GURUS of TQM.	---	---	
	1.5 Awards in Quality management	---	---	
	1.6 Applications of TQM	---	---	
	1.7 Case studies on successful TQM implementation	Basic concepts of TQM (017104601-Unit-01)	---	
02	<b>Customer and employee focused leadership</b>			3 (12%)
	2.1 Deming philosophy	---	---	
	2.2 Characteristics of a good leader	---	---	
	2.3 Ethics, core values and framework	---	---	
	2.4 Customer perception of quality, feedback and converting them into specifications	---	---	
	2.5 Employee motivation and teamwork	---	---	
	2.6 Case studies	Concepts of customer and employee focused leadership (017104601-Unit-02)	---	
03	<b>Continuous Process Improvement</b>			4 (12%)
	3.1 Introduction to process & Juran Trilogy	---	---	
	3.2 Types of problems & improvement strategies	---	---	
	3.3 PDSA CYCLE	---	---	
	3.4 Lean Manufacturing- 5S, Kaizen	---	---	
	3.5 Six Sigma	---	---	
	3.6 Poka Yoke, Mistake proofing	---	---	
	3.7 Case studies on current research in Continuous process improvement	Concepts of continuous process improvement (017104601-Unit-03), Basic Probability and Statistics (017101291-Unit-10)	---	
04	<b>TQM Tools and Techniques</b>			3 (12%)
	4.1 Benchmarking, Quality function Deployment	---	---	
	4.2 Failure Mode and Effect Analysis	---	---	
	4.3 Total productive maintenance	---	---	
	4.4 Affinity, tree and matrix diagrams	---	---	
	4.5 Why why analysis, Forced field analysis	---	---	
	4.6 case studies	Concepts of TQM tools (017104601-Unit-04), Basic Probability and Statistics (017101291-Unit-10)	---	
05	<b>Statistical process control</b>			3 (10%)
	5.1 Fundamentals of statistics	---	---	
	5.2 Control charts for variables and attributes	---	---	
	5.3 Measurement system analysis	---	---	
	5.4 Seven quality control tools(Check Sheet,cause and effect Diagram,Control chart,Histogram,Pareto chart,scatter diagram,Stratification)	---	---	
	5.5 Examples based on SPC	---	---	
06	<b>Introduction to Design of Experiments</b>			3 (8%)
	6.1 Introduction, Taguchi Method, loss function	---	---	
	6.2 Orthogonal arrays	---	---	
	6.3 Signal to noise ratio	---	---	
	6.4 Parametric design	---	---	
	6.5 Tolerance design	---	---	
07	<b>Quality by Design</b>			2 (8%)
	7.1 Introduction	---	---	
	7.2 Objectives of Quality by Design	---	---	

	7.3 Design for Six Sigma (DFSS)	---	---	
	7.4 Tools for Quality by Design	---	---	
	7.5 case studies	Concepts of quality by design (017104601-Unit-07)	---	
	<b>Reliability</b>			
08	8.1 Concept and Components	---	---	3 (10%)
	8.2 Types of failure – Reliability of system	---	---	
	8.3 Success and Failure models in series and parallel – Methods of achieving higher reliability	---	---	
	8.4 Concept of maintainability and availability -- Weibull Distribution (Bath Tub curve),	---	---	
	8.5 Comparison with reliability, MTBF & MTTF	---	---	
	8.6 case studies	Concepts of reliability (017104601-Unit-08), Basic Probability and Statistics (017101291-Unit-10)	---	
	<b>Quality Management Standards</b>			
09	9.1 The ISO 9001:2000 Quality Management System Standard	---	---	3 (9%)
	9.2 The ISO 14001:2004 Environmental Management System Standard	---	---	
	9.3 ISO 27001:2005 Information Security Management System	---	---	
	9.4 ISO / TS 16949:2002 for Automobile Industry - CMMI Fundamentals and Concepts	---	---	
	9.5 Case studies related to ISO 9001, ISO 14001 and ISO / TS 16949	Concepts of ISO 9001, ISO 14001 and ISO / TS 16949 (017104601-Unit-09)	---	
	<b>World Class Manufacturing</b>			
10	10.1 Concept of World Class Manufacturing, Philosophy and Evolution of WCM	---	---	3 (9%)
	10.2 Hall's framework of Value-added engineering, Toyota Production system	---	---	
	10.3 Schonberger's framework of WCM, Gunn's model of WCM, Maskell model of WCM	---	---	
	10.4 America and India's best plants model of WCM	---	---	
	10.5 Case studies on World Class Manufacturing	Concepts of world class manufacturing (017104601-Unit-10)	---	

**Proposed Theory + Practical Evaluation Scheme by Academicians  
(% Weightage Category Wise and it's Marks Distribution)**

**L :** 3      **T:** 0      **P:** 0

**Note: In Theory Group, Total 4 Test (T1+T2+T3+T4) will be conducted for each subject.  
Each Test will be of 25 Marks.  
Each Test Syllabus Weightage: Range should be 20% - 30%**

Group (Theory or Practical)	Group (Theory or Practical) Credit	Total Subject Credit	Category	% Weightage	Marks Weightage	
Theory	3	3	MCQ	100%	100	
Theory			Theory Descriptive (Mainly Programming)	00%	0	
Theory			Formulas and Derivation	0%	0	
Theory			Numerical	0%	0	
<b>Expected Theory %</b>	<b>100%</b>			<b>Calculated Theory %</b>	<b>100%</b>	<b>100</b>
Practical	0		Individual Project	0%	0	
Practical			Group Project	0%	0	
Practical			Internal Practical Evaluation (IPE)	0%	0	
Practical			Viva	0%	0	
Practical			Seminar	0%	0	
<b>Expected Practical %</b>	<b>0%</b>		<b>Calculated Practical %</b>	<b>0%</b>	<b>0</b>	
<b>Overall %</b>	<b>100%</b>			<b>100%</b>	<b>100</b>	

**Course Outcome**

	<i>Upon completion of course, student will be able to</i>
1	Develop an understanding on quality management philosophies and frameworks.
2	Develop in-depth knowledge on various tools and techniques of quality management.
3	Learn the applications of Reliability and Design.
4	Develop analytical skills for investigating and analyzing quality standards to achieve world class manufacturing

<b>Suggested Reference Books</b>	
1	Total Quality Management: Dale H.Besterfield, et al., Pearson Education Asia
2	Total Quality Management: Subburaj Ramasamy, Tata McGraw Hill
3	Quality Control and Total Quality Management, Jain, Khanna Publications, New Delhi
4	Total Quality Management, Poonia & Sharma, Khanna Publishing House
5	Total Quality Management, Gopal, PHI Publication
6	Total Quality Management and Operational Excellence by John S. Oakland, Routledge Publication
7	Total Quality Management Key Concepts and Case Studies, D.R. Kiran, Butterworth-Heinemann Publication

<b>List of Open Source Software/Learning website</b>	
1	<a href="http://nptel.ac.in/">http://nptel.ac.in/</a>
2	<a href="http://www.minitab.com/">http://www.minitab.com/</a>
3	<a href="http://www.r-project.org/">http://www.r-project.org/</a>
4	<a href="http://www.coursera.org/">http://www.coursera.org/</a>
5	<a href="http://www.python.org/">http://www.python.org/</a>