MMA-E413
FLUID DYNAMICS

MM : 100
Time : 3 hrs
L T P
5 2 0

Sessional : 30
ESE : 70
Pass Marks : 40

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

Kinematics: Lagrangian and Eulerian descriptions, Continuity of mass flow, Circulation, Irrotational and rotational flows, Boundary surface.

Euler's Equations: General equations of motion, Bernoulli's theorem (Compressible incompressible flows) Kelvin's Theorem (Constancy of circulation).

Two Dimensional Irrotational Motion : Stream function, Complex potential, Sources, Sinks and doublets circle theorem, Method of images, Theorem of Blasius, Schwartz Christoffel transformation, Jacowski aero-foil and potential flow.

Three Dimensional Irrational Motion : Potential flow due to sources, Sinks and Doublets, Stokes stream function, Spherical harmonics and motion of a sphere.

Real Fluids : Navier- Stoks equations, Dissipation of energy, Diffusion of vorticity, Steady parallel flow between two infinite parallel plates, Through a circular pipe (Hagen-Poiseulle flow), Past a sphere (Stoke's flow).

Text /Reference Books
1. S. W. Yuan, Foundations of Fluid Mechanics, Academic Press
2. L.M. Milne-Thomson, Hydrodynamics, Dover Publications