



## FACULTY OF ENGINEERING & TECHNOLOGY

### First Year Master of Engineering

### Semester II

**Course Code: 102320201**

**Course Title: Advanced Material Processing Techniques**

**Type of Course: Core Course III**

**Course Objectives:** To understand the basic principles, capabilities, limitations of various conventional and non-conventional material processing techniques alongwith in-depth knowledge of precision materials removal techniques.

#### Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Internal		External		Total
				Theory	J/V/P*	Theory	J/V/P*	
3	2	0	4	30 / 15	20/ 10	70/35	30/15	150/75

\* J: Jury; V: Viva; P: Practical

#### Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction Concepts of conventional and non-conventional machining processes, need of non-conventional machining, Classification of non-traditional machining processes, scope of non-traditional machining processes.	3
2	Non-Conventional Machining Processes Concepts of non-conventional machining processes, Tool design for various non-traditional machining processes, mechanical-thermal analysis of selected non-traditional machining processes, Parametric analysis, economical study of non-traditional machining processes, advantages, limitations, applications.	10
3	Lasers in Manufacturing and Material Processing Laser fundamentals and it's fabrication, Laser Medium (Solid state medium, gaseous medium, liquid medium), Properties of laser, Laser cutting, laser marking, laser drilling, laser joining processes, Laser and its application.	8
4	Advanced Metal Forming Basics of metal forming processes, Advancements in metal forming processes, High energy rate forming techniques: Explosive forming, Electro-magnetic forming, Electro-Magneto forming, Principles and various process parameters, advantages, limitations, applications.	7



<b>5</b>	<p>Micro-Machining Processes</p> <p>Introduction and classifications of Micro Machining Processes (MMPs), Mechanical type: Abrasive Jet micro machining, ultrasonic micro machining, Abrasive based nano finishing processes: Abrasive flow finishing, magnetic abrasive finishing, magnetorheological finishing, magnetorheological abrasive flow finishing, Thermoelectric type micro machining processes: Electric discharge micromachining, wire EDM, Laser beam micromachining, electron beam micromachining, Chemical and electrochemical advanced machining processes: Electrochemical micromachining, chemical and photochemical micromachining. Advantages, limitations and applications.</p>	<b>11</b>
----------	--	-----------

### Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						R: Remembering; U: Understanding; A: Application, N: Analyze; E: Evaluate; C: Create
R	U	A	N	E	C	
05	15	15	15	10	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

### Reference Books:

<b>1</b>	Manufacturing Engineering and Technology, Serope Kalpakjian, Steven R Schmid, Pearson Education.
<b>2</b>	Introduction to micromachining, V. K. Jain, Narosa Publishers.
<b>3</b>	Manufacturing Processes for Engineering Materials, Serope Kalpakjian Pearson Education.
<b>4</b>	Modeling of Metal Forming and Machining Processes by Finite Element and Soft Computing Methods, P M Dixit, U M Dixit Springer.
<b>5</b>	Advance Method of Machining, McGeough, J.A Springer.
<b>6</b>	Micromachining of Engineering Materials, J.A. McGeough. CRC Press.
<b>7</b>	Fundamentals of Microfabrication, Mark Madou CRC Press.
<b>8</b>	Modern Machining Processes, Pandey, P.C., and Shan, H.S. Tata McGraw-Hill Education.
<b>9</b>	Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, M P Groover Wiley India.

### Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	To learn various non-traditional machining processes	<b>40</b>
CO-2	To understand basic concepts and applications of LASERS.	<b>15</b>
CO-3	To choose, economically, a manufacturing processes for a particular job.	<b>30</b>
CO-4	To compare traditional and non-traditional machining processes.	<b>15</b>



## List of Practicals / Tutorials:

1	Introduction
2	Conventional machining processes
3	Non-Conventional machining processes
4	Fundamentals of advanced Lasers
5	Basics of Metal forming
6	Advanced metal forming
7	Basics of micro machining processes
8	Abrasive based nano finishing processes
9	Thermoelectric, chemical, electrochemical based finishing processes
10	Economical study of non-conventional machining processes
11	Case studies

## Supplementary learning Material:

### Curriculum Revision:

Version:	1
Drafted on (Month-Year):	Apr-20
Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22