

AMTD08 UNCONVENTIONAL MACHINING PROCESSES

UNIT-1 ULTRASONIC MACHINING (USM)

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

UNIT-2 ABRASIVE JET MACHINING (AJM)

- 2.1 Introduction, Equipment, Variables in AJM: Carrier Gas, Type of abrasive work material, standoff distance (SOD), nozzle design, shape of cut.
- 2.2 Process characteristics-Material removal rate, Nozzle wear, Accuracy & surface finish. Applications, advantages & Disadvantages of AJM.
- 2.3 Water Jet Machining: Principle, Equipment, Operation, Application, Advantages and limitations of Water Jet machining.

UNIT-3 ELECTROCHEMICAL MACHINING (ECM)

- 3.1 Introduction, study of ECM machine, elements of ECM process: ECM Process characteristics
- 3.2 Material removal rate, Accuracy, surface finish, Applications,
- 3.3 Electrochemical turning, Grinding, Honing, deburring, Advantages, Limitations.

UNIT-4 CHEMICAL MACHINING (CHM)

- 4.1 Introduction, elements of process, chemical blanking process, process characteristics of CHM:
- 4.2 Material removal rate, accuracy, surface finish,
- 4.3 Hydrogen embrittlement, advantages & application of CHM.

UNIT-5 ELECTRICAL DISCHARGE MACHINING (EDM)

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

UNIT-6 PLASMA ARC MACHINING (PAM)

- 6.1 Introduction, equipment, non-thermal generation of plasma, selection of gas,
- 6.2 Mechanism of metal removal, PAM parameters, process characteristics.
- 6.3 Applications, Advantages and limitations.

UNIT-7 LASER BEAM MACHINING (LBM)

- 7.1 Introduction, equipment of LBM mechanism of metal removal, LBM parameters,
- 7.2 Process characteristics, Applications, Advantages & limitations.

UNIT-8 ELECTRON BEAM MACHINING (EBM)

- 5.1 Principles, equipment, operations, applications, advantages and limitation of EBM.

UNIT-9 INTRODUCTION TO SURFACE ENGINEERING, HIGH SPEED MACHINING AND GRINDING

- 9.1 Application of advanced coatings in high performance modern cutting tools and high performance superabrasive grinding wheels,
- 9.2 Micro and nano machining of glasses and ceramics. Theory and application of chemical processing: Chemical Machining, Machining of semi-conductors,
- 9.3 Coating and Electroless forming, PVD and CVD; Introduction to Reverse Engineering, Concurrent Engineering and Rapid prototyping:

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

