

**ME402: PRODUCTION TECHNOLOGY**  
**CREDITS = 5 (L=3, T=0, P=2)**

**Course Objective:**

To expose principles of conventional and modern machining processes along with jigs and fixtures for production of quality components.

**Teaching and Assessment Scheme:**

Teaching Scheme			Credits	Assessment Scheme				
L	T	P	C	Theory		Practical		Total Marks
				ESE	CE	ESE	CE	
3	0	2	5	70	30	30	20	150

**Course Contents:**

Unit No.	Topics	Teaching Hours
1	<p><b><u>Machining Processes:</u></b> Principles of metal cutting, Classification of machining processes, Geometry of single point cutting tools, Different cutting tool materials and their applications, Coatings used for Cutting tool.</p> <p><b><u>Mechanics of Metal Cutting:</u></b> Classification of chips, Mechanism of chip formation, Effect of process parameters and tool geometry on mechanism of chip formation, Chip breakers, Orthogonal and oblique cutting, Forces acting in the cutting zone, Merchant's circle diagram, Force and velocity relationship, Effect of tool geometry on cutting forces and power consumption, Machine tool dynamometers.</p> <p><b><u>Thermal aspects in Metal Cutting:</u></b> Heat sources in metal cutting, Heat flow and distribution in the cutting zone, Measurement of cutting temperature and its control, Functions of cutting fluid, Types of cutting fluids, Application of cutting fluids, Maintenance and disposal of cutting fluids.</p> <p><b><u>Tool wear and Tool life:</u></b> Types of tool wear, Physical mechanism of tool wear, Tool life, Formulation of Taylor's tool life equation, Factors affecting tool life.</p> <p><b><u>Economics of Metal Cutting:</u></b> Factors influencing economics of cutting, Economical cutting speed for minimum cost and maximum production rate.</p> <p><b><u>Machinability of metals:</u></b> Definition and machinability criteria, Factors affecting machinability, Survey of machinability of engineering materials.</p>	12

Unit No.	Topics	Teaching Hours
2	<b><u>Gear Manufacturing:</u></b> Forming and generation methods in gear cutting, Gear finishing operations.	04
3	<b><u>Unconventional machining methods:</u></b> Introduction, Working principle, equipment, process parameters and applications of EDM, Wire cut EDM, ECM, USM, EBM, LBM, AJM, WJM, and AWJM.	08
4	<b><u>Jigs, Fixtures and Gauges:</u></b> Necessity, Elements of jigs and fixtures, Principle of 3-2-1 location and its application, Types of locators, Concept of work piece control, geometric control, dimensional control and mechanical control, Clamping, Clamping devices, Design of drill jigs, Fixtures for milling and turning, Modular fixtures, Taylor's principle of gauge design.	10
5	<b><u>Statistical Quality Control:</u></b> Variability in manufacture, Normal distribution curve, and Variable control charts, Process capability indexes, Attribute control charts, Tolerance analysis in assemblies using additive relationship and probabilistic relationship.	08
<b>TOTAL</b>		<b>42</b>

**List of References:**

1. Boothroyd G, "Fundamentals of Machining and Machine Tools", 3<sup>rd</sup> edition, CRC publication.
2. Lissaman A. J., Martin S. J., "Principles of Engineering Production", ELBS.
3. Rao P. N., "Manufacturing Technology Vol. - 2", 3<sup>rd</sup> ed, Tata McGraw Hill.
4. Raghuvanshi B. S., "Workshop Technology Vol. II", Dhanpat Rai & Co.
5. P. C. Sharma, "Textbook of Production Engg." S. Chand.
6. Joshi P. H., "Jigs and Fixtures (Design Manual)", 3<sup>rd</sup> edition, McGraw Hill.
7. Jain V. K., "Advanced Machining Processes", Allied Publishers.
8. Amitabha Ghosh and Asok Kumar Mallik "Manufacturing Science", John Wiley and Sons.

**Course Outcomes (COs):**

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

1. Apply the fundamental principles of metal cutting processes to improve the performance of manufacturing processes.
2. Decide Gear manufacturing method based on industrial applications.
3. Select unconventional machining method for industrial applications.
4. Design of jigs, fixtures and gauges for components.
5. Apply statistical method to monitor and maintain the quality of product.