

202041: Manufacturing Process- I

Teaching Scheme:	Credits	Examination Scheme:
TH: 03 Hrs/week	Th: 03	In-Sem: 50
	Tut:--	End-Sem: 50
PR: 02 Hrs/week	PR/OR/TW: 01	PR: --
		OR: --
		TW: 50

Course Objectives:

- To make acquaintance of foundry processes pattern making and casting
- To study metal forming processes such forging, rolling, extrusion and wire drawing.
- To make study of different plastic molding processes
- To study metal joining processes
- To design and development of product with Sheet metal working process
- Introduction to center lathe

Course Outcomes:

On completion of the course, learner will be able to–

- Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects.
- Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.
- Understand different plastic molding processes, Extrusion of Plastic and Thermoforming
- Understand different Welding and joining processes and its defects
- Understand, Design and Analyze different sheet metal working processes
- Understand the constructional details and Working of Centre Lathe

Course Contents

Unit I Casting Processes:

(9 Hrs)

SAND CASTING – Pattern- types, material and allowances, Molding sand- types, properties and testing, Molding – types, equipment's, tools and machines, Core – types and manufacturing, Gating system and Riser – types and design (Numerical), Heating and pouring, cooling and solidification- process and time estimation (Numerical), Cleaning and Finishing, Defects and remedies, Inspection techniques. Die casting, Investment casting, Centrifugal Casting, Continuous Casting- Types, equipment, process parameters, material to cast.

Unit II Metal Forming Processes:**(8 Hrs)**

Hot and Cold Working – Concepts and comparative study, Material behavior in metal forming, strain rate sensitivity, friction and lubrication in metal forming Rolling – Types of rolling mills, flat rolling analysis, power required per roll for simple single pass two rollers. (Simple Numerical) Forging – Types, process parameter, Analysis of open die forging (Numerical) Extrusion – Types, process parameter, Extrusion dies, Shape factor (Numerical), Drawing – Wire drawing and its analysis (Numerical), tube drawing

Unit III Plastic Processing:**(6Hrs)**

Molding – Compression molding, Transfer molding, Blow molding, Injection molding – Process and equipment. Extrusion of Plastic – Type of extruder, extrusion of film, pipe, cable and sheet Thermoforming – Principle, pressure forming and vacuum forming

Unit IV Joining Processes:**(6Hrs)**

Surface preparation and types of joints. Welding Classification Arc welding – Theory, SMAW, GTAW, FCAW, Submerged arc welding, Stud welding. Resistance welding – Theory, Spot, seam and projection weld process. Gas welding. Soldering, brazing and braze welding. Joint through Adhesive – classification of adhesive, types of adhesive, applications. Weld inspection, Defects in various joints and their remedies.

Unit V Sheet Metal Working:**(7Hrs)**

Types of sheet metal operations, Types of dies and punches, material for dies and punches, Die design for Progressive and Drawing Die, clearance analysis, center of pressure, blank size determination (Numerical), strip layout, sheet utilization ratio (Numerical), method of reducing forces

Unit VI Centre lathe:**(7Hrs)**

Introduction to centre lathe, types of lathe, construction and working of lathe, attachments and accessories, various operations on lathe, taper turning and thread cutting methods (numerical), machining time calculation (numerical)

Books:**Text**

1. Hajara Choudhari, Bose S.K. – Elements of workshop Technology Vol. I &II , Asian Publishing House
2. D. K. Singh – Fundamentals of Manufacturing Engineering – Ane's Books. Pvt. Ltd.

Reference:

1. B. Ravi – Metal Casting – Computer Aided design and analysis- Prentice Hall of India
2. Reikher – Casting: An analytical approach – Springer
3. Wang – Rapid tooling guidelines for sand casting – Springer
2. J. T. Black – Degormos Materials and process in manufacturing – John Willey and sons
3. M.P Grover – Fundamentals of modern manufacturing: Materials and systems
4. A.S Athalye – Processing of plastic – Colour Publication (Pvt.)Ltd. U.K
5. Cryil Donaldson and George H LeCain – Tool Design – Tata McGraw Hill Education Pvt. Ltd.
6. Dr. R. S. Parmar, Welding Processes And Technology, Khanna Publishers, New Delhi.

Lab Assignments

1. Manufacturing of any one assembly consisting of minimum two components and involving all the lathe operations
2. Demonstration of Sand Moulding Processes
3. Job on TIG/ MIG/ Resistance welding

Guidelines for Term Work assessment

Each student must complete and submit following Term Work

- i) Assgmenyt-1 and assignment-3 w.r.t. above mentioned laboratory assignments
- ii) Journal consisting of following write-ups:
 - a) Study of casting processes
 - b) Study of plasting moulding processes
 - c) Study of welding processes
 - d) Study of centre lathe and single point cutting tool geometry