II B. Tech – II Semester

(20ME4764) MACHINING OF ADVANCED WORKPIECE MATERIALS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	4

Prerequisites: Production Technology, Machine Tools, Metal Cutting, Material Science.

Course Objectives:

- To make acquainted the various unconventional manufacturing processes
- To know about the applications of advanced manufacturing processes (which are exceptional)
- To encourage the students for developing the models of Advanced Manufacturing Processes Course Outcomes:
- At the end of the course, the student will be able to understand the working principle of Electron beam, laser beam and laser beam processes.
- Able to understand different types of composite material characteristics, types of micro & macro machining processes.
- Understand the e-manufacturing & nano materials.

UNIT- I: Surface treatment:

Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating.Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

UNIT- II: Non-Traditional Machining:

Introduction, need, AJM, Parametric Analysis, Process capabilities, USM –Mechanics of cutting, models, Parametric Analysis, WJM –principle, equipment, process characteristics, performance, EDM – principles, equipment, generators, analysis of R-C circuits, MRR, Surface finish, WEDM.

UNIT- III:

Laser Beam Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications. Plasma Arc Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications. Electron Beam Machining - Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications. Electro Chemical Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.

UNIT- IV Processing of ceramics:

Applications, characteristics, classification. Processing of particulate ceramics, Powder preparations, consolidation, Drying, sintering, Hot compaction, Area of application, finishing of ceramics. Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

UNIT- V Fabrication of Microelectronic devices:

Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in microelectronics, surface mount technology, Integrated circuit economics. E-Manufacturing, nanotechnology, micromachining and High-speed Machining, basic principles, working, applications, advantages.

Course Outcome:
At the end of the course, the student should be able to:

S. No	Course Outcome	BTL
CO1	Illustrate the principles of surface treatment.	L2
CO2	Outline the principles of non-traditional machining.	L2
CO3	Explain the fundamentals of laser beam machining.	L2
CO4	Apply the knowledge of processing of ceramics.	L3
CO5	Show examples of fabrication of microelectronic devices.	L2

Correlation of Cos with POs & PSOs:

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

TEXT BOOKS

1. Manufacturing Engineering and Technology by Kalpakijian, Adisson Wesley, 1995.
2. Foundation of MEMS by Chang Liu, Pearson, 2012.
3. Advanced Machining Processes by V. K. Jain, Allied Publications.

REFERENCE BOOKS:

1. Process and Materials of Manufacturing by R. A. Lindburg, 4th edition, PHI 1990.
2. Introduction to Manufacturing Processes by John A Schey, McGraw Hill.
3. Micro Machining of Engineering Materials by J. McGeough, CRC Press.
4. Non-Traditional Manufacturing Processes by Gary F Benedict, CRC Press.
5. Advanced Methods of Machining by J. A McGeough, Springer