



C.U.SHAH UNIVERSITY – WADHWANCITY

FACULTY OF: - Technology and Engineering (Diploma Engineering)

DEPARTMENT OF: - Mechanical Engineering

SEMESTER: - VI **CODE:** - 2TE06TEN1

NAME OF SUBJECT: - Tool Engineering

Teaching & Evaluation Scheme:-

Subject Code	Name of the Subject	Teaching Scheme				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hours	Marks	Hours	Pr/Viva	TW	Pr	
<u>2TE06TEN1</u>	Tool Engineering	3	0	2	5	4	30	1.5	70	3	--	20	30	150

Objective: -

This syllabus will enable the students to achieve competencies required by the industries. It is obvious that effective implementation will ensure achievement of competencies and such acquired competencies through this course will lead to enhance productivity and quality with stringent cost control. It is also important that to acquire defined competencies, selection and proper usage of tools plays a vital role. It is aimed that students get ability to select and use proper locating and clamping devices in their day to day supervisory tasks.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	Introduction Concept, meaning and definitions of tool, tool design and tool engineering. Tools-types, classification, features & applications. Tool engineering-functions and importance to enhance productivity and quality. Importance of process planning in tool engineering. Economy-concept, meaning, importance and principles in tool engineering. Universal acts & their elements of a manufacturing operation with suitable simple example.	04
2	Cutting tools and tool holders Cutting tool materials-types, composition, properties and applications. Carbide inserts-types, ISO-designation and applications. Re-sharpening methods of following cutting tools: Drill, Side and face milling cutter, End mill, Centre drill, Gear hob. Tool holders for turning and milling carbide inserts-types, ISO-designation and applications. Tool holding and tool mounting systems for conventional milling and drilling machine tools.	06
3	Locating and clamping devices and Jigs and fixtures Concept, meaning and definitions of location and clamping. Use of locating and clamping principles in day-to-day supervision on shop floor. Degree of freedom-concept and importance. 3-2-1 principle of location. Locators: Types, Sketches with nomenclature, Working, Applications. Fool proofing and ejecting. Clamping devices: Types, Sketches with nomenclature, Working, Applications. Concept, meaning, differences and benefits of jigs and fixtures. Types, sketches with nomenclature, working and applications of jigs. Types, sketches with nomenclature, working and applications of fixtures. Steps to design jigs and fixture. For given simple component: Select type, Develop locating method, Develop clamping method, Design jig and fixture (as applicable), Prepare details and assembly sketches.	15
4	Press tools Press working processes-types, sketches and applications. Press tools: types, working, components and their functions. Concept, meaning, definitions and calculations of press tonnage and shut height of press tool. Shear action in die cutting operation. Centre of	09

	pressure: Concept, meaning, definition, methods of finding and importance. Die clearance: Concept, meaning, definition, reasons, effects and methods of application. Cutting force: Methods to calculate and methods of reducing. Shear angle- concept, need and method to give shear angle on punch and die. Scrap strip layout: - Concept, importance, method to prepare, and determining percentage stock utilization. Types, working, and applications of stock stop, pilots, strippers and knockouts. Cutting dies-types and applications. Design of progressive cutting die :Sketch the component, Prepare scrap strip layout, Calculate tonnage, Determine center of pressure, Determine dimensions of punches die block and die shoe, Prepare sketch of stripper plate. vii. General assembly sketch of punches arrangement, die block, die shoe and stripper plate.	
5	Dies Bending: Types, Parts and functions of bending die, Definition, calculations and factors affecting bend radii, bend allowance and spring back, Method to compute bending pressure, Types, sketch, working and applications of bending dies. Drawing dies-types and method to determine blank size for drawing operation. Types, sketch, working and applications of drawing dies: embossing, curling, bulging, coining, swaging and hole flanging. Forging dies- terminology, types, sketch, working and applications. Sketch, working and applications of following dies: Extrusion, Plastic injection.	06
6	Cams Types-disc, cylindrical etc.	02

List of Experiments:-

- **Preparatory activity**
- **Cutting tools re-sharpening**
Sketch the cutting tool with nomenclature taken for re-sharpening and re-sharpen any one cutting tool from Drill, Side and face milling cutter, Centre drill.
- **Design of fixture**
Sketch the component, Sketch location details, Sketch clamping details.
Prepare production drawings of all parts of fixture (Details), Sketch assembly.
- **Design of jig**
Sketch the component, Sketch location details, Sketch clamping details.
Prepare production drawings of all parts of jig (Details), Sketch assembly.
- **Design of die**
Sketch the component, Sketch location details, Sketch clamping details.
Prepare production drawings of all parts of die (Details), Sketch assembly.

Learning Outcomes:-

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Re-sharpen given cutting tool.
- Interpret designation system of cutting tool and tool holder.
- Select locating and clamping devices for given component.
- Select and design jig and fixture for given simple component.
- Classify and explain various press tools and press tools operations.
- Select a die for a given simple component.

Books Recommended:

- Case study and problem solution in tool engineering, J. A. Soni.
- Jigs and fixture. P. H. Joshi.
- Principles of tool & jig design, M. H. A. Kempster.
- Production Engineering Design, Surender Kumar.
- Production Engineering, P.C.Sharma.