

1. Explain principles of fluid statics, kinematics and dynamics.
2. Explain the terms used in fluid mechanics to describe fluid and flow properties.
3. Explain classifications of fluid flow.
4. Apply the continuity, momentum and energy principles
5. Apply dimensional analysis

UNIT I Fluid and continuum, Physical properties of fluids, Rheology of fluids. Pressure-density height relationship, manometers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies. [8 Hours]

UNIT II Types of fluid flows: Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic, sonic and supersonic flows, sub-critical, critical and supercritical flows one, two and three dimensional flows, streamlines, path lines, streak lines, stream tube, continuity equation for 1-D, 2-D and 3-D flows, circulation, stream function and velocity potential function. [8 Hours]

UNIT III Potential Flow: source, sink, doublet. Equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, orifice meter, venturimeter and bend meter, notches and weirs, momentum equation and its application to pipe bends. resistance to flow, Minor losses in pipe in series and parallel, power transmission through a pipe, siphon, water hammer, [8 Hours]

UNIT IV Equation of motion for laminar flow through pipes, Stokes' law,, Boundary layer thickness, boundary layer over a flat plate, displacement, momentum and energy thickness. Application of momentum equation. Laminar boundary layer, turbulent boundary layer, laminar sub-layer, separation and its control. Mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces. [8 Hours]

UNIT V Drag and lift, drag on a sphere, aerofoil, Similarity Laws; geometric, kinematics and dynamic similarity, undistorted and distorted model studies, Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance. Introduction to Computational Fluid Dynamics (CFD). [8 Hours]

Books and References

1. Hibbler, "Fluid Mechanics in SI Units" 1/e Pearson Education, Noida.
2. Fox & Donald, "Introduction to Fluid Mechanics" John Wiley & Sons Pvt Ltd,
3. Cengel & Cimbala, "Fluid Mechanics" TMH, New Delhi.
4. Katz, "Introductory Fluid Mechanics" Cambridge University Press
5. Pnueli & Gutfinger, "Fluid Mechanics" Cambridge University Press
6. Modi & Seth "Hydraulics & Fluid Mechanics" Standard Publications.
7. Gupta, "Fluid Mechanics & Hydraulic Machines" Pearson Education, Noida
8. Graebel, "Engineering Fluid Mechanics", CRC Press Taylor & Francis Group.
9. Janna, "Introduction to Fluid Mechanics" 4/e, CRC Press Taylor & Francis Group.
10. White, F.M. "Fluid Mechanics" TMH, New Delhi.
11. Munson et al, "Fundamental of Fluid Mechanics" Wiley Newyork Ltd
12. Garde, R.J., " Fluid Mechanics", SciTech Publications Pvt. Ltd
13. I.H. Shames, "Mechanics of Fluids", McGraw Hill, Int. Student.
14. RK Bansal "Fluid Mechanics and Hydraulic Machines" Laxmi Publication
15. Jagdish Lal "Fluid Mechanics"
16. N Narayan Pillai " Principles of Fluid Mechanics & Fluid Machines" Universities Press.
17. Esposito, Fluid Power & Applications" 7/e Pearson Education, Noida. DR Malhotra & Malhotra, "Fluid Mechanics Hydraulics & Hydraulic Machines" Satya Prakas
18. **Fluid Mechanics : Dr Shreenivas Londhe (Available on aicte ekumbh portal)**
Link for aicte book portal : <https://ekumbh.aicte-india.org/allbook.php>