Civil Engineering Licensure Exam – Mock Exam (Day 36: Stresses and Strains in Materials)

February 24, 2025

Instructions

- Time Limit: 60 Minutes
- Coverage: Stresses and Strains in Materials
- Total Questions: 10 (Multiple Choice & Problem-Solving)
- Show complete solutions for problem-solving questions.

Section A: Multiple Choice Questions (MCQs)

Choose the best answer.

1. The unit of stress in the SI system is:
   (a) Pascal (Pa)
   (b) Newton (N)
   (c) Joule (J)
   (d) Meter (m)
2. Strain is defined as:
   (a) The force applied per unit area
   (b) The deformation per unit length
   (c) The internal resistance of a material

(d) The energy stored in a material

3. Hooke's Law states that:

   (a) Stress is proportional to strain within the elastic limit
   (b) Strain is independent of stress
   (c) Stress and strain are always inversely proportional
   (d) The modulus of elasticity varies with load

4. The Poisson's ratio of a material is given by:

   (a) The ratio of lateral strain to axial strain
   (b) The ratio of stress to strain
   (c) The ratio of shear stress to shear strain
   (d) The ratio of axial strain to lateral strain

5. The modulus of elasticity for steel is approximately:

   (a) 200 GPa
   (b) 70 GPa
   (c) 100 MPa
   (d) 500 MPa

Section B: Problem-Solving

1. A steel rod with a cross-sectional area of 100 mm^2 is subjected to an axial tensile force of 50 kN. Determine the stress in the rod.

2. A 2 m long bar extends by 1.5 mm under an axial force. If the original length is 2 m, determine the strain in the material.

3. A steel bar with a modulus of elasticity of 200 GPa is subjected to a stress of 100 MPa. Determine the strain.

4. A cylindrical rod of diameter 20 mm experiences a lateral strain of 2×10^{-5} when subjected to an axial strain of 1×10^{-3}. Determine Poisson's ratio.

5. A concrete column is subjected to an axial compressive force of 2000 kN. If the column has a cross-sectional area of 0.2 m^2, determine the compressive stress.