

PPD6I102 NON -TRADITIONAL MACHINING

Module I (10 hours)

ULTRASONIC MACHINING (USM): Introduction, equipment, tool materials & tool size, abrasive slurry, cutting tool system design:- Effect of parameters on Material removal rate, tool wear, Accuracy, surface finish, applications, advantages & Disadvantages of USM.

ABRASIVE JET MACHINING (AJM): Introduction, Equipment, Variables in AJM: Carrier Gas, Type of abrasive work material, stand off distance (SOD), nozzle design, shape of cut. Process characteristics-Material removal rate, Nozzle wear, Accuracy & surface finish. Applications, advantages & Disadvantages of AJM.

Module II (10 hours)

Water Jet Machining: Principle, Equipment, Operation, Application, Advantages and limitations of Water Jet machining.

ELECTROCHEMICAL MACHINING (ECM): Introduction, study of ECM machine, elements of ECM process: ECM Process characteristics – Material removal rate, Accuracy, surface finish, Applications, Electrochemical turning, Grinding, Honing, deburring, Advantages, Limitations.

CHEMICAL MACHINING (CHM): Introduction, elements of process, chemical blanking process, process characteristics of CHM: material removal rate, accuracy, surface finish, Hydrogen embrittlement, advantages & application of CHM.

Module III (10 Lectures)

ELECTRICAL DISCHARGE MACHINING (EDM): Introduction, mechanism of metal removal, dielectric fluid, spark generator, EDM tools (electrodes) Electrode feed control, EDM process characteristics: metal removal rate, accuracy, surface finish, Heat Affected Zone. Machine tool selection, Application, electrical discharge grinding, wire EDM.

PLASMA ARC MACHINING (PAM): Introduction, equipment, non-thermal generation of plasma, selection of gas, Mechanism of metal removal, PAM parameters, process characteristics. Applications, Advantages and limitations.

LASER BEAM MACHINING (LBM): Introduction, equipment of LBM mechanism of metal removal, LBM parameters, Process characteristics, Applications, Advantages & limitations.

ELECTRON BEAM MACHINING (EBM): Principles, equipment, operations, applications, advantages and limitation of EBM.

Module IV (10 Lectures)

Introduction to Surface engineering, High speed machining and grinding: Application of advanced coatings in high performance modern cutting tools and high performance super-abrasive grinding wheels, Micro and nano machining of glasses and ceramics. Theory and application of chemical processing: Chemical Machining, Aching of semi conductors, Coating and Electroless forming, PVD and CVD; Introduction to Reverse

Engineering, Concurrent Engineering and Rapid prototyping:

Text Books:

1. Modern machining process, Pandey and Shan, Tata McGraw Hill 2000
2. Manufacturing Engg. & Technology, Kalpakjian , Pearson Education
3. Manufacturing Science, A.Ghosh & A.K. Mallik, EWP

Reference Books

1. Metals Handbook: Machining Volume 16, Joseph R. Davis (Editor), American Society of Metals.
2. Surface Wear Analysis, Treatment & Prevention - ASM International, Materials Park, OH, U.S.A., 1st Ed. 1995
3. Production Technology, HMT, Tata McGraw Hill. 2001
4. Modern Machining Process, Aditya. 2002
5. Non-Conventional Machining, P.K.Mishra, The Institution of Engineers (India) Test book series, Narosa Publishing House – 2005.
6. Introduction to Rapid Prototyping, A Ghosh, North West Publication

**NON -TRADITIONAL MACHINING
PRACTICAL**

List of Experiments:

1. An Experimental study of working principle and applications of Electrochemical Machining.
2. An Experimental study of working principle and applications of Chemical Machining.
3. An Experimental study of working principle and applications of various finishing processes.
4. A study of working principle and applications of Ultrasonic Machining.
5. A study of working principle and applications of Abrasive Jet Machining.
6. A study of working principle and applications of ELECTRICAL DISCHARGE MACHINING.
7. A study of working principle and applications of ELECTRON BEAM MACHINING.
8. Evaluation effects process parameters in Metal forming processes.
9. A comparative study of working principle and applications of various Micro-Machining processes, and study effects of process parameters of them.
10. Study of process parameters of Laser processing