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| **Syllabus for Comprehensive Test**  |
| **Full Marks: 30 marks**  |

**ME 501: Advanced Fluid Mechanics**

**Basic concepts of Fluid Mechanics**

Basic concept and Governing Equations of Fluid Motion: Definition and Properties of Fluids, Langragian and Eulerian description, Velocity and stress field, Fluid statics, Fluid Kinematics, Reynolds transport theorem, Integral and differential forms of governing equations: mass, momentum and energy conservation equations, Navier-Stokes equations, Euler’s equation, Bernoulli’s Equation

**Laminar Boundary Layers**

Boundary layer equations, Boundary layer parameters, Boundary layer on a flat plate, Integral form of boundary layer equations, Approximate Methods, Flow separation and control, Hagen Poiseuille Flow, Plane Poiseuille Flow, and Couette Flow

**Potential Flows**

Stream and Velocity Potential Function, Circulation, Irrotational Vortex, Source and Sink, Vortex Flow, Doublet, Flow Past a Circular Cylinder, Magnus Effect; Kutta-Joukowski Lift Theorem; Concept of Lift and Drag.

**References**:

1. F. P. Incropera & D.P. Dewitt, “Fundamentals of Heat and Mass Transfer”, John Willey & Sons
2. A. Bejan,“Convective Heat Transfer”, John Wiley and Sons
3. K. Muralidhar and G. Biswas, “Advanced Engineering Fluid Mechanics”, Narosa