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

ENR210 Continuum Mechanics
End-Term Examination
Saturday 21 Feb 2026, 08:00 – 10:00

Name:	Roll no.	A U 2	Marks /40

Write your answers in the answer book. Attach this sheet to the answer book and then submit it. Answer all questions.

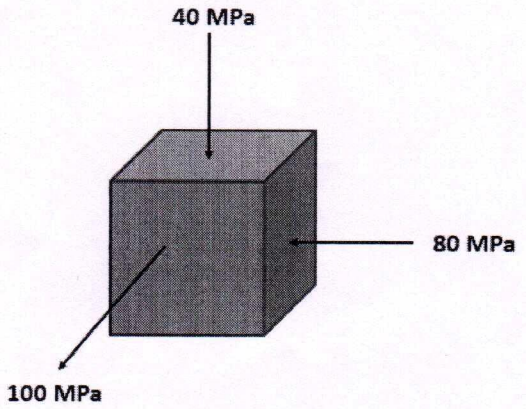
Marks

1. A 250-mm-long rod with a diameter of 3 mm is loaded with a 3000 N weight. If the diameter decreases to 2.2 mm, compute the following: *(5)*
   (a) The true stress and true strain at this load.
   (b) The engineering stress and strain at this load.

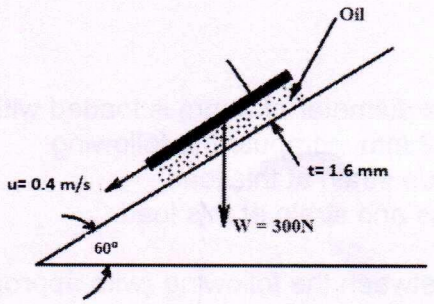
2. Explain the difference between the following (with appropriate formula and figure as well): *(2×5)*
   (a) Normal strain and Shear strain
   (b) Average stress and Stress at a point
   (c) True strain v/s Engineering strain
   (d) Isotropic v/s Anisotropic material
   (e) Engineering stress v/s true stress

3. A two-dimensional displacement field in a deformable solid is given by: *(5)*
   $u(x,y) = axy + by^3x$
   $v(x,y) = cx^2 + dy^2$
   where u and v are displacement components in the x- and y-directions respectively,
   and a, b, c, d are constant.
   (a) Evaluate normal and shear strain components
   (b) Evaluate the strain components at the point P (x= 1 mm, y=2 mm), given that a= 0.002 mm^{-2}, b= 0.001 mm^{-4}, c= 0.003mm^{-2}, d= 0.001 mm^{-2}.

4. The principal stresses at a point are shown. If the material properties are E= 70 GPa and v= 0.4, determine the principal strains. *(5)*



5. Calculate the dynamic viscosity of an oil, which is used for lubrication between a square plate of size 0.8 m x 0.8 m and an inclined plane with an angle of inclination 60° as shown in Fig. 1.4. The weight of the square plate is 300 N, and it slides down the inclined plane with a uniform velocity of 0.4 m/s. The thickness of the oil film is 1.6 mm. *(5)*



6. A river discharges into a reservoir at a rate of 450,000 m^3/s, and the outflow rate from the reservoir through the passage in a dam is 150,000 m^3/sec. If the reservoir surface area is 50 m^2. What is the rate of rise of water in the reservoir? *(5)*

7. (a) Define a control volume and control surface in the context of fluid dynamics with an example. *(2.5+ 2.5)*

(b) What is a non-Newtonian fluid and classify different types of non-Newtonian fluid with equations.

End