

**METROLOGY AND MACHINE TOOLS**

**B.Tech. III Year I Sem.**  
**Course Code: ME503PC**

**L T/P/D C**  
**4 1/0/0 4**

**Pre-requisites: None**

**Course Objectives:** The course content enables students to:

- Acquire the knowledge of Engineering metrology and its practice which is having increasing importance in industry.
- Specifically makes the student to improve applications aspect in the measurements and control of process of manufacture
- Impart the fundamental aspects of the metal cutting principles and their application in studying the behavior of various machining processes.
- Train in knowing the fundamental parts of various machine tools and their kinematic schemes.
- Discuss various principles of jigs and fixtures which will be used hold the work pieces in various machine tools

**Course Outcome:** At the end of the course, the student would be able to

- Identify techniques to minimize the errors in measurement.
- Identify methods and devices for measurement of length, angle, gear & thread parameters, surface roughness and geometric features of parts.
- Understand working of lathe, shaper, planer, drilling, milling and grinding machines.
- Comprehend speed and feed mechanisms of machine tools.
- Estimate machining times for machining operations on machine tools

**UNIT – I**

Metal cutting: Introduction, elements of cutting process – Geometry of single point tools. Chip formation and types of chips. Engine lathe – Principle of working, types of lathe, specifications. Taper turning,– Lathe attachments. Capstan and Turret lathe – Single spindle and multi-spindle automatic lathes – tool layouts.

**UNIT – II**

Drilling and Boring Machines – Principles of working, specifications, types, operations performed; twist drill. Types of Boring machines and applications. Shaping, slotting and planing machines –Principles of working – machining time calculations.

**UNIT – III**

Milling machines – Principles of working – Types of milling machines – Geometry of milling cutters methods of indexing. Grinding – theory of grinding – classification of grinding machines. Types of abrasives, bonds. Selection of a grinding wheel. Lapping, honing and broaching machines, comparison and Constructional features, machining time calculations

**UNIT – IV**

Limits, fits and tolerances- Unilateral and bilateral tolerance system, hole and shaft basis system. Interchangeability and selective assembly.

**Limit Gauges:** Taylor's principle, Design of GO and NO GO gauges Measurement of angles, Bevel protractor, and Sine bar. Measurement of flat surfaces, straight edges, surface plates, optical flat and auto collimator.

**UNIT – V**

Surface Roughness Measurement: Roughness, Waviness. CLA, RMS, Rz Values. Methods of measurement of surface finish, Talysurf. Screw thread measurement, Gear measurement; Machine Tool Alignment Tests on lathe, milling and drilling machines. Coordinate Measuring Machines: Types and Applications of CMM.

**TEXT BOOKS:**

1. Machine Tool Practices/ Kibbe, John. Neely, T. White, Rolando O. Meyer/ Pearson
2. Fundamentals of Metal Machining and Machine Tools / Geoffrey Boothroyd / McGraw Hill.

**REFERENCE BOOKS:**

1. Principles of Machine Tools, Bhattacharyya A and Sen.G.C / New Central Book Agency.
2. Fundamentals of Dimensional Metrology / Connie Dotson / Thomson