

Branch Name:	Mechanical Engineering (Production Technology)
Program Code:	ET209
Course Name:	Non-Traditional Manufacturing Processes
Course Code:	2ET2090301T
Pre-requisite Course:	Manufacturing Technology

Course Objectives:

1. To study need, classification and selection of non-conventional machining processes
2. To understand the principle, mechanism of metal removal of various non-conventional machining processes.
3. To study various process parameters and their effect on component machined for various non- conventional machining processes.
4. To understand the applications of different processes.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
03	03	-	-	03	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: Introduction to Non- conventional machining, Need for Non-conventional machining process, Comparison between conventional and non-conventional machining, general classification Non-conventional machining processes, and selection of non conventional machining processes, Specification, advantages, limitations and applications of non-conventional machining processes.	04	10
2	Mechanical Processes: Introduction, principle, process description, process capabilities, material removal mechanism, parametric analysis, tool design, limitations, and applications of Ultrasonic Machining (USM), Abrasive Jet Machining (AJM), Water Jet Machining (WJM) and Abrasive Water Jet Machining (AWJM) processes.	12	30
3	Electrochemical & Chemical Processes: Fundamental principle, process description, process capabilities, mechanism of material removal, surface finish and accuracy, limitations, and applications of Electrochemical Machining (ECM), Electrochemical Grinding (ECG), Electrochemical deburring, Electrochemical honing and Chemical Machining (CM) processes.	10	25

4	Thermal Metal Removal Processes: Electrical Discharge Machining (EDM): Working principle, process description, process capabilities, power circuits, mechanism of material removal, selection of tool electrode and dielectric fluid, limitations, and applications. Wire cut electro discharge machining (WCEDM), powder mixed electro discharge machining process Laser Beam Machining (LBM), Electron Beam Machining (EBM), Plasma Arc Machining (PAM) and Ion Beam Machining(IBM).	10	25
5	Micromachining Processes: Introduction to micromachining methods; material removal mechanism and process capability of micro machining methods like micro-turning, micro-milling, micro-drilling, microEDM, micro- WEDM, micro ECM, etc. ultra-precision machining, electrolytic in-process dressing and grinding.	04	10

Review Presentation:

The student is expected to refer at least two peer reviewed journal papers related to this domain/subject so as to identify issues/challenges and emerging trends. Student is supposed to explore various video lectures (E.g. NPTEL) available in the domain/subject. Student is required to make a review-presentation on the work carried out for the same.

Recommended sites for journal papers are (1) asmedigitalcollection.asme.org (2) springer.com (3) sciencedirect.com (4) ieeexplore.ieee.org (5) scholar.google.co.in or others of similar repute.

List of Reference Books:

1. P.C.Pandey and H.S. Shan, Modern Machining Processes, Tata McGraw Hill, New Delhi, 2003
2. P.K. Mishra, Nonconventional machining, Narosa publishing house, 2011
3. V.K. Jain, Introduction to micromachining, Narosa publishing house, New Delhi, 1st Edition, 2010
4. A. Ghosh and A. K. Mallik, Manufacturing Science, East-West Press, New Delhi, 2006
5. G. Benedict, Nontraditional manufacturing processes, Marcel Dekker, New York, 1st Edition, 1987.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the compare traditional and non-traditional machining process and recognize the need for Non-traditional machining process.	2 Understanding
CLO2	Understand the constructional features, performance parameters,	1 Remembering 2 Understanding
CLO3	Process characteristics, applications, advantages and limitations USM, AJM and WJM.	3 Applying 4 Analyze
CLO4	Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.	2 Understanding
CLO5	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.	2 Understanding 5 Evaluating
CLO6	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM	1 Remembering

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	H	M	M		H		L	L				M		
CLO2	M	M		M	H	L		M			M			M
CLO3	H	L	M	M	M					M	M		M	
CLO4	H	M	M		H		L	L				M		H
CLO5	H	M	M		M	L			M		M		M	
CLO6	M	H	L	M		L		M		M	L	H		L

H: High, M:Medium, L:Low