AMMV13 MARINE ENGINEERING MATERIALS

UNIT-1 FUNDAMENTALS OF METALLURGY

1.1 Basic metallurgy, metals and processes, properties of materials and uses- Metallurgy of steel and cast iron- iron- Iron carbide equilibrium diagram.

1.2 Classification of steel and cast Iron, microstructure- Aluminium, copper and its alloys- Non-metallic materials- polymers properties - applications of marine materials.

UNIT-2 HEAT TREATMENT

2.1 Definition- Full annealing, stress relief, recrystallisation and spheroidizing- normalising, hardening and tempering of steel.

2.2 Isothermal transformation diagrams- cooling curves superimposed on I.T. diagram

2.3 Hardenability, Jominy end quench test- Austempering, martempering

2.4 Case hardening carburising, nitriding, cyaniding, carbonitriding, flame and induction hardening – precipitation hardening.

UNIT-3 MECHANICAL PROPERTIES AND TESTING

3.1 Mechanism of plastic deformation, slip and twinning- Types of fracture- Failure modes - Testing of materials under tension, compression and shear loads

3.2 Hardness tests (Brinell, Vickers and Rockwell), Impact test - Izod and Charpy,

3.3 Fatigue and creep tests, fracture toughness tests..

UNIT-4 MATERIAL PROCESSING

4.1 Properties and applications of materials used in machinery on board ships.

4.2 Engineering processes used in construction and repair.

4.3 Design characteristics and selection of materials in construction of equipment

4.4 Welding, Gas cutting methods.

UNIT-5 TESTING OF JOINTS

5.1 Materials under load, self-secured joints, permanent joints, bonding plastics, adhesives and bonding. Vibration tests.

5.2 Destructive and non-destructive testing of materials – different methods

References Books:

1. Eyres, D.J. “Ship Construction” 5Edition,2001 (Elsevier India Private limited , Reprint 2005)
2. William D Callister “Material Science and Engineering”, John Wiley and Sons 2007.
3. Raghavan.V “Materials Science and Engineering”, Prentice Hall of India Pvt., Ltd., 2007.