MANUFACTURING PROCESSES

IV Semester: ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AMEC11	Core	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisite: Workshop Manufacturing Practices Laboratory

I. COURSE OVERVIEW:

The primary objective of this course is to introduce the concept of manufacturing technology with the help of various processes widely employed in industries. The course consists of casting, welding, sheet metal forming, extrusion and forging processes with the related details of equipment and applications. Introduces the different manufacturing processes and breakeven analysis. Engineering materials, laying emphasis on ferrous and non-ferrous materials along with the heat treatment of metals. Discusses the special casting processes and metal-forming processes respectively.

II. COURSE 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.

I. The knowledge in thermal, metallurgical aspects during casting and welding for defect free manufacturing components.

II. The design features that make each of this manufacturing process both harder, easier, assess design and manufacturing features on real products.

III. COURSE OUTCOMES:

After successful completion 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.	Remember
CO 2	**Categorize** various defects and shortcomings during gas welding operation such as TIG, MIG and Spot welding etc. for real time applications.	Understand
CO 3	**Illustrate** the properties and bonding techniques of plastics for variousplastic molding techniques.	Understand
CO 4	**Apply** the appropriate metal forming techniques, for producing components like hexagonal bolt, nut etc.	Apply
CO 5	**Explain** the working principle of hot and cold extrusion processes and their application in industries for making of pipes and tubes.	Apply
CO 6	**Classify** the various forging techniques based on functionality, cost and time in development of critical products.	Understand

IV. SYLLABUS:

MODULE-I: CASTING (09)

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 (09)

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 (09)

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.

IV. TEXT BOOKS

1. Kalpakjian and Schmid, Manufacturing processes for engineering materials -Pearson India, 5th Edition 2014.

VI. REFERENCE BOOKS:

1. Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems John Wiley & Sons Inc., 4th Edition, 2008.
2. Degarmo, Black &Kohser, Materials and Processes in Manufacturing (9th Edition) John Wiley & Sons Inc., 7th Edition, 2012.

VI. WEB REFERENCES:

1. https://books.google.co.in/books/about/Manufacturing_Processes_Reference_Guide.html?id=6x1sm

VII. E-TEXT BOOKS:

1. https://books.google.co.in/books?id=6wFuw6wufTMC&printsec=frontcover#v=onepage&q&f=false