

UNCONVENTIONAL MACHINING PROCESSES

B.Tech. III Year II Semester

Course Code	Category	Hours/ Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	TOTAL
ME3201PE	Elective	3	0	0	3	25	75	100
		Contact Classes: 52		Tutorial Classes: Nil		Practical Classes: Nil	Total Classes: 52	

Prerequisites: Metrology and Machine Tools

I. COURSE OVERVIEW:

The objective of this course is to introduce the student to more advanced topics in the machining processes. To bring out the need for Unconventional Machining Processes which will overcome the difficulties associated with Traditional Machining.

II. COURSE OBJECTIVES:

- To teach the modeling technique for machining processes
- To teach interpretation of data for process selection
- To teach the mechanics and thermal issues associated with chip formation
- To teach the effects of tool geometry on machining force components and surface finish
- To teach the machining surface finish and material removal rate

III. COURSE OUTCOMES:

- Understand the basic techniques of Unconventional Machining processes modeling
- Estimate the material removal rate and cutting force, in an industrially useful manner, for Unconventional Machining processes.

IV. COURSE SYLLABUS:

UNIT I:

Introduction - Need for non-traditional machining methods- Classification of modern machining processes - considerations in process selection. Materials. Applications.

Ultrasonic machining - Elements of the process, mechanics of metal removal process, parameters, economic considerations, applications and limitations, recent development.

UNIT II:

Abrasive Jet Machining, Water Jet Machining and Abrasive Water Jet Machining: Basic principles, equipment, process variable, and mechanics of metal removal, MRR, application and limitations. Electro Chemical Processes: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring processes, metal removal rate in ECM, Tool design, Surface finish and accuracy, economic aspects of ECM - Simple problems for estimation of metal removal rate.

UNIT III:

Thermal Metal Removal Processes: General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes - Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

UNIT IV:

Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes -General Principle and application of laser beam machining - thermal features, cutting speed and accuracy of cut.

UNIT V:

Application of plasma for machining, metal removing mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries. Chemical machining - principle - maskants – applications Magnetic abrasive finishing, Abrasive flow finishing, Electro stream drilling, shaped tube electrolyte machining.

TEXT BOOKS:

1. Advanced Machining Processes / VK Jain / Allied publishers
2. Modern Machining Processes - P. C. Pandey, H. S. Shan/ Mc Graw Hill

REFERENCE BOOKS:

1. Unconventional Manufacturing Processes/ Singh M.K/ New Age Publishers
2. Advanced Methods of Machining/ J.A. McGeough/ Springer International
3. Non-Traditional Manufacturing Processes/ Benedict G.F. / CRC Press