

# NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

## COURSE PLAN – PART I

<b>Name of the programme and specialization</b>	<b>B.Tech. Production Engineering - V Semester ( B Section)</b>		
<b>Course Title</b>	Quality, Reliability and Safety Engineering		
<b>Course Code</b>	PRPC22	<b>No. of Credits</b>	3
<b>Course Code of Pre-requisite subject(s)</b>	General awareness about Statistical Theory and applications		
<b>Session</b>	July 2018	<b>Section (if, applicable)</b>	B
<b>Name of Faculty</b>	R.Rajesh	<b>Department</b>	Production Engineering
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<b>Name of Course Coordinator(s) (if, applicable)</b>			
<b>E-mail</b>		<b>Telephone No.</b>	
<b>Course Type</b>	<input checked="" type="checkbox"/> <b>Core course</b>	<input type="checkbox"/> <b>Elective course</b>	
<b>Syllabus (approved in BoS)</b>			
Introduction to quality assurance and quality control – Statistical concepts in quality – Central limit theorem – Quality control tools			
Control charts for variables and attributes– process capability studies – Sampling inspection- Quality System standard			
Failure Rate, Mean Time Between Failures (MTBF)-Mean Time To Failure (MTTF), Bathtub distribution, Down time, Repair time, Availability, Series-Parallel Structures, Redundancy, Reliability Allocation, Mechanical Reliability, Failure Mode Analysis.			
Safety - Importance -Fundamental Concepts and Terms- Workers' Compensation - Product Liability - Hazards and their Control -Walking and Working Surfaces, Electrical Safety - Tools and Machines - Materials Handling.			
Fire Protection and Prevention -Explosions and Explosives - Radiation - Biohazards - Personal Protective Equipment - Managing Safety and Health.			
<b>COURSE OBJECTIVES</b>			
<ul style="list-style-type: none"> <li>• To identify and analyze failures of components and sub-components of mechanical and electronic items.</li> <li>• To distinguish different concepts in maintenance and explore in order to increase service life of the products/machines</li> <li>• To list various safety measures concerned with environment described for a safety engineer</li> </ul>			

<b>COURSE OUTCOMES (CO)</b>	
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>
1. Identify and analyze the failures of the components and sub-components of mechanical and electronic items.	PO1, PO 6 (Unit II,III)
2. Distinguish different concepts in maintenance and explore in order to increase the service life of the products/machines	PO 2 (Unit I,III)
3. List various safety measures concerning with environments described for a safety engineer	PO 7 (Unit IV, V)

### **COURSE PLAN – PART II**

#### **COURSE OVERVIEW**

Quality control (QC) is a procedure or set of procedures intended to ensure that a manufactured product or performed service adheres to a defined set of quality criteria or meets the requirements of the client or customer.

The ability of a system or component to perform its required functions under stated conditions for a specified time. Reliability engineering relates closely to safety engineering and to system safety, in that they use common methods for their analysis and may require input from each other.

This course enables students to study the appropriate quality control tools for controlling the process or products and perform analysis to enhance the reliability of the product. Finally, the safety aspects in industrial environment shall be explained with practical examples.

#### **COURSE TEACHING AND LEARNING ACTIVITIES**

<b>S.No.</b>	<b>Week/Contact Hours</b>	<b>Topic</b>	<b>Mode of Delivery</b>
1	Week 1	Introduction to quality Assurance and quality control, Quality control tools	PPT
2	Week 2	Contributions of quality gurus, control charts for process control	PPT
3	Week 3	Variable charts - X bar and R Chart, X bar and s chart & MR chart, tutorials	C&T
4	Week 4	Attribute charts - p, np charts, tutorials	C&T

5	Week 5	c, u and U charts, Process capability studies	C&T	
Cycle test -1				
6	Week 6	Acceptance sampling- single, double sampling plans	C&T	
7	Week 7	Design of sampling plans, Performance measures of sampling plans	C&T	
8	Week 8	Reliability studies, life cycle of a product	C&T	
9	Week 9	Series-Parallel and redundant connections	C&T	
Cycle test -2				
10	Week 10	Importance and Fundamental concepts of Safety, Workers Compensation	PPT	
11	Week 11	Hazards and their control, Materials Handling	PPT	
12	Week 12	Fire Protection and Prevention, Personal Protective Equipment, Managing Safety and Health	PPT	
<b>COURSE ASSESSMENT METHODS (shall range from 4 to 6)</b>				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle test -1	End of 5 Weeks	1 Hr	20%
2	Cycle test -2	End of 9 Weeks	1 Hr	20%
3	Assignment	Once in 4 Weeks	----	10%
4	Compensation Assessment	End of 12 Weeks	1.5 Hr	20%
5	Final Assessment	End of Semester	3 Hrs	50%

**COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)**

- Course exit survey will be collected at the end of the semester.
- Feedback during class committee meeting

**COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)**

- Attending classes regularly and continuously is required for the students to understand the concepts.
- Attendance will be taken in every class. If the student is not able to maintain 75% attendance, he/she is required to write the compensation assessment and obtain a minimum of 15 marks to become eligible to write the final assessment.
- Participation in the discussions is mandatory during the tutorial classes.
- Strict academic disciplines have to be maintained inside the class room.
- If any student is not able to attend any of the continuous assessments (1, 2, and 3) due to genuine reason, student is permitted to attend the compensation assessment with % weightage equal to maximum of the CAs. However, a student absent for more than one CAs, maximum of the % weightage among the assessments for which the student was absent will be considered for computing marks for CA.
- Reassessment shall be conducted for failed / absented (in final assessment) in the beginning of next session. Failed (in final assessment) candidates shall get a maximum of E grade in the reassessment.

**ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)**

- **At least 75% attendance in each course is mandatory.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

**ACADEMIC DISHONESTY & PLAGIARISM**

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

**FOR APPROVAL**

Course Faculty



CC-Chairperson



HOD



**Guidelines:**

- a) The number of assessments for a course shall range from 4 to 6.
- b) **Every course shall have a final assessment on the entire syllabus with at least 30% weightage.**
- c) **One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered. Details of compensation assessment to be specified by faculty.**
- d) **The passing minimum shall be as per the regulations.**
- e) **Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.**
- f) **Absolute grading policy shall be incorporated if the number of students per course is less than 10.**
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.