



WELDING METALLURGY

PROF. PRADEEP K. JHA

Department of Metallurgy and Material Science
IIT Roorkee

TYPE OF COURSE : Rerun | Core | PG/UG

COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)

EXAM DATE : 24 Apr 2022

PRE-REQUISITES : Introduction to courses such as Welding processes, Materials science etc.

INDUSTRIES APPLICABLE TO : Manufacturing Industries like SAIL, BHEL etc.

COURSE OUTLINE :

The course focuses on understanding the metallurgy and solidification of weldments. The course will make the students aware with the metallurgical aspects of welding. For getting a sound weld, the students are required to be aware of the science behind the welding phenomena, especially in the domain of weld metal solidification, heat transfer, heat treatment processes, strengthening mechanisms etc. The course will be useful for engineering graduates as well as professionals working in the area of welding.

ABOUT INSTRUCTOR :

Prof. Pradeep K. Jha is presently working as Associate Professor in the Department of Mechanical & Industrial Engineering at IIT Roorkee. He has been teaching the courses related to manufacturing technology and theory of production processes to undergraduate and postgraduate students for more than 12 years. He is actively involved in research work related to production processes, especially casting and welding processes.

COURSE PLAN :

Week 1: Introduction to welding metallurgy, phase diagrams

Week 2: Phase transformation, TTT and CCT diagrams

Week 3: Metal strengthening approaches

Week 4: Heat treatment processes for weldments

Week 5: Analysis of heat flow and temperature distribution in welding

Week 6: Concept of solidification in welding, constitutional supercooling

Week 7: Introduction to heat affected zones, Properties of HAZ

Week 8: Residual stresses in welding, Preheat and postweld heat treatment

Week 9: Types of welding distortion and its control

Week 10: Cracks in welds

Week 11: Weldability issues in materials

Week 12: Welding defects, Design considerations in welding