

Branch Name:	Mechanical Engineering (Production Technology)
Semester/Year:	Semester III / Second Year
Subject Title:	Non-Traditional Manufacturing Processes
Subject Code:	1ET2090301
Pre-requisite:	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 Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	02	05	60	40	30	20	150

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 nonconventional machining processes, Specific 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.	14	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.	12	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).	12	25

5	Micromachining Processes: Introduction to micro machining methods; material removal mechanism and process capability of micro machining methods like micro -turning, micro-milling, micro-drilling, micro EDM, micro- WEDM, micro ECM, etc. ultra-precision machining, electrolytic in process dressing and grinding.	04	10
		46	100

Review Presentation: The student is expected to spend minimum 2 hours per week (as mentioned in the teaching and evaluation scheme) to refer at least two peer reviewed journal papers related to this domain/subject. The student is expected to identify issues/challenges and emerging trends in the domain/subject. 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 (5) ieeexplore.ieee.org (6) scholar.google.co.in or others of similar repute.

Course Outcomes:

The student will be able to

1. Understand the compare traditional and non-traditional machining process and recognize the need for Non-traditional machining process.
2. Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
3. Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.
4. Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.
5. Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM

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 micro machining, 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.

List of Practical:

Laboratory work shall be based on the topics above. At least 5-6 practical must be designed. Experiments with performance/demonstration facility should be given preference.