



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)  
Dundigal - 500 043, Hyderabad, Telangana

**COURSE CONTENT**

<b>MANUFACTURING PROCESSES</b>								
<b>III Semester: ME</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AMED08	Core	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
<b>Contact Classes: 48</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: Nil</b>		<b>Total Classes:48</b>		
<b>Prerequisite: Manufacturing Practice</b>								

**I. COURSE OVERVIEW:**

This course is to introduce the concept of manufacturing process with the help of various processes widely employed in the industries. This course consists of casting, welding, sheet metal forming, extrusion and forging processes with the related details of equipment and applications. It introduces the different manufacturing processes and breakeven analysis.

**II. COURSES OBJECTIVES:**

**The students will try to learn**

- I. The Importance of manufacturing sciences in the day-to-day life, and study the basic manufacturing processes and tools used.
- II. The knowledge in thermal, metallurgical aspects during casting and welding for defect free manufacturing components.
- III. The design features that make each of this manufacturing process both harder, easier, assess design and manufacturing features on real products.

**III. COURSE OUTCOMES:**

**At the end of the course students should be able to:**

- CO 1 Outline the steps involved in making a casting the desired pattern for automotive industry components cylinder heads, engine blocks etc.
- CO 2 Categorize various defects and shortcomings during gas welding operation such as TIG, MIG and Spot welding for real time applications.
- CO 3 Illustrate the properties and bonding techniques of plastics for various plastic molding techniques.
- CO 4 Demonstrate the appropriate metal forming techniques, for producing components like hexagonal bolt and nuts.
- CO 5 Explain the working principle of hot and cold extrusion processes and their application in industries for making of pipes and tubes.
- CO 6 Classify the various forging techniques based on functionality, cost, and time in development of critical products.

**IV. COURSE CONTENT:**

**MODULE – I: CASTING (10)**

Casting: Steps involved in making a casting, its applications, patterns and types of patterns, pattern allowances, types of casting processes, solidification of casting, casting defects.

**Module – II: WELDING (09)**

Welding: Welding types, Oxy-fuel gas welding, Arc welding Process, Resistance welding, Inert gas welding, TIG welding, MIG welding, Friction welding, Induction pressure welding, Electron beam welding, Laser welding, Soldering and Brazing. Heat affected zone in welding, welding defects, causes and remedies.

### **MODULE – III: METAL FORMING (10)**

Forming: Hot working, cold working, recovery, re-crystallization and grain growth, comparison of properties of cold and hot worked parts, rolling fundamentals, theory of rolling, types of rolling mills and products, stamping, forming.

Blanking and piercing, bending and forming, drawing and its types, wire drawing and tube drawing; coining; hot and cold spinning.

### **MODULE – IV: EXTRUSION AND RAPID PROTOTYPING (10)**

Extrusion of Metals: Basic extrusion process and its characteristics, hot extrusion and cold extrusion, forward extrusion and backward extrusion, impact extrusion, tube extrusion and Pipe making, hydrostatic extrusion; Additive manufacturing: Rapid prototyping and rapid tooling.

### **MODULE – V: FORGING (09)**

Forging operations and principles, tools, smith forging, drop forging, roll forging, rotary forging, forging defects, cold forging, swaging.

### **V. TEXT BOOKS:**

1. Kalpakjian and Schmid, “Manufacturing Processes for Engineering Materials”, Pearson India, 10<sup>th</sup> edition, 2019.
2. R. K. Jain, “Production Technology”, Pearson India, 11<sup>th</sup> edition, 2019.

### **VI. REFERENCE BOOKS:**

1. Mikell P. Groover, “Fundamentals of Modern Manufacturing: Materials, Processes, and Systems”, John Wiley & Sons Inc., 4<sup>th</sup> edition, 2018.
2. Degarmo, Black & Kohser, “Materials and Processes in Manufacturing”, John Wiley & Sons Inc., 9<sup>th</sup> edition, 2012.

### **VII. ELECTRONIC RESOURCES:**

1. <https://nptel.ac.in/courses/112106286>.
2. [https://akanksha.iare.ac.in/index?route=course/details&course\\_id=33](https://akanksha.iare.ac.in/index?route=course/details&course_id=33).
3. [https://akanksha.iare.ac.in/index?route=course/details&course\\_id=31](https://akanksha.iare.ac.in/index?route=course/details&course_id=31).
4. [https://akanksha.iare.ac.in/index?route=course/details&course\\_id=1293](https://akanksha.iare.ac.in/index?route=course/details&course_id=1293).

### **VIII. MATERIALS ONLINE:**

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Open end experiments
5. Definitions and terminology
6. Assignments
7. Model question paper - I
8. Model question paper - II
9. Lecture notes
10. E-learning readiness videos (ELRV)
11. Power point presentation