



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

## MECHANICAL ENGINEERING

### COURSE DESCRIPTOR

Course Title	PRODUCTION TECHNOLOGY LABORATORY				
Course Code	AME107				
Programme	B.Tech				
Semester	IV	ME			
Course Type	Core				
Regulation	IARE - R16				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	3	1	4	3	2
Chief Coordinator	Dr. G. Naveen Kumar, Professor				
Course Faculty	Dr. G. Naveen Kumar, Professor Mr. C. Labesh Kumar , Assistant Professor				

#### I. COURSE OVERVIEW:

The aim of this course is to conduct experiments chiefly encompasses Metal casting, Welding, Press working and processing of Plastics. It inculcates knowledge and skill to the students starting from preparing a wooden pattern to completion of a casting which also comprises different Sand testing techniques. Also, students can understand broadly Welding and press working skills employed in Industries. One of the most outstanding features of plastics is the ease with which they can be processed. Production Technology lab also throws light on processing of plastics by Blow and Injection molding machines.

#### II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AME005	III	Metallurgy and material science	3

#### III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Production Technology Laboratory	70 Marks	30 Marks	100

#### IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✓	Chalk & Talk	✗	Quiz	✗	Assignments	✗	MOOCs
✗	LCD / PPT	✓	Demonstration	✓	Experimentation	✓	Videos
✗	Open Ended Experiments						

#### V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

**Semester End Examination (SEE):** The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

#### Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	Laboratory		Total Marks
	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

#### Continuous Internal Examination (CIE):

One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	Performance	Calculations and Graph	Results and Error Analysis	Viva	Total
2	2	2	2	2	10

## VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	SEE, CIE
PO 2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	2	Day to Day Evaluation
PO 3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	2	Day to Day Evaluation
PO 9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	2	Day to Day Evaluation

**3 = High; 2 = Medium; 1 = Low**

## VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	<b>Professional Skills:</b> To produce engineering professional capable of synthesizing and analyzing mechanical systems including allied engineering streams.	2	Day to Day Evaluation
PSO 2	<b>Problem solving skills:</b> An ability to adopt and integrate current technologies in the design and manufacturing domain to enhance the employability.	2	Day to Day Evaluation
PSO 3	<b>Successful career and Entrepreneurship:</b> To build the nation, by imparting technological inputs and managerial skills to become technocrats.	1	Presentation on real-world problems

**3 = High; 2 = Medium; 1 = Low**

## VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Understand practical orientation of manufacturing processes.
II	Knowledge on different kinds of production processes and practices available for shaping or molding several daily used parts for industries.
III	Determine bending and shearing strength for different materials
IV	Evaluate the performance of welding joints.
V	Understand Selection of equipment's for various manufacturing processes will be understood.

# IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AME107.01	CLO 1	Understand the Pattern design and making, casting drawing	PO 1, PO 2, PO 3, PO 9	3
AME107.02	CLO 2	Utilize and determination of Sand properties testing for strengths and permeability	PO 1, PO 2, PO 3, PO 9	3
AME107.03	CLO 3	Demonstrate practical understanding Moulding, melting and casting	PO 1, PO 2, PO 3, PO 9	3
AME107.04	CLO 4	Demonstrate practical understanding of ARC welding lap and butt joint	PO 1, PO 2, PO 3, PO 9	2
AME107.05	CLO 5	Demonstrate practical understanding of Spot welding, TIG welding	PO 1, PO 2, PO 3, PO 9	2
AME107.06	CLO 6	Demonstrate practical understanding of Plasma welding and brazing (water plasma device).	PO 1, PO 2, PO 3, PO 9	2
AME107.07	CLO 7	Understand Blanking and piercing, operation and study of simple, compound and progressive press tool.	PO 1, PO 2, PO 3, PO 9	1
AME107.08	CLO 8	Demonstrate practical understanding of Hydraulic press, deep drawing and extrusion operation.	PO 1, PO 2, PO 3, PO 9	1
AME107.09	CLO 9	Understand the Bending and other operation	PO 1, PO 2, PO 3, PO 9	2
AME107.10	CLO 10	Demonstrate practical understanding Injection moulding process	PO 1, PO 2, PO 3, PO 9	2
AME107.11	CLO 11	Demonstrate practical understanding Blow moulding process	PO 1, PO 2, PO 3, PO 9	3
AME107.12	CLO 12	Demonstrate practical understanding MIG welding exercises and Riveting of plates.	PO 1, PO 2, PO 3, PO 9	3

**3 = High; 2 = Medium; 1 = Low**

# X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3								3				1	2	
CLO 2	3		3						3				1		
CLO 3	3		3						3				1	2	
CLO 4	2	2							2				1	2	
CLO 5	2		2						2				1	2	
CLO 6	2	2							2					2	
CLO 7	1	1	1						1				1		
CLO 8	1	1	1						1					2	
CLO 9	2	2							2					2	
CLO 10	2		2						2				1		

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 11	3		3						3					2	
CLO 12	3	3	1						3				1		

3 = High; 2 = Medium; 1 = Low

#### XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2, PO 4, PO 9	SEE Exams	PO 1, PO 2, PO 4, PO 9	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 2, PO 4, PO 9	Student Viva	-	Mini Project	-	Certification	-

#### XII. ASSESSMENT METHODOLOGIES - INDIRECT

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

#### XIII. SYLLABUS

LIST OF EXPERIMENTS	
<b>Week-1</b>	<b>PATTERN MAKING</b>
Pattern design and making, casting drawing.	
<b>Week-2</b>	<b>SAND PROPERTIES TESTING</b>
Sand properties testing for strengths and permeability.	
<b>Week-3</b>	<b>METAL CASTING</b>
Moulding, melting and casting.	
<b>Week-4</b>	<b>ARC WELDING</b>
ARC welding lap and butt joint.	
<b>Week-5</b>	<b>SPOT WELDING</b>
Spot welding, TIG welding.	
<b>Week-6</b>	<b>PLASMA WELDING AND BRAZING</b>
Plasma welding and brazing (water plasma device).	
<b>Week-7</b>	<b>APPLICATION OF SIMPLE AND COMPOUND DIE</b>
Blanking and piercing, operation and study of simple, compound and progressive press tool.	
<b>Week-8</b>	<b>APPLICATION OF PROGRESSIVE DIE</b>
Hydraulic press: deep drawing and extrusion operation.	

<b>Week-9</b>	<b>MECHANICAL PRESS WORKING</b>
Bending and other operation.	
<b>Week-10</b>	<b>PROCESSING OF PLASTICS</b>
Injection moulding.	
<b>WeeK-11</b>	<b>PROCESSING OF PLASTICS</b>
Blow moulding.	
<b>Week-12</b>	<b>BEYOND SYLLABUS</b>
MIG welding exercises and Riveting of a plates.	

#### **XIV. COURSE PLAN:**

The course plan is meant as a guideline. Probably there may be changes.

<b>Week No</b>	<b>Topics to be covered</b>	<b>Course Learning Outcomes (CLOs)</b>	<b>Reference</b>
1	Pattern design and making, casting drawing.	CLO 1	T1:1.4 R1:1.2
2	Sand properties testing for strengths and permeability.	CLO 2	T1:1.5 R1:2.4
3	Moulding, melting and casting.	CLO 3	T1:2.5 R1:2.5
4	ARC welding lap and butt joint.	CLO 4	T1:2.5 R1:2.6
5	Spot welding, TIG welding.	CLO 5	T1:22.7
6	Plasma welding and brazing (water plasma device).	CLO 6	T1:6.3 R1:5.3
7	Blanking and piercing, operation and study of simple, compound and progressive press tool.	CLO 7	T1:7.5 R1:6.3
8	Hydraulic press: deep drawing and extrusion operation.	CLO 8	T1:8.5 R1:6.8
9	Bending and other operation.	CLO 9	T1:12.2 R1:13.1
10	Injection moulding.	CLO 10	T1:12.3 R1:13.2
11	Blow moulding.	CLO 11	T1:12.10 R1:13.7
12	MIG welding exercises and Riveting of a plates.	CLO 12	T1:11.2 R1:10.2

#### **XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:**

<b>S NO</b>	<b>Description</b>	<b>Proposed actions</b>	<b>Relevance with POs</b>	<b>Relevance with PSOs</b>
1	To improve standards and analyze the concepts.	Class room teaching, Video Lecture	PO 1, PO 4	PSO 1

#### **Prepared by:**

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