Indian Institute of Technology
Course Details Report

Course No: OE6200
Course Name: Design of Fixed Offshore Structures

Course Type:
Theory

Description:
The course syllabus is revised to explain the principles of design of fixed offshore structures including basic configuration, loads, and design for members and joints including fatigue and anodes

Course Content:
Wind profile; gusting and averaging of wind speed; wind pressure and forces; Wave kinematics; Wave theory selection; drag and inertia regimes; wave and current interaction; Morison equation applied to spatially distributed framed structures; hydrodynamic coefficients and marine growth; Seismic zone in India on land and offshore/coastal area; Recurrence interval and selection of design seismic acceleration; Return period for strength and ductility; Seismic loads; loads due to fire and blast; loads due to ship impact and ice impact;

Design principles of jackets and pile foundations; main and skirt pile arrangements; wellhead and process platforms; concepts and geometry; Material selection for different classes of structural members; Structural analysis (linear and nonlinear); Pushover analysis procedure;

Tubular Members, Slenderness effects; Column Buckling, Design for Hydrostatic pressure; Design for combined axial and bending stresses;

Simple tubular joints, design using allowable loads; design of T, K and Y joints; Parametric equations; stress concentration factors; Design using pseudo static methods; Design of ring stiffened joints;

Introduction to fatigue failure; cracking and Paris law; fracture mechanics and material selection for joints; material toughness class; S-N curves and fatigue damage calculations; deterministic and spectral fatigue analysis;

Introduction to corrosion; corrosion protection coatings and design of cathodic protection; design of anodes; cathodic protection monitoring system

Text Books:

1. Chakrabarti, SK. 1994. Hydrodynamics of Offshore Structures, WIT Press, Southampton, UK. ISBN: 978-0-90545-166-4
2. Chakrabarti, SK. 2005. Handbook of Offshore Engineering, Elsevier, ISBN: 978-008-05-2381-1
3. Chen,WF, E.M. Lui. 1987. Structural stability: Theory and implementation, Elsevier, New York, ISBN: 0-444-01119-6.
4. Ben C. Gerwick Jr. 2007. Construction of Marine and Offshore Structures, CRC Press, USA, ISBN: 978-042-91-2502-7
5. UEG Offshore Research. 1985. Design of Tubular Joints for offshore structures, Vol. 1-3, UEG Publications, ISBN: 978-086-0172-314
6. Bjorn Skallerud and Jorgen Amdahl. 2002. Nonlinear analysis of offshore structures, Research Studies Press, Baldock, ISBN: 978-086-3802-584
7. Srinivasan Chandrasekaran, Gaurav Srivastava. 2022. Fire-resistant design of structures, CRC Press, FLORIDA, USA, ISBN: 978-103-2358-116

Reference Books:

1. API-RP 2A. 2000. Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms - Working Stress Design, 21st Edition, Errata and Supplement 1, December 2002, Errata and Supplement 2, September 2005, Errata and Supplement 3, October 2007.
2. FABIG. 1992. Interim Guidance Notes for the design of and protection of topside structures against explosion and fire, FABIG Technical Notes, Ascot, UK.
3. AWS D1.1. 2000. Structural welding code- Steel, American Welding Society, FL, USA, pp. 449.
4. DNV-RP-401. 2010. Cathodic protection design, Det Norske Veritas, Norway.
5. 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.
6. N-006. 2009. Assessment of structural integrity for existing offshore load bearing structures, 1st Ed., NORSOK Standards, Norway.
7. DNV Report 95-3203. 1996. Guidelines for offshore structural reliability analysis: Application to Jacket Platforms, Det Norske Veritas, Norway.