



# ADVANCED DESIGN OF STEEL STRUCTURES

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**PRE-REQUISITES :** 4th year Civil engg, PG students of 1st Sem

**INTENDED AUDIENCE :** UG students of Civil Engg, PG students of structural engineering, PG students of Mech, Aerospace and Appl Mech, Faculty of civil engineering, PG students of Ocean engg and Naval arch, MS and PhD scholars of the above discipline

**INDUSTRY SUPPORT :** L&T, ONGC, DGNP, and all major consulting organizations in the country

### COURSE OUTLINE :

The proposed course is designed to enhance and strengthen the knowledge on detailed design methods for steel structures, in compliance with Indian and International codes. 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. This course also covers topics on stability analysis of steel structures and supported by Matlab programs

### ABOUT INSTRUCTOR :

Prof. Srinivasan Chandrasekaran is a full professor (HAG) and is well-known academician with a teaching and research experience of about 30 years. He has authored about 17 text books, and 170 journal papers in the domain of structural engineering. His NPTEL courses are very popular and has benefitted more than about 50,000 participants, in both India and abroad. Lectures of the course will be delivered in class-room style, for which the instructor is very popular. Extensive support for Matlab program with computer codes and solved examples will be discussed by the delS-developed codes by the instructor.

### COURSE PLAN :

1. Introduction to various geometric forms of structures- Loads on engineering structures- Failure analysis of members in 2d and 3d stress states-Comparison of failure theories- Material properties of structural steel under normal and high temperature - Design methods and code compliance.
2. Plastic behaviour of structures- shape factor- Moment curvature relationships- upper and lower bound theorems-estimate of collapse loads- plastic design
3. Stability analysis of beam-column under axial tension and compression- Beam-column with elastic support- stability analysis of frames using stiffness approach- Stability functions- Matlab programs
4. Unsymmetric bending- curved beams with small and large initial curvature- Crane hooks- Matlab programs
5. Column design phenomenon- lateral buckling- torsional buckling- stiffeners- Beam-column design- Open sections- lateral and torsional buckling of open sections- Examples from different codes of practice (Euro Code, Australian code and Indian code)
6. Blast loads - impact loads- ice-infested loads on structures- fire loads- fire-resistant design
7. Design examples of large industrial structures like production offshore steel platform, Postulated analysis of nuclear power plant elements etc.