

DETAILED SYLLABUS FOR THE POST OF ASSISTANT  
ENGINEER(MECHANICAL)-KERALA PORTS SERVICE (HYDROGRAPIC  
SURVEY WING)(CATEGORY NO.539/2025

(TOTAL : 100 MARKS)

**Module 1: Fluid Mechanics (10 Marks)**

Definition of fluid, properties of Fluid, Pascal's Law, Hydrostatic law, Measurement of pressure, Total pressure, center of pressure, Buoyancy, Meta centre, Metacentric height, types of fluid flow, discharge, continuity equation, Euler's equation, Bernoulli's equation, Venturi meter, orifice meter, pitot tube, flow through Orifices, notches and weirs, Reynolds experiments, major and minor losses, Darcy Weisbach equation, Chezy's formula, water hammer, vapour pressure

**Module 2: Hydraulic machines: (10 Marks)**

Impact of jet, jet Propulsion, Hydraulic turbines such as Pelton turbine, Francis and Kaplan turbines and its various efficiencies, draft tube, uses, different types, Specific speed, unit quantities, Governing of turbines, Centrifugal pumps and Reciprocating pumps, cavitation, effect of cavitation, Slip, positive and negative slips, reason for slip, Indicator diagram

**Module 3: Thermodynamics (10 Marks)**

Thermodynamic systems, thermodynamic properties, Intensive and extensive properties, path, process like reversible, Cyclic, quasi static, Zeroth law of thermodynamics, Enthalpy, entropy, specific heats, First law, second law, gas laws such as Boyle's law, Charles' law, Avogadro's law, Joule's law, Carnot cycle, Air standard efficiency, Mechanical efficiency, overall efficiency, Otto cycle, Diesel cycle.

**Module 4; Thermal Engineering & Power plant Engineering (10 Marks)**

Fuels, combustion of fuels, Calorific values, lower calorific values, Upper calorific values, Bomb calorimeter, gas calorimeter, minimum air and excess air required for combustion of fuels, stem, wet, dry and super-heated steam, Rankine cycle, Brayton cycle, steam turbines, Gas turbines, steam nozzles, compounding, velocity, pressure, and velocity-pressure compounding. Impulse and Reaction turbines , advantages and disadvantages of both

**Module 5: Mechanics and Strength of Materials (10 Marks)**

Centre of gravity, centroid, Moment of inertia, parallel axis theorem, Perpendicular axis theorem, beams, types of beams and different types of loads acting on the beams Simple stresses and strains, Hook's law,

elastic constants, Factor of safety, linear stress and strain, lateral stress and strain, Poisson's ratio, Thermal stress and strains, composite bar, Mohr's circle, Shear force and bending moments, torsion of shafts, thin and thick cylinders, Columns and struts.

#### Module 6: Engineering Materials (10 Marks)

Metals and Nonmetals, Alloys and alloy materials, Heat treatments, Upper critical temperature and lower critical temperature, Heat treatments and various heat treatment and surface hardening processes, composition and properties and uses of various steels, plastics and other newer engineering materials

#### Module 7: Manufacturing process and Production Engineering (10 Marks)

Elementary ideas about various basic workshop practices of Carpentry, foundry, sheet metal, welding, smithy and Fitting and various tools using in each sections Machine tools like lathe, shaper, plainer, milling, drilling and slotting machines and its operations, Cutting tools, Tool materials, cutting speed, feed, depth of cut, tool nomenclature, tool life, shaper mechanisms

#### Module 8: Engineering Drawing and Machine design (10 Marks)

First angle projection method and its symbol, projection of points and line in four quadrants, construction of various conic sections like ellipse, parabola and hyperbola, Development of surfaces, section of solids, Isometric and oblique projections. Design of joints, threaded fasteners, keys, cotters, couplings, transmission system, belt, rope, gear, chain drives, and Open belt and cross belt, length of the belts. Welded joints and Riveted joints and its strength and various efficiencies

#### Module 9: I.C Engines and Steam boilers (10 Marks)

Engines, Heat engines, S.I & C.I engines, detonation and knocking, Fuel injection, Air fuel ratio, compression ratio, Octane number, Cetane number, steam boiler, water tube and fire tube boilers like Cochran and Babcock and Wilcox boiler, modern high pressure boilers like La Mont boiler, Benson boiler Boiler accessories and mountings

#### Module 10: Heat transfer and Refrigeration (10 Marks)

3 modes of heat transfer such as conduction convection and radiation and its governing laws such as Fourier law, Newton's law of cooling, Stefan-Boltzmann's law, Refrigeration, Heat Engine, refrigerator and heat pump, COP, ton of refrigeration, properties of refrigerant. Psychometric and psychometric chart

**NOTE: - It may be noted that apart from the topics detailed above,**

questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper