

**School of Engineering and Technology**  
**Department of Mechanical Engineering**

**Syllabus for Ph.D. Entrance Exam**

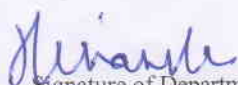
Engineering Mechanics: Free body diagrams and Equilibrium, Trusses and Frames, Kinematics and dynamics of particles and of rigid bodies in plane motion, Impulse and Momentum, Center of gravity, Moment of Inertia, Friction, Energy formulations, Virtual work. Mechanics of Materials: Stress and strain, Elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; Shear force and bending moment diagrams, Deflection of beams. Torsion of circular shafts; Euler's theory of columns; energy methods, Failure theories. Theory of Machines: Kinematic and Dynamic analysis of linkages, Balancing of reciprocating and rotating masses, Fly wheel, Free vibration and forced vibration of single degree of freedom systems, Effect of damping; Vibration isolation; Resonance; Critical speeds of shafts. Machine Design: Design for static and dynamic loading; S-N diagram; Design of machine elements for bolted, riveted and welded joints; Design of shafts, gears, brakes and springs.

Thermodynamics: Basic concepts and definitions-Properties of gas and pure substance- First law for closed system; Application of steady state flow process; Second law of thermodynamics; Carnot cycle; Otto cycle; Diesel cycle; Rankine cycle; Brayton cycle, Vapour compression refrigeration cycle. Heat transfer: Basic modes of heat transfer; General heat conduction equation; Steady and unsteady heat conduction; Natural and forced convection; Laws of radiation. Heat exchanger performance, LMTD and NTU methods. Fluid Mechanics: Fluid properties- Viscosity; Hydrostatics- Buoyancy; Bernoulli's equation, Differential equation of continuity and momentum; boundary layer; Flow measurement- Pipes and pipe fittings- Pumps, Compressors and Turbines.

Materials Science: Atomic packing factor; Volume, planar and linear atomic density- Crystallographic planes and directions- Gibbs phase rule; Cooling curves; Lever rule; Invariant reactions in Fe-Fe<sub>3</sub>C phase diagram; Stress and strain in metals.

Manufacturing: *Theory of metal cutting*: Tool wear & tool life; Machining time calculation. Lathe, Drilling and Milling operations. *Metal forming processes*; Blanking and Punching force measurement; Calculation of Bending force. Principles of powder metallurgy.

Industrial Engineering: Constraint and unconstraint optimization techniques, Practical aspects of optimization-Forecasting, Aggregate production planning and scheduling, Inventory analysis and control, Project planning, Linear programming; Transportation-Assignment models; Sequencing; Simple queuing.



Signature of Department Ph.D.  
Coordinator with Date

Name:

Dr. Himanshu Patel  
5/1/24



Signature of Concerned HoD  
with Date

Name: Dr. Ananda Babu

Head of the Department  
Dept. of Mechanical Engineering  
Sharda School of Engineering & Technology  
Sharda University, Greater Noida



Signature of School Ph.D.  
Coordinator with Date

Name:

Dr. Mandeep  
Kumar



Signature of Dean SSET  
with Date

Name: Dean

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Greater Noida