



SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

Narsapur, West Godavari District, A.P. 534280

DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Course Code	Course Title	Semester	Branches	Conduct Periods /Week	Academic Year	Date of commencement of Semester
23ME6E10	Unconventional Machining Processes	VII	Mechanical Engineering	6	2023-24	17-06-2026

COURSE OUTCOMES

1	Explain the need, classification, and selection criteria of nontraditional machining processes and compare them with conventional machining methods. [K2]
2	Apply principles and process parameters of cold cutting processes such as AJM, WJM, and AWJM to suitable materials and applications. [K3]
3	Analyze the working mechanisms, parameters, and performance of Ultrasonic Machining (USM) for different industrial applications. [K4]
4	Analyze chemical and electrochemical machining processes (CHM, ECM, ECG, ECH) with respect to MRR, surface finish, and process parameters. [K4]
5	Evaluate Electric Discharge Machining (EDM), Wire EDM, and related processes by analyzing process parameters, tool selection, and surface integrity. [K4]
6	Analyze high energy beam machining (LBM, EBM, PBM) and advanced nano finishing processes in terms of mechanism, accuracy, and applications. [K4]

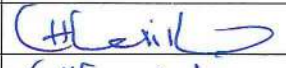
UNIT	Out Comes/ BTL	Topic No.	Topics/Activity	Textbook/ Reference	Conduct Hour	Delivery Method
I	Explain the need, classification, and selection criteria of nontraditional machining processes and compare them with conventional machining methods. [K2]	1. INTRODUCTION				
		1.1	Introduction	T ₁ & T ₂	1	Chalk, Talk, & Tutorial s, Seminar
		1.2	Conventional Machining	T ₁ & T ₂	1	
		1.3	Need for non-traditional machining methods	T ₁	1	
		1.4	Classification of modern machining processes	T ₁ & R ₁	1	
		1.5	considerations in process selection	T ₁ & R ₁	1	
		1.6	considerations in Materials	T ₂ & R ₂	1	
		1.7	Applications of UCMP	T ₂ & R ₂	1	
		1.8	Comparison of traditional and non-traditional machining methods.	T ₁	1	
Total					08	

II	CO2: Apply principles and process parameters of cold cutting processes such as AJM, WJM, and AWJM to suitable materials and applications. [K3] CO3: Analyze the working mechanisms, parameters, and	2. COLD CUTTING PROCESS			Chalk, Talk, & PPT	
		2.1	Abrasive Jet Machining (AJM)	T ₁ & T ₂		1
		2.2	Process variables, process Mechanism	T ₁ & R ₁		1
		2.3	Metal removal, applications and limitations	T ₁ & R ₁		1
		2.4	Water Jet Machining (WJM)	T ₁ & R ₁		1
		2.5	process variables, Mechanism MRR, applications and limitations	T ₁ & R ₁		1
		2.6	Abrasive Water Jet Machining (AWJM)	T ₁ & R ₁		1
		2.7	Process variables, Mechanism MRR, applications and limitations	T ₁ & R ₁		1
		ULTRASONIC MACHINING				
		2.8	Ultrasonic Machining	T ₁ & R ₁		1
		2.9	Elements of the process	T ₁ & R ₁		1
		2.10	Mechanics of metal removal process parameters, economic considerations	T ₁ & R ₁		1
		2.11	Applications and limitations, recent development	T ₁ & R ₁		1
	C.B.S-1	2.12	Magnetostriction Transducer	T ₁ & R ₁		1
Total				12		
III	Analyze chemical and electrochemical machining processes (CHM, ECM, ECG, ECH) with respect to MRR, surface finish, and process parameters. [K4]	3. ELECTRO-CHEMICAL ENERGY BASED PROCESSES			Chalk, Talk & PPT, Virtual labs	
		3.1	Chemical machining [CHM]	T ₂ & R ₂		1
		3.2	Etchants, Maskant	T ₂ & R ₂		1
		3.3	Techniques of applying maskants	T ₁ & T ₂		1
		3.4	Process parameters, surface finish and MRR	T ₁ & T ₂		1
		3.5	Applications	T ₁ & T ₂		1
		3.6	Electro-Chemical machining [ECM]	T ₁ & T ₂		1
		3.7	Surface Roughness & MRR	T ₁ & T ₂		1
		3.8	Electrical circuit & process Parameters	T ₁ & T ₂		1
		3.9	Electro Chemical Grinding [ECG]	T ₁ & T ₂		1
		3.10	Process Parameters applications, Advantages and disadvantages	T ₁ & T ₂		1
		3.11	Electro Chemical Honing [ECH]	T ₂ & R ₂		1
		3.12	Applications	T ₁ & T ₂		1
	Total					12

IV	Evaluate Electric Discharge Machining (EDM), Wire EDM, and related processes by analyzing process parameters, tool selection, and surface integrity. [K4]	4. ELECTRIC DISCHARGE MACHINING			Chalk, Talk, Virtual labs	
		4.1	General Principle and applications of Electric Discharge Machining	T ₁ & T ₂		1
		4.2	Mechanics of metal removal in EDM	T ₁ & T ₂		1
		4.3	Process parameters	T ₁ & T ₂		1
		4.4	Selection of tool electrode and dielectric fluids,	T ₂ & R ₁		1
		4.5	Methods surface finish, machining accuracy	T ₁ & R ₁		1
		4.6	Characteristics of spark eroded surface and machine tool selection	T ₁ & T ₂		1
		4.7	Power circuits for EDM	T ₁ & T ₂		1
		4.8	Applications, Advantages & Disadvantages	T ₁ & R ₁		1
		4.9	Electric Discharge Grinding	T ₁ & T ₂		1
		4.10	Applications, Advantages & Disadvantages	T ₁ & T ₂		1
		4.11	Electric discharge wire cutting processes	T ₁ & T ₂		1
		4.12	Applications, Advantages & Disadvantages	T ₁ & R ₁		1
	C.B.S-2	4.13	Recent Developments in EDM Process	T ₁ & T ₂		1
Total				13		
V	Analyze high energy beam machining (LBM, EBM, PBM) and advanced nano finishing processes in terms of mechanism, accuracy, and applications. [K4]	5. HIGH ENERGY BEAM MACHINING			Chalk, Talk, Quiz	
		5.1	Laser Beam Machining (LBM)	T ₁ & T ₂		1
		5.2	Mechanism of metal removal process characteristics	T ₁ & T ₂		1
		5.3	Accuracy and surface quality, application	T ₁ & T ₂		1
		5.4	Electron Beam Machining (EBM),	T ₁ & T ₂		1
		5.5	Mechanism of metal removal process characteristics	T ₁ & T ₂		1
		5.6	Accuracy and surface quality, application	T ₁ & T ₂		1
		5.7	Plasma Beam Machining (PBM)	T ₁ & T ₂		1
		5.8	Abrasive Flow Machining	T ₂ & R ₁		1
		5.9	Equipment s, effect of process parameters	T ₂ & R ₁		1
		5.10	Chemo-Mechanical Polishing	T ₂ & R ₁		1
	5.11	Magnetic Abrasive Finishing their working Principles	T ₂ & R ₁	1		
Total				11		
Cumulative Proposed Periods				56		

Textbooks:	
S. No	Authors, Book Title, Edition, Publisher, Year of Publication
T1	Vijay. K. Jain “Advanced Machining Processes” Allied Publishers Pvt. Ltd., New Delhi, 1 st edition, 2010
T2	Gary F. Benedict. “Non-traditional Manufacturing Processes” CRC Press, 1 st edition, 2017.
Reference Books:	
S.No.	Authors, Book Title, Edition, Publisher, Year of Publication
R1	Suneev Anil Bansal “Advances in Nonconventional Machining Processes”, Bentham Science Publishers, 1 st edition, 2020.
R2	J. Paulo Davim “Non-traditional Machining Processes Research Advances”, Springer London, 1 st edition, 2013.

Web Details	
W1	https://nptel.ac.in/courses/112103202
W2	https://nptel.ac.in/courses/112105212

S.NO.	Details	Name	Signature
i.	Faculty	Ch. Harish Kumar	
ii.	Course Coordinator	Ch. Harish Kumar	
iii.	Module Coordinator	Dr. R. Sanjeev Kumar	
iv.	Program Coordinator	Dr. Francis Luther King M	


Principal