

## ME421 Advanced Manufacturing Processes

L	T	P	Credit	Area		CWS	PRS	MTE	ETE	PRE
3	0/1	2/0	4	DEC/GEC		15/25	25	20/25	40/50	-

**Course Objective:** To familiarize the students with basics of advanced manufacturing processes. To impart knowledge about the basic principles of operation for each process and their applications. State various process parameters influencing the machining process.

Syllabus							Contact Hours
<b>Unit-1</b>	Introduction: mechanical advanced machining processes, need of advanced machining processes, hybrid processes Ultrasonic machining (USM): Introduction, mechanics of cutting, parametric analysis, process capabilities, applications.						<b>6</b>
<b>Unit-2</b>	Abrasive jet machining (AJM): Introduction, AJM setups, gas propulsion system, abrasive feeder, machining chamber, AJM nozzle, abrasive parametric analysis, process capabilities, applications.						<b>6</b>
<b>Unit-3</b>	Water jet machining: Introduction, process characteristics, process performance, applications. Abrasive Water jet machining: Working principle, parametric analysis, process capabilities and applications. Abrasive finishing process: Working principle, material removal and surface finish parametric analysis, process variables and applications.						<b>8</b>
<b>Unit-4</b>	Electro discharge machining (EDM): Introduction, Working principle, parametric analysis, process variables, process characteristics, applications, hybrid processes such as electro discharge grinding, diamond grinding, wire EDM, Laser beam machining: production of laser, working principle, types of laser, process characteristics and applications. Electron beam machining: Working principle, process parameter, process characteristics, applications. Ion beam machining: Working principle, process parameter, process characteristics, applications. Plasma arc machining: Working principle, Plasma arc cutting system, applications.						<b>8</b>
<b>Unit-5</b>	Electro-chemical machining: Working principle, ECM systems, parametric analysis, advantages and limitations, process performance, hybrid process such as EC grinding and chemical machining.						<b>7</b>
<b>Unit-6</b>	Ultra precision machining for higher accuracy and surface quality, micro machining, nano finishing and future trends in advanced machining processes.						<b>7</b>
	Total						<b>42</b>

### Reference Book:

1	Advanced machining process, Dr. V. K. Jain
2	Non traditional methods of manufacturing, shah & Pandey

### Course Outcomes

CO1	The course aims to equip students with overview and the need of advanced manufacturing processes.
CO2	To comprehend working principle of advanced manufacturing processes based on energy used such as mechanical, thermal, and Kinetic energy.
CO3	To study parametric analysis of advanced manufacturing processes such as EDM, ECM, USM, AJM, AJWM.
CO4	To study the process variables on the performance of advanced manufacturing process such as metal removal and surface finish.
CO5	To study the capabilities and limitations of the advanced manufacturing processes and the guidelines for their selection of different materials.
CO6	To learn the working principle of hybrid advanced manufacturing techniques to enhance the manufacturability.

**CO-PO/PSO Matrix**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	2	2	1	2	3	1	2	3	3	2	1	
CO2	1	2	3	1	2	1	3	1	2	2	3	1	2	1	3
CO3	2	3	2	1	1	3	1	2	1	3	1	2	2	1	2
CO4	1	2	3	2	1	2	3	2	2	1	1	3	3	2	1
CO5	2	1	1	2	1	2	1	2	1	3	3	1	3	1	2
CO6	1	2	3	3	2	1	2	1	1	2	3	2	3	1	3