

AMSB17 SHIP STRUCTURAL ANALYSIS

UNIT-1 LOADS ACTING ON SHIP STRUCTURES

- 1.1 Static loading on a ship afloat in still water
- 1.2 Distribution of loads, still water bending moment calculation.
- 1.3 Wave induced loads- Deterministic evaluation,
- 1.4 Probabilistic analysis, short term extreme values.

UNIT-2 LONGITUDINAL STRENGTH

- 2.1 Concept of permissible stress, Application of beam theory to hull girder,
- 2.2 Calculation of Section modulus,
- 2.3 Calculation of longitudinal bending stress,
- 2.4 Calculation of shear stress, Vertical bending of hull girder.

UNIT-3 TRANSVERSE STRENGTH

- 3.1 Loads to be considered for transverse strength,
- 3.2 Moment Distribution Method for transverse strength estimation.

UNIT-4 STRENGTH OF HULL GIRDER

- 4.1 Theory of thin plates- Love Kirchhoff assumptions, implications, governing equation, solution using strain energy method,
- 4.2 Levy's method, Navier Method, Relevant equations for circular plates.

UNIT-5 LARGE DEFLECTION OF PLATES

- 5.1 Buckling of plates, Analysis of Stiffened plates, Buckling of stiffened plates
- 5.2 Practicals: - Longitudinal strength calculation, Transverse strength calculation

UNIT-6 ANALYSIS OF SUBMARINE HULLS

- 6.1 Linear and buckling analysis of unstiffened and stiffened cylindrical shells.

UNIT-7 TORSION OF HULL GIRDER

- 7.1 Loads – Cargo torque and wave torque.
- 7.2 Torsion of beams of- Uniform Thin walled cross-sections, closed and open cross sections, thin walled multicell cross sections,
- 7.3 Torsion warping, Deformations and stresses, sectional properties of thin walled open sections, Torsion of container ships.

UNIT-8 RELIABILITY ANALYSIS AND ULTIMATE STRENGTH OF HULL GIRDER

- 8.1 Reliability based analysis of ship structures, Limit state of ship structures,
- 8.2 Ultimate strength of plates, stiffened plates and Hull girder
- 8.3 Application of closed form expressions, analytical methods and non-linear finite element analysis.

UNIT-9 VIBRATION ANALYSIS OF HULL GIRDER

6.1 Review of the equations of vibrations of beams, Basic features of Hull structure vibration, Calculation of natural frequencies and mode shapes.

UNIT-10 FATIGUE AND FRACTURE OF HULL GIRDER

10.1 Fatigue analysis – SN curve and Fatigue damage accumulation and calculation, Low cycle Fatigue and high cycle Fatigue. Fracture analysis

10.2 Linear Elastic Fracture Mechanics, crack propagation, Fracture toughness.

Reference Books:

1. Alaa Mansour, Don Liu, Principles of Naval Architecture Series: Strength of ships and ocean structures, SNAME, New Jersey, 2008.
2. Owen. F. Hughes and Jeom Kee Paik – Ship Structural Analysis and Design, SNAME, New York, 2008
3. Mohammed Shama – Torsion and Shear Stresses in Ships, Springer - Verlag, 2010.

