AMSB19 CONTROLLABILITY OF SHIPS

UNIT-1 MANOEUVRING FUNDAMENTALS

1.1 The control loop, path keeping, equations of motion, linearised equations and control fixed stability indexes, model tests.

UNIT-2 STABILITY AND CONTROL IN THE HORIZONTAL AND VERTICAL PLANES

2.1 Definitive manoeuvres, turning trials.

UNIT-3 CONTROL SURFACE HYDRODYNAMICS

3.1 Geometry of control surface (rudder), flow around rudder, aspect ratio, influence of hull shape on aspect ratio, influence of fixed structures.

3.2 Control surface design - specification of requirements and constraints on rudder design, rudder location and orientation, number of rudders, type of rudder,

3.3 Geometric properties of rudder, maximum rudder deflection angle and deflection rate, rudder stock location.

UNIT-4 INFLUENCE OF SHIP FEATURES ON CONTROLS FIXED STABILITY

4.1 Fixed fin, propeller, hull, configuration

UNIT-5 HYDRODYNAMIC

5.1 Experimental determination of hydrodynamic derivatives (rotating arm technique, planar motion mechanism).

5.2 Non-linear Manoeuvres, Simulation, IMO Rules and Recommendations.

Practicals:- Calculation of free stream characteristics of rudder, Rudder design, Zigzag manoeuvre.

Reference Books:

1. Lewis,E.U, Principles of Naval Architecture, (2 nd Rev.), SNAME, New Jersey, U.S.A, 2010.
2. Abkowitz,M.A.; Lectures on Ship Hydrodynamics- Steering and Manoeuverability, Danish Technical Press, Copenhagen, Denmark, 1964.
3. Khac Duc Do and Jie Pan,Control of Ships and Underwater Vehicles , Springer, 2009.