## MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING

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LESSON PLAN												
Department of Mechanical Engineering												
Name of the Subject	UNCONVENTIONAL MACHINING PROCESSES	Name of the handling	Mr. SAKTHIVEL D									
Subject Code	ME8073	Year / Sem	IV/VII									
Acad Year	2022-2023	Batch	2019-2023									

## **Course Objective**

To learn about various unconventional machining processes, the various process parameters and their influence on performance and their applications

### **Course Outcome**

- CO1 Explain the need for unconventional machining processes and its classification
- CO2 Compare various thermal energy and electrical energy based unconventional machining processes.
- CO3 Summarize various chemical and electro-chemical energy based unconventional machining processes.
- CO4 Explain various nano abrasives based unconventional machining processes.
- CO5 Distinguish various recent trends based unconventional machining processes.

### Lesson Plan

Sl. No.	Topic(s)	T / R*	Period s	Mode of Teaching (BB / PPT /	Blooms Level (L1-	СО	PO
	• **	Book	Requir ed	NPTEL /	L6)		
	UNIT I-INTRODUCTION AND MECHANI	CAL ENE	RGY I	BASED PI	ROCESSES	S	
1	Unconventional machining Process- Need and classification, merits, demerits and applications.	T2	1	BB	L1	CO1	PO1
2	Abrasive Jet Machining - Working Principles and equipment used	T2	1	PPT	L2	CO1	PO1,PO5
3	Abrasive Jet Machining - Process parameters, MRR & Applications.	T2	1	PPT	L3	CO1	PO1,PO5
4	Water Jet Machining - Working Principles and equipment used	T2	1	PPT	L2	CO1	PO1,PO5
5	Water Jet Machining- Process parameters ,MRR and Applications.	T2	1	PPT	L3	CO1	PO1,PO5
6	Abrasive Water Jet Machining - Working Principles and equipment used	T2	1	PPT	L2	CO1	PO1,PO5
7	Abrasive Water Jet Machining - Process parameters ,MRR- and Applications.	T2	1	PPT	L3	CO1	PO1,PO5
8	Ultrasonic Machining -Working Principles and equipment used	T2	1	PPT	L2	CO1	PO1,PO5
9	Ultrasonic Machining - Process parameters ,MRR and Applications.	T2	1	PPT	L3	CO1	PO1, PO2

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any \* Assignment given to the students

**Evaluation method** 

\* assignments are evaluated and marks were given based on the students answer to the question.

	UNIT II-THERMAL AND ELECTRICAL ENERGY BASED PROCESSES											
10	Electric Discharge Machining (EDM)	Т2	1	PPT	L2	CO2	PO1					
11	Wire cut EDM-Working Principle-equipments-Process Parameters and Surface Finish and MRR	T2	1	PPT	L2	CO2	PO1, PO2					
12	Wire cut EDM - electrode and Tool and Power and control Circuits and Tool Wear and Dielectric and Flushing and Applications.	T2	1	PPT	L3	CO2	PO1, PO2,PO5					
13	Laser Beam machining and drilling, (LBM)-Principles and Equipment	T2	1	PPT	L2	CO2	PO1,PO5					
14	LBM-Beam control techniques and Applications.	T2	1	PPT	L3	CO2	PO1,PO5					
15	plasma, Arc machining (PAM)-Principles and Equipment	Т2	1	PPT	L2	CO2	PO1,PO5					
16	plasma, Arc machining (PAM) - control techniques and Applications.	T2	1	PPT	L3	CO2	PO1,PO5					
17	Electron Beam Machining (EBM)- Principles and Equipment	T2	1	PPT	L2	CO2	PO1,PO5					
18	Electron Beam Machining (EBM)- control techniques and Applications	T2	1	PPT	L3	CO2	PO1,PO5					

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any \* Quiz given to the students

## **Evaluation method**

\* Quiz marks were given based on the students answer to the question.

	UNIT III-CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES													
19	Chemical machining	Т2	1	PPT	L1	CO3	PO1							
20	Electro-Chemical machining	Т2	1	PPT	L2	CO3	PO1							
21	Etchants and Maskant and techniques of applying maskants	Т2	1	PPT	L2	CO3	PO1							
22	ECM- Process Parameters Surface, finish and MRR-Applications	Т2	1	PPT	L3	CO3	PO1, PO2							
23	ECM-working Principles	Т2	1	PPT	L2	CO3	PO1							
24	ECM - equipments-Surface Roughness	Т2	1	PPT	L2	CO3	PO1							
25	ECM - MRR Electrical circuit	Т2	1	BB	L2	CO3	PO1							
26	Electro chemical grinding -application	Т2	1	PPT	L3	CO3	PO1							
27	Electro chemical honing - applications	Т2	1	PPT	L3	CO3	PO1							

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any \* Assignment given to the students

### **Evaluation method**

\* assignments are evaluated and marks were given based on the students answer to the question.

# UNIT IV-ADVANCED NANO FINISHING PROCESSES

28	Abrasive flow machining- working principles, equipments	T2	1	РРТ	L2	CO4	PO1,PO5
29	Abrasive flow machining- process effect,process parameters, applications, advantages and limitations.	Т2	1	PPT	L2	CO5	PO1,PO6
30	chemo-mechanical polishing- working principles, equipments	T2	1	PPT	L2	CO4	PO1,PO5
31	chemo-mechanical polishing - effect of process parameters, applications, advantages and limitations.	T2	1	PPT	L2	CO4	PO1,PO5
32	magnetic abrasive finishing -working principles, equipments,	T2	1	PPT	L2	CO4	PO1,PO5
33	magnetic abrasive finishing - effect of process parameters, applications, advantages and limitations.	T2	1	PPT	L2	CO4	PO1,PO5
34	magneto rheological finishing- working principles,	T2	1	PPT	L2	CO4	PO1,PO5
35	magneto rheological finishing equipments	Т2	1	PPT	L2	CO4	PO1,PO5
36	magneto rheological finishing - effect of process parameters, applications, advantages and limitations.	Т2	1	PPT	L3	CO4	PO1,PO5

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any \* Case Studies given to the students

## **Evaluation method**

\* Case studies are evaluated marks were given based on the students answer to the question.

	UNIT V-NON-TRADITIONAL MACHINING PROCESSES													
37	Recent developments in non-traditional machining processes	PPT	L2	CO5	PO1									
38	non-traditional machining processes - their working principles	T2	2	PPT	L2	CO5	PO1,PO5							
39	non-traditional machining processes - equipments,	T2	2	PPT	L2	CO5	PO1,PO5							
40	non-traditional machining processes - effect of process parameters	Т2	2	PPT	L2	CO5	PO1,PO5							
41	non-traditional machining processes - applications, advantages and limitations	T2	1	PPT	L3	CO5	PO1,PO5							

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42	Compari	son of non-t	Т	72	1	PF	T	I	.2	CO5	PO1,PO5			
		ity: Assignr ven to the s		e Studies /	Tuorials/ Quiz/Mini	Projec	cts / M	odel De	velope	d/othe	rs Pla	nned	if any	
	ntion meth		l and mark	ks were giv	en based on the studer	nts ans	wer to	the que	estion.					
Conter	nt Beyond	the Syllabı	ıs Planned											
1	Advanced	l materials a	and characte	erization, 1	Powder metallurgy									
					Text Boo	oks								
1	Vijay.K.	Jain "Adva	nced Mach	ining Proce	esses" Allied Publishers	Pvt. Lt	d., Nev	vDelhi,	2007Cc	mpan	y,1997	1		
2	Pandey P.C. and Shan H.S. "Modern Machining Processes" Tata McGraw-Hill, New Delhi, 2007.													
					Reference I	Books	_			_	_	_		
1	Benedict.	G.F. "Nont	raditional N	Manufactur	ing Processes", Marcel	Dekker	Inc., N	lew Yo	rk, 1987	<b>7.</b>				
2	Mc Geou	gh, "Advano	ced Method	ls of Mach	ining", Chapman and Ha	ıll, Lon	don, 19	998.						
3		Garmo, J.T.I n, NewDelh		Ronald. A.	Kohser, "Material and P	rocesse	es in M	anufactı	uring" F	rentic	e Hall	of Ind	ia Pvt. Lt	d.,
	ı				Website / URL	Refere	ences							
1	https://r	nptel.ac.in/	courses/1	12/105/1	12105212/									
Level	1 (I.1) · I	Remember	ing		Blooms L		Level	4 (L4)	·Ana	lycine	T		Higher	
		Jnderstan			Lower Order	Hour				•			Order	Projects / Mini
	3 (L3) : A				Thinking							Thinkin g	Projects	
		11 0	ng cyllah	uic with	Bloom's Taxonon									
Hn	nit No	Марри	<u> </u>	Unit Nar		L1	L2	L3	L4	L5	L6	LOT	НОТ	Total
	Init 1		JCTION A	ND MECH	IANICAL ENERGY	1	4	4				9	0	9
	Jnit 2	THERMA			L ENERGY BASED	1	5	4				9	0	9
	Unit 3				CHEMICAL ENERGY	1	5	3				9	0	9
U	Jnit 4				NG PROCESSES		5	2				7	0	7
Ü	Jnit 5	NON-TR.	ADITION	AL MACH	INING PROCESSES		5	1				6	0	6
	Total							14	0	0	0	40	0	40
	_	To	tal Perc	entage		5	60	35	0	0	0	100	0	100
					CO PO Map	ping								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO2
CO1	3	2			3								3	2
CO2	3	1			3								3	2

CO3	3	1										3	2		
CO4	3				3							3	2		
CO5	3				3							3	2		
Avg	3	1			3							3	2		
	Justification for CO-PO mapping														
CO1	PO1: Basic engineering knowledge is required PO2: Problem analysis is required and PO5: Modern Engineering tools is been used for the machining process														
CO2	PO1: Basic engineering knowledge is required PO2: Problem analysis is required and PO5: Modern Engineering tools is been used for the machining process														
CO3	PO1: Ba	asic engi	neering l	knowled	ge is required & P	O2: F	Proble	m analys:	is is re	quirec	1				
CO4		_	_		ge is required PO2 r the machining pr			analysis is	s requi	red ar	nd PC	)5: Moo	lern		
CO5		•	_		ge is required PO2 r the machining pr			analysis is	s requi	red an	ıd PC	)5: Mod	dern		
	3		High level		2		Mo	derate level		1		Low lev	/el		
Name	& Sign of	Faculty Ir	ncharge : S	SAKTHIV	EL D										
Name	& Sign of	Subject E	xpert :												
Head o	of the Depa	artment	:												

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