Indian Institute of Technology
Course Details Report

Course No: OE5012
Course Name: Deep Sea Technology

Course Type:
Theory

Description:
To learn about various deep sea technologies being used in ocean exploration and production systems

Course Content:
Introduction about ocean survey: bathymetry, seismic and side scan, robotics with AUVs and remotely-controlled diving robots. Introduction about the physical environment (i.e. winds, surface gravity water waves and currents) for oceans; Introduction to deep-sea resource exploration systems; Introduction to different types of deep water production systems (i.e. semi-submersible, FPSOs, SPAR, subsea systems and drill ships, etc.); Morrison, Froude-Krylov and diffraction theory for force estimation, issues in deep water riser mechanics; dynamic position system; and umbilical - design and development.
Operation, maintenance and repair; Flow assurance challenges like hydrate formation, corrosion, sand control, erosion, MEG injection, subsea control system; marine growth prevention techniques; paints, ROVs and sliding marine growth preventer in splash zone.; underwater welding, ROV inspection, health monitoring, measurement of marine growth
Case studies on few deepwater E&P systems in India and abroad; Technology demonstration project: At the end, a student or a group of students will need to do a project that will show at the conceptual level the application of a selected technological idea/concept to problems of interest in deep sea.
Tutorials: The assignments will focus on hands-on exercises and application of case studies

Text Books:
[1] Roy Burcher and Louis J. Rydill Concepts in Submarine Design, Cambridge University Press, USA.
[2] Norman Friedman (1984) Submarine Design and Development, Naval Institute Press, USA.
[3] R. Sharma (2017) Deep-Sea Mining: Resource Potential, Technical and Environmental Considerations, Springer, Germany.
[4] Kevin T. Pickering and Richard N. Hiscott (2015) Deep Marine Systems: Processes, Deposits, Environments, Tectonics and Sedimentation, AGU, USA.

Reference Books:

[1] E. Eugene Allmendinger (1990) Submersible Vehicle Systems Design, SNAME, USA.
[2] Günther Clauss, Eike Lehmann, Carsten Östergaard, M. J. Shields (2013) Offshore Structures: Volume I: Conceptual Design and Hydromechanics (Volume 1), Springer, Germany.
[3] Günther Clauss, Eike Lehmann, Carsten Östergaard, M. J. Shields (2013) Offshore Structures: Volume II Strength and Safety for Structural Design, Springer, Germany.
[4] C. M. Wang and B. T. Wang (2014) Large Floating Structures: Technological Advances, Springer, Germany.
[5] Mohamed El-Reedy (2012) Offshore Structures: Design, Construction and Maintenance, Gulf Professional Publishing, USA.
[6] Mohamed El-Reedy (2014) Marine Structural Design Calculations, Butterworth-Heinemann, UK. [7] Thomas Worzyk (2012) Submarine Power Cables: Design, Installation, Repair, Environmental Aspects, Springer, Germany