

**Fluid Mechanics – I**  
S.E. Sem. III [CIVIL/CONE]

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**EVALUATION SYSTEM**

	<b>Time</b>	<b>Marks</b>
<b>Theory Exam</b>	3 Hrs.	100
<b>Practical</b>	2 Hrs.	–
<b>Oral</b>	–	–
<b>Term Work</b>	–	25

**SYLLABUS**

**1. Properties of Fluids**

Mass density, weight density, specific gravity, specific volume, viscosity, compressibility, bulk surface tension, capillary action, vapour pressure, types of fluids, basic concept of applicable to fluid mechanics.

**2. Fluid State**

Pascal's law, Hydrostatic Law, pressure variation in fluids at rest, absolute, atmospheric, gauge pressure, measurement of pressures, Hydrostatic force on plane and curved surface.

Buoyancy and flotation : Archimede's principle Metacentre, metacentric height, equilibrium of floating and submerged bodies, oscillation of floating body.

**3. Liquids in Relative Equilibrium**

Uniform linear acceleration, liquid containers subjected to constant horizontal and vertical acceleration, constant rotation with vertical axis.

**4. Fluid Kinematics**

Description of fluid flow : Lagrangian method, Eulerian method. Streamline, Path lines and streak lines, Classification of Fluids flows, Differential equation of continuity, continuity equation in polar co-ordinates, Rotational flow, Rotation and vorticity, stream function, potential function, circulation, flow net.

**5. Fluid Dynamics**

Control volume and control surface, Euler's equation, Bernoulli's Theorem, Bernoulli's equation of real fluids, application to flow measuring devices : Venturimeter, nozzle meter, pitot tube, rotameter.

**6. Flow Measurement**

**Orifice :** Hydraulic coefficients, small and large orifice, time of emptying a tank through orifice.

Mouthpieces : External, convergent Borda's mouthpieces

Notches and weirs : rectangular, triangular, Cipolletti weirs, velocity of approach, end contractions.

**7. Ideal Fluid Flow**

Uniform flow, source flow, sink flow, free vortex flow, superimposed flow : source and sink flow, doublet, flow past half body, flow past a Rankine oval body, flow past a cylinder only.

110<sup>th</sup> over parallel line through the flow past of the body source and venturimeter, orifice, nozzlemeter, Bernoulli's theorem

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**References :**

1. Hydraulics and fluid mechanics (*Dr. P. M. Modi & Dr. S. M. Seth*) – Standard Book House.
2. Theory and applications of fluid mechanics (*K. Subramanya*) – Tata McGraw Hill, New Delhi.
3. Fluid mechanics (*Dr. A K. Jain*) – Khanna Publishers
4. Fluid mechanics and fluid pressure engineering (*D. S. Kumar, F.K. Kataria & sons*)
5. Fluid mechanics (*R. K. Bansal*) – Laxmi Publications (P) Ltd.
6. Fluid mechanics (*Frank M. White*) – Tata McGraw-Hill
7. Fluid mechanics (*Streeter, Wylie, Bedford*) – McGraw-Hill International Edition
8. Fluid mechanics with engineering applications (*R. L . Daugherty, J. B. Franzini, E. J. Finnemore*) – Tata McGraw-Hill International Edition.
9. Fluid mechanics (*Joseph Spurk*) – Springer
10. Mechanics of fluids (*Potler, Wiggert*) – Prentice-Hall International.

