

AMTD21 FOUNDRY TECHNOLOGY

UNIT-1 INTRODUCTION

- 1.1 Introduction to casting process and the steps involved; Components produced by casting process,
- 1.2 Comparison of metal casting with metal joining, Advantages and limitations of casting process;
- 1.3 Overview of the industry Solidification of metals: Introduction, freezing of pure metals;
- 1.4 Nucleation and Growth, shrinkage, solidification of alloys; dendritic growth and segregation;
- 1.5 Shrinkage in alloys; Alloys freezing in two stages; solidification process in eutectic and non-eutectic alloys; Properties related to the solidification mechanism
- 1.6 Fluidity, Hot tearing or hot cracking, Evolution of dissolved gases, Effect of inoculation;
- 1.7 Solidification of actual castings; Progressive and directional solidification;
- 1.8 Centerline feeding resistance; Rate of solidification; Chvorinov's Rule.

UNIT-2 SAND MOLDING

- 2.1 Types and requirements of base sand; Binders and additives used- types and properties; Molding tools and equipment- hand molding tools, molding machines
- 2.2 Jolt type, squeeze type, Jolt and Squeeze type and Sand slinger;
- 2.3 Cores- types, core prints, core venting and baking, core shifting and chaplets, method of making cores, binders used, core sand molding;
- 2.4 Gating systems- principles and types of gates and risers, gating ratios and chills, riser location and design in actual casting;
- 2.5 Molding processes- bench molding, floor molding, pit molding, stack molding, green sand molding, dry sand molding, loam molding, machine molding.

UNIT-3 SPECIAL MOLDING PROCESSES

- 3.1 Study of important molding processes, No bake molds, Flask less molds, Sweep mold, CO₂ mold, Shell mold, Investment mold.
- 3.2 Metal Molds: Gravity die casting, Pressure die casting, Centrifugal casting, Squeeze casting, Slush casting, Thixo-casting, Continuous casting.
- 3.3 Non-metal molding, Plaster and Ceramic molding; Expandable pattern mold casting.
- 3.4 Finishing processes: Fettling and cleaning of castings; removal of gates and risers, grinding.
Non-Ferrous Foundry practice:
- 3.5 Casting of Al-Si and Al-Mg alloys, Cu-base casting alloys

UNIT-4 FOUNDRY PRACTICES OF CAST IRONS, STEELS, INSPECTION AND TESTING OF CASTINGS

- 4.1 Foundry practice for cast irons – gray iron, white cast iron;
- 4.2 Ductile iron, malleable iron, SG iron, Steel castings – steel melting in the foundry;
- 4.3 Metallurgy of cast steel; Casting design considerations;
- 4.4 Inspection and testing of castings: Defects in castings – types, causes and remedies; Inspection and non-destructive testing of castings.

- 4.5 Modernization and mechanization of foundry; Material handling; Pollution control in foundry;
4.6 Application of computers in casting process; Software available for casting process simulation.

Reference Books:

1. R.A. Lindberg, “Processes and Materials for Manufacturing”, 4th Ed, Pearson Education, 2006.
2. P.N.Rao, “Manufacturing Technology: Foundry, forming and welding”, 3rd Ed., Tata McGraw Hill, 2003.
3. “ASM Handbook: Volume 15: Casting” 9th Ed., American Society of Metals, Ohio, 2008.

