

II Year I Semester

Code: 20ME3003

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PRODUCTION TECHNOLOGY

Course Objectives:

- 1) To impart basic knowledge and understanding about the primary manufacturing processes such as casting, joining, bulk forming, sheet metal forming.
- 2) To know about powder metallurgy and their relevance in current manufacturing industry.

UNIT – I

Manufacturing concepts: Primary and secondary manufacturing processes

Metal Casting: Objectives, Terminology, Steps involved in making a casting - Advantage of casting and its applications. - Pattern: Types, Allowances, Materials and their construction – Methods of Moulding – Selection, Properties, Testing and preparation of moulding sands - Moulding tools and equipment, Machine moulding and Core making. Principles of Gating, Gating ratio and design of Gating systems.

UNIT – II

Methods of melting and types of furnaces, Solidification of castings, Solidification of puremetals and alloys, short & long freezing range alloys, Casting Defects. Risers - Types, function and design, casting design considerations, Basic principles and applications of Centrifugal casting, Die casting and Investment casting.

UNIT – III

Joining Process: Types of Joining, Welding Process, Physics of welding, Gas welding, Gas Cutting. Electric Arc welding, Resistance welding, Submerged arc welding, and Inert Gas welding- TIG & MIG welding. Solid state welding processes- Friction welding, Friction stir welding, Explosive welding: Thermit welding, Plasma welding, Laser welding, electron beam welding, Soldering & Brazing. Welding defects – causes and remedies – destructive and non-destructive testing of welds.

UNIT – IV

Metal Forming Processes: Plastic deformation in metals and alloys, hot working and cold working, Strain hardening and Annealing. Bulk forming processes: Forging - Types Forging, Smith forging, Drop Forging, roll forging, Forging hammers, Rotary forging, forging defects; Rolling - fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing.

UNIT – V

Sheet metal forming - Blanking and piercing, Forces and power requirement in these operations, Deep drawing, stretch forming, Bending, Spring back and its remedies, Coining, Spinning, Types of presses and press tools. High energy rate forming processes: Principles of

explosive forming, electromagnetic forming, Electro hydraulic forming, rubber pad forming, advantages and limitations.

Processing of Plastics: Types of Plastics, Properties, Applications and their Processing methods, Blow and Injection moulding.

Text Books:

1. Manufacturing Technology -Vol I- P.N. Rao- TMH
2. Production Technology- R.K. Jain- Khanna

References:

1. Manufacturing Science - A. Ghosh & A.K. Malik - East West Press Pvt. Ltd
2. Process and materials of manufacture- Lindberg- PHI
3. Production Technology-P C Sharma-S. Chand
4. Manufacturing Processes- H.S. Shaun- Pearson
5. Manufacturing Processes- J.P. Kaushish- PHI

Weblinks/ Online Resources:

- www.nptel.ac.in
- www.library.nu
- www.freebookspot.com

Course Outcomes:

On the completion of the course the student will be able to:

CO1: Design the patterns and core boxes for metal casting processes.

CO2: Design the gating system for different metallic components.

CO3: Know the different types of joining processes.

CO4: Be able to use forging, extrusion processes.

CO5: Learn about the different types of sheet metal forming processes and methods for processing of plastics.