MICROMACHINING
(Professional Elective -IV)

II Semester

Course Code: 19ME2163

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3	0	3

Course Outcomes: At the end of the course, the student will be able to
CO1: Identify the traditional and micro machining processes.
CO2: Describe advanced micromachining and nano finishing processes.
CO3: Explain thermoelectric advanced micromachining processes.
CO4: Describe electrochemical and chemical micromachining processes.
CO5: Discuss selection of micro machining processes.

UNIT-I **(10-Lectures)**

Introduction to micromachining, traditional micromachining processes: diamond turning micromilling, microgrinding, accuracy and dimensional control.

Learning outcomes:

1. Identify the traditional and micromachining processes (L1)
2. Explain the diamond turning and micromilling processes (L2)
3. Illustrate the microgrinding process with applications (L4)

UNIT-II **(10-Lectures)**

Advanced Micromachining and Nano finishing Processes: abrasive jet micromachining, ultrasonic micromachining, abrasive water jet micro machining, abrasive flow nano finishing, magnetic abrasive nano finishing.

Learning outcomes:

1. Illustrate the abrasive jet micromachining, and ultrasonic machining. (L4)
2. Explain the abrasive water jet micro machining and abrasive flow nano finishing. (L2)
3. Summarize the magnetic abrasive nano finishing process. (L5)

UNIT-III **(10-Lectures)**

Thermoelectric Advanced Micromachining Processes: electric discharge micromachining, electric discharge grinding and electric discharge diamond grinding, wire electric discharge micromachining, laser beam micromachining, electron beam micromachining, focused ion beam machining.

Learning outcomes:

1. Illustrate electric discharge micromachining, electric discharge grinding and electric discharge diamond grinding. (L3)
2. Explain wire electric discharge micromachining, and laser beam micromachining. (L2)
3. Summarize the electron beam micromachining, and focused ion beam machining. (L5)

UNIT-IV **(10-Lectures)**

Electrochemical and Chemical Micromachining Processes: electrochemical micromachining, electrochemical micro grinding, electro stream micro drilling, electrochemical micro deburring, shaped tube electrolytic micromachining, chemical micromachining.

Learning outcomes:

1. Discuss the electrochemical micromachining, electrochemical micro grinding, and electro stream micro drilling. (L2)
2. Explain the electrochemical micro deburring, and shaped tube electrolytic micromachining. (L2)
3. Outline the chemical micromachining. (L4)

UNIT-V **(10-Lectures)**

Miscellaneous: selection of micro machining processes, sensors and actuators, metrology for micro manufactured products.

Learning outcomes:

1. List the selection of micro machining processes. (L1)
2. Explain the sensors and actuators. (L2)
3. Summarize the metrology for micro manufactured products. (L5)

TEXT BOOKS:

1. V. K. Jain, *Micro manufacturing*, CRC press, 2012.
2. Joseph McGeough, *Micromachining of Engineering materials*, Marcel Dekker Publishers, New York,2002.
3. V. K. Jain, *Introduction to Micromachining*, Narosa Publishers, 2010, New Delhi.

REFERENCE BOOKS:

1. Mark J. Jackson, *Microfabrication & Nano manufacturing*, CRC press, 2005.
2. V. K. Jain, *Advanced Machining Processes*, Allied Publishers Private Limited, New Delhi, 2007.