

DEPARTMENT OF PRODUCTION ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech – Production Engineering, VII Semester		
Course Title	PRECISION ENGINEERING		
Course Code	PRPE29	No. of Credits	03
Course Code of Pre-requisite subject(s)	PRPC14	---	---
Session	July 2022	Section (if, applicable)	---
Name of Faculty	V.Murugabalaji	Department	PRODUCTION ENGG
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Name of Course Coordinator(s) (if, applicable)	Dr. D. Lenin Singaravelu		
E-mail		Telephone No.	
Course Type	<input type="checkbox"/> Core course <input checked="" type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
PRPE29 PRECISION ENGINEERING			
<p>Precision machining – Concepts and significance – Classification - Top down – Bottom up approaches– Precision and micromachining - Machining of micro-sized components - Ultra precision machining grinding</p> <p>Lithography – Photolithography - Electron beam lithography – Ion Beam lithography - Deep UV lithography–MEMS – Principle – Elements – Characteristics – Applications- Design and fabrication approaches.</p> <p>Micro-manufacturing- Limits of capability of conventional mechanical manufacturing-Micro-machining-concepts-Types–Tools–Electrical Discharge Micro-Machining–Wire cut EDM– Electro Chemical Micro-Machining–Abrasive Jet Micromachining - Laser based micromachining</p> <p>Nano surface generation-Concepts and applications-Types- Ductile mode of machining- Diamond turning of parts to nanometer accuracy – ELID grinding – Chemo Mechanical Polishing- Magnetorheological finishing.</p> <p>Precision metrology –In-process measurement of position of processing point - Post process and online measurement of dimensional features -Mechanical measuring systems - Optical measuring systems - Electron beam measuring systems – Scanning Tunnelling – Atomic Force Microscope.</p> <p>LAB EXERCISES</p> <ol style="list-style-type: none"> 1. Exercise on Micro-turning operation on DT-110 Multi-process micro-machining center. 2. Exercise on Micro-milling operation on DT-110 Multi-process micro-machining center. 			

3. Exercise on Micro-drilling operation on DT-110 Multi-process micro-machining center.

COURSE OBJECTIVES

To provide and enhance technical knowledge in precision engineering, its components and applications

COURSE OUTCOMES (CO)

Course Outcomes

Aligned Programme Outcomes (PO)

Understand the concept of precision engineering, its principles and importance as applicable to instruments and machines

Unit-I, II, III, IV, V

COURSE PLAN – PART II

COURSE OVERVIEW

The aim of this course is to enable the students to understand the concepts of precision manufacturing of micro sized components and make them familiar with the concepts of nanoscale finishing processes and precision measurement techniques.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week-1	Precision machining – Concepts and significance	C&T,PPT
		Classification - Top down – Bottom up approaches	
		Precision and micromachining	
2	Week-2	Machining of micro-sized components	C&T,PPT
		Ultra-precision machining grinding	
		Lithography	
3	Week-3	Photolithography	C&T,PPT
		Electron beam lithography	
		Ion Beam lithography	
4	Week-4	Deep UV lithography	C&T,PPT
		MEMS – Principle – Elements	
		MEMS – Characteristics – Applications	
5	Week-5	Micro-manufacturing- Limits of capability of conventional mechanical manufacturing	C&T,PPT
		Micro- machining-concepts	
		Design and fabrication approaches	
6	Week-6	Micro- machining -Types-Tools	C&T,PPT
		Electrical Discharge Micro-Machining	
		Wire cut EDM	
7	Week-7	Electro Chemical Micro-Machining-	C&T,PPT
		Abrasive Jet Micromachining	
		Laser based micromachining	

		Laser based micromachining	
8	Week-8	Nano surface generation-Concepts and applications	C&T,PPT
		Nano surface generation - Types	
		Ductile mode of machining	
9	Week-9	Diamond turning of parts to nanometer accuracy - ELID grinding	C&T,PPT
		Chemo Mechanical Polishing	
		Micro-turning operation - lab	
10	Week-10	Magnetorheological finishing.	C&T,PPT
		Precision metrology - In-process measurement of position of processing point	
		Micro-milling operation - lab	
11	Week-11	Post process and online measurement of dimensional features - Mechanical measuring systems -	C&T,PPT
		Optical measuring systems - Electron beam measuring systems	
		Micro-drilling operation - lab	
12	Week-12	Scanning Tunneling Microscope	C&T,PPT
		Atomic Force Microscope	
		Lab Assessment	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment		---	10
2	Cycle test -1	Week-5	60 Minutes	20
3	Cycle test -2	Week-10	60 Minutes	20
CPA	Compensation Assessment*	Week-13	60 Minutes	Same as cycle test 1 and 2
4	Lab Assessment	Week 12		10
5	Final Assessment *	Week-14	180 Minutes	40

***mandatory; refer to guidelines on page 4**

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

1. Feedback from the students during class committee meetings.
2. Anonymous feedback through questionnaire.
3. End semester feedback on course outcomes.

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

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.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or class average/2 whichever is greater.		Peak/3 or class average/2 whichever is lower		40%

- 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.