

<b>COURSE CODE</b>	<b>NON TRADITIONAL MACHINING PROCESSES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>1152ME124</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### 1. Preamble

This course addresses additive manufacturing principles, variety and its concept, scope of additive manufacturing and areas of application..

### 2. Prerequisite

Machining and Machine Tools Technology    1151ME107

### 3. Links to other courses

Nil

### 4. Course Educational Objectives

Students undergoing this course are expected to:

- Acquire a functional understanding of non-traditional manufacturing equipment.
- Understand the terminology used in non-traditional manufacturing industries.
- To provide knowledge on the classification of non-traditional machining process.
- Know about various process parameters and their influence on performance and their applications.
- Impart knowledge on various energy involved in non-traditional machining process.

### 5. Course Outcomes

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Understand the need of Non Traditional Machining Processes and able to Classify various processes	K2
CO2	Recognize the role of mechanical energy in non-traditional machining processes.	K3
CO3	Apply the knowledge on machining electrically conductive material through electrical energy in non-traditional machining processes.	K2
CO4	Understand the concept of machining the hard material using chemical energy and electrochemical energy.	K2
CO5	Familiarity with various thermal energy based nontraditional machining processes.	K3

### 6. Correlation of CO's with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	L										L	H	
CO2	H	L										L	H	
CO3	H	L										L	H	
CO4	H	L										L	H	
CO5	H	L										L	H	

H- High; M-Medium; L-Low

## 7. Course Content

### UNIT I UNCONVENTIONAL MACHINING PROCESS

L-9

Introduction - Need - Classification - Energies employed in the processes - Brief overview of Abrasive jet machining(AJM), Water jet machining(WJM), Ultrasonic machining(USM), Electric discharge machining(EDM), Electro-chemical machining(ECM), Electron beam machining(EBM), Laser beam machining(LBM), Plasma arc machining(PAM).

### UNIT II MECHANICAL ENERGY BASED PROCESSES

L-9

Abrasive Jet Machining, Water Jet Machining and Ultrasonic Machining - Working Principles, Equipment, Process parameters, Material removal rate, Applications.

### UNIT III ELECTRICAL ENERGY BASED PROCESSES

L-9

Electric Discharge Machining - Working Principles, Equipment, Process Parameters, Material removal rate, Electrode / Tool, Power Circuits, Tool Wear, Dielectric, Flushing, Wire cut EDM - Applications.

### UNIT IV CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES

L-9

Chemical machining - Etchants, Maskants - techniques. Electro-chemical machining – Working principle, Equipment, Process Parameters, Material removal rate, Electrical circuit. Electro-chemical grinding - Electro-chemical honing - Applications.

### UNIT V THERMAL ENERGY BASED PROCESSES

L-9

Laser Beam machining, Plasma Arc Machining - Principles, Equipment. Electron Beam Machining - Principles, Equipment, Types, Beam control techniques, Material removal rate - Applications.

### BEYOND THE SYLLABUS

Abrasive water jet machining- Micro EDM- Electric discharge grinding and drilling- Electro-stream drilling- Electro-chemical deburring.

**Total: 45 Periods**

## 8. Text Books

1. P. K. Mishra, Non-Conventional Machining, Narosa Publishing House, New Delhi, 2007.
2. P. C. Pandey and H.S. Shan, Modern Machining Processes, Tata McGraw Hill Publishing Company Pvt Ltd., New Delhi, 2008.
3. Joao Paulo Davim, Nontraditional Machining Processes: Research Advances, Springer, New York, 2013.

## 9. Reference Books

1. Paul De Garmo, J.T. Black, and Ronald.A. Kohser, Material and Processes in Manufacturing, Prentice Hall of India Pvt. Ltd., New Delhi, 2011.
2. Vijaya Kumar Jain, Advanced Machining Processes, Allied Publishers Pvt. Ltd., New Delhi, 2005.
3. Hassan El-Hofy, Advanced Machining Processes: Nontraditional and Hybrid Machining Processes, McGraw-Hill Professional, New Delhi, 2005