OE3035: MOTION OF SHIPS & FLOATING SYSTEMS

Course Content:

Ship motions – coordinate systems, 6 dof, uncoupled and coupled equation of motion; hydrodynamic coefficients; encounter frequency; motion damping effects, magnification and tuning factors. Ship responses in regular waves. Ship in seaway and dynamic effects – Linear superposition, response amplitudes operator, motions in irregular waves, local and relative motions, green water effects, slamming, parametric rolling, broaching, added resistance, powering in waves; motion sickness. Linear wave induced motions on floating structures- Responses in regular and irregular seas, Wave induced motions and loads on a tension leg platform and spar. Heave and pitch motion of a semi-submersible, discussion of natural period, damping and excitation. Ship and floating system motion control – Control of roll - bilge keel, free surface tanks, U-tanks, moving weight;, fin stabilisers, gyro, active-tank;, rudder stabilization; Control of pitch. Practical : 1. Estimation of hydrodynamic coefficients and RAOs using strip theory. Experiments: 2. Roll and heave damping coefficient estimation using free oscillation tests 3. Ship and floating body motion response in regular waves

Text Books:

1. **Lewis,E.U**, Principles of Naval Architecture, SNAME, New Jersey, U.S.A, 2010.
2. **Lewandowski, E.M.** The Dynamics of Marine Crafts – Seakeeping & Maneuvering, World Scientific, 2004

Reference Books:

1. **Faltinsen, M.O.** Sea Loads on Ships and Offshore Structures, Cambridge Ocean Technology Series, 1999
2. **Bhattacharyya..R**; 'Dynamics of Marine vehicles', 1978, Wiley Inter Science, New York
3. **Faltinsen, M.O**. Hydrodynamics of High Speed Marine Vehicles, Cambridge Press, 2005

Prerequisite: