



Indian Institute of Technology

Course Details Report

Course No: OE5410

Course Name: Advanced steel design

Course Type:

Theory

Description:

Detailed numerical modelling for preliminary analysis and design of steel members under special loads like fire, impact loads, ice loads and blast loads will be discussed. The course covers topics on stability analysis of steel structures and Mathieu stability analysis of compliant structures.

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.