

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER3C4 MANUFACTURING PROCESSES	L	T	P	L	T	P	Total
Duration of Theory Paper:3 Hours	3	1	2	3	1	1	5

Learning Objectives:

1. To provide an understanding of the various processes which are used extensively in the manufacturing of mechanical components.
2. To learn about the constructional features of the standard types of machine tools used in shop floor
3. To learn about the process parameters and the standard tooling used on various machine tools.
4. To learn about the basic measurement and inspection tools used in shop floor.

Pre requisite(s): Elements of Mechanical Engineering, Workshop Practice

COURSE CONTENTS

UNIT-I

Production of Axi-symmetric Parts: Introduction to the mechanics of metal cutting, Turning and related processes, Turning parameters, Constructional features and operation of turning and related machine tools: Lathes, Capstan-Turret lathes, Automats, CNC lathes, Machining centers and Turning centers. Single point cutting tools: types and geometry, Tool Materials.

UNIT-II

Production of Prismatic Parts: Introduction to the Shaping, Planning and Milling processes and their process parameters, Constructional features and operation of Shaper, Planner, Slotter and Milling machines, Tool holding, Work holding and Indexing methods, Cutting tools: types and geometry.

UNIT-III

Drilling, Broaching, Screw Thread and Gear cutting: Introduction to operations like Drilling, Boring, Reaming, Counter Boring and Counter Sinking. Machine Tools for drilling and related hole making processes, Drilling machine accessories, Process parameters for drilling and boring operations, Accuracy and finish of drilled holes, Broaching processes and broaching machines, power calculations. Cutting tools like drills, reamer, broach and taps: types and geometry. Thread forms and thread fits, External and Internal thread cutting processes. Gear: types and methods of gear manufacturing, Machine tools and tooling used for gear manufacturing.

UNIT-IV

Abrasive Machining: Introduction to various grinding operations, Types of abrasives and bonds, Marking system for grinding wheels and their selection criteria, Mechanics of grinding, Truing and dressing of grinding wheels, Grinding machines for cylindrical and surface grinding, Tool & cutter grinders. Safety in grinding, Other abrasive processes: Honing, Lapping, Super finishing, Polishing and Buffing.

UNIT-V

Metrology: Basic measurements and the use of Squares and Surface Plates, Micrometers, Vernier Calipers, Gage blocks, Inside, Depth and Height measuring instruments, Angular measurements, Limits, tolerances and fits: Need for limit systems, Interchangeability, Statistical assembly, Selective assembly, Limit system. Taylor's principles of gauge design, Gauge tolerance and wear allowances, Types of limit gauges, Thread or screw gauges, Advantages & limitation of limit gauges. Measurement and inspection of external screw threads and gears.

Learning Outcomes :

Upon Completing the Course, Student will able to:

1. Identify the processes used for the manufacturing of components of various sizes and shapes.
2. Understand the construction and working of the machine tools used for various operations along with the hands on experience of some of them during laboratory work.
3. Select the tooling and the process parameters for the processing of common engineering work materials.
4. Understand the use of basic measurement and inspection tools used in shop floor, recognize and design the three types of plug and ring gauges based on the limit system.

BOOKS RECOMMENDED:

- [1] Gupta I.C., *A Textbook of Engineering Metrology, 7ed*, Dhanpat Rai Publications.
- [2] Sharma P. C., *Production Technology, Production Engineering*, S. Chand and Co.
- [3] HMT *Production Technology*, Tata McGraw-Hill Publishing Company Ltd.
- [4] Chapman W.A.J., *Workshop Technology Part 1, 2 and 3, 4ed*, Viva Books Private Ltd.
- [5] Hajra Choudhury A.K., Hajra Choudhury S.K., Roy Nirjhar *Elements of Workshop Technology : Machine Tools* (Volume - 2), Media Promoters and Publishers Pvt. Ltd.

List of Practical Assignment:

1. Study of the geometry of single point cutting tools.
 2. Study of the geometry of milling cutters.
 3. Study of the geometry of double fluted twist drill.
 4. Study of the geometry of Taps and Reamer.
 5. Study of constructional features of the Lathe and to machine a job as per given dimensions on it.
 6. Study of constructional features of the Shaper and to machine a job as per given dimensions on it.
 7. Study of constructional features of the Milling m/c and to machine a job as per given dimensions on it.
 8. To study the indexing of workparts, to be milled, using a dividing head.
 9. Study of comparators.
 10. Measurement and inspection of screw threads and cutting tools using a Tool Makers Microscope and Profile Projector.
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