Syllabus for Ph.D entrance examination – Aerospace Engineering

Choose any one of the following fields for written test based on your research interest

1. **Aerodynamics/CFD**

   Governing equations of fluid dynamics, Boundary layer separation, Internal and external flows, Drag and Lift, non-dimensional parameters, airfoils, angle of attack, potential flow theory, Zhukovsky transformation, fundamentals of CFD, N-S and Euler Equations, mesh generation, stability, convergence, numerical schemes for elliptic, parabolic and hyperbolic equations, Basic understanding of Finite Volume Method.

2. **Turbomachinery, CFRP, and Accoustics**

   Fundamentals of turbo machinery, torque equation, velocity triangles, classification of turbomachines, Thermodynamics of turbomachines, p-v and T-S diagrams, fundamentals of composite materials, fundamentals of CFD, governing equations, mesh generation

3. **Aerospace structures:**

   Analysis of axial members, transverse members, and torsional members, Statically indeterminate members, stresses in combined loading, Buckling of columns; Stress and displacement formulations, Airy's stress function, Prandtl stress function, st. Venant warping functions, membrane analogy, torsion in narrow rectangular section; Torsional shear flows in thin-walled open and closed sections, Flexural shear flows in thin-walled open and closed sections; SDOF systems, 2/MDOF systems, vibration of continuous system/ (Theory of Elasticity); fundamentals of composite materials and structures.