AMMV10 MARINE DIESEL ENGINES-I

UNIT-1 PERFORMANCE CHARACTERISTICS OF I.C. ENGINE

1.1 4-Stroke and 2-Stroke cycles; Deviation from ideal condition in actual engines; Limitation in parameters, Timing Diagrams of 2-Stroke and 4-Stroke engines.

1.2 Comparative study of slow speed, medium speed and high-speed diesel engines – suitability and requirements for various purposes.

1.3 Mean Piston speed, M.C.R. & C.S.R. ratings.

1.4 Practical heat balance diagrams and thermal efficiency

UNIT-2 GENERAL DESCRIPTION OF MARINE DIESEL ENGINE

2.1 Constructional Details of I.C. engines and marine diesel engines: components: jackets and liners, cylinder heads and fittings, pistons, cross heads,

2.2 Connecting rods, crank shaft, bearings, bed plates, aframes, welded construction for bedplates & frames and tie rods etc.

2.3 COOLING OF I.C. ENGINES: Various cooling media, their merits and demerits, cooling of pistons, cylinder jackets & cylinder heads, bore cooling,

2.4 Coolant conveying mechanism and systems, maintenance of coolant and cooling system, cooling water: testing and treatment.

UNIT-3 SCAVENGING SYSTEM

3.1 Scavenging arrangements in 2-stroke engines; air charging and exhausting in 4-stroke engines; various types of scavenging in 2-stroke engines;

3.2 Uniflow, loop and cross flow scavenging, their merits and demerits, scavenge pumps for normally aspirated engines, under piston scavenging, and scavenge manifolds.

3.3 SUPERCHARGING ARRANGEMENTS Pulse and constant pressure type; merits and demerits in highly rated marine propulsion engines.

3.4 Air movements inside the cylinders. Turbocharger and its details.

UNIT-4 FUEL TECHNOLOGY

4.1 Liquid fuels- petroleum- distillation process- effects of modern refining on residual fuel properties – fuel oil for marine diesel engines- testing and properties of fuel oils- shore side and shipboard sampling and testing.

4.2 Treatment of fuel for contaminants including microbiological infection. Combustion of fuel-air for combustion- combustion of hydro carbons (theoretical treatment).

4.3 Compression pressure ratio and its effect on engines.

4.4 Reasons for variation in compression pressure and peak pressure.

4.5 Design aspects of combustion chamber.

4.6 Control of NOX, SOX in Exhaust emission.

UNIT V MARINE LUBRICATING OIL:

5.1 Introduction- hydrocarbon classification refining of crude petroleum and lubricating oils properties and testing of lubricating oils additives – greases.

5.2 Lubrication principles: introduction- friction- functions of lubricants- basic requirements- machine components- surface finish- types of lubricants

5.3 Hydrodynamic or full fluid film lubrication- lubrication of slider bearings- hydrostatic lubrication- boundary lubrication- elasto hydrodynamic lubrication.

5.4 SELECTION OF LUBRICANTS Introduction- field of application- cylinder lubrication for large two stroke engines- crank case oil for large two stroke engines-

5.5 Lubricants for medium speed trunk piston engines medium / high and high- speed engines- air compressor cylinder oil- all-purpose oil-refrigeration compressor crank case oil.

5.6 Lubricating systems for various engines- monitoring engines through lubricating oil analysis reports.

5.7 Treatment of Luboil for contaminants including microbiological infection.

References Books:

1. M.E.P., "Low Speed Diesel Engines New", Marine Engineering Practice, Vol-2 Part-17,, IMarEST, London
2. S. H. Henshall, "Medium and High Speed Diesel Engines for Marine Use", 1st Edition, Institute of Marine Engineers, Mumbai, 1996.
3. D.K. Sanyal, "Principle & Practice of Marine Diesel Engines", 2nd Edition, Bhandarkar Publication, Mumbai, 1998.