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 he need for it. [K2]
2	Compare various mechanical energy based unconventional maching 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]	**1.**	**INTRODUCTION**			Chalk, Talk, & Tutorials, Seminar
		1.1	Introduction	T_1 & T_2	1	
		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.	T1	1	
				Total	**08**	
II	**CO2:** Explain the working principle, mechanism of metal removal, parametric analysis cold working unconventional	**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	2	
		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	2	
		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	**14**	
	CO3: Summarize various chemical and electro-chemical energy based unconventional machining processes [K2]	**3. ELECTRO-CHEMICAL ENERGY BASED PROCESSES**				
		3.1	Chemical machining [CHM]	T_2 & R_2	1	Chalk, Talk & PPT, Virtual labs
		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	**CO4:** Describe about various parameters and applications of Electric Discharge Machining [K2]	**4. ELECTRIC DISCHARGE MACHINING:**				
		4.1	General Principle and applications of Electric Discharge Machining	T_1 & T_2	1	Chalk, Talk, Virtual labs
		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**	

		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	CO5: Explain about various parameters of high Energy beam and advanced Nano finishing process. [K2]	**5. HIGH ENERGY BEAM MACHINING**				
		5.1	Laser Beam Machining (LBM)	T_1 & T_2	2	Chalk, Talk, Quiz
		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	2	
		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	**13**	
				Cumulative Proposed Periods	**60**	

Text Books:	
S.No	**Authors, Book Title, Edition, Publisher, Year of Publication**
T1	Vijay. K. Jain "Advanced Machining Processes" Allied Publishers Pvt. Ltd., New Delhi, 1st edition, 2010
T2	Gary F. Benedict. "Non-traditional Manufacturing Processes" CRC Press, 1st 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, 1st edition, 2020.
R2	J. Paulo Davim "Non-traditional Machining Processes Research Advances", Springer London,1st 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	

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