OE3045: VIBRATION OF MARINE STRUCTURES

Course Content:

Equations of motion, D'Alembert's principle. Analysis of single degree of freedom systems (free and forced), Dynamic amplification factor and resonance, Viscous and structural damping, Impulse response system, Time & Frequency domain methods, Duhamel integral, Vibration isolation, Concept of Lagrange • Discrete MDOF systems, Modes of vibration, Normal modes, Natural frequencies, modal Participation factor, orthogonality applications, forced vibration using eigen functions expansions, vibration absorbers, Shear building models • Continuous systems: Vibration of cables, rods and beams – Sources of vibration – propeller excited, wave-induced and machinery, Hull girder vibration. • Dynamic effects of earthquake, wind and moving loads, vehicular impacts. Random vibrations, Calculation procedure for torsional vibration of propulsion systems – empirical methods. • Approximate methods, Rayleigh's quotient, Rayleigh Ritz and Galerkin methods.

Text Books:

1. **L Meirovitch** 1997, Principles of techniques of vibration, Prentice Hall, NJ
2. **A K Chopra** 2007, Dynamics of structures, Pearson Education India.
3. **R W Clough and J Penzien** 2015, Dynamics of Structures, CBS Publishing; 2nd edition.
4. **S. S. Rao** 2019, Vibration of Continuous Systems, Wiley-Blackwell.
5. **E. V Lewis** 1990, Principles of Naval Architecture, SNAME

Reference Books:

1. **L Fryba** 2012, Vibration of solids and structures under moving loads, Springer
2. **R. D. Blevins** 2006, Flow-Induced Vibration, Krieger Publishing Company
3. **M.Y.H. Bangash** 2009, Shock, Impact and Explosion: Structural Analysis and Design, Springer.
4. **J. P. Den Hartog** 1985 Mechanical Vibrations, Dover
5. **L. Meirovitch** 2007, Methods of Analytical Dynamics, Dover.
6. **L D Lutes and S Sarkani**, “Random Vibrations”, Elsevier Butterworth, Burlington, USA, 2004

Prerequisite: