DEPARTMENT OF Aerospace Engineering
Syllabus PG Entrance Test
JET 2021

1. Linear Algebra: Vector algebra, Matrix algebra, systems of linear equations, rank of a matrix, eigenvalues and eigenvectors.
2. Calculus: Functions of single variable, limits, continuity and differentiability, mean value theorem, chain rule, partial derivatives, maxima and minima, gradient, divergence and curl, directional derivatives. Integration, Line, surface and volume integrals. Theorems of Stokes, Gauss and Green.
3. Differential Equations: First order linear and nonlinear differential equations, higher order linear ODEs with constant coefficients. Partial differential equations and separation of variables methods.
4. Fourier Series, Numerical methods for linear and nonlinear algebraic equations, Numerical integration
5. Strength of Materials: States of stress and strain. Stress and strain transformation. Mohr's Circle. Principal stresses. Three-dimensional Hooke's law. Plane stress and strain; Failure theories: Maximum stress, Tresca and von Mises; Strain energy. Analysis of statically determinate and indeterminate trusses and beams. Elastic flexural buckling of columns.
6. Structural Dynamics: Free and forced vibrations of undamped and damped SDOF systems.
7. Fluid Statics- Measurement of Pressure- manometers, Fluid properties, Forces on plane and curved surfaces, Buoyancy, stability of floating and submerged bodies.
8. Fluid Dynamics- Governing equations of fluid flow, Bernoullis equation and applications, Momentum principle and applications, Flow through pipes and plates, flow losses
9. Airfoil nomenclature, Kutta-Joukoswki theorem; Thin airfoil theory, Kutta condition, starting vortex; Finite wing theory: Induced drag, Prandtl lifting line theory; Critical and drag divergence Mach number.
10. Basic concepts of compressibility, Conservation equations; One dimensional compressible flows, Isentropic flows, normal and oblique shocks, Prandtl-Meyer flow; Flow through nozzles and diffusers.
11. Elementary ideas of viscous flows including boundary layers.
12. Basics: Thermodynamics,Thrust, efficiency and engine performance of turbojet, turboprop, turbo shaft, turbofan and ramjet engines.

13. Heat-Transfer - One dimensional heat conduction, modes of heat transfer, heat transfer through fins, resistance concept & electrical analogy, lumped parameter system, thermal boundary layer, heat transfer correlations for flow over flat plates and through pipes, heat exchanger performance, effect of turbulence, Stefan-Boltzmann law, radiative heat transfer, Wien's displacement law, view factors, black and grey surfaces
14. Rocket propulsion: Thrust equation and specific impulse, vehicle acceleration, drag.
15. Basics: Atmosphere: Properties, standard atmosphere. Classification of aircraft. Airplane (fixed wing aircraft) configuration and various parts;
16. Airplane performance: Pressure altitude; equivalent, calibrated, indicated air speeds; Primary flight instruments: Altimeter, ASI, VSI, Turn-bank indicator. Drag polar; takeoff and landing; steady climb & descent, absolute and service ceiling; cruise, cruise climb, endurance or loiter; load factor, turning flight, V-n diagram; Winds: head, tail & cross winds;
17. Analog circuits, circuit theory, Basics of electromagnetic's. Basics of digital circuits.
18. Fundamentals of communication
19. Fundamentals of control system design. Nyquist stability criteria; Bode and root-locus plots;

Reference Books

1) Advanced Engineering Mathematics by Erwin Kreyszig
2) Aircraft structures for engineering students T. H. G. Megson
3) Fluid mechanics Pijush K. Kundu
4) Fundamentals of Aerodynamics by John D. Anderson
5) Aircraft Performance and Design by John D. Anderson
6) Heat Transfer by Yunus A Çenge
7) Thermodynamics: An Engineering Approach by Michael A. Boles and Yunus A Çengel
8) Electronic Devices and Circuit Theory by Louis Nashelsky and Robert Boylestad
9) Fundamentals of Communication Systems by Proakis
10) Control Systems Engineering by Norman Nise