

UNCONVENTIONAL MACHINING PROCESSES

VII Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AME507	Elective	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 60	
<p>OBJECTIVES :</p> <p>The course should enable the students to:</p> <ol style="list-style-type: none"> I. Understand the need and importance of non-traditional machining methods and process selection. II. Gain the knowledge to remove material by thermal evaporation, mechanical energy process. III. Apply the knowledge to remove material by chemical and electro chemical methods. IV. Analyze various material removal applications by unconventional machining process. <p>COURSE OUTCOMES (CO's)</p> <p>CO 1. Compare non-traditional machining, classification, material applications in material removal process</p> <p>CO 2. Summarize the principle and processes of abrasive jet machining.</p> <p>CO 3. Understand the principles, processes and applications of thermal metal removal processes.</p> <p>CO 4. Identify the principles, processes and applications of EBM.</p> <p>CO 5. Understand the principles, processes and applications of Plasma Machining.</p> <p>COURSE LEARNING OUTCOMES (CLOs):</p> <ol style="list-style-type: none"> 1. Understand of fundamentals of the non-traditional machining methods and industrial applications. 2. Compare Conventional and Non-Conventional machining and analyze the different elements of Ultrasonic Machining and its applications. 3. Identify and utilize fundamentals of metal cutting as applied to machining. 4. Understand a problem and apply the fundamental concepts and enable to solve problems arising in metal removal process. 5. Explore the ability to define and formulate the properties of cutting tool materials and characteristics. 6. Illustrate the variables in Abrasive Jet Machining 7. Explain the different elements of Chemical and Electro chemical Machining and its applications 8. Comparison between non-traditional machining process with the traditional parameters, energy sources, economics of processes, shape and size of the material. 9. Illustrate different parameters of Electrical Discharge Machining 10. Develop methods of working for minimizing the production cost. 11. Apply the best suitable advanced manufacturing process for processing of unconventional materials employed in modern manufacturing industries. 12. Study the parametric influences during processing of materials using developed models. 13. Analyze the different elements of Laser and Electronic Beam machining. 14. Apply unconventional machining process in various industrial applications. 15. Analyze and simulate various industrial problems in advanced machining processes using EBM and LBM 16. Understand the applications of plasma machining and chemical machining. 17. Explain the process and mechanism in Plasma Arc Machining 18. Explore the use of modern engineering tools, software and equipment to prepare for competitive exams, higher studies. 								
UNIT I	INTRODUCTION						Classes: 09	
<p>Need for non-traditional machining methods, classifications of modern machining processes, considerations in process selection, materials application, Ultrasonic machining: Elements of the process, mechanics of metal removal, process parameters, economic considerations, application and limitations, recent developments.</p>								

UNIT II	ABRASIVE JET MACHINING	Classes: 09
<p>Abrasive jet machining, water jet machining and abrasive water jet machining: basic principles, equipment's process variables, mechanics of metal removal, MRR, applications and limitations; Electro chemical processes: Fundamentals of electro chemical machining, electro chemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, tool design, surface finish and accuracy, economic aspect of ECM, simple problem for estimation of metal removal rate</p>		
UNIT III	THERMAL METAL REMOVAL PROCESSES	Classes: 09
<p>General principle and applications of Electric discharge machining, electric discharge grinding, electric discharge wire cutting processes, power circuits in EDM, mechanism of metal removal in EDM, process parameters.</p> <p>Selection of tool electrodes and dielectric fluids, surface finish and accuracy, characteristics of spark eroded surface and machine tool selection, wire EDM principle and applications.</p>		
UNIT IV	ELECTRON BEAM MACHINING	Classes: 09
<p>Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non thermal processes, general principle and applications of laser beam machining, thermal features, cutting speed and accuracy of cut.</p>		
UNIT V	PLASMA MACHINING	Classes: 09
<p>Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries; Chemical machining principle, maskants, etchants, applications.</p>		
Text Books:		
<ol style="list-style-type: none"> 1. K. Jain, "Advanced Machining Processes", Allied Publishers, 1st Edition, 2013. 2. Pandey P. C., Shah H.S., "Modern Machining Processes", Tata McGraw-Hill, 1st Edition, 2013. 		
Reference Books:		
<ol style="list-style-type: none"> 1. Bhattacherya A, "New Technology", The Institute for Engineers, 1st Edition, 1973. 2. C. Elanchezian, B. Vijaya Ramnath, M. Vijayan, "Unconventional Machining processes", Anuradha Publication, 1st Edition, 2005. 3. M. K. Singh, "Unconventional Machining processes", New Age International Publishers, 1st Edition, 2010. 		
Web References:		
<ol style="list-style-type: none"> 1. http://nptel.ac.in/courses/112105126/36. 2. http://nptel.ac.in/courses/112105127/pdf/LM-40.pdf. 		
E-Text Books:		
<ol style="list-style-type: none"> 1. http://engineeringstudymaterial.net/ebook/advanced-machining-processes. 2. https://books.google.co.in/books/about/Advanced_Machining_Processes.html?id=duBqhj2OlfAC. 3. https://books.google.co.in/books/about/Modern_Machining_Processes.html?id=uC3rHzhogmMC. 		