

OE6001: MATERIALS AND FABRICATION OF SHIP AND OFFSHORE STRUCTURES

Course content:

Steel manufacturing processes; Tempered and quenched steel; Thermo-Mechanically Controlled Process (TMCP); Low carbon steel, high strength alloys, duplex and super duplex steels; ASTM / API steel products, chemical composition, carbon equivalent, mechanical properties, through thickness requirements, weldability, supplementary requirements, low temperature service, Charpy V-notch test and energy requirements, properties of steel at elevated temperature; Steel requirements for ship classification to IRS/ABS/DNV/BV etc. Functionally Graded Materials for corrosion resistance-applications to pipelines and risers. American Welding Society (AWS) guidelines, standard prequalified welds, Welding processes; SMAW and FCAW process; full penetration / fillet welds, heat affected zone (HAZ), Welding electrodes; Hydrogen induced cracking; Crack Tip Opening Displacement (CTOD) tests, fabrication tolerances, residual stresses; inspection and quality control requirements; NDT of welds; Ultrasonic tests; Magnetic particle inspection; X-rays methods; Jacket fabrication sequence; Quality Assurance Program; Rolling and fabrication of tubular; TKY joints, typical jacket fabrication and rollup procedure, frame rolling up and assembly; loadout arrangement; skidways; launch ways; quayside requirement; Ship fabrication arrangement; Dry docks; slipways; modular fabrication; assembly; longitudinal and transverse bulk heads; stiffeners and deck frame; machinery and outfitting; launching and testing.

Text Books:

1. **Ben C. Gerwick Jr.** 2007. Construction of Marine and Offshore Structures, CRC Press, USA, ISBN: 978-042-91-2502-7
2. **Srinivasan Chandrasekaran, Arvind Kr. Jain, Nasir Shafiq, M. Mubarak A. Wahab.** 2021. Design aids for offshore platforms under special loads, CRC Press, Florida, pp. 280, ISBN: 9781032136844.
3. **Srinivasan Chandrasekaran.** 2019. Advanced steel design of structures, CRC press, Florida, ISBN: 978-036-72-3290-0
4. **Srinivasan Chandrasekaran.** 2020. Design of Marine Risers with Functionally Graded Materials, Woodhead Publishing, Elsevier, pp. 200, ISBN: 978-0128235379
5. **UEG Offshore Research.** 1985. Design of Tubular Joints for offshore structures, Vol. 1-3, UEG Publications, ISBN: 978-086-0172-314

Reference books:

1. **AWS D1.1. 2000.** Structural welding code- Steel, American Welding Society, FL, USA, pp. 449.
2. **DNV-RP-401. 2010.** Cathodic protection design, Det Norske Veritas, Norway.
3. **Chandima Ratnayake, RM and Samindi Samarakoon, SM.** 2017. Modeling and Simulation techniques in structural engineering: Structural Integrity Assessment and Control of Ageing Onshore and Offshore Structures, IGI Global publishers, USA, pp. 445-476.

Prerequisite:

NIL