

Branch Name:	Mechanical Engineering (CAD/CAM)
Program Code:	ET201
Course Name:	Advanced Manufacturing Processes
Course Code:	2ET2010103T
Pre-requisite Course:	UG level subjects on Design, Material and Industrial Engineering.

Course Objectives: To expose the students in the art of manufacturing new products due to the development of new materials and processes. The students will totally get a feel of the relevant suitable process while evaluating and deciding.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
4	4	-	-	4	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Advanced Machining Processes Introduction, Process principle, Material removal mechanism, Parametric analysis, applications, derivations problems, merits, demerits of processes such as ultrasonic machining (USM), Abrasive jet machining (AJM), Water jet machining (WJM), Abrasive water jet machining (AWJM), Electrochemical machining (ECM), Electro discharge machining (EDM), Electron beam machining (EBM), Laser beam machining (LBM), Plasma arc machining, Ion beam machining (IBM).	10	30
2	Advanced Casting Processes Metal mould casting, Continuous casting, Squeeze casting, Vacuum mould casting Evaporative pattern casting, Ceramic shell casting.	04	20
3	Advanced Welding Processes Details of electron beam welding (EBW), laser beam welding (LBW), ultrasonic welding (USW).	04	20
4	Advanced Metal Forming Processes Details of high energy rate form (HERF) process, Electro-magnetic forming, explosive forming, Electro-hydraulic forming, Stretch forming, and Contour roll forming.	04	15
5	Micro Fabrication Technology Semi-conductors - Films and film de-purification, Oxidation, diffusion, ion implantation, etching, metallization, bonding, surface and bulk machining, LIGA Process – Solid free form fabrication.	04	15

Review Presentation:

The student is expected to spend minimum 2 hours per week (as mentioned in the teaching and evaluation scheme) to refer at least two peer reviewed journal papers related to this domain/subject. The student is expected to identify issues/challenges and emerging trends in the domain/subject. Student is

supposed to explore various video lectures (E.g. NPTEL) available in the domain/subject. Student is required to make a review-presentation on the work carried out for the same.

Recommended sites for journal papers are (1) asmedigitalcollection.asme.org (2) springer.com (3) sciencedirect.com (4) ieeexplore.ieee.org (5) scholar.google.co.in or others of similar repute.

List of References:

1. “Materials and Processes in Manufacturing” (8th Edition), E. P. DeGarmo, J. T Black, R. A. Kohser, Prentice Hall of India, New Delhi (ISBN 0-02-978760).
2. “Manufacturing Science” A. Ghosh, and A. K. Mallik, Affiliated East-West Press Pvt. Ltd. New Delhi.
3. “Nontraditional Manufacturing Processes”, G.F. Benedict, Marcel Dekker, Inc. New York (ISBN 0-8247-7352- 7).
4. “Manufacturing process engg material” Serope kelpikjian & stevan r. schmid— 2003
5. Micro sensors Mems & smart devices- Julian W.Hardner – 2002
6. “Advanced machining” Brahem T. Smith, I.F.S. UK 1989.
7. “Introduction to microelectronic fabrication” Jaeger R.C., Addison Wesley, 1988.
8. “Modern Machining Processes” Pandey P.C. & Shan HS, Standard Publishing Co., 1980

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom’s Taxonomy Level
CLO1	Have a strong background in manufacturing processes and materials for discreet piece part manufacture, considering nomenclature recognition, limits, costs, benefits, etc. of comparative processes and materials through hands on approach.	2 Understanding 4 Analyze
CLO2	Select proper casting process for respective component.	3 Applying
CLO3	Select and utilize proper advanced welding processes in place of conventional process.	3 Applying 5 Evaluating
CLO4	Identify the process parameters affecting the product quality in various advanced machining of metals/ non-metals, ceramics and composites.	2 Understanding 6 Creating
CLO5	Utilize modern tools and techniques to effectively communicate technical requirements and functionality in oral, written, and graphical forms.	3 Applying 4 Analyze
CLO6	Analyze technical problems, propose solutions and document with written and oral reports.	2 Understanding 4 Analyze

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	H	M			H						M		M	
CLO2			H	H	L	M			L					
CLO3		L		H	H			M		L				M
CLO4	M		H	M	M		L					M	M	H
CLO5			M			H		H	H	H		H		M
CLO6		M		M			M	L		H			M	

H: High, M: Medium, L: Low