

Course Type	Course Code	Name of the Course	L	T	P	Credit
DE	OMED618	Theory of Production Processes	3	0	0	3

Prerequisites
Introduction to manufacturing technology or manufacturing processes.
Course Objective
1. Gain a comprehensive understanding of various casting, forming, and welding techniques. 2. Develop a strong grasp of the principles behind solidification, fluidity, gating, risering, and other key concepts in casting. 3. Learn about stress-strain relationships, yield criteria, and the mechanics involved in different forming processes. 4. Understand how different process parameters affect the outcome of casting, forming, and welding processes. 5. Be able to select appropriate processes and parameters for specific manufacturing needs in various industries.
Learning Outcome
1. Demonstrate the ability to understand and explain different casting methods and their applications. 2. Be able to select the appropriate welding process and parameters based on material and application requirements. 3. Apply knowledge of metal forming principles to design efficient and effective forming systems. 4. Understand how process parameters affect the outcome of powder metallurgy processes. 5. Gain knowledge of additive manufacturing techniques and their unique characteristics.

Unit No.	Topics to be Covered	No. of Lecture Videos	Video Time (Minutes)	Learning Outcomes
1	Theory of Casting and Solidification, Fluidity of liquid metals	5	168	Understand casting fundamentals, solidification theory, and factors affecting fluidity.
2	Patternmaking and Mouldmaking, Pattern allowances, Testing of molding sand, cores	5	170	Gain knowledge of pattern, mould, and core design along with sand testing methods.
3	Gating system design, Riser design, Riser volume and feeding distance calculations	5	174	Learn to design gating and risering systems and perform feeding calculations.
4	Melting of ferrous and non-ferrous materials, Casting design, Casting defects	5	170	Understand melting practices, casting design principles, and defect analysis.
5	Mechanical fundamentals of metalworking, Stress-strain, Flow curve	5	150	Understand stress-strain behavior and fundamentals of plastic deformation.
6	Yield criteria, Plastic stress-strain relations, Mechanics of metalworking	5	162	Learn yield theories and mechanics governing metalworking processes.
7	Rolling and forging processes, Force calculations	5	158	Analyze rolling and forging processes and calculate forming forces.

8	Extrusion and drawing processes, Forming defects	5	170	Understand extrusion and drawing mechanics and identify forming defects.
9	Classification of welding processes, Thermal effects, HAZ	5	161	Understand welding classifications, thermal cycles, and metallurgical effects.
10	Arc welding, GMAW, Solid state welding, Resistance welding, Brazing, Soldering, Adhesive bonding	5	164	Understand principles and applications of major joining processes.
11	Residual stresses, Measurement techniques, Welding distortion and control	5	157	Learn causes, measurement, and control of residual stresses and distortion.
12	Weldability assessment, Tests for weldability, Ferrous and non-ferrous materials	5	156	Evaluate weldability of engineering materials using standard methods.
Total		44	1960	

Textbooks:

1. “Manufacturing Science” by Ghosh, A., and Mallik, A.K., Affiliated East-West Press Pvt. Ltd.
2. “Principles of Metal Casting” by: Heine, R.W., Loper, C.R., and Rosenthal, P.C., TMH

Reference Books:

1. “Mechanical Metallurgy” by: Dieter Feorge E., McGrawHill
2. “Welding Metallurgy” by: Kuo, S., John-Wiley & Sons Inc