

Steel Making

(No. of Credits: 4)

Unit-I: Introduction: Classification of Steel making Processes. Early steel making processes; Cementation and crucible processes; Raw materials for steel making, Factors affecting efficiency of steel making.

Unit-II: Principles of Steel making: Decarburisation, desiliconization. Dephosphorisation and desulphurization; deoxidation and degassing; molecular and ionic theory of slags.

Unit-III: Construction and process details in acid and basic Bessemer converters and open hearth furnace Improvement and modification of the above process; Construction and process details in LD, LD-AC, Kaldo and rotor steel making processes; Bottom blown oxygen processes. Combined blow processes. Continuous steel making process: BISRA, IRSID & WORCRA Process.

Unit-IV: Construction details of electric arc furnace; Steel making through EAF route, Induction furnace for steel making; Advances in EAF; Refractory materials and refractories in steel making.

Unit-V: Secondary steel making: Degassing methods; deoxidation methods; alloying; Vacuum treatment of steels. AOD, VOD, Powder injection methods; Electro slag refining process; Vacuum arc remelting process. Precipitation, diffusion and treatment with synthetic slags, Brief outline of manufacture of alloy steels.

Unit-VI: Casting of steels: Casting pit side practice, Types of Moulds, Teeming Methods, Killed, Semi Killed, and rimmed Steels, Solidification of steels. Ingot defects and remedies; Continuous casting practice; factors affecting heat transfer in contiguous casting practice; defects.

Reference books:

1. A. Ghosh and A. Chatterjee, Iron Making and Steel Making Theory and Practice
2. R. H. Tupkary and V. H, Tupkary, Modern Steel Making
3. A.K. Chakrabarhi, Steel Making
4. Seshadri Seetharaman, A Treatise on Process Metallurgy: Volume III,
5. Richard J. Fruehan, The Making, Shaping and Treating of Steel, 11th Edition,