IV B.TECH - I SEMESTER

ADVANCED MACHINING PROCESSES

Course Code: ME7T5B **Credits: 3**
Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

COURSE OBJECTIVES:

- Define various advanced machining processes.
- Acquire knowledge in the elementary mechanism and the machin ability of materials with different advanced machining processes.
- Determine basic principles of operation and various parameters influencing for each machining process and their applications.

COURSE OUTCOMES:

Upon completion of this course the student will be able to:

1. Illustrate advanced machining processes, mechanism of Mechanical machining processes, its applications and limitations.
2. Classify the Electro Chemical machining process, economic aspects of ECM.
3. Interpret Thermal Metal Removal Processes, characteristics of spark eroded surface & machine tool selection.
4. Relate Generation and control of electron beam for machining and laser beam for machining.

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.

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

UNIT II

ABRASIVE JET MACHINING, WATER JET MACHINING AND ABRASIVE WATERJET MACHINEING:

Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations, Magnetic abrasive finishing, Abrasive flow finishing.

UNIT III

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. Electro stream drilling, Shaped tube electrolytic machining: Basic Principle of operation, advantages, disadvantages and applications.

CHEMICAL MACHINING: Principle, maskants, etchants and applications.

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 toolelectrode and dielectric fluids, methods, surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications. Comparison of thermal and non-thermal processes.

ELECTRON BEAM MACHINING

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

UNIT V

LASER BEAM MACHINING, PLASMA ARC MACHINING

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

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

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