

# Syllabus for Aerospace Engineering Master's

## Section 1: Subject Knowledge

Please Note: A Total of 40 Questions will be asked, combining the following topics, with the difficulty level commensurate to a Master's candidate.

### Section I: Engineering Mathematics

Linear Algebra, Calculus, Differential Equations, Fourier Series, Laplace Transforms, Numerical methods for linear and nonlinear algebraic equations, Numerical integration and differentiation. Complex analysis. Probability and statistics.

### Section II: Flight Mechanics

Atmosphere, Airplane Performance, Static Stability, Dynamic Stability, Equations of motion, Decoupling of longitudinal and lateral-directional dynamics, longitudinal modes, lateral-directional modes.

### Section III: Space Dynamics

Central force motion, determination of trajectory, and orbital period in simple cases, Kepler's laws, escape velocity.

### Section IV: Aerodynamics

Basic Fluid Mechanics, Potential Flow Theory, Airfoils and Wings, Compressible Flows, Wind Tunnel Testing, Shock boundary layer interaction.

### Section V: Structures

Strength of Materials, Flight Vehicle Structures, Structural Dynamics, Vibration of beams, Theory of elasticity: Equilibrium and compatibility equations, Airy's stress function.

### Section VI: Propulsion

Engine Performance, Aerothermodynamics of Aircraft Engines, Turbomachinery, Centrifugal Compressor, Axial Turbines, Rockets, Aerothermodynamics of non-rotating propulsion components such as intakes, combustor and nozzle. Turbine blade cooling. Compressor-turbine matching, Surge and stall.

## **Section 2: Fundamental Skills**

Please Note: A Total of 24 Questions will be asked, combining the following topics, with the difficulty level commensurate to a Master's candidate.

Unit I: Data Analysis

Unit II: Math and Statistics

Unit III: Reasoning and Aptitude

Unit IV: Reading and Writing

## **Section 3: Specific Skill Proficiency**

This section has multiple skills. You can select the ones you are proficient in from the enrollment form. You can select a maximum of 4 skills.