

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**B. E. SEMESTER: V**  
**PRODUCTION ENGINEERING**

Subject Name: **Tool Design**

Subject Code: **152502**

<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>		
<b>Theory</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Total</b>	<b>University Exam (Theory) (E)</b>	<b>Mid Sem Exam (Theory) (M)</b>	<b>Practical (I)</b>
3	2	0	5	70	30	50

<b>Sr. No.</b>	<b>Course content</b>
1.	<b>Introduction:</b> Tool design practice, procedure of tool design, process planning and tool design.
2.	<b>Mechanics of Machining:</b>  Place of machine in production , classification of material removal processes, orthogonal and oblique cutting, merchant's circle diagram-force and velocity relationship, types of cutting tool mechanics, their characteristics and selection criteria, mechanics of metal cutting- effect of tool-geometry and other cutting parameters, mechanisms of formation of chips-types of chips formed, concept of specific cutting pressure , types of tool wear, factors causing wear, tool life, variables affecting tool life, economical cutting speed, mach inability of metals, economics of machining.
3.	<b>Thermal Aspects in Machining:</b>  Sources of heat generation in machining and its effects, temperature measurement techniques in machining, types of cutting fluids, Functions of cutting fluid, Characteristics of cutting fluid, Application of cutting fluids.
4.	<b>Design of Single Point Cutting Tools:</b>  Tool geometry for single point cutting tool, tool signature , Design of single point cutting tools such as solid tools , tipped tools, coated tipped tools, throw away type tools and diamond tools.
5.	<b>Design of Multipoint Tools:</b>  Design of milling cutters, gear milling cutters, hobs gear shaping tools, broaches, drills, reamers, taps & dies for thread cutting, boring tools, flat form tools, circular form tools. Standard tool holders & standard tooling and their design for turrets and automates.

6.	<b>Cutting Tool Materials:</b> Types of cutting tool materials, their selection and applications.
7.	<b>Design of Press Tools:</b>  Introduction to press tools and related terminology, effect of clearances, theory of deformation, stages of cutting operation, center of pressure, strap strip layout , die and punch design, design of simple, compound and progressive dies, methods of mounting punches and dies, design of drawing dies, bend allowances, bending and forming dies, Dies for die-casting and forging operations.
8.	<b>Jigs and Fixture:</b>  Essential requirements of jigs & fixtures, economics of jigs and fixtures, principles of location and clamping, location and clamping devices, types of drill bushes, types of jigs and fixtures- such as fixtures for milling, welding, heat treatment, grinding, assembly and inspection processes; standardization in jigs and fixtures, principle of work holders, common work holders for production like vises, chucks, arbors, mandrels & collets.
9.	<b>Limits, Fits &amp; Tolerances:</b>  Terminology for limits and fits, Meaning of limits, General limits of tolerances, complete interchangeability, Statistical assembly, Limit systems, and Selective assembly.
10.	<b>Gauges and Gauge Design:</b>  Introduction, Plain gauges, Design of limit gauges, Manufacturing of limits gauges, Choice of limits gauges, Thread or screw gauges, Advantages and limitation of limit gauges, Care of gauges, other types of gauges.

### Reference Books:

1. A Text Book of Production Engineering By P.C.Sharma., S Chand & Co.
2. Production Engineering Sciences By P.C.Pandey & C.K.Singh, Standard Publishers.
3. Tool Engineering and Design By G.R. Nagpal.
4. Manufacturing Science by Ghosh & Mallik, East West Press, New Delhi.
5. Manufacturing Processes for Engineering Materials by Kalpakjian S, Pearson Publication.
6. Fundamental of Metal Machining and Machine Tools by Geoffrey Boothroyd.
7. Jig & Fixtures by P.H.JOSHI, Tata McGrawhill.
8. Jigs & Fixtures by Grant, Tata McGrawhill.