DEPARTMENT OF PRODUCTION ENGINEERING NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

TATIOTICE II	TOTAL OF TECH	,	NAI I ALLI	
	COURSE PL	AN - PART I		
Name of the programme and specialization	B. Tech – Production E	ngineering, VII Semeste		
Course Title	PRECISION ENGINE	PRECISION ENGINEERING		
Course Code	PRPE29	No. of Credits	03	
Course Code of Pre- requisite subject(s)	PRPC14		and the second s	
Session	July 2022	Section (if, applicable)		
Name of Faculty	V.Murugabalaji	Department	PRODUCTION ENGG	
Email	414120003@nitt.edu	Telephone No.	9597675365	
Name of Course Coordinator(s) (if, applicable)	Dr. D. Lenin Singarave	lu		
E-mail		Telephone No.		
Course Type	Core course	Elective course		
	新 斯			
Syllabus (approved in E	BoS)	- 43		
Precision machining approaches—Precision as machining grinding	PRPE29 PRECISIOn g - Concepts and significant micromachining - Machine	ance - Classification - 7	Top down – Bottom up ponents - Ultra precision	

Lithography – Photolithography - Electron beam lithography – Ion Beam lithography - Deep UV lithography–MEMS – Principle – Elements – Characteristics – Applications- Design and fabrication approaches.

Micro-manufacturing- Limits of capability of conventional mechanical manufacturing-Micro-machining-concepts-Types-Tools-Electrical Discharge Micro-Machining-Wire cut EDMM- Electro Chemical Micro-Machining-Abrasive Jet Micromachining - Laser based micromachining

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.

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.

LAB EXERCISES

- 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	
		Precision machining – Concepts and significance	C&T,PPT	
1	Week-1	Classification - Top down - Bottom up approaches		
		Precision and micromachining		
_	Week-2	Machining of micro-sized components	C&T,PPT	
2	WCCR-2	Ultra-precision machining grinding		
		Lithography		
3	Week-3	Photolithography	C&T,PPT	
		Electron beam lithography Ion Beam lithography		
		Deep UV lithography	34.37	
4	Week-4	MEMS – Principle – Elements	C&T,PPT	
		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	
44	West	Micro- machining -Types-Tools	C&T,PPT	
6	Week-6	Electrical Discharge Micro-Machining	C&1,PP1	
	Wire cut EDMM	Wire cut EDMM		
7	Week-7	Electro Chemical Micro-Machining- Abrasive Jet Micromachining	C&T,PPT	
		Laser based micromachining		

		Laser based micromachining		
8 Week-8	Week-8	Nano surface generation-Concepts and applications	C&T,PPT	
		Nano surface generation - Types		
		Ductile mode of machining		
	Week-9	Diamond turning of parts to nanometer accuracy - ELID grinding	C&T,PPT	
9		Chemo Mechanical Polishing		
		Micro-turning operation - lab		
		Magnetorhelogical finishing.	C&T,PPT	
10	Week-10	Precision metrology - In-process measurement of position of processing		
	point			
		Micro-milling operation - lab		
		Post process and online measurement of dimensional features - Mechanical	C&T,PPT	
11 Week-1	Week-11	measuring systems -		
		Optical measuring systems - Electron		
		beam measuring systems		
		Micro-drilling operation - lab		
	Week-12	Scanning Tunneling Microscope	C&T,PPT	
12		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
СРА	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)

MODE OF CORRESPONDENCE (email/ phone etc)

- All the correspondence will be done through class representative.
- Queries and discussion about the course outside the classroom are appreciated.

COMPENSATION ASSESSMENT POLICY

- This is for absentees in cycle tests due to genuine reason with prior permission
- · This is not meant for improvement test.
- 90 minutes examination includes all syllabus.

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.

The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION	
Students should refer me	ore books for in-depth knowledge about the course.
FOR APPROVAL	
Course Faculty	CC-Chairperson C.S.T.; NC7+ C.S.T.; A
(MURUGABALAJI.V)	for

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	•	Peak/3 or class		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.