



**LESSON PLAN**

Course Code	Course Title	Semester	Branches	Conduct Periods /Week	Academic Year	Date of commencement of Semester
20ME6E03	Unconventional Machining Processes	VI	Mechanical Engineering	5	2024-25	18-11-2024

**COURSE OUTCOMES**

1	Classify the Unconventional machining process and describe the need for it. [K2]
2	Compare various mechanical energy based unconventional machining processes. [K2]
3	Illustrate the chemical and electro-chemical energy based unconventional machining processes. [K3]
4	Describe about various parameters and applications of Electric Discharge Machining.[K3]
5	Describe about various parameters of high Energy beam and advanced nano-finishing process. [K3]

UNIT	Out Comes/ BTL	Topic No.	Topics/Activity	Text Book / Reference	Conduct Hour	Delivery Method	
I	CO1: Explain the need for unconventional machining processes and its classification. [K2]	<b>1. INTRODUCTION</b>					Chalk, Talk, & Tutorials, Seminars, Seminar
		1.1	Introduction	T <sub>1</sub> & T <sub>2</sub>	1		
		1.2	Conventional Machining	T <sub>1</sub> & T <sub>2</sub>	1		
		1.3	Need for non-traditional machining methods	T <sub>1</sub>	1		
		1.4	Classification of modern machining processes	T <sub>1</sub> & R <sub>1</sub>	1		
		1.5	Considerations in process selection	T <sub>1</sub> & R <sub>1</sub>	1		
		1.6	Considerations in Materials	T <sub>2</sub> & R <sub>2</sub>	1		
		1.7	Applications of UCMP	T <sub>2</sub> & R <sub>2</sub>	1		
		1.8	Comparison of traditional and non-traditional machining methods.	T <sub>1</sub>	1		
<b>Total</b>					<b>08</b>		
II	CO2: Explain the working principle, mechanism of metal removal, parametric analysis cold working unconventional	<b>2. COLD CUTTING PROCESS</b>					Chalk, Talk, & PPT
		2.1	Abrasive Jet Machining (AJM)	T <sub>1</sub> & T <sub>2</sub>	1		
		2.2	Process variables, process Mechanism	T <sub>1</sub> & R <sub>1</sub>	1		
		2.3	Metal removal, applications and limitations	T <sub>1</sub> & R <sub>1</sub>	2		
		2.4	Water Jet Machining (WJM)	T <sub>1</sub> & R <sub>1</sub>	1		
		2.5	Process variables, Mechanism MRR, applications and limitations	T <sub>1</sub> & R <sub>1</sub>	1		
		2.6	Abrasive Water Jet Machining (AWJM)	T <sub>1</sub> & R <sub>1</sub>	2		
		2.7	Process variables, Mechanism MRR, applications and limitations	T <sub>1</sub> & R <sub>1</sub>	1		


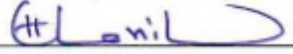

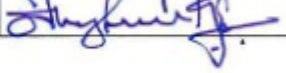
		<b>ULTRASONIC MACHINING</b>			
		2.8	Ultrasonic Machining	T <sub>1</sub> & R <sub>1</sub>	1
		2.9	Elements of the process	T <sub>1</sub> & R <sub>1</sub>	1
		2.10	Mechanics of metal removal process parameters, economic considerations	T <sub>1</sub> & R <sub>1</sub>	1
		2.11	Applications and limitations, recent development	T <sub>1</sub> & R <sub>1</sub>	1
	<b>C.B.S-1</b>	2.12	Magnetostriction Transducer	T <sub>1</sub> & R <sub>1</sub>	1
<b>Total</b>					<b>14</b>
		<b>3. ELECTRO-CHEMICAL ENERGY BASED PROCESSES</b>			
	<b>CO3:</b> Summarize various chemical and electro-chemical energy based unconventional machining processes [K2]	3.1	Chemical machining [CHM]	T <sub>2</sub> & R <sub>2</sub>	1
		3.2	Etchants, Maskant	T <sub>2</sub> & R <sub>2</sub>	1
		3.3	Techniques of applying maskants	T <sub>1</sub> & T <sub>2</sub>	1
		3.4	Process parameters, surface finish and MRR	T <sub>1</sub> & T <sub>2</sub>	1
		3.5	Applications	T <sub>1</sub> & T <sub>2</sub>	1
		3.6	Electro-Chemical machining [ECM]	T <sub>1</sub> & T <sub>2</sub>	1
		3.7	Surface Roughness & MRR	T <sub>1</sub> & T <sub>2</sub>	1
		3.8	Electrical circuit & process Parameters	T <sub>1</sub> & T <sub>2</sub>	1
		3.9	Electro Chemical Grinding [ECG]	T <sub>1</sub> & T <sub>2</sub>	1
		3.10	Process Parameters applications, Advantages and disadvantages	T <sub>1</sub> & T <sub>2</sub>	1
		3.11	Electro Chemical Honing [ECH]	T <sub>2</sub> & R <sub>2</sub>	1
		3.12	Applications	T <sub>1</sub> & T <sub>2</sub>	1
<b>Total</b>					<b>12</b>
		<b>4. ELECTRIC DISCHARGE MACHINING:</b>			
<b>IV</b>	<b>CO4:</b> Describe about various parameters and applications of Electric Discharge Machining [K2]	4.1	General Principle and applications of Electric Discharge Machining	T <sub>1</sub> & T <sub>2</sub>	1
		4.2	Mechanics of metal removal in EDM	T <sub>1</sub> & T <sub>2</sub>	1
		4.3	Process parameters	T <sub>1</sub> & T <sub>2</sub>	1
		4.4	Selection of tool electrode and dielectric fluids,	T <sub>2</sub> & R <sub>1</sub>	1
		4.5	Methods surface finish, machining accuracy	T <sub>1</sub> & R <sub>1</sub>	1
		4.6	Characteristics of spark eroded surface and machine tool selection	T <sub>1</sub> & T <sub>2</sub>	1
		4.7	Power circuits for EDM	T <sub>1</sub> & T <sub>2</sub>	1
		4.8	Applications, Advantages & Disadvantages	T <sub>1</sub> & R <sub>1</sub>	1
		4.9	Electric Discharge Grinding	T <sub>1</sub> & T <sub>2</sub>	1
		4.10	Applications, Advantages & Disadvantages	T <sub>1</sub> & T <sub>2</sub>	1
		4.11	Electric discharge wire cutting processes	T <sub>1</sub> & T <sub>2</sub>	1
		4.12	Applications, Advantages & Disadvantages	T <sub>1</sub> & R <sub>1</sub>	1
		<b>C.B.S-2</b>	4.13	Recent Developments in EDM Process	T <sub>1</sub> & T <sub>2</sub>
<b>Total</b>					<b>13</b>

		4.10	Applications, Advantages & Disadvantages	T <sub>1</sub> & T <sub>2</sub>	1		
		4.11	Electric discharge wire cutting processes	T <sub>1</sub> & T <sub>2</sub>	1		
		4.12	Applications, Advantages & Disadvantages	T <sub>1</sub> & R <sub>1</sub>	1		
	<b>C.B.S-2</b>	4.13	Recent Developments in EDM Process	T <sub>1</sub> & T <sub>2</sub>	1		
					<b>Total</b>	<b>13</b>	
		<b>5. HIGH ENERGY BEAM MACHINING</b>					
<b>V</b>	<b>CO5:</b> Explain about various parameters of high Energy beam and advanced Nano finishing process. [K2]	5.1	Laser Beam Machining (LBM)	T <sub>1</sub> & T <sub>2</sub>	2	Chalk, Talk, Quiz	
		5.2	Mechanism of metal removal process characteristics	T <sub>1</sub> & T <sub>2</sub>	1		
		5.3	Accuracy and surface quality, application	T <sub>1</sub> & T <sub>2</sub>	1		
		5.4	Electron Beam Machining (EBM),	T <sub>1</sub> & T <sub>2</sub>	1		
		5.5	Mechanism of metal removal process characteristics	T <sub>1</sub> & T <sub>2</sub>	1		
		5.6	Accuracy and surface quality, application	T <sub>1</sub> & T <sub>2</sub>	1		
		5.7	Plasma Beam Machining (PBM)	T <sub>1</sub> & T <sub>2</sub>	2		
		5.8	Abrasive Flow Machining	T <sub>2</sub> & R <sub>1</sub>	1		
		5.9	Equipment s, effect of process parameters	T <sub>2</sub> & R <sub>1</sub>	1		
		5.10	Chemo-Mechanical Polishing	T <sub>2</sub> & R <sub>1</sub>	1		
		5.11	Magnetic Abrasive Finishing their working Principles	T <sub>2</sub> & R <sub>1</sub>	1		
					<b>Total</b>	<b>13</b>	
<b>Cumulative Proposed Periods</b>						<b>60</b>	

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

**Web Details**

W1	<a href="https://nptel.ac.in/courses/112103202">https://nptel.ac.in/courses/112103202</a>
W2	<a href="https://nptel.ac.in/courses/112105212">https://nptel.ac.in/courses/112105212</a>

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	



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Principal