

AMMR-7: PHASE EQUILIBRIA IN MATERIALS

Course Details:

Phase rule, Lever rule & free energy of phase mixtures, Binary isomorphous system equilibrium phase rule, Lever rule & free solidification, non-equilibrium solidification, dendritic growth, coring, CuNi alloys & zone refining. Binary eutectic & hypoeutectic systems - solidification of eutectic, hypoeutectic & hypereutectic alloys. Solidification of peritectic, hypoperitectic & hyperperitectic alloys, Morphologies of eutectic systems Binary monotectic & syntectic systems, Stability of regular solution & miscibility gap, intrinsic stability of solution & spinodal, Hume-Rothery rules & intermediate phases, e.g., laves, sigma, electron compounds, binary eutectoid, peritectoid, metatectic & monotectic systems, Iron carbon phase diagram & microstructures of plain carbon steel & cast iron, Non-equilibrium structures, Binary ceramic systems, Ternary phase diagrams Gibbs triangle isothermal & vertical sections polythermal projections, two-phase equilibrium, concept of tie-lines, rules for construction of tie-lines, three-phase equilibrium, concept of tie-triangle four-phase equilibria multi-component alloy systems stainless steels, high speed steels, Hadfield steels, super alloys, light metal alloys, refactor systems.

Text Books and Reference:

1. Physical Metallurgy, V. Raghvan (PHI)
2. Materials Science and Engineering, V. Raghvan
3. Phase Diagrams in Metallurgy, Frederic N. Rhines (Mc Graw Hill)
4. Introduction to Physical Metallurgy, Sidney H Avner (TMH)

