

Course Code	18ME34	Course Title	Manufacturing process-I	Semester	III
Credits	3	L – T – P –TL*	3 – 0 – 0 – 3	Teaching Hrs	42
Total Marks	100	CIE*	40	SEE*	60
*NOTE: L – Lecture; T – Tutorial; P – Practical; TL – Total; CIE – Continuous Internal Evaluation; SEE – Semester End Examination					
Course Learning Objectives: This course will enable students to;					Teaching Hr
<ul style="list-style-type: none"> • To provide understanding of the concept of material casting processes and to introduce the concept of dependent and independent variables which control materials casting. • To introduce the concept of selection of appropriate production processes for a specific application. • To introduce students to good foundry practices and product design considerations. • To provide understanding of the fundamentals of joining processes.. 					
Module-1					
<p>Manufacturing process: Introduction to basic manufacturing, Classification of manufacturing process, Applications.</p> <p>Casting: Introduction, steps involved in making casting, Terminologies of casting, Advantages and limitations, Applications.</p> <p>Pattern making: Functions of pattern, Classification of pattern, Different pattern materials, various pattern allowances in design of pattern.</p> <p>Mould making: Types of moulds, Mould making, Desirable properties of Sand mould. Core making: Functions of cores, important factors in core design and making.</p>					08
Module-2					
<p>Moulding sand ingredients: Types of base sand, Properties of base sand, Types of binders and its functions, various types of additives and its functions.</p> <p>Gating system: Concept of gating system, different types of gating systems, gating system design, risering design, Numerical on gating and risering design.</p> <p>Solidification: Solidification of pure metal and alloy, Mechanisms of solidification, types of nucleation, grain structures. Progressive and directional solidification, solidification variables. Methods of achieving directional solidification</p> <p>Defects in casting: Introduction, types of defects, causes and remedies.</p>					08
Module-3					
<p>Special casting processes: Shell molding, investment casting, Gravity die casting, Pressure die casting, Centrifugal casting, Slush casting, Continuous casting, Injection molding, CO₂ mould.</p> <p>Melting Furnaces: Classification, constructional features and working principle of coke fired and Gas fired pit furnace, Resistance furnace, Electric arc furnace, Cupola furnace.</p>					08

Module-4	09
<p>Welding Process: Definition, Principles, Classification, Application, Advantages & limitations of welding. Gas welding, Oxy – Acetylene welding, Types of flame and Flame characteristics.</p> <p>Electric Arc Welding: Introduction to Arc welding, Classification of Arc welding, FSMAW, TIG, MIG, Arc welding current and voltage, Arc welding equipment's.</p>	
Module-5	09
<p>Soldering and Brazing: Principles of soldering & brazing: Parameters involved & Mechanism, Different Types of Soldering & Brazing Methods.</p> <p>Inspection Methods – Methods used for Inspection of casting and welding-Visual, Magnetic particle, Fluorescent particle, Ultrasonic, Radiography, Eddy current, Holography methods of Inspection.</p>	
<p>Course outcomes: By the end of the course, the student shall be able to</p> <p>CO1: Define and explain the importance of casting process, steps involved in casting, patterns, binders, additives and molding machines.</p> <p>CO2: Discuss the types of cores, types of metallic mold castings and melting furnaces.</p> <p>CO3: Discuss the basic principles of different welding processes and their applications</p> <p>CO4: Define and explain the basics of metallurgy of welding and identify the role of non destructive techniques in production processes.</p>	
<p>Question paper pattern:</p> <ul style="list-style-type: none"> • The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub- questions) from each module. • Each full question will have sub- question covering all the topics under a module. <p>The students will have to answer five full questions, selecting one full question from each module.</p>	
<p>Textbooks:</p> <ol style="list-style-type: none"> 1. Foundry Technology, O.P. Khanna, Dhanpatrai publications (P)-2003 reprint. 2. Manufacturing Technology: Foundry, Forming and Welding, P N Rao, 2 nd Edition Tata McGraw-Hill publishing company Limited. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. S.K. HajraChoudhury (2001), Elements of Workshop Technology, Vol-I, Media Promoters Pvt Ltd., Mumbai. 2. S. Kalpakjian and S.R. Schmid, “Manufacturing Engineering and Technology”, 7 th Edition, Prentice-Hall, 2013 3. Roy A. Lindberg (2004), Processes and Materials of Manufacture, 4th Edition, Prentice-Hall of India, New Delhi. 4. Banga T.R; and Agrawal R.L, “Foundry Engineering”, Khanna Publishers, 1992. 	