



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3172510
Semester – VII
Subject Name: TOOL ENGINEERING

Type of course: Professional Elective

Prerequisite: Nil

Rationale:

Tools are as basic component for any machining process. The quality and efficiency of any machining operation basically depends upon quality of tools which in turn depends upon the proper shape, size and material of the tools. Productivity and quality of machining operations may further be enhanced by proper and quick mounting of tools and jobs on machines. Jigs and fixture plays an import roll in this process. Therefore this course attempts to develop abilities in students to select a tool of proper size and shape for required machining operation

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	Introduction Concept, meaning and definitions of tool, tool design and tool engineering. Tools-typ classification, features & applications. Tool engineering-functions and importance to enhar productivity and quality. Importance of process planning in tool engineering. Economy-conce meaning, importance and principles in tool engineering. Universal acts & their elements o manufacturing operation with suitable simple example.	04
2	Cutting tool material 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: i. Drill. ii. Side and face milling cutter. iii. End mill. iv. Centre drill, type A and B. v. 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. Tool sharpening method for single point cutting tool.	8
3	Locating and clamping devices. 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: i. Types- ii. Sketches with nomenclature. iii. Working. iv. Applications.	8



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3172510

	Fool proofing and ejecting. Clamping devices: i. Types. ii. Sketches with nomenclature. iii. Working. iv. Applications.	
4	Jigs and fixtures. 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: i. Select type (Jig or fixture). ii. Develop locating method. iii. Develop clamping method. iv. Design jig and fixture (as applicable). v. Prepare details and assembly sketches	10
5	Press tool design. 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 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: i. Sketch the component. ii. Prepare scrap strip layout. iii. Calculate tonnage. iv. Determine centre of pressure. v. Determine dimensions of punches, die block and die shoe. vi. Prepare sketch of stripper plate. vii. General assembly sketch of punches arrangement, die block, die shoe and stripper plate	10
6	Dies and moulds. Bending: i. Types. ii. Parts and functions of bending die. iii. Definition, calculations and factors affecting bend radii, bend allowance and spring back. iv. Method to compute bending pressure. v. 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/mould: i. Extrusion. ii. Plastic injection. iii. Blow moulding.	05
	Total Hours	45



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3172510

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	40	25	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Fundamentals of tool design , Basu S.K., oxford
2. Tool design, Donaldson & Lecain, TME
3. Tool engineering and design. Nagpal G H , Khanna publication
4. Principles of tool & jig design, M. H. A. Kempster
5. Design Of Jigs Fixtures And Press Tools, C. Elanchezian, T. Sunder Selwyn, B. Vijaya Ramnath, Eswar Press, 2007, 2nd Edition

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Interpret various geometry of cutting tools	15
CO-2	Use relevant cutting tool and inserts for different machining operation	15
CO-3	Design of JIG and Fixtures	20
CO-4	Design bending and cutting die of simple component	25
CO-5	Application various press	15

List of Experiments:

Experiments based on above contents and should include below mentioned topics.

1. Identify the use of different types of tools and their designation system
2. Draw the cutting tool with nomenclature
3. Use different tool holders and their use with specific application.
4. Use different clamping devices and their use with specific application available in work shop
5. Use different locators and their use with specific application available in work shop
6. Design a JIG and Fixture for simple machining component
7. Design a progressive cutting die for simple machining component



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3172510

8. Study different types of press
9. Design a bending die for given component

List of Open Source Software/learning website:

1. www.nptel.ac.in