

PRODUCTION ENGINEERING

IV Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AME006	Core	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
OBJECTIVES: The course should enable the students to: I. Comprehensive understanding of different manufacturing processes for product development. II. Apply casting, metal joining and forming processes for various industries. III. Select process parameters, equipment for material processing.								
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 importance of sheet metal forming, bending, and deep drawing. 16. Compare extrusion and forging processes to identify advantages and limitations. 17. Enable students to understand various manufacturing processes for industrial applications. 18. Enable students to understand importance of manufacturing for life long learning, Higher Education and competitive exams.								
Unit-I	CASTING					Classes: 09		
Casting: Steps involved in making a casting, it's applications, patterns and types of patterns, pattern allowances and their construction, types of casting processes, solidification of casting.								
Unit -II	WELDING-I					Classes: 09		
Welding: Welding types, Oxy-fuel gas welding, cutting, standard time and cost calculations, arc welding process, forge welding, resistance welding, thermit welding.								
Unit -III	WELDING-II					Classes: 09		
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 nondestructive testing of welds.		
Unit -IV	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		
Unit -V	EXTRUSION, FORGING	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; 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. P. N. Rao, “Manufacturing Technology”, Tata McGraw-Hill, 2nd Edition, 2013. 2. Hajra Chowdhary, “Workshop Technology”, Asia Publishing House, 2nd Edition, 2008.		
Reference Books:		
1. Sarma P C, “Production Technology”, S.Chand & CO, New Delhi, 7th Edition, 2006. 2. R. K. Jain, “Production Technology”, Khanna Publishers, 18th Edition, 2013. 3. T. V. Ramana Rao, “Metal Casting”, New Age, 1st Edition, 2010. 4. Philips Rosenthal, “Principles of Metal Castings”, Tata McGraw-Hill, 2nd Edition, 2001. 5. B. S. Raghuwamshi, “A Course in Workshop Technology”, Dhanpat Rai & Sons, 2014. 6. Kalpakjain S, “Manufacturing Engineering and Technology”, Pearson Education, 7th Edition, 2014. 7. HMT, “Production Technology”, McGraw-Hill Education, 1st Edition, 2013.		