

FR. Conceicao Rodrigues College Of Engineering
 Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50
Department of Production Engineering

S.E. (Production) (semester VI) (2018-2019)

Lecture Plan

Subject: Production Tooling (PT-PEC603)

Credits-04

1. Syllabus.

Module	Contents	Hrs
01	<p style="text-align: center;">Introduction to Jigs and Fixture:</p> <p>1.1 Introduction to Jigs and Fixtures, their difference and Significance. Material used for different elements of jigs/fixtures and recommended hardness where necessary.</p> <p>1.2 Location & Locating Devices: Locating principles, Degrees of freedom, Redundant location, Fool proofing, nesting, Locators: location from Flat and cylindrical surfaces, conical locators, centralizers.</p> <p>1.3 Clamping & clamping Devices: Clamping Principle, Examples of typical clamps such as multiple clamping and equalizing devices, quick acting clamping mechanisms such as link, toggle, cam, eccentric, pneumatic &hydraulic devices.</p>	08
02	<p style="text-align: center;">Construction of Drill Jig</p> <p>2.1 Introduction, Selection of location, supporting and clamping faces/points.</p> <p>2.2 Various types of Jig Bushes.</p> <p>2.3 Commonly used Drill jigs. Case Study on Drill Jig Design.</p>	08
03	<p style="text-align: center;">Construction of Milling fixture</p> <p>3.1 Introduction, Selection of location, supporting and clamping faces/points.</p> <p>3.2 Tool setting &cutter guiding (Tennons & Setting block).</p> <p>3.3 Case Study on Milling Fixture Design.</p>	08

04	<p style="text-align: center;">Introduction to Press Working</p> <p>4.1 Classification of common Press working operations, Benefits and limitations of using Press tools. Applications of pressed parts/components.</p> <p>4.2 Theory of Shearing in Press Working. Optimum Cutting clearance Construction of Basic shearing die. Functions of different elements of a press tool. Methods of feeding the strip/coil material.</p>	06
05	<p style="text-align: center;">Design and Calculations for Piercing & Blanking Die</p> <p>5.1 Different types of Dies, Die sets and its selection.</p> <p>5.2 Calculations for Economic Strip Layout, Calculations of Cutting force and Stripping force. Recommending minimum tonnage of a press. Centre of Pressure (its importance and calculation).</p> <p>5.3 Design aspects of Press tool elements viz. Punches & methods of retaining punches, Die block, Stripper, Pilot, etc. Methods of reducing cutting loads on press tools.</p> <p>5.4 Selection of materials and its hardness for different elements of Press tools.</p>	10
06	<p style="text-align: center;">Bending & Drawing Dies</p> <p>6.1 Theory of Bending. Spring back and measures to control it. Calculations for bending force & Blank development of Simple Bent components. Types of Bending dies. Minimum bend radius.</p> <p>6.2 Theory of Drawing. Metal flow in Drawing & forming operations; reduction ratio and redrawing limits, draw clearance, drawing and blank holding forces for cylindrical draws only. Blank development of Cup.</p> <p>6.3 Defects in drawn as well as bent parts. Presses selection for drawing/bending operations.</p> <p>6.4 Basic construction and working of Bending and Drawing dies.</p>	08

2. CO Statements.

Learner will be able to

PEC603.1: Select location and clamping faces/points on jobs.

PEC603.2: Design and develop simple productive and cost effective jigs.

PEC603.3: Design and develop simple productive and cost effective fixture.

PEC603.4: Identify press tool requirements to build concepts pertaining to design of press tools.

PEC603.5: Prepare working drawings and setup for economic production of sheet metal components.

PEC603.6: Develop blank size in bent and drawn components.

3. CO-PO-PSO Mapping.

CO# / PO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEC603.1	3	2	2	-	-	-	-	-	-	-	-	2
PEC603.2	3	2	2	-	-	-	-	-	-	-	-	2
PEC603.3	3	2	2	-	-	-	-	-	-	-	-	2
PEC603.4	3	-	3	-	-	-	-	-	-	-	-	2
PEC603.5	3	-	3	-	-	-	-	-	-	-	3	2
PEC603.6	3	-	-	--	--	--	-	--	-	-	-	2

CO# / PSO#	PSO1	PSO2
PEC603.1	3	-
PEC603.2	3	-
PEC603.3	3	-
PEC603.4	3	-
PEC603.5	3	-
PEC603.6	3	-

4. CO Assessment tools with target.

Co Statement #	Target for Assessment Tools		
	Unit Test	End Semester Exam	Course Exit Survey
PEC603.1	50%	40%	60%
PEC603.2	50%	40%	60%
PEC603.3	50%	40%	60%
PEC603.4	50%	40%	60%
PEC603.5	50%	40%	60%
PEC603.6	50%	40%	60%

5. Curriculum Gap/Content beyond syllabus (if any).

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6. Lecture/Lab/Mini Project/Assignment Plan.

TE Production 2018-2019 Lesson Plan			
Teacher In-Charge:- Prof. Hitendra Vaishnav (Design of Press Tool & Metal Joining)			
Planned	Topic	Actual	Topic
01/01/2019	Introduction to subject	01/01/2019	Introduction to subject
02/01/2019	Requirement in Jig and fixture	02/01/2019	Requirement in Jig and fixture
03/01/2019	Application of jig and fixture	03/01/2019	Application of jig and fixture

04/01/2019	Costing	04/01/2019	Costing
07/01/2019	Locating	07/01/2019	Locating
08/01/2019	Clamping	07/01/2019	Locating
09/01/2019	Construction of Jig	08/01/2019	Clamping
10/01/2019	Bush design and types of jig	08/01/2019	Clamping
11/01/2019	Types of jig	09/01/2019	Construction of Jig
15/01/2019	Tips to select jig	09/01/2019	Construction of Jig
16/01/2019	problem based on jig	11/01/2019	Bush design and types of jig
17/01/2019	Milling fixture construction	11/01/2019	Bush design and types of jig
18/01/2019	Milling fixture Problems	15/01/2019	problem based on jig
22/01/2019	Economic Strip Layout	16/01/2019	Design of jig
23/01/2019	Strip layout Case study	17/01/2019	Group discussion on Jig design
24/01/2019	Basic type of Press and there construction	30/01/2018	Milling fixture
25/01/2019	Press Tonnage Calculation	01/02/2019	Mass bunk
29/01/2019	Die Clearance Calculation	07/02/2019	Press tool strip layout Demo
30/01/2019	Basic Press operation and Basic Dies	07/02/2019	Press tool strip layout Demo
31/01/2019	Annual sport day	08/02/2019	U.T. Paper and basic milling
01/02/2019	Computing Die Thickness	12/02/2019	Master Chef
05/02/2019	U.T.1	20/02/2019	Milling fixture Introduction to press tool
06/02/2019	U.T.1	21/02/2019	Basic type of Press and there construction
07/02/2019	Design of locating elements	22/02/2019	Press Tonnage Calculation
08/02/2019	Selection of hardware	26/02/2019	Die Clearance Calculation
12/02/2019	Problem on Design of fastners	27/02/2019	Basic Press operation and Basic Dies
13/02/2019	Euphoria	28/02/2019	Computing Die Thickness
14/02/2019	Euphoria	01/03/2019	Design of locating elements
15/02/2019	Euphoria	05/03/2019	Selection of hardware
19/02/2019	Shivaji Jayanti	06/03/2019	Problem on Design of fastners
20/02/2019	Die Plan	07/03/2019	Die Plan
21/02/2019	Bolster and pillars	08/03/2019	Bolster and pillars
22/02/2019	Stripper and pilots	12/03/2019	Stripper and pilots
26/02/2019	Mounting of Punches	13/03/2019	Mounting of Punches
27/02/2019	COP Calculation for Cutting Dies	14/03/2019	COP Calculation for Cutting Dies
28/02/2019	COP Calculation for Progressive Dies	19/03/2019	COP Calculation for Progressive Dies
01/03/2019	Design Calculation of Progressive Dies	20/03/2019	Design Calculation of Progressive Dies
05/03/2019	Assembly of Progressive Dies	22/03/2019	Assembly of Progressive Dies
06/03/2019	Details of Progressive Dies	26/03/2019	Details of Progressive Dies
07/03/2019	Press Tool Material	27/03/2019	Press Tool Material
08/03/2019	Bending Theory	28/03/2019	Bending Theory
12/03/2019	Bend Length Calculation	29/03/2019	Bend Length Calculation
13/03/2019	Bending Force Calculation	02/04/2019	Bending Force Calculation

14/03/2019	Bending Die Design	03/04/2019	Bending Die Design
15/03/2019	Crescendo	04/04/2019	Deep Drawing theory
19/03/2019	Deep Drawing theory	05/04/2019	Simple Drawing problem
20/03/2019	Simple Drawing problem	11/04/2019	Drawing Stage Problem
21/03/2019	Holi	12/04/2019	Drawing Stage Problem
22/03/2019	Drawing Stage Problem		
26/03/2019	Drawing Stage Problem		
27/03/2019			
28/03/2019			
29/03/2019			
02/04/2019			
03/04/2019			
04/04/2019			
05/04/2019			
09/04/2019	U.T.2		
10/04/2019	U.T.2		
11/04/2019			
12/04/2019			

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Department of Production Engineering

S.E. (Production) (semester IV) (2018-2019)

Lecture Plan

Subject: Production Tooling (PT-PEL603)

Credits-01

1. Syllabus.

A : Design of

1. Simple Progressive Die
with minimum threestages.
(Assembly &BOM)
2. Drill Jig (Assembly &BOM).
3. Milling fixture (Assembly &BOM).

B : A detailed report based on an Industrial visit to a manufacturing firm, covering the topics mentioned in subject of Production Tooling.

Assignments on topics drawn from the syllabus are as follows-

One assignment/module on module nos. 1, 2, 3 and 1 physical model/prototype (by a group of 4 students) on module 4, 5 or 6.

OR

One assignment/module on module nos. 4, 5, 6 and 1 physical model/prototype (by a group of 4 students) on module 1, 2 or 3.

2. CO Statements.

Learner will be able to

- PEC603.1: Identify and select location and clamping faces/points on jobs.
PEC603.2: Design and develop simple productive and cost effective jigs.
PEC603.3: Design and develop simple productive and cost effective fixture.
PEC603.4: Identify press tool requirements to build concepts pertaining to design of press tools.
PEC603.5: Prepare working drawings, including bill of materials and setup for economic production of sheet metal components.
PEC603.6: Demonstrate the principles of blank development.

3. CO-PO-PSO Mapping.

CO# / PO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEC603.1	3	2	2	-	-	-	-	-	-	-	-	2
PEC603.2	3	2	2	-	-	-	-	-	-	-	-	2
PEC603.3	3	2	2	-	-	-	-	-	-	-	-	2
PEC603.4	3	-	3	-	-	-	-	-	-	-	-	2
PEC603.5	3	-	3	-	-	-	-	-	-	-	3	2
PEC603.6	3	-	-	--	--	--	-	--	-	-	-	2

CO# / PSO#	PSO1	PSO2
PEL603.1	3	-
PEL603.2	3	-
PEL603.3	3	-
PEL603.4	3	-
PEL603.5	3	-
PEL603.6	3	-

4. CO Assessment tools with target.

Co Statement #	Target for Assessment Tools			
	Assignments	Experiments	Oral Exam	Course Exit Survey
PEL603.1	-	70%	60%	60%
PEL603.2	-	70%	60%	60%
PEL603.3	-	70%	60%	60%
PEL603.4	-	70%	60%	60%
PEL603.5	-	70%	60%	60%
PEL603.6	70%	70% (IV)	60%	60%

5. Curriculum Gap/Content beyond syllabus (if any).

6. Lab Plan.

Week No.	Topics	Hours (Per Batch)
<u>Week 3</u> (14/01/19 – 18/01/19)	Demonstration of Jig and Fixture	2
<u>Week 4</u> (21/01/19 – 25/01/19)	CAD modelling of Jig	2

<u>Week 5</u> (28/01/19 – 01/02/19)	CAD modelling of Jig	2
<u>Week 6</u> (04/02/19 – 08/02/19)	Unit Test 1 (Feb 12, 14 and 15) – FE, SE, TE.	-
<u>Week 7</u> (11/02/19 – 15/02/19)	Drafting of Jig	2
<u>Week 8</u> (18/02/19 – 22/02/19)	CAD modelling of Fixture	2
<u>Week 9</u> (25/02/19 – 1/03/19)	CAD modelling of Fixture	2
<u>Week 10</u> (4/03/19 – 08/03/19)	Drafting of Fixture	2
<u>Week 11</u> (11/03/19 – 15/03/19)	Demonstration of Press	2
<u>Week 12</u> (18/03/19 – 22/03/19)	Cam and Follower Profile Assignment	2
<u>Week 13</u> (25/03/19 – 29/03/19)	Cam and Follower Profile Assignment	2
<u>Week 14</u> (1/04/19 – 05/04/19)	Cam and Follower Profile Assignment	2
<u>Week 15</u> (08/04/18 – 12/04/18)	Unit Test 2 (April 2, 3 and 4) – SE, TE.	--
<u>Week 16</u> (15/04/19 – 19/04/19)	Term End (April 15)	--