

MODERN MACHINING METHODS

Course Code	20ME4501C	Year	III	Semester	I
Course Category	Professional Elective-I	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	MP
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes: Upon successful completion of the course, the student will be able to

CO	Statement	Skill	Blooms	Units
CO1	Illustrate advanced machining processes, mechanism of Mechanical machining processes, its applications and limitations.	Understand Communication	L2	1,2,3,4,5
CO2	Classify the Electro Chemical machining process, economic aspects of ECM.	Apply, Communication	L3	3
CO3	Interpret Thermal Metal Removal Processes, characteristics of spark eroded surface & machine tool selection.	Apply, Communication	L3	4
CO4	Relate Generation and control of electron beam for machining and laser beam and Plasma Arc for machining.	Apply, Communication	L3	5

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: High, 2: Medium, 1: Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2		2				2			2	2	1
CO2	3		2		2				2			2	2	2
CO3	3		2		2				2			2	2	1
CO4	2		2		2				2			2	2	1

Syllabus

UNIT	Course Content	Mapped COs
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 developments.	CO1
II	ABRASIVE JET MACHINING, WATER JET MACHINING AND ABRASIVE WATERJET MACHINEING: Basic principles, equipment's, process variables, mechanics of metal removal, MRR, application and limitations, Magnetic abrasive finishing, Abrasive flow finishing.	CO1
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.	CO1, CO2

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. Comparison of thermal and non-thermal processes.	CO1, CO3
V	ELECTRON BEAM MACHINING: Generation and control of electron beam for machining, theory of electron beam machining. LASER BEAM MACHINING: General Principle and application of laser beam machining, thermal features, cutting speed, and accuracy of cut. PLASMA ARC MACHINING: Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish, other applications of plasma in manufacturing industries.	CO1, CO4

Learning Resource

Text books:

VK Jain, “Advanced machining processes”, Allied publishers, New Delhi,2005. Advanced Machining Processes by Hasan Abadel – Gawad El - Hofy , Mc Graw-Hill
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Reference books

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| 1. Pandey P.C. and Shah H.S, “Modern Machining Process”, TataMcGraw-Hill Publishing.1984
2. McGeough, J. A, “Advanced Methods of Machining” Springer publisher; 1988 |
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e- Resources & other digital material
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| 1. https://nptel.ac.in/courses/112/104/112104204/ |
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