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 course should enable the students to:

I. Understand and develop an appreciation of the manufacturing processes in correlation with material properties
II. Learn the material properties which change the shape, size and form of the raw materials into the desirable product.
III. Understand the processes for creating products by conventional or unconventional manufacturing methods.

COURSE OUTCOMES(COs):

CO 1: Describe the concept of manufacturing and material, design and properties of casting..
CO 2: Understand the functions of casting defects, welding and industrial concepts..
CO 3: Understand the working of design related and causes and NDT techniques systems..
CO 4: Explore the concept of heat inputs and rapid prototyping, sheet metal and forging.
CO 5: Classification of various manufacturing processes for industrial applications and their use in real world competition.

COURSE LEARNING OUTCOMES (CLOs):

1. Understand various manufacturing processes used in various industries.
2. Explain the steps involved in casting processes
3. Use design principles to incorporate sprue, runner, gates, and risers in foundry practice.
4. Evaluate properties of sand for use in sand casting.
5. Solve problems and find methods to rectify casting defects.
6. Demonstrate the preparation of moulds for various casting processes
7. Describe applications of various casting processes
8. Explain principles of welding, brazing and soldering processes.
9. Demonstrate use of welding equipment for various industrial applications.
10. Demonstrate use of Brazing and soldering equipment for various industrial applications.
11. Explain design of welded joints, residual stresses, distortion and control.
12. Explain causes and remedies of welding defects.
13. Compare destructive and non-destructive testing techniques.
14. Understand the effect of heat input in welds.
15. Understand the concepts to Additive manufacturing.
16. Understand the importance of sheet metal forming, bending, and deep drawing.
17. Compare extrusion and forging processes to identify advantages and limitations.
18. Enable students to understand various manufacturing processes for industrial applications.
19. Enable students to understand importance of manufacturing for lifelong learning, Higher Education and competitive exams.

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, 5 th 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., 7 th Edition, 2012.		
Web References:		
https://books.google.co.in/books/about/Manufacturing_Processes_Reference_Guide.html?id=6x1sm Af _PAcC		
E-Text Books:		
https://books.google.co.in/books?id=6wFuw6wufTMC&printsec=frontcover#v=onepage&q&f=false		