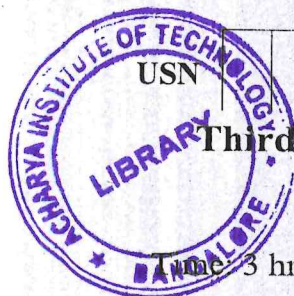


CBCS SCHEME



BAE303/BAS303

Third Semester B.E./B.Tech. Degree Examination, June / July 2026 Fluid Mechanics

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume the suitable data if missing.
3. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Define the following : i) Mass density and Specific gravity ii) Ideal fluid and Newtonian fluid iii) Dynamic viscosity and Kinematic viscosity iv) Surface tension and capillarity	10	L1	CO1
	b.	With a neat sketch derive expression for capillary rise and fall.	10	L2	CO1
OR					
Q.2	a.	State and prove Pascal's Law with a neat sketch.	08	L2	CO1
	b.	A hydraulic press has a ram of 20 cm diameter and a plunger of 3 cm diameter and it is used to lift a weight of 30 KN. Find the force required at the plunger.	06	L3	CO1
	c.	Explain the following terms with a help of sketch: i) Absolute pressure ii) Gauge pressure iii) Vacuum pressure.	06	L2	CO1
Module – 2					
Q.3	a.	Derive an expression for continuity equation for a three – dimensional flow in Cartesian co-ordinates.	10	L2	CO1
	b.	Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8m in diameter and carries one third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE. Sketch the arrangement.	10	L3	CO1
OR					
Q.4	a.	Obtain the expression for Navier – Stokes equation using Momentum equation.	12	L2,3	CO1

OR

Q.8	a.	Obtain the expression for drag force on a flat plate due to boundary layer and write Von-Karman momentum integral equation.	12	L2	CO3
	b.	Explain the following : i) Laminar and Turbulent Boundary layer ii) Kutta Joukowski Theorem	08	L2	CO3

Module – 5

Q.9	a.	Obtain an expression for velocity of sound wave in a fluid. Also deduce the relation for adiabatic process.	10	L2	CO3
	b.	Define the following on the basis of mach number for compressible flow, i) Sub –sonic ii) Sonic flow and iii) Super-sonic flow.	05	L1	CO2
	c.	Find the sonic velocity for the following fluids : i) Crude oil of specific gravity 0.8 and bulk modulus 153036 N/cm^2 ii) Mercury having a bulk modulus of 2648700 N/cm^2	05	L3	CO3

OR

Q.10	a.	Calculate the stagnation pressure, temperature and density at the nose of the aircraft. The aircraft is flying at 800 Km/hr through the stationary air which has a pressure of 8.0 N/cm^2 (abs) and temperature of -10°C . Take $R = 287 \text{ J/kg-K}$ and $K = 1.4$.	10	L3	CO3
	b.	Draw and explain the propagation of pressure waves in a compressible fluid and explain about Mach Core, Mach angle. Also mention the zone of action and zone of silence.	10	L3	CO3
