NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF PRODUCTION ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	MTech. Manufacturing Technology		
Course Title	Process Modelling and Additive Manufacturing Lab		
Course Code	PR610	No. of Credits	2
Course Code of Pre-requisite subject(s)	-		
Session	January 2021	Section (if, applicable)	
Name of Faculty	Dr V Senthilkumar & Dr S Vinodh	Department	Production Engg
Official Email	vskumar@nitt.edu, vinodh@nitt.edu	Telephone No.	9500403991, 9952709119
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	☐ Core course	☐ Elective course	

Syllabus (approved in BoS)

1. Analysis of stress strain distribution in a structural loading of composite bar using MATLAB codes.
2. Transient heat transfer analysis of a rectangular slab using a FEA package.
3. Modeling & simulation of forging/rolling/machining process using a FEA package.
4. Microstructural modelling of machined specimen using Cellular Automata (CA) method.
5. Modelling & Simulation of selective laser melting using Multi-physics software.
6. Selection of Rapid Prototyping Technology.
7. Product development activity – Concept design and Detailed design.
8. Product development activity – Engineering analysis and Prototype development.
9. Life Cycle Assessment using GaBi package.
10. Sustainable Product Development – Developing environmentally friendlier products.

COURSE OBJECTIVES

1. This lab course aims at enabling the students to perform modelling and simulation of manufacturing processes
2. This lab course provides insights to students to execute product development phases and develop environmentally friendlier products

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO)

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	(Enter Numbers only)
1. Knowledge to perform modelling and simulation of manufacturing processes	**1,2,3,5,9**
2. Competence to execute product development phases	**1,2,3,5,8,9**
3. Developing environmentally friendlier products	**1,2,3,5,9**

COURSE PLAN – PART II

COURSE OVERVIEW

This lab course deals with modelling and simulation of manufacturing processes using FEA, execution of various product development phases, prototype development using 3D Printer and analysis of tolerances.
1. Process Modelling Lab
2. Additive Manufacturing Lab

COURSE TEACHING AND LEARNING ACTIVITIES   (Add more rows)

S.No.	Week/ Contact Hours	Lab	Topic	Mode of Delivery
1	Week 1	1	Study of MATLAB commands and their functions	Exercise
		2	Basic Exercise on CAD	
2	Week 2	1	Analysis of spring stiffness using MATLAB	Exercise
		2	Development of mechanical assembly using CAD	
3	Week 3	1	Steady state heat conduction on thin L shaped part using ABAQUS	Exercise
		2	Development of mechanical assembly using CAD	
4	Week 4	1	Simulation of orthogonal machining using ABAQUS	Exercise
		2	Stress analysis of cantilever beam using CAE	
5	Week 5	1	Simulation of stress distribution on beam structure using ABAQUS	Exercise
		2	Thermal and Structural Analysis using CAE	
6	Week 6	1	Simulation of rolling using ABAQUS	Exercise
		2	Product Development project– Concept design	

			and Evaluation	
7	Week 7	1	Simulation of forging using ABAQUS	Exercise
		2	Product Development project – Modelling and Analysis	
8	Week 8	1	Simulation of steady-state 2D heat transfer with conduction using COMSOL	Exercise
		2	Rapid Prototyping technology selection using AHP	
9	Week 9	1	Structural analysis of a cantilever beam with edge load using COMSOL	Exercise
		2	Development of prototypes using 3D Printer	
10	Week 10	1	Analysis of thermally loaded beam using COMSOL	Exercise
		2	Quality Function Deployment for Environment	
11	Week 11	1	Analysis of the Laser-Cladding Process using COMSOL	Exercise
		2	Sustainable Product Development - Life Cycle Assessment using GaBi LCA module	
12	Week 12	1	End Semester Laboratory Examination	
		2	End Semester Laboratory Examination	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	% Weightage
1	Internal Assessment	75
2	Final Assessment *	25

*mandatory; refer to guidelines on page 4

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

At the end of the semester students will give feedback online (MIS) as well feedback will be gathered during class committee meetings. Also, mid semester feedback will be obtained through questionnaire.

COURSE POLICY (including compensation assessment to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)

The course faculty is available for discussion based on prior appointment by email –
vskumar@nitt.edu / vinodh@nitt.edu

COMPENSATION ASSESSMENT

- Attending online classes regularly and continuously is required for the students to understand the concepts.

- Interaction and participation in the discussions is encouraged during online learning process.

- Attending the exercises/assignment, and final assessment is mandatory. Final assessment will be on the entire syllabus.

ATTENDANCE POLICY

- Attendance for students will be considered as per institute policy.

ACADEMIC DISHONESTY & PLAGIARISM

- As per Institute Policy

ADDITIONAL INFORMATION, IF ANY

FOR APPROVAL

Course Faculty _____ CC- Chairperson _____ HOD _____

Dr V Senthil   Dr. S. Vinodh
Kumar