

ME 672 Welding Science and Technology (3-0-0-6)

Offered to: UG & PG

Introduction and classification of welding; Design principles of welded structures; Welding methods – shielded metal arc welding, gas tungsten arc welding, gas metal arc welding, flux cored arc welding, submerged arc welding, plasma arc welding, electroslag welding, electro-gas welding, arc stud welding, synergic and pulsed welding, friction welding, Oxy-fuel gas welding, resistance welding, brazing, soldering; Types of power source and their characteristics; Physics of welding arc – characteristics of arc, mode of metal transfer, forces acting on a molten droplet; Welding fluxes and coatings - type and classification; Study and analysis of heat flow, cooling rates, models for welding heat sources; Testing of welds, fracture and fatigue of welded structures, welding metallurgy, heat treatment of welds, effect of alloying materials; Welding symbols, standards and codes; Welding process modeling using ANN and Fuzzy.

Textbooks/References:

- [1] O'Brien, Welding Handbook: Welding Processes, Part 1, Vol. 2, AWS, 2004.
- [2] J. F. Lancaster, The Physics of welding, Pergamon, 1986.
- [3] R. W. Messler, Principles of Welding, John Wiley and Sons, 1999.
- [4] O. Grong, Metallurgical modelling of welding, 2nd Ed, IOM Publication, 1997.
- [5] V.M. Radhakrishnan, Welding technology and design, New age, 2002.
- [6] J. A. Goldak, Computational welding mechanics, Springer, 2005.
- [7] L-E Lindgren, Computational welding mechanics, Woodhead Publishing Limited 2007.