

SYLLABUS FOR M.E. ENTRANCE (ADMISSION) TEST 2018-19 (MECHANICAL ENGINEERING)

Stress and strain, stress-strain relationship and elastic constants, Mohr's circle for plane stress and plane strain, thin cylinders ; shear force and bending moment diagrams ; bending and shear stresses ; deflection of beams ; torsion of circular shafts; Euler's theory of columns; strain energy methods ; thermal stresses.

Displacement, velocity and acceleration analysis of plane mechanism; dynamic analysis of slider-crank mechanism; gear trains; flywheels- Belt, rope & chain drivers, brake & dynamometers, cam profile.

Free and forced vibration of single degree of freedom system ; effect of damping vibration isolation; resonance, critical speeds of shafts.

Design for static and dynamic loading; failure theories, fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted, riveted and welded joints, shafts, spur gears, rolling and sliding contact bearings, brakes and clutches.

Fluid properties; fluid statics, manometry, buoyancy; control-volume analysis of mass, momentum and energy; fluids acceleration; differential equations of continuity and momentum; Bernoulli's equation; viscous flow of incompressible fluids; boundary layer; elementary turbulent flow; flow through pipes, head losses in pipes, bends, etc.

Modes of heat transfer; one dimensional heat conduction, resistance concept, electrical analogy, unsteady heat conduction, fins; dimensionless parameters in free and forced convective heat transfer, various correlations for heat transfer in flow over flat plates and through pipes ; thermal boundary layer; effect of turbulence; radiative heat transfer, black and grey surfaces, shape factors, network analysis ; heat exchanger performance, LMTD and NTU methods.

Zeroth, First and second laws of thermodynamics ; thermodynamic systems and processes; Carnot cycle, entropy / calculation of work and heat in ideal processes; analysis of thermodynamic cycles related to energy conversion.

Power Engineering : Steam Tables, Rankine, Brayton cycles with regeneration and reheat, I.C. Engines : air-standard, Otto, Diesel cycles, Refrigeration and air-conditioning : Vapour refrigeration cycles, heat pumps ; moist air; psychrometric chart, basic psychrometric processes.

Structure and properties of engineering materials, heat treatment, stress-strain diagrams for engineering materials.

Patterns, moulds and cores; solidification and cooling.

Plastic deformation and yield criteria; fundamentals of hot and cold working processes ; load estimation for bulk (forging, rolling , extrusion , drawing) and sheet (shearing, deep drawing, bending) metal forming processes ; principles of powder metallurgy.

Physics of welding, brazing and soldering.

Mechanics of machining, single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining ; principles of non-traditional machining processes; Limits, fits and tolerances ; linear and angular measurement ; comparators; gauge design; interferometry; form and finish measurement.

Forecasting models, aggregate production planning, scheduling, materials requirement planning.

Deterministic and probabilistic inventory models; safety stock inventory control systems.

Linear programming, simplex method, duality, transportation, assignment, simple queuing models, PERT and CPM.