**LESSON PLAN**

**Class:** T.E Production

**Academic Term:** July-Dec 2020

**Course:** Design of Mold & Metal Forming Tools **Course Code:** PEC501

**Credit:04**

**Faculty Member: Prof. Dipali Kisan Bhise**

**Prerequisites: None**

**Course Objectives:**

|  |  |
| --- | --- |
| **CO1** | Demonstrate the concepts of metal casting and metal forming processes. |
| **CO2** | Identify the equipment, machinery and tooling used for sand casting/die casting. |
| **CO3** | Identify equipment, machinery and tooling used for forming processes (such as forging, rolling and extrusion). |
| **CO4** | Illustrate the basic theory pertaining to plastic deformation of metal. |
| **CO5** | Develop skills in designing tools, the set up for the processing techniques pertaining to various metal casting and metal forming operations. |
| **CO6** | Analyze various defects, their probable causes and remedial measures confronted with metal casting and forming processes. |

***Course Outcomes:***

*\*(Preferably should the CO’s mentioned in University Curriculum)*

**PO1** Engineering Knowledge –

**PO2** Problem Analysis –

**PO3** Design / Development of Solutions –

**PO4** Investigations of complex problems –

**PO5** Modern Tool Usage –

**PO6** Engineer and Society –

**PO7** Environment & Sustainability –

**PO8** Ethics

**PO9** Individual and Team Work

**PO10** Communication

**PO11** Project Mgmt & Finance

**PO12** Life-Long Learning –

***Periods (Hours) per week:***

**Lecture:**4 Hr **Practical:**2 Hr **Tutorial:**Nil

**University Evaluation Method:**

Theory examination: 80 Marks ( 3 Hrs)

Internal Assessment: 20 Marks (Avg. of Test1 and Test2)

Practical Examination: None

Oral Examination: 20

Term work: 25

Total: 150

***Mapping of CO’s to PO’s:***

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CO# / PO# | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| PEC501.1 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| PEC501.2 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| PEC501.3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| PEC501.4 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| PEC501.5 | 3 | 3 | 3 |  |  |  |  |  |  |  |  |  |
| PEC501.6 | 3 | 3 | 3 |  |  |  |  |  |  |  |  |  |

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| CO# / PSO# | PSO1 | PSO2 |
| PEC501.1 | 2 | - |
| PEC501.2 | 2 | - |
| PEC501.3 | 2 | - |
| PEC501.4 | 2 | - |
| PEC501.5 | 2 | - |
| PEC501.6 | 2 | - |

**CO Attainment Scheme:**

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|  | **Target for Assessment Tools** | | |
| **Unit Test** | **End Semester Exam** | **Course Exit Survey** |
| PEC501.1 | 50% | 50% | 60% |
| PEC501.2 | 50% | 50% | 60% |
| PEC501.3 | 50% | 50% | 60% |
| PEC501.4 | 50% | 50% | 60% |
| PEC501.5 | 50% | 50% | 60% |
| PEC501.6 | 50% | 50% | 60% |

**Lesson Plan:**

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| --- | --- | --- |
| **Lecture No.** | **Date** | **Topic Covered** |
| 2 | 13/07/2020 | Introduction to Sand Casting |
| 3 | 15/07/2020 | Introduction to Sand Casting & Defects in sand casting |
| 4 | 17/07/2020 | Types of patterns and allowances |
| 5 | 20/07/2020 | Types of allowances and Introduction to Pattern Design |
| 6 | 22/07/2020 | Pattern Design Numerical |
| 7 | 24/07/2020 | Pattern Design Numerical1 |
| 8 | 27/07/2020 | Pattern Design Numerical1(Continuation of Lecture 7) |
| 9 | 29/07/2020 | Pouring time and Sprue height Calculation, Pattern Design Numerical 2 |
| 10 | 31/07/2020 | Sand Casting Design 2 Numerical |
| 11 |  | No lecture |
| 12 | 05-08-2020 | Sand Casting Design Numerical |
| 13 | 07-08-2020 | Pattern Coading And Melting Practice |
| 14 | 10-08-2020 | Die Casting(Hot Chamber, Cold Chamber Die Casting, Difference between Die Casting and sand Casting and introduction to Investment Casting.) |
| 15 | 12-08-2020 | Janmashtami |
| 16 | 14/08/2020 | Investment Casting, Shell Molding casting, Introduction to Die Casting Numerical. |
| 17 | 17/08/2020 | Die Casting Design & Introduction to rolling |
| 18 | 19/08/2020 | Module 1 & 2 Quiz |
| 19 | 21/08/2020 | Rolling Design Theory |
|  | 24/08/2020 | Ganpati Vacation |
|  | 26/08/2020 | Ganpati Vacation |
|  | 28/08/2020 | Ganpati Vacation |
| 20 | 31/08/2020 | Roll pass Design( For 4 Passes) |
| 21 | 02-09-2020 | Roll pass Design( For 6 Passes) |
| 22 | 04-09-2020 | Roll Pass Design (8- Passes) |
| 23 | 07-09-2020 | Rolling Theory and Introduction to Extrusion |
| 24 | 09-09-2020 | Extrusion Theory |
| 25 | 11-09-2020 | Revision on Module 1,2,3 |
| 26 | 15/09/2020 | Extrusion Theory on Lubrication & University May18 Problem Solving on sand casting |
| 27 | 16/09/2020 | Revision On Sand Casting Numerical |
| 28 | 18/09/2020 | Revision on Sand casting-(MAY19 Numerical) |
|  | 21/09/2020 | **Unit Test-1** |
|  | 23/09/2020 |
|  | 25/09/2020 |
| 29 | 29/09/2020 | Forging theory |
| 30 | 30/09/2020 | Sheet 1 Disussion (Sand Casting) |
| 31 | 5-10-2020 | Forgining Design |
| 32 | 7-10-2020 | MCQ on Module 3 & 5 |
| 33 | 9-10-2020 | Forging Design Continuation of Lecture 32...And Defects |
|  | 12-10 | No lecture |
| 34 | 14/10/2020 | Theory on Pattern Material & Core Boxes |
| 35 | 16/10/2020 | Sheet 1 Assesment |
| 36 | 20-10-2020 | Sheet 1 Assesment |
| 37 | 21-10-2020 | Sheet 1 Assesment &Types of Core |
| 38 | 23-10-2020 | MCQ on Module 4& 6 |
| 39 | 27-10-2020 | Sheet1 Assesment & Types of Core , Die casting Sheet ecxplanation |
| 40 | 28-10-2020 |  |
| 41 | 2-11-2020 | Forging Machines & Die Design |
| 42 | 4-11-2020 | Forging Machines, Rollig Revision & Sheet 1 assesment |
| 43 | 6-11-2020 | Forgining theory:stages in multiple stage forging process,sheet 1 assesment |
| 44 | 9-11-2020 | Revision on sand casting and rolling |

**Reference Books:**

*1.Manufacturing Technology*, P.N. Rao.

2. *Metal Casting : A Sand Casting Manual for the Small Foundry*-*Vol. 2*, Stephen

D. Chastain.

3. *Principles of Metal Casting,* R W Heine, C R Loper, P. C. Rosenthal.

**Laboratory Plan**

**Class:** T.E Production

**Academic Term:** July-Dec 2019

**Course:** Design of Mold & Metal Forming Tools Laboratory

**Corse Code:** PEL501 , **Credit:**01

**Faculty Member: Prof. Dipali Kisan Bhise**

**Outcomes:** Learner will be able to…

PEL501.1. Illustrate various forming and casting processes used in manufacturing of components.

PEL501.2. Classify the equipment’s and machines used in manufacturing processes, such as casting, rolling, forging, extrusion and wire drawing.

PEL501.3. Design and draw the moulds required for castings/ pressure die casting processes.

PEL501.4. Design and draw the dies required for forging processes.

PEL501.5. Design and draw the grooves required for rolling processes.

PEL501.6. Demonstrate various trends in the foundry/forging industries.

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| **Sr. No** | **Design Exercise/Assignments** |
| 01 | Assignment on Sand casting |
| 02 | Assignment on Special casting process. |
| 03 | Assignment on Extrusion process. |
| 05 | Design of sand casting moulds. |
| 06 | Design of Pressure die casting dies. |
| 07 | Design of Forging dies. |
| 08 | Design of Roll pass grooves. |

**CO-PO-PSO Mapping.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CO# / PO# | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| PEC501.1 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| PEC501.2 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| PEC501.3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| PEC501.4 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| PEC501.5 | 3 | 3 | 3 |  |  |  |  |  |  |  |  |  |
| PEC501.6 | 3 | 3 | 3 |  |  |  |  |  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| CO# / PSO# | PSO1 | PSO2 |
| PEC501.1 | 2 | - |
| PEC501.2 | 2 | - |
| PEC501.3 | 2 | - |
| PEC501.4 | 2 | - |
| PEC501.5 | 2 | - |
| PEC501.6 | 2 | - |

**CO Assessment tools with target:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Co Statement #** | **Target for Assessment Tools** | | | |
| **Assignments** | **Drawing Sheets** | **Oral Exam** | **Course Exit Survey** |
| PEL502.1 | 70% | - | 60% | 60% |
| PEL502.2 | 70% | - | 60% | 60% |
| PEL502.3 | 70% | - | 60% | 60% |
| PEL502.4 | 70% | 60% | 60% | 60% |
| PEL502.5 | 70% | 60% | 60% | 60% |
| PEL502.6 | 70% | 60% | 60% | 60% |

1. **Curriculum Gap/Content beyond syllabus (if any).**

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1. **Lab Plan.**

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| --- | --- | --- |
| **Week No.** | **Topics** | **Hours**  **(Per Batch)** |
| 3 | Assignment on Sand casting | **2** |
| 4 | Assignment on Sand casting | **2** |
| 5 | Design Of Sand Casting | **2** |
| 6 | Design Of Sand Casting | **2** |
| **7** | **Unit Test 1 (Aug 13,14,16)** |  |
| **8** | Assignment on Special casting process. | **2** |
| **9** | Design of Roll pass grooves. | **2** |
| **10** | Design of Roll pass grooves. | **2** |
| **11** | Design of Roll pass grooves. | **2** |
| **12** | Design of Forging dies. | **2** |
| **13** | Design of Forging dies. | **2** |
| **14** | Assignment on Extrusion process. | **2** |
| **15** | Assignment on Extrusion process. | **2** |
|  |  |  |