II Year II Semester	**L**	**T**	**P**	**C**
17ME402	**3**	**1**	**0**	**3**

MACHINE TOOLS AND METROLOGY

UNIT – I:

LATHE MACHINES: Engine lathe - principle of working, specification of lathe - types of lathe - work holders tool holders - box tools taper turning, thread turning - for lathes and attachments, constructional features of speed gear box and feed gear box. Turret and capstan lathes - collect chucks - other work holders - tool holding devices - box and tool layout. Principal features of automatic lathes - classification - single spindle and multi-spindle automatic lathes - tool layout and cam design for automats.

UNIT – II

SHAPING, SLOTTING AND PLANING MACHINES: Principles of working - principal parts-specifications, operations performed, machining time calculations.

DRILLING & BORING MACHINES: Principles of working, specifications, types, operations performed -tool holding devices - twist drill - Boring Machines - fine Boring Machines - jig boring machine, deep hole Drilling Machine.

UNIT - III

MILLING MACHINES: Principles of working - specifications - classification of Milling Machines - principal features of horizontal, vertical and universal Milling Machine, machining operations, types of cutters, geometry of milling cutters - methods of indexing, accessories to milling machines.

UNIT-IV

SYSTEMS OF LIMITS AND FITS: Introduction, nominal size, tolerance, limits, deviations, fits - Unilateral and bilateral tolerance system, hole and shaft basis systems- interchangeability, determistic & statistical tolerances, selective assembly. International standard system of tolerances, selection of limits and tolerances for correct functioning.

LINEAR MEASUREMENT: Length standards, end standards, slip gauges- calibration of the slip gauges, dial indicators, micrometers.

MEASUREMENT OF ANGLES AND TAPERS:

Different methods - bevel protractor, angle slip gauges- angle dekkor- spirit levels- sine bar- sine table, rollers and spheres used to measure angles and tapers.

LIMIT GAUGES:

Taylor's principle - design of go and no go gauges; plug, ring, snap, gap, taper, profile and position gauges.

UNIT-V

SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness -Numerical assessment of surface finish-CLA, Rt., R.M.S. Rz, R10 values, Method of measurement of surface finish - Profilograph, Talysurf, ISI symbols for indication of surface finish.

COMPARATORS: Types - mechanical, optical, electrical and electronic, pneumatic comparators and their uses.

UNIT - VI

GEAR MEASUREMENT: Nomenclature of gear tooth, tooth thickness measurement with gear tooth vernier & flange micro meter, pitch measurement, total composite error and tooth to tooth composite errors, rolling gear tester, involute profile checking.

SCREW THREAD MEASUREMENT: Elements of measurement - errors in screw threads- concept of virtual effective diameter, measurement of effective diameter, angle of thread and thread pitch, and profile thread gauges.

FLATNESS MEASUREMENT:

Measurement of flatness of surfaces- instruments used- straight edges- surface plates - auto collimator.

MACHINE TOOL ALIGNMENT TESTS: Principles of machine tool alignment testing on lathe, drilling and milling machines.

TEXT BOOKS:

1.Dimensional Metrology/Connie Dotson/Cengage Learning

2.Engineering Metrology / R.K.Jain / Khanna Publishers

3. Manufacturing Processes / JP Kaushish/ PHI Publishers-2nd Edition

4. Manufacturing Technology Vol-II/P.N Rao/Tata McGraw Hill

References:

1.Engineering Metrology / Mahajan / DhanpatRai Publishers

2.Engineering Metrology / I.C.Gupta / DhanpatRai Publishers

3.Metal cutting and machine tools /Geoffrey Boothroyd, Winston A.Knight/ Taylor & Francis

4. Production Technology / H.M.T. Hand Book (Hindustan Machine Tools).

5. Production Engineering/K.C Jain & A.K Chitaley/PHI Publishers