MANUFACTURING PROCESSES

III Semester: ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AMEB05	Core	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

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
II. The knowledge in thermal, metallurgical aspects during casting and welding for defect free manufacturing components.
III. Design features that make each of these manufacturing process both harder, easier, assess design and manufacturing features on real products.

COURSE OUTCOMES:

CO 1 **Outline** the steps involved in making a casting the desired pattern for automotive industry components cylinder heads, engine blocks etc
CO 2 **Design** the gating and riser system needed for casting requirements to achieve defect/error free components
CO 3 **Categorize** various defects and shortcomings during gas welding operation such as TIG, MIG and Spot welding etc. for real time applications
CO 4 **Illustrate** the properties and bonding techniques of plastics and various plastic molding techniques
CO 5 **Apply** the appropriate metal forming techniques, for producing components like hexagonal bolt, nut etc.,
CO 6 **Explain** the working principle of hot and cold extrusion processes and their application in industries for making of pipes and tubes
CO 7 **Analyze** the manufacturing defects as well as material characterization and its application
CO 8 **Classify** the various forging techniques based on functionality, cost and time in development of critical products
CO 9 **Evaluate** the appropriate manufacturing process parameters, for effective optimization of prototype / products

MODULE-I	CASTING	Classes: 09

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

MODULE-II	WELDING	Classes: 09

Welding: Welding types, Oxy-fuel gas welding, cutting, standard time and cost calculations, arc welding Process, forge welding, resistance welding, Thermit welding. Inert gas welding, TIG welding, MIG welding, friction welding, induction pressure welding, explosive welding, electron beam welding, laser welding, soldering and brazing. Heat affected zone in welding, welding defects, causes and remedies, destructive and non-destructive testing of welds.

MODULE-III	METAL FORMING	Classes: 09

Forming: Hot working, cold working, strain hardening, 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; Forces in rolling and power requirements, stamping, forming and other cold.

Working processes: Blanking and piercing, bending and forming, drawing and its types, wire drawing and tube drawing; coining; hot and cold spinning, types of presses and press tools, forces and power requirements for the above operations.		
MODULE- IV	**EXTRUSION AND RAPID PROTOTYPING**	**Classes: 09**
Extrusion of Metals: Basic extrusion process and its characteristics, hot extrusion and cold extrusion, forward extrusion and backward extrusion, impact extrusion, extruding equipment, tube extrusion and Pipe making, hydrostatic extrusion, forces in extrusion; Additive manufacturing: Rapid prototyping and rapid tooling		
MODULE-V	**FORGING**	**Classes: 09**
Forging processes: Forging operations and principles, tools, forging methods, Smith forging, drop forging, roll forging, forging hammers: Rotary forging, forging defects, cold forging, swaging, forces in forging operations.		

Text Books:

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

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.

Web References:

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

E-Text Books:

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