

Course Code	18ME552	Course Title	Non Traditional Machining	Semester	V
Credits	3	L – T – P – TL*	2 – 1 – 0 – 3	Teaching Hrs	42
Total Marks	100	CIE*	40	SEE*	60
*NOTE: L – Lecture; T – Tutorial; P – Practical; TL – Total; CIE – Continuous Internal Evaluation; SEE – Semester End Examination					
Course Learning Objectives: This course will enable students to; <ul style="list-style-type: none"> • To understand the principle, mechanism of metal removal of various non-traditional machining processes. • To study the various process parameters and their effect on component machined on various non-traditional machining processes. • To understand the applications of different processes 					Teaching Hrs
Module - 1					
Introduction: Introduction to Non-traditional machining, Need for Non-traditional machining process, Comparison between traditional and non-traditional machining, general classification Non-traditional machining processes, classification based on nature of energy employed in machining, selection of non-traditional machining processes, Specific advantages, limitations and applications of non-traditional machining processes Water Jet Machining (WJM): Equipment & process, Operation, applications, advantages and limitations of WJM.					8
Module – 2					
Ultrasonic Machining (USM): Introduction, Equipment and material process, Effect of process parameters: Effect of amplitude and frequency, Effect of abrasive grain diameter, effect of slurry, tool & work material. Process characteristics: Material removal rate, tool wear, accuracy, surface finish, applications, advantages & limitations of USM. Abrasive Jet Machining (AJM): Introduction, Equipment and process of material removal, process variables: carrier gas, type of abrasive, work material, stand-off distance (SOD). Process characteristics- Material removal rate, Nozzle wear, accuracy & surface finish. Applications, advantages & limitations of AJM.					10
Module – 3					
ELECTROCHEMICAL MACHINING (ECM): Introduction, Principle of electro chemical machining: ECM equipment, elements of ECM operation, Chemistry of ECM. ECM Process characteristics: Material removal rate, accuracy, surface finish. Process parameters: Current density, Tool feed rate, Gap between tool & work piece, velocity of electrolyte flow, type of electrolyte, its concentration temperature, and choice of electrolytes. Applications ECM: Electrochemical grinding and electrochemical honing process. Advantages, disadvantages and application of ECG, ECH. CHEMICAL MACHINING (CHM): Elements of the process: Resists (maskants), Etchants. Types of chemical machining process-chemical blanking process, chemical milling process. Process characteristics of CHM: material removal rate, accuracy, surface finish, advantages, limitations and applications of chemical machining process.					8

<p style="text-align: center;">Module – 4</p> <p>ELECTRICAL DISCHARGE MACHINING (EDM): Introduction, mechanism of metal removal, EDM equipment: spark erosion generator (relaxation type), dielectric medium-its functions & desirable properties, electrode feed control system. Flushing types; pressure flushing, suction flushing, side flushing, pulsed flushing. EDM process parameters: Spark frequency, current & spark gap, surface finish, Heat Affected Zone. Advantages, limitations & applications of EDM.</p> <p>PLASMA ARC MACHINING (PAM): Introduction, non-thermal generation of plasma, equipment mechanism of metal removal, Plasma torch, process parameters, process characteristics. Safety precautions. Safety precautions, applications, advantages and limitations.</p>	8
<p style="text-align: center;">Module – 5</p> <p>LASER BEAM MACHINING (LBM): Introduction, generation of LASER, Equipment and mechanism of metal removal, LBM parameters and characteristics, Applications,</p> <p>ELECTRON BEAM MACHINING (EBM): Introduction, Principle, equipment and mechanism of metal removal, applications, Advantages & limitations.</p>	8
<p>Course outcomes: After a successful completion of the course, the student will be able to:</p> <p>CO1. Compare traditional and non-traditional machining process and recognize the need for Non-traditional machining process.</p> <p>CO2. Explain constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.</p> <p>CO3. Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.</p> <p>CO4. Explain constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.</p> <p>CO5. Enlighten LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.</p>	
<p>Question paper pattern:</p> <ul style="list-style-type: none"> • The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub- questions) from each module. • Each full question will have sub- question covering all the topics under a module. • The students will have to answer five full questions, selecting one full question from each module. 	
<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 1. Modern Machining Process by P.C Pandey and H S Shah, McGraw Hill Education India Pvt. Ltd. 2000 2. Production technology, HMT, McGraw Hill Education India Pvt. Ltd. 2001 <p>REFERENCE BOOKS</p> <ol style="list-style-type: none"> 1. New Technology, Dr. Amitabha Bhattacharyya, The Institute of Engineers (India), 2000 2. Modern Machining process, Aditya, 2002. 	