

SEMESTER II: STREAM 1 – OFFSHORE AND SHIP STRUCTURES

OE 6200 DESIGN OF FIXED OFFSHORE STRUCTURES

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.

Prerequisite: NIL