

Syllabus

Lecturer (Mechanical Engineering)

Engineering Materials: Structure and properties of engineering materials. Heat treatment, composite materials and their applications

Engineering Mechanics: Free body concepts, Equations of Equilibrium. Centroids and Moment of inertia.

Strength of Materials: Stress and Strains. Elastic Constants. Principal Stresses, Maximum Shear Stress, Theories of failure, Shear Force and Bending Moment diagrams. Shear and bending stresses in Beams, Deflection of Beams, Torsion, Columns.

Fluid Mechanics: Fluid properties, fluid statics, Manometry, Buoyancy, Conservation laws, Euler's equation, Bernoulli's equation, Viscous flow of incompressible fluids, Laminar and Turbulent flows, Flow through pipes, Dimensional analysis.

Thermodynamics: Laws of thermodynamics, internal energy, enthalpy and entropy, Thermodynamic processes, Heat and work, Irreversibility and availability, perfect gas, properties of pure substances, Air standard and fuel air cycles, IC engines and Gas turbines, centrifugal and axial flow compressors.

Heat-Transfer: Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; unsteady heat conduction, lumped parameter system, thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat transfer correlations for flow over flat plates and through pipes, effect of turbulence; heat exchanger performance, LMTD and NTU methods; radiative heat transfer, Stefan- Boltzmann law, Wien's displacement law, black and grey surfaces.

Theory of Machines: Analysis of planar mechanisms, Dynamic analysis of Slider-Crank mechanism, Cams and followers, Kinematics of Gears, Governors and flywheels, balancing of reciprocating and rotating masses, Free and Forced vibrations of single degree freedom systems, Effect of damping, Transmissibility, Vibration Isolation, Critical speed of shafts. 8.

Design of Machine Elements: Material and manufacturing considerations, Design of Shafts, keys, couplings, bolted, riveted and welded joints, Dynamic loads, Design of power screws, helical springs, Spur gears, clutches and brakes, Hydro-dynamic lubrication, Journal bearings and anti-friction bearings

Production Engineering: Metal casting processes, Melting and Pouring of cast iron, Ferrous and non-ferrous metals and alloys, casting defects, Inspection of castings, Hot and Cold working of metals, Metal joining processes: Soldering, brazing and welding, modern welding processes; Metal cutting tools - machine tool operations, Non-traditional machining processes.

Metrology and Inspection: Limits, fits and tolerances; linear and angular measurements; comparators; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.