

GUJARAT TECHNOLOGICAL UNIVERSITY

MECHANICAL (ADVANCE MANUFACTURING SYSTEM) (50)

ADVANCE MANUFACTURING PROCESSES

SUBJECT CODE:3715003

SEMESTER: I

Type of course: Engineering Science

Prerequisite: None

Rationale: This course is designed to acquaint and motivate the students with the complex and interdisciplinary nature of manufacturing processes and surface treatments through a balanced coverage of relevant fundamentals and real world problems.

Teaching and Examination Scheme :

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE(E)	PA (M)	PA (V)	PA (I)		
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Contents	Total Hrs.	% Weightage
1	Advanced Machining Processes Introduction, Process principle, Material removal mechanism, Parametric analysis and applications of processes such as Water jet machining (WJM), Abrasive water jet machining (AWJM), Electron beam machining (EBM), Laser beam machining (LBM) processes	11	26
2	Surface Treatment Introduction to surface engineering, Scope of surface engineering for different engineering materials, Surface Preparation methods such as Chemical, Electrochemical, Mechanical: Sand Blasting, Shot peening, Shot blasting, Hydro-blasting, Vapor Phase Degreasing etc., Different methods for surface modification, Surface modification by use of directed energy beams, Plasma, Sputtering & Ion Implantation. Surface modification by Friction stir processing. Coatings: Classification, Properties and applications of Various Coatings. Chemical Conversion Coating, Metallic coating, Coating from Vapour Phase, Thermal spray coatings, Diffusion Coating	14	34
3	Advanced Welding Processes Details of electron beam welding (EBW), laser beam welding (LBW), ultrasonic welding (USW)	8	19
4	Advanced Metal Forming Processes	9	21

	Details of high energy rate forming (HERF) process, Electro-magnetic forming, explosive forming, Electro-hydraulic forming, Stretch forming, Contour roll forming		
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Reference Books:

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. Surface Engineering for Corrosion and Wear Resistance, J. R. Davis, ASM International
5. Advanced Surface Coatings: a Handbook of Surface Engineering, A. Matthews, Springer Netherlands, 2012

Course Outcome:

After learning the course the students will able :

1. To understand different advance manufacturing techniques.
2. To identify specific manufacturing techniques for components to be produced.
3. To define surface finishing processes for desire surface finish.
4. To implement their idea for new start up and innovation.

List of Experiments:

Students are required to perform experiments based on:

- Parametric study of various non-conventional manufacturing processes, welding processes, forming processes and surface treatment processes.
- Tool Design assignments for selected manufacturing processes