SUBJECT NO-MT31017, SUBJECT NAME- PHASE TRANSFORMATION AND HEAT TREATMENT OF MATERIALS

LTP- 3-1-0,CRD- 4

SYLLABUS :-

MT31017: PHASE TRANSFORMATION AND HEAT TREATMENT OF MATERIALS (3-1-0)

Prerequisite â Introduction to Engineering Materials(MT21107) / Materials Engineering(MT31011).Introduction and classification of phase transformations. Diffusion in solids: phenomenological approach and atomistic approach. Nucleation and growth theories of vapour to liquid, liquid to solid, and solid to solid transformations; homogeneous and heterogeneous strain energy effect during nucleation; interface-controlled growth and diffusion controlled growth; overall transformation kinetics. Principles of solidification, evolution of microstructures in pure metals and alloys. Precipitation from solid solution: types of precipitation reactions, crystallographic description of precipitates, precipitation sequence and age hardening, spinoidal decomposition. Iron-carbon alloy system: iron-carbon diagram, nucleation and growth of pearlite, cooling of hypo-eutectoid, eutectoid, and hyper-eutectoid steels, development of microstructures in cast irons. Heat treatment of steels: TTT and CCT diagrams, bainitic transformation, martensitic transformation, hardenability, role of alloying elements in steels, conventional heat treatment of steels. Massive transformation. Order-disorder transformation. Phase transformations in and heat treatment of some common non-ferrous metals and alloys. Text Books:1.D. A. Porter and K. Easterling: Phase Transformation in Metals and Alloys, CRC Press, 2000.2. George Krauss: Steels-Heat Treatment and Processing Principles, ASM International, Materials Park, Ohio, 1990.