Course Syllabus
Gyanmanjari Institute of Technology
Semester-5 (B. Tech)

Subject: Manufacturing Process-II – BETME15312.

Type of course: Professional Core.

Prerequisite: Mechanical workshop and manufacturing process-1.

Rationale: This subject covers essential manufacturing processes, focusing on casting, welding, forming, and non-metal processing. Students gain a strong foundation in material selection, process optimization, defect analysis, and machining techniques, preparing them for real-world industrial applications.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
3	0	2	4	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No	Course content	Hrs	% Weightage
1	**Manufacturing Processes:** Basic Introduction, Importance of Manufacturing, Economics and Technological Definition, Classification and Selection of Manufacturing Processes. **Metal Casting Processes:** Patterns, Types of patterns, allowances and material used for patterns, moulding materials, moulding sands, Moulding sands; properties and sand testing: Grain fineness, moisture content, clay content and permeability test. Core materials and core making. Moulding practices: Green, dry and loam sand moulding, pit and floor moulding; shell moulding; permanent moulding; carbon dioxide moulding. Metal casting: Melting furnaces: Rotary, Pit electric, Tilting and cupola. Review of casting processes, casting design considerations, capabilities and applications of casting processes; Gating and Rising design fundamentals, casting defects	15	35
2	**Metal Joining Processes:** Principle of welding, soldering, Brazing and adhesive bonding. Classification of welding and allied processes. Capabilities and applications; welding parameters, general concepts of weldability, welding metallurgy and weldment design, Gas welding and gas cutting, Arc welding, Power sources and consumables, Resistance welding: Spot, Projection and seam welding process, atomic hydrogen, ultrasonic, Plasma and laser beam welding, Electron beam welding, and special welding processes e.g., TIG, MIG, friction and explosive welding, welding of C.I. and Al. Defects of welding and remedial actions. Numerical Calculation of Different process parameters of welding.	12	25
3	**Metal Shaping and Forming:** Metal working, Elastic and plastic deformation, Concept of strain hardening, Hot and cold working, Rolling, Principle and operations, roll pass sequence, Forging, Forging operations, extrusion, Wire and tube drawing processes. Forging: Method of forging, forging hammers and presses, Principle of forging tool design, Cold working processes: Shearing, Drawing Squeezing, Blanking, Piercing, deep drawing, Coining and embossing, Metal working defects, cold heading, Riveting, Thread rolling bending and forming operation. Numerical Calculation of Different process parameters of metal shaping and forming.	10	20
4	**Plastic, Ceramic and Glass Processing:** Classification of Plastics, Ingredients of Moulding compounds, General Properties of Plastics, Plastic part manufacturing processes such as compression moulding, Transfer moulding, Injection moulding, Extrusion moulding, Blow moulding, Calendaring, Thermoforming, slush moulding, laminating. Ceramic Structure, Properties, and Applications, Shaping Ceramics, Glasses Structure, Properties, and Applications, Forming and shaping of glass, Composite materials, Processing of metal matrix and ceramic matrix composites, Processing semiconductors, Basics of 3D printing.	08	20

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Industry-Based Case Study Report:** Students will analyze real-world manufacturing processes from industries, identify challenges, propose improvements, and upload their case study reports with images on the GMIU web portal.	10
2	**Reverse Engineering of a Product:** Students will disassemble a common product, study its manufacturing process, suggest improvements, and upload a short report on the GMIU web portal.	10
3	**Mini Project:** Students will participate in an industrial visit or live workshop, apply manufacturing techniques in a project and upload photographs on the GMIU web portal.	10
	Total	30

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	25%	30%	25%	10%	10%	-

Course Outcome:

After learning the course, the students should be able to:	
CO1	Understand manufacturing processes, classifications, and metal casting with defect analysis.
CO2	Learn metal joining methods and welding defects with process parameters.
CO3	Explore metal forming techniques and their applications.
CO4	Gain insights into plastic, ceramic, glass, composites, semiconductors, and 3D printing.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs.
1	To design and making of pattern - for one casting drawing.	1	4
2	To determine sand properties- Exercise -for strengths, and permeability	1	2
3	To Prepare Mould for Casting.	1	4
4	To prepare a butt joint with the specimens by Arc Welding.	2	4
5	To join the specimens by gas welding process.	2	4
6	To investigate the effects of varying voltage and current on spot welded specimen	2	4
7	To perform blanking & piercing operation.	3	4
8	To manufacture components using by 3D printing.	4	4
		Total	30

Instructional Method:

The course delivery method will be based on the content requirements and student needs. The instructor will use a combination of traditional methods, such as lectures and blackboard teaching, along with demonstrations, quizzes, and brainstorming sessions.

Students will have access to supplementary resources like online videos, NPTEL/SWAYAM, e-courses, and virtual laboratories.

Internal evaluation will be based on Active Learning Assignments (ALAs).A practical/viva examination will be held at the end of the semester to assess students' laboratory performance.

Reference Books:

[1] Workshop Technology Vol. I, II & III by WAJ Chapman.

[2] Workshop Technology Vol. II by Hajra & Choudhari.

[3] Manufacturing Processes by O.P. Khanna.

[4] Production Technology by R. K. Jain.

[5] Processes and Materials of Manufacture by Lindberg Roy A.; Prentice-Hall India.

[6] Principles of Manufacturing Materials and Process by J S Campbell.