

## **OE6008: DESIGN, CONSTRUCTION AND OPERATION OF LNG CARRIERS AND TERMINALS**

### **Course Content:**

Introduction to the LNG carrier ships and terminals; Design of Different Types of Gas Carriers - Integral Tanks, Independent Tanks, Type 'A' Tanks, Type 'B' Tanks, Type 'C' Tanks, Membrane Tanks, Moss tanks (Spherical IMO type B tanks) IHI (Prismatic IMO type B tanks), TGZ Mark III, GT 96, and CS1, etc. LNG Containment Systems; Fully Pressurized Tanks; Semi Pressurized or Semi Refrigerated Tanks; and Fully Refrigerated Tanks. Ship handling at port: Factors affecting berthing/unberthing; Pilot; Support crafts; Mooring System; Ship/Shore Mooring Equipments; Mooring Hooks & Capstan; Fender arrangement; and Access gangway, etc. Concept design; Preliminary design and contract design; Basic hull form development; Estimation of the Basic Forces (i.e. weights of structure, cargo and other systems, and buoyancy etc.), Scantling; Estimation of Mass; Loading conditions analysis; and Local and global structural analyses. LNG terminals - Engineering parameter estimates; LNG terminal concept; Preliminary sizing of the 'Modified Gravity Based Concrete Structure (MGBCS)'; Offshore environmental loads on the structure (i.e. wave and wind loads); and Analysis of the terminal. Tutorials: Design and analysis problems with software solution systems.

### **Text Books:**

1. **L. N. Patnaik** (2011), "Design of LPG and LNG jetties with navigation and risk analysis", CBS, India.
2. **Apostolos Papanikolaou** (2014), "Ship Design", Springer Nature, Singapore.
3. **Owen F. Hughes and Jeom Kee Paik** (2010), "Ship Structural Analysis and Design", The Society of Naval Architects and Marine Engineers (SNAME), USA.
4. **Suresh Chandra Misra** (2015), "Design Principles of Ships and Marine Structures", CRC Press, USA.

### **Reference Books:**

1. DNV (2018), "**Rules for classification of ships: Newbuildings special service and type additional class**", PART 5 - CHAPTERs 5, 6, 7, 15; and PART 6 - CHAPTERs 36, 37; DNV GL, Germany.
2. DNV (2013), "**Strength Analysis of Liquefied Gas Carriers with Independent Type B Prismatic Tanks**", Classification notes 31.12, DNV GL, Germany.
3. DNV - GL (2018), "**GAS CARRIERS Leading the way – from concept to operation**", DNV GL, Germany.

### **Prerequisite:**

Consent of teacher