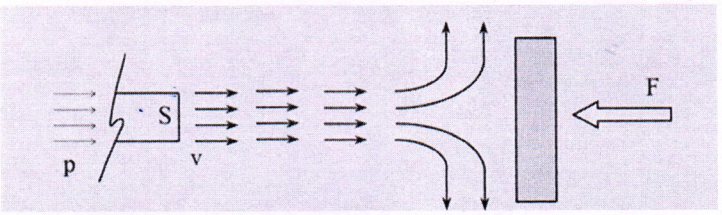
AHMEDABAD UNIVERSITY
School of Engineering and Applied Science
2025-2026 Monsoon

ENR210 Continuum Mechanics
Final-Term Examination
Wednesday 03rd December 2025, 2:00 – 4:0 PM

Name:	Roll no.	A U 2							Marks /50

Write your answers in the answer book. Attach this sheet to the answer book and then submit it. Answer all questions. Access to the net or notes is not allowed. A scientific calculator is allowed.

		Marks
1.	Define: (a) 1st law of thermodynamics (b) Limitation of 1st law of thermodynamics (c) Reversible and irreversible processes (d) 2nd law of thermodynamics (e) Thermodynamic process	*(2*5=10)*
2.	A flat element has the in-plane stress tensor (MPa) $\sigma = \begin{bmatrix} 80 & 30 \\ 30 & 50 \end{bmatrix}$ Find the principal stress and direction for each principal stress using the concept of eigen vector and eigen value.	*(2.5*4=10)*
3.	(a) Explain the principle of balance of linear momentum. (b) A water jet with cross-section S, pressure P and velocity v, impacts perpendicularly on a disc as indicated in the figure below. Determine the force "F" in the steady state regime that must be exerted on the disc for it to remain in a fixed position. (Consider the atmospheric pressure in negligible) 	*(5+5=10)*
4.	(a) Explain four constitutive equations of fluid mechanics. (b) Explain Stokes fluid, Newtonian fluid and perfect fluid. (c) What are thermodynamic pressure and hydrostatic pressure?	*(1*4+1*3+ 1.5*2 =10)*
5.	Derive the mathematical equation for convective flux. Kindly draw diagrams and use proper notation, if required.	*(10)*