



श्री चन्द्रशेखरेन्द्र सरस्वती विश्वमहाविद्यालयः
SRICHANDRASEKHARENDRASARASWATHIVISWAMAHAVIDYALAYA
(Accredited with 'A' Grade by NAAC)
(Deemed to be University under section 3 of the UGC Act 1956)
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Syllabus PhD – Entrance Examinations - Department of Mechanical Engineering

UNIT 1 – MATERIALS AND APPLIED MECHANICS

Engineering Materials - Phase diagrams, structure and properties of engineering materials, heat treatment, stress-strain diagrams for engineering materials. Mechanics of Materials - Elastic constants, Stress and strain, Poisson's ratio, thin cylinders, Mohr's circle for plane stress and plane strain, shear force and bending moment diagrams, deflection of beams, bending and shear stresses, torsion of circular shafts, energy methods, Euler's theory of columns, thermal stresses. Engineering Mechanics - Trusses and frames; Free body diagrams and equilibrium, virtual work; impulse and momentum (linear and angular), kinematics and dynamics of particles & of rigid bodies in plane motion and energy formulations, collisions.

UNIT 2 – MECHANICAL DESIGN

Theory of Machines - Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses. Machine Design - Design for static and dynamic loading, Failure theories, fatigue strength and the S-N diagram, gears, shafts, rolling and sliding contact bearings, springs, brakes and clutches, principles of the design of machine elements like riveted, bolted and welded joints. Vibrations - Effect of damping, Free and forced vibration of single degree of freedom systems, resonance, vibration isolation, critical speeds of shafts.

UNIT 3 - FLUID MECHANICS AND THERMAL SCIENCES

Fluid Mechanics - Fluid statics, properties, manometry, buoyancy, stability of floating bodies, forces on submerged bodies, control-volume analysis of mass, fluid acceleration, momentum and energy, differential equations of continuity and momentum, dimensional analysis, Bernoulli's equation, viscous flow of incompressible fluids, elementary turbulent flow, boundary layer, flow through pipes, bends and fittings and head losses in pipes. Thermodynamics - Properties of pure substances, thermodynamic systems and processes, the behaviour of ideal and real gases, calculation of work and heat in various processes, zeroth and first laws of thermodynamics, the second law of thermodynamics, thermodynamic relations and thermodynamic property charts and tables, availability and irreversibility.

UNIT 4 – MANUFACTURING ENGINEERING

Casting, Forming and Joining Processes - Design of patterns, moulds and cores, Different types of castings, solidification and cooling, riser & gating design, fundamentals of hot and cold working processes, Plastic deformation and yield criteria load estimation for bulk (drawing, rolling, forging, extrusion) and sheet (deep drawing, shearing, bending), principles of powder metallurgy, metal forming processes, brazing, Principles of welding, soldering & adhesive bonding. Machining & Machine Tool Operations - Basic machine tools, Mechanics of machining, single and multi-point cutting tools, tool life and wear, tool geometry and materials, the economics of machining, principles of work holding, principles of non-traditional machining

processes, design of jigs and fixtures. Computer Integrated Manufacturing - Concepts of CAD/CAM and their integration tools.

UNIT 5 - INDUSTRIAL ENGINEERING

Metrology and Inspection - Linear and angular measurements, Limits, fits and tolerances & comparators; gauge design, interferometry, alignment and testing methods, form and finish measurement, tolerance analysis in manufacturing and assembly.

Operations Research - Simplex method, linear programming, transportation, PERT & CPM network flow models, assignment, simple queuing models.