APRCET 2023-24
60-MARINE ENGINEERING

Engineering Mathematics

Linear Algebra: Matrix algebra, Systems of linear equations, Eigen values and Eigen vectors.

Calculus: Functions of single variable, Limit, continuity and differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

Differential equations: First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy's and Euler's equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation. Analytic functions, Cauchy's integral theorem, Taylor and Laurent series.

Probability and Statistics: Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions.

Numerical Methods: Numerical solutions of linear and non-linear algebraic equations Integration by trapezoidal and Simpson's rule, single and multi-step methods for differential equations.

Naval Architecture and Marine Engineering

Applied Mechanics – Statics and Dynamics of particles and rigid bodies. Shear force, Bending Moments, stresses and deflection of beams. Torsion of circular shafts, pressure vessels.

Floatation: Some physical fundamentals - Archimedes principle, laws of floatation stability and trim, forces acting on a ship (static condition in waves and during launching) The ship's form main dimensions, lines plan, coefficients and their meaning. Classification of ships.

Basics of Offshore Structures: Types of offshore structures and conceptual development - Analytical models for jacket structures - Materials and their behavior under static and dynamic loads Joining: Physics of welding, brazing and soldering; adhesive bonding; design considerations in welding.

Corrosion - Corrosion mechanism - Types of corrosion - Offshore structure corrosion zones – Biological corrosion - Preventive measures of Corrosion - Principles of cathode protection systems - Manufacturing: Basic concepts of CAD/CAM and their integration tools.

Thermodynamics: Thermodynamic Laws: -.Study flow and non flow systems. Systems undergoing a cycle and change of state- First law applied to steady flow processes- Limitations of first law of thermodynamics. Steam Turbines. And Gas Turbines and their applications. Vapour compression refrigeration and air conditioning.

Marine Diesel Engines: Starting, reversing: Starting systems, Compressor air starting. Reversing methods for 2-stroke and 4-stroke engines, controls and automation. Crank shaft alignment and

failure, piston and cylinder liner, Scavenging and supercharging: Types of scavenging, scavenging parameters, Super charging exhaust grouping. Scavenge fire.

Marine Machinery: Steering gears: Different types-description of construction, operation and maintenance, Stern Tubes: Stern tubes and glands-oil lubricated stern tubes, shaft seals, shaft alignment, thrust block, reduction gearing Rudders: Types and construction details, fixing, maintenance and operation, ship stabilizers.