

Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech.	Metal Cutting & Tool Design	MEM 504	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
II	4	3-1-0	3 Hours

Unit - I

Metal Cutting: Various methods of tool nomenclature and their inter relationship; Theoretical Determination of shear angle and cutting forces; Shear plane theory–Merchant’s models; Lee and Shofer’s model. Velocity relations; Estimation of shear angle experimentally; Metal cutting friction; Real area of contact-Rules of dry sliding; stress distribution of tool face-variation of co-efficient of tool face friction with the rake angle.

Principles and Working of Super-finishing Processes: Honing; Lapping; Burnishing; Ballizing and polishing. **(09 Hours)**

Unit - II

Cutting Tool Materials and Processes: Desired Properties; Types; Major constituents; Relative characteristics; Latest Developments; ISO classification and coding of carbide tools; Coated tools and inserts **(06 Hours)**

Unit - III

Design of Single Point Cutting Tools; Form Tools: Design of flat and circular form tools and holding methods.

Design of Multipoint Cutting Tools: Milling cutters; Major types; Design and manufacturing of peripheral; End and face milling cutters; Force and power consumption; Grinding of milling cutters.

Broaches: Push and Pull types; external and internal broaches; Design and manufacturing of pull type and push type broaches. **(08 Hours)**

Unit - IV

Multi Point Cutting Tools: Twist drill geometry; Design and manufacturing of twist drill; Effect of variations of different angles on torque and thrust forces; Types and design of shanks; Sharpening of twist drills.

Reamers: Types; Geometry; Reaming allowance; Tolerance disposition; Design and manufacturing of twist drills;

Taps and Dies: Types; Geometry; Design and manufacturing of taps and dies.

(08 Hours)

Unit - V

Design of Press Tools: Die set elements; Design of die set for simple components in blanking; Piercing; Bending; Drawing; Forging and spinning; Plastic tools; Plastic dies for simple components.

(08 Hours)

Unit - VI

Jigs and Fixtures: Design principles and construction features; Locating principles associated with flat; Cylindrical; Internal and external surfaces; Types of locating pins; Requirements and choice of locating systems; Redundant location; Fool proofing; Setting blocks- types of clamping devices and their basic elements; Quick action clamps and nuts; Equalizing and multiple clamping pneumatics; Hydraulic; Magnetic; Pneumatic; Electrical and Vacuum; Types of drill jig and their classifications; Types of jig bushes; Jig feet; Indexing jig; Design of fixtures for turning; Grinding; Milling and welding; Economic analysis of jig and fixtures.

(06 Hours)

Recommended Books:

1. Tool Design; Donaldson; Leain and Goold; Tata McGraw Hills; New Delhi; 1983.
2. Design of Cutting Tools; Rodin; Mir Publication; Moscow.
3. Design of Cutting Tools: Use of Metal Cutting Theory; Amitabha Bhattacharya and Inyong Ham; ASTME Publication; Michigan; USA 1969.
4. Production Engineering Design (Tool Design); Surender Keshav and Umesh Chandra; Satya Prakashan; New Delhi; 1994.