LESSON PLAN

DEPARTMENT OF PRODUCTION TECHNOLOGY
MIT CAMPUS, ANNA UNIVERSITY CHENNAI

SUBJECT CODE: ME5074

SUBJECT TITLE: DESIGN OF JIGS, FIXTURES AND PRESS TOOLS

PERIODS: 3 per week

SEMESTER: 6th

NAME OF FACULTY: Dr.M.MANOJ

ACADEMIC YEAR: 2023-2024

From date: 22/01/2024 **To Date:** 10/05/2024

COURSE CONTENT:

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Applying the principles of locating and clamping in Jigs and fixtures and various components related to Press tools.
2. Designing various types of Jigs for given components and draw multiple views of the same with dimensions and parts List.
3. Designing various types of Fixtures for given components and draw multiple views of the same with dimensions and parts List.
4. Designing various parts of cutting dies and draw the standard dimensioned views.
5. Designing various parts of forming dies and draw the standard dimensioned views.

UNITI PRINCIPLES OF JIGS, FIXTURES AND PRESS WORKING **9**

Objectives and importance of tool design—work holding devices- Basic elements of jigs and fixtures- location – clamping-indexing-operational chart-Fits and Tolerances Tools for press working Press Working Terminologies –cutting and non cutting operations – Types of presses – press accessories – Computation of press capacity – Strip layout – Material Utilization – Shearing action – Clearances – Press Work Materials – Center of pressure– knockouts – direct and indirect – pressure pads – Ejectors- Die Block – Punch holder, Die set, 103 guide plates – Stops – Strippers – Pilots – Selection of Standard parts –Recent trends in toolingrecent trends in tool design- computer Aids for sheet metal forming Analysis – basic introduction - tooling for numerically controlled machines- setup reduction for work holding – Single minute exchange of dies-Poka Yoke.

UNITII JIGS **9**

Design and development of jigs for given component - Types of Jigs – Post, Turnover, Channel, latch, box, pot, angular post jigs – Indexing jigs.

UNITIII FIXTURES 9

Design and development of fixtures for given component- General principles of milling, Lathe, boring, broaching and grinding fixtures – Assembly, Inspection and Welding fixtures – Modular fixturing systems- Quick change fixtures.

UNIT IV DESIGN OF CUTTING DIES 9

Complete design and preparation of standard views of simple blanking, piercing, compound and progressive dies -fine Blanking dies

UNITV DESIGN OF BENDING, FORMING, DRAWING AND MISCELLANEOUS DIES 9

Difference between bending forming and drawing – Blank development for above operations – Types of Bending dies – Press capacity – Spring back– Variables affecting Metal flow in drawing operations – draw die inserts – draw beads- ironing – Design and development of bending, forming, drawing, reverse redrawing and combination dies – Blank development for axisymmetric, rectangular and elliptic parts – Single and double action dies

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1. Apply the principles of locating and clamping in Jigs and fixtures and various components related to Press tools.

CO2. Design various types of Jigs for given components and draw multiple views of the same with dimensions and parts List.

CO3: Design various types of Fixtures for given components and draw multiple views of the same with dimensions and parts List.

CO4: Design various parts of cutting dies and draw the standard dimensioned views.

CO5: Design various parts of forming dies and draw the standard dimensioned views.

TEXT BOOKS:

1. Joshi, P.H. "Jigs and Fixtures", Second Edition, Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2010.

2. Joshi P.H "Press tools - Design and Construction", S. Chand & Co Ltd. 2001.

REFERENCES:

1. "ASTME – Fundamentals of tool design", Prentice Hall of India, 1984.

2. Donaldson, Lecain and Goold, "Tool Design", Tata McGraw Hill, 2000.

3. Hoffman "Jigs and Fixture Design" – Thomson Delmar Learning, Singapore, 2004.

4. Kempster, "Jigs and Fixture Design", Hoddes and Stoughton, 1974.

5. K. Venkataraman, "Design of Jigs Fixtures & Press Tools", Anne Publications, 2015.

Week	Unit	Topics	Text / Ref.
1	1	Introduction to Design of Jigs, Fixtures and Press Tools	T1/T2/R5
	1	Objectives and importance of tool design—work holding devices- Basic elements of jigs and fixtures- location – clamping-indexing-operational chart-Fits and Tolerances Tools for press working Press. Working Terminologies –cutting and non-cutting operations.	T1/T2/R5
2	1	Types of presses – press accessories – Computation of press capacity – Strip layout – Material Utilization – Shearing action – Clearances.	T1/T2/R5
	1	Press Work Materials – Center of pressure– knockouts – direct and indirect – pressure pads	T1/T2/R5
3	1	Ejectors- Die Block – Punch holder, Die set, 103 guide plates – Stops – Strippers – Pilots – Selection of Standard parts –Recent trends in tooling recent trends in tool design	T1/T2/R5
	1	Computer Aids for sheet metal forming Analysis – basic introduction - tooling for numerically controlled machines- setup reduction for work holding – Single minute exchange of dies-Poka Yoke.	T1/T2/R5
4	2	Design and development of jigs for given component	T1/R2/R5
	2	Types of Jigs – Post, Turnover, Channel, latch, box, pot, angular post jigs	T1/R2/R5
5	2	Types of Jigs – Post, Turnover, Channel, latch, box, pot, angular post jigs – Indexing jigs.	T1/R2/R5
6	2	Example problems	T1/R2/R5
	2	Example problems	T1/R2/R5
7	3	Design and development of fixtures for given component.	T1/R2/R5
	3	General principles of milling, Lathe, boring, broaching and.	T1/R2/R5
8	3	Grinding fixtures – Assembly, Inspection and Welding fixtures.	T1/R2/R5
	3	Modular fixturing systems- Quick change fixtures.	T1/R2/R5
9	3	Example problems	T1/R2/R5
	3	Example problems	T1/R2/R5
10	4	Complete design and preparation of standard views of simple blanking, piercing, compound and progressive dies.	R2/R5
	4	fine Blanking dies	R2/R5
11	4	Example problems	R2/R5
12	4	Example problems	R2/R5
13	5	Difference between bending forming and drawing – Blank development for above operations – Types of Bending dies.	T2/R5
	5	Press capacity – Spring back– Variables affecting Metal flow in drawing operations – draw die inserts – draw beads- ironing	T2/R5
14	5	Design and development of bending, forming, drawing, reverse redrawing and combination dies.	T2/R5
15	5	Blank development for axisymmetric, rectangular and	T2/R5

		elliptic parts – Single and double action dies	
	5	Example problems	T2/R5

Course Faculty

6/2/24
Professor in charge

HOD (PT)