

ME204: MACHINING PROCESSES
CREDITS = 6 (L=4, T=0, P=2)

Course Objective:

To understand the principles of conventional material removal processes along with necessary tooling and parameters.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				
L	T	P		Theory		Practical		Total Marks
			ESE	CE	ESE	CE		
4	0	2	6	70	30	30	20	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	<p><u>Basic Machine Tools and Metal Cutting Principles:</u> Classification of machining processes and machine tools, Basic motions in various machines tools, Cutting tool materials, Cutting fluids, Different types of cutting tools, Nomenclature of single point and multi point cutting tools, Concept of cutting speed, feed, depth of cut and MRR for various machine tools.</p>	05
2	<p><u>Metal Cutting Lathes:</u> Classification of lathes, Constructional details/elements of engine lathe, Accessories and attachments, Specifications, Lathe operations, Methods of taper turning, Thread cutting on lathe.</p> <p>Capstan and Turret lathes: Construction details, Operations and applications. Alignment tests of lathes.</p>	11
3	<p><u>Drilling Machines:</u> Fundamentals of drilling operation, Construction of drilling machines, Types of drilling machines, Twist drill, tap and reamer geometry, Allied operations performed on drilling machine, Alignment tests of drilling machine.</p> <p><u>Boring Machine:</u> Purpose of boring operation, Horizontal and vertical boring machines, Jig boring machines and construction features.</p>	06

Unit No.	Topics	Teaching Hours
4	<p><u>Shaper, Planer, and Slotter:</u> Shaper: Working principle, Classification of shapers, Principal parts of shaper, Shaper mechanisms, Shaper operations Planer: Working principle, Difference between shaper and planer Slotter: Principal parts, Operations performed on slotter.</p> <p><u>Broaching and Sawing Machines:</u> Broaching: Fundamentals of broaching, broaching tool terminology, Types of broaching machines, Advantages and limitations of broaching. Sawing: Operation, Saw blades, Types of sawing machines.</p>	08
5	<p><u>Milling Machines:</u> Principle of milling, Types of milling machines, Construction details of column and knee type milling machine, Types of milling cutters, Different types of milling operations, Concept of up-milling and down-milling, Cutting conditions in milling, Accessories and attachments, Indexing, Helical milling operation and its set up, Alignment tests of milling machine.</p>	10
6	<p><u>Finishing and super finishing process:</u> <u>Grinding Machines and Abrasives:</u> Characteristic of grinding process, Classification of grinding machines, Operations and applications of surface, cylindrical and centerless grinding processes, Dressing, truing and balancing of grinding wheels, Abrasives, Grinding wheel designation and selection.</p> <p><u>Super Finishing Processes:</u> Lapping, honing, buffing, and polishing: Characteristics, machining and applications.</p>	08
TOTAL		48

List of References:

1. Hajra Choudhury S.K., Bose H.K., and Hajra Choudhury A. K., “*Elements of Workshop Technology*” (Vol. II, 12th Edition), Media promoters and Publishers Pvt. Ltd.
2. Raghuwanshi B. S., A Course in “*Workshop Technology*” (Machine Tools Vol.II), Dhanpat Rai & Sons.
3. W.A.J. Chapman, “*Workshop Technology*” (Vol. I, II & III).
4. Rao P. N., “*Manufacturing Technology*” (Vol. 2), Tata McGraw-Hill.
5. HMT, “*Production Technology*”, Tata Mc GrawHill.

Course Outcomes (COs):

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

1. Determine the concept of generatrix and directrix for the generation of surfaces or profiles on the workpiece, Select cutting tool materials and tool geometry, cutting fluids, for improving machinability and tool life.
2. Analyze the structure, basic elements and working of general purpose machine tools.
3. Comprehend basic mechanisms such as drive, speed, feed and indexing mechanisms for general purpose machine tools.
4. Calculate the cutting parameters like cutting speed, feed, depth of cut, machining time and material removal rate for general purpose machine tools.
5. Identify finishing and super finishing processes in context to its applications.
6. Inspect the alignment of machine tools.