

Course: MODERN MACHINING METHODS

Course Coordinator: Dr. Vikas Gupta

Course Code: ME-457-L , **Course Credits:** 4.0, **Contact Hours:** 4hours/week (MON, TUE, WED: 2nd Lecture and THU: 3rd Lecture), **Examination Duration:** 3 hours, **Course Assessment Methods** (internal: 30; external: 70) Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Course Objectives and Outcomes: The objectives of this course are to:

1. Understand the basic concepts of modern machining methods.
2. Learn the working of EDM and ECM machines.
3. Gain knowledge about EBM, EBW, LBW, USM, AJM, WJM, and CHM.
4. Compare non-traditional machining processes.

By the end of the course, a student is expected to:

1. List the non-traditional machining processes.
2. Explain schematically about modern machining methods.
3. List the applications, advantages, and limitations of new machining methods.
4. Select the correct non-conventional material removal process.

Course Contents

UNIT-I Unconventional Machining Process: Characteristics of Modern Machining Processes, Basic Principles of New Machining Methods, Advantages and Limitations of Non-traditional Machining Processes. Electric Discharge Machining (EDM): Operating Principles of Spark Erosion, Construction details and components of Spark Erosion Machines (Schematic Diagrams), Applications, Advantages, and Limitations of EDM process.

UNIT-II Electro-Chemical Machining (ECM): Principle of ECM process, ECM process Details with Chemical Reactions (Schematic Diagram), Advantages, Disadvantages and Application of ECM process. Electron Beam Machining (EBM): Description of EBM process (Schematic Diagrams), Applications and Limitations of Electron Beam Machining, Electron Beam Welding (EBW), and Laser beam Welding (LBW).

UNIT-III Ultrasonic Machining (USM): Basic Principle of the USM, Essential components of USM, Performance Parameters of USM, Applications, Advantages and Limitations of USM. Abrasive Jet Machining (AJM): Features of AJM (Schematic Diagrams), Practical Applications of AJM, Advantages & Disadvantages of AJM, Water Jet Machining (WJM).

UNIT-IV Chemical Machining (CHM): Basic Techniques of CHM, Mechanism of CHM, Process Variables in CHM, Advantages and Applications of CHM. Comparison of Unconventional Machining Processes: Comparison on Power Consumption basis, Selection of Non-traditional Machining process, Effect of Non-conventional Material removal processes on Surface Integrity.

Text and Reference Books: 1. Unconventional Machining Process – M.Adithan, Atlantic

2. Modern Machining Processes – P.C.Pandey, H.S.Shan, Tata McGraw Hill

3. Machining Science- Ghosh and Malik, Affiliated East-West Press

4. Non Traditional Manufacturing Processes- Benedict G.F, Marcel Dekker

5. Advanced Methods of Machining- Mc Geonh J.A, Chapman and Hall