4/4 B.Tech. SEVENTH SEMESTER

ME7T3 ADVANCED MACHINING PROCESSES Credits: 4

Lecture:- 4 periods/week - Internal assessment: 30marks
Tutorial : -- Semester end examination: 70 marks

Objectives:

1. Define various advanced machining processes.
2. Acquire knowledge in the elementary mechanism and the machinability of materials with different advanced machining processes.
3. Determine basic principles of operation for each process and their applications.
4. State various parameters influencing the machining process.

Learning outcomes:

At the end of course the students will be able to:

1. Illustrate advanced machining processes, cutting tools and cutting fluids for a specific material and part features.
2. Classify the mechanism of Mechanical machining processes, economic considerations in Ultrasonic machining, its applications and limitations.
3. Interpret Electro Chemical machining process, economic aspects of ECM and problems on estimation of metal removal rate.
4. Relate Generation and control of electron beam for machining, laser beam machining, comparison of thermal and non-thermal processes
5. Differentiate Thermal Metal Removal Processes, characteristics of spark eroded surface, machine tool selection and various finishing techniques.

Pre-Requisites:

Machine Tools, Production Technology

UNIT – I
INTRODUCTION:

Need for non-traditional machining methods, Classification of modern machining processes, considerations in process selection, Materials, Applications.

UNIT II

ULTRASONIC MACHINING:

Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT – III

ABRASIVE JET MACHINING, WATER JET MACHINING AND ABRASIVE WATER JET MACHINE:

Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations.

UNIT – IV

THERMAL METAL REMOVAL PROCESSES:

General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

UNIT - V

ELECTRO–CHEMICAL PROCESSES:

Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, Surface finish and accuracy economic aspects of ECM–Simple problems for estimation of metal removal rate.

Fundamentals of chemical machining, advantages and applications.

UNIT – VI

ELECTRON BEAM MACHINING:

Generation and control of electron beam for machining, theory of electron beam machining.

Comparison of thermal and non-thermal processes.

General Principle and application of laser beam machining, thermal features, cutting speed and accuracy of cut.

UNIT-VII

Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

Chemical machining: Principle, maskants, etchants and applications.

UNIT – VIII

Magnetic abrasive finishing, Abrasive flow finishing, Electrostream drilling, Shaped tube electrolytic machining: Basic Principle of operation, advantages, disadvantages and applications.

Learning resources

Text book:

1. VK Jain, “Advanced machining processes”:, Allied publishers, New Delhi,2005.

Reference books:

1. Pandey P.C. and Shah H.S , “Modern Machining Process”, Tata McGraw-Hill Publishing. 1984
2. McGeough, J. A, , “Advanced Methods of Machining” *Springer publisher*; 1988.