III Year II Semester	**L**	**T**	**P**	**C**
Code: 20ME6640	**3**	**1**	**0**	**4**

ADVANCED MANUFACTURING TECHNOLOGY

Course objectives:

The Students will acquire the knowledge

1. To illustrate the principles of advanced manufacturing processes.
2. To illustrate various metal removing processes based on surface finish.
3. To Select appropriate advanced manufacturing Processes as per row materials and surface finish.
4. To illustrate appropriate advanced material processing techniques for different requirements and applications
5. To Compare different advance material processing techniques for industry applications

UNIT-I UNCONVENTIONAL MACHINING PROCESSES:

Mechanical Energy Based Processes Abrasive Jet Machining (AJM), Water Jet Machining (WJM), Abrasive Water Jet Machining (AWJM), Ultrasonic Machining (USM). Working Principles – equipment used – Process parameters – MRR- Applications. Electrical Energy Based Processes Electric Discharge Machining (EDM)- working Principle- equipment used - Process Parameters - Surface Finish and MRR - electrode / Tool – Power and control Circuits- Tool Wear – Dielectric – Flushing – Wire cut EDM – Applications.

UNIT-2 CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES

Chemical machining and Electro - Chemical machining (CHM and ECM) - Etchants – Maskant - techniques of applying maskants - Process Parameters – Surface finish and MRR - Applications. Principles of ECM - equipments-Surface Roughness and MRR Electrical circuit-Process Parameters- ECG and ECH - Applications. Thermal Energy Based Processes Laser Beam machining and drilling (LBM), Plasma Arc machining (PAM) and Electron Beam Machining (EBM). Principles – Equipment –Types - Beam control techniques – Applications.

UNIT-3 RAPID PROTOTYPING

Introduction Stereo Lithography Systems Introduction: Need for the compression in product development, history of RP systems, Survey of applications, Growth of RP industry, and classification of RP systems. Stereo Lithography Systems: Principle, Process parameter, Process details, Data preparation, data files and machine details, Application. Selective Laser Sintering Fusion Deposition Modelling

Selective Laser Sintering: Type of machine, Principle of operation, process parameters, Data preparation for SLS, Applications. Fusion Deposition Modelling: Principle, Process parameter, Path generation, Applications. Solid Ground Curing Principle of operation, Machine details, Applications. Laminated Object Manufacturing: Principle of operation, LOM materials. Process details, application. Concepts Modelers Principle, Thermal jet printer, Sander's model market, 3-D printer. Genisys Xs printer HP system 5, object Quadra systems.

UNIT-4 GLASS SCIENCE

Glass and Glassy State, Glass Compositions and Properties, Raw Materials, Glass Melting, glass furnace and furnace types, Glass Forming Processes, Glass processing, Application of Glass

UNIT-5 COMPOSITE MATERIALS

Introduction, Classification of composites, Manufacturing methods : Spray Lay-Up, Wet/Hand Lay-up, Vacuum Bagging, Filament Winding, Pultrusion, Resin Transfer Moulding (RTM), Resin Film Infusion (RFI), Mechanical Properties -Stiffness and Strength

REFERENCE BOOKS:

1. Unconventional Machining process, Dr. Senthil, A R S Publishers
2. Modern Machining Processes, P. C. Pandey, H. S. Shan, Tata McGraw-Hill
3. Design for Advanced Manufacturing: Technologies and Processes, LaRoux K. Gillespie, McGraw Hill Education
4. Advanced Machining Processes / Non Traditional and Hybrid Machining Processes, Hassan ElHofy, McGraw-Hill
5. The Handbook of Glass Manufacture, F.Tooley, Tooley, New York : Books for Industry, [1974]
6. 3D Printing and Additive Manufacturing: Principles and Applications, Chee Kai Chua and Kah Fai Leong, World Scientific 7. Rapid Prototyping, Adithan M., Atlantic Publisher.

Course Outcomes:

Upon successful completion of this course, the students will be able to:

1. Demonstrate the principles of advanced manufacturing processes.
2. Distinguish various metal removing processes based on surface finish.
3. Select appropriate advanced manufacturing Processes as per row materials and surface finish.
4. Identify appropriate advanced material processing techniques for different requirements and applications
5. Compare different advance material processing techniques for industry applications