

OE5410: ADVANCED STEEL DESIGN

Course content:

Introduction to various geometric forms of marine structures- Material properties of different structural steel under normal and high temperature - types of failure in 2d and 3d stress states- Design methods and code compliance. Plastic behavior of structures- shape factor- Moment curvature relationships- upper and lower bound theorems-estimate of collapse loads- plastic design. Stability analysis beam-columns with axial loads, both tension and compression- Beam-column with elastic support- stability analysis of frames using stiffness approach- Stability functions- Column design phenomenon- lateral buckling- torsional buckling- stiffeners- Beam-column design Open sections- lateral and torsional buckling of open sections Blast loads on offshore structures- impact loads- ice-infested loads on structures- blast-resistant framed structures- Design procedure- Architectural considerations- fire loads- fire rating of materials- fire-resistant design

Text Books:

1. **White.** 1993. Plastic hinge-based methods of advanced analysis and design of steel frames,
2. **Chen W F, Sohal I.** 1995. Plastic Design and Second-Order Analysis of Steel Frames. Springer-Verlag, New York

Reference Books:

1. **Chen W F, Lui E M, eds.** 2005. Steel frame design using advanced analysis, Handbook of Structural Engineering. 2nd ed., CRC Press.
2. **Chen W F, Lui E M.** Stability Design of Steel Frames. Boca Raton: CRC Press, 1992 5. SP: 6(1). 1972.
3. **Srinivasan Chandrasekaran.** 2017. Offshore structures under special loads including fire resistance, Video course under MOOC, NPTEL portal <http://nptel.ac.in/courses/114106043> 8.
4. **Srinivasan Chandrasekaran.** 2018. Computer methods of analysis of offshore structures, Video course under MOOC, NPTEL portal <http://nptel.ac.in/courses/114106045>
5. **Srinivasan Chandrasekaran.** 2013. Advanced Marine Structures, Video course on NPTEL portal. Available at:<http://nptel.ac.in/courses/114106037>
6. **Srinivasan Chandrasekaran.** 2018. Advanced structural analysis with Matlab. CRC Press, USA,
7. **Srinivasan Chandrasekaran and Gaurav Srivastava.** 2018. Design aids of offshore structures under special environmental loads including fire resistance, Springer, Singapore. ISBN: 978-981-10-7607-7
8. **Srinivasan Chandrasekaran.** 2019. Advanced steel design, CRC Press, USA.

Prerequisite:

Consent of teacher