

**INDIAN INSTITUTE OF INFORMATION TECHNOLOGY,
DESIGN AND MANUFACTURING, KANCHEEPURAM,
CHENNAI – 600 127**

FACULTY RECRUITMENT

(Ref.: Advt. No. IIITDMK/R/2/2024 dated 15.07.2024)

SYLLABUS FOR WRITTEN TEST

Post: Assistant Professor Grade-II (Level 10 and Level 11)

DEPARTMENT OF MECHANICAL ENGINEERING

Section 1: Engineering Mathematics

- **Linear Algebra:** Matrix algebra, linear equations, eigenvalues, and eigenvectors.
- **Calculus:** Single-variable functions, limits, continuity, mean value theorems, definite and improper integrals, partial derivatives, Taylor series, maxima and minima, Fourier series, gradient, divergence, curl, and vector identities; line, surface, and volume integrals; applications of Gauss, Stokes, and Green's theorems.
- **Differential Equations:** First-order equations, higher-order linear equations, Euler-Cauchy, Laplace transforms, and solutions to heat, wave, and Laplace's equations.
- **Complex Variables:** Analytic functions, Cauchy-Riemann equations, and Taylor and Laurent series.
- **Probability and Statistics:** Probability definitions, distributions, and statistical measures.
- **Numerical Methods:** Solutions to algebraic equations, integration, and differential equations.

Section 2: Applied Mechanics and Design

- **Engineering Mechanics:** Free-body diagrams, equilibrium, friction, trusses, frames, kinematics, rigid bodies, impulse, momentum, energy formulations, Lagrange's equation.
- **Mechanics of Materials:** Stress-strain, elastic constants, Mohr's circle, beam deflection, torsion, Euler's theory, energy methods, thermal stresses, strain gauges, material testing.
- **Theory of Machines:** Displacement, velocity, acceleration analysis, linkages, cams, gears, flywheels, governors, balancing.
- **Vibrations:** Free and forced vibrations, damping, isolation, resonance, critical shaft speeds.
- **Machine Design:** Static/dynamic loading, fatigue strength, design of joints, shafts, gears, bearings, brakes, clutches, springs.

Section 3: Fluid Mechanics and Thermal Sciences

- **Fluid Mechanics:** Study fluid properties, statics, forces on submerged bodies, stability of floating bodies, control-volume analysis, fluid acceleration, continuity and momentum equations, Bernoulli's equation, dimensional analysis, viscous flow, boundary layers, turbulence, pipe flow, head losses, and basics of compressible flow.
- **Heat Transfer:** Covers conduction, convection, radiation, heat exchangers, unsteady heat conduction, thermal boundary layers, dimensionless parameters, heat transfer correlations, LMTD and NTU methods, Stefan-Boltzmann law, Wien's displacement law, black and grey surfaces, and radiation network analysis.
- **Thermodynamics:** Focus on systems and processes, properties of substances, thermodynamic laws, property charts, availability, irreversibility, and thermodynamic relations, compressors, power cycles, regeneration, reheat, Otto, Diesel, dual cycles, refrigeration and air-conditioning, turbines, velocity diagrams

Section 4: Materials, Manufacturing and Industrial Engineering

- **Engineering Materials:** Structure, properties, phase diagrams, heat treatment, and stress-strain diagrams.
- **Casting, Forming, and Joining Processes:** types, pattern, solidification, load estimation for metal forming, powder metallurgy, welding, brazing, soldering, and adhesive bonding.
- **Machining and Machine Tool Operations:** Machining mechanics, basic tools, tool geometry, tool life, non-traditional machining, work holding, NC/CNC machines, and programming.
- **Metrology and Inspection:** Limits, fits, tolerances, measurements, form and finish, alignment, tolerance analysis, and CMM concepts.
- **Computer Integrated Manufacturing:** CAD/CAM basics, integration, and additive manufacturing.
- **Production Planning and Control:** Forecasting, scheduling, materials planning, and lean manufacturing.
- **Inventory Control:** Deterministic models and safety stock systems.
- **Operations Research:** Linear programming, network flow, queuing models, PERT, and CPM.