NPTEL Video Course - Metallurgy and Material Science - NOC:Welding Metallurgy

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Co-ordinating Institute - IIT - Roorkee

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to welding metallurgy
Lecture 2 - Overview of Welding Processes
Lecture 3 - Introduction to phase diagrams
Lecture 4 - Phase diagram of Iron Carbon system
Lecture 5 - Phase diagram of non ferrous metals and alloys
Lecture 6 - Phase Transformations
Lecture 7 - Time Temperature Transformation Diagrams
Lecture 8 - Continuous Cooling Transformation Diagrams
Lecture 9 - Carbon Equivalent, Schaeffler Diagrams
Lecture 10 - Problem solving on Phase Diagrams
Lecture 11 - Introduction to strengthening mechanism in metals
Lecture 12 - Solid solution strengthening and grain refinement
Lecture 13 - Precipitation Hardening and Martensite Strengthening
Lecture 14 - Strain Hardening and Strain Ageing
Lecture 15 - Problem solving on strengthening mechanism in metals
Lecture 16 - Introduction to Heat treatment Processes in Welding
Lecture 17 - Hardening and Hardenability
Lecture 18 - Martempering and Austempering
Lecture 19 - Case Hardening methods
Lecture 20 - Heat treatment of Non-Ferrous metals and alloys
Lecture 21 - Heat Sources in Welding
Lecture 22 - Heat Flow in Welding
Lecture 23 - Temperature Distribution in Welding
Lecture 24 - Effect of Welding Parameters
Lecture 25 - Metallurgical effect of Heat Flow on Welding
Lecture 26 - Principles of Solidification in Welding
Lecture 27 - Solute redistribution during Solidification
Lecture 28 - Constitutional Supercooling
Lecture 29 - Microsegregation and Banding

Lecture 30 - Grain Structure during Solidification in Welding
Lecture 31 - Distinct Zones in Fusion Welded Specimen
Lecture 32 - Heat Affected Zone
Lecture 33 - Properties of Heat Affect Zone
Lecture 34 - Microstructural Products in Weldments
Lecture 35 - Introduction to Preheat and Postweld Heat Treatment
Lecture 36 - Preheat and Postweld Heat Treatment of Different Materials
Lecture 37 - Residual Stresses in Welding
Lecture 38 - Causes of Residual Stress Development in Welding
Lecture 39 - Measurement of Residual Stresses in Weldments
Lecture 40 - Controlling Residual Stresses in Weldments
Lecture 41 - Introduction to Welding Distortion
Lecture 42 - Types of Welding Distortions
Lecture 43 - Angular Distortions in Welds
Lecture 44 - Bowing, Buckling and Twisting in Welds
Lecture 45 - Control of Distortion in Welds
Lecture 46 - Introduction to Cracks in Welds
Lecture 47 - Types of Weld Cracks
Lecture 48 - Specific Weld Cracks
Lecture 49 - Chevron Cracks and Reheat Cracks
Lecture 50 - Lamellar Cracks and Stress Corrosion Cracking
Lecture 51 - Introduction to Weldability of Metals
Lecture 52 - Weldability of Carbon Steels
Lecture 53 - Weldability of Alloy Steels
Lecture 54 - Weldability of Cast Iron
Lecture 55 - Weldability of Non Ferrous Metals and Alloys
Lecture 56 - Introduction to Welding Defects
Lecture 57 - Surface and Subsurface Welding Defects
Lecture 58 - Issues in Welding
Lecture 59 - Considerations for Fatigue Loading in Welding
Lecture 60 - Design Features for Fatigue and Static Loading in Welding