Civil Engineering Licensure Exam – Mock Exam (Day 31: Beams and Frames – Shear and Moment Diagrams)

February 24, 2025

Instructions

- Time Limit: 60 Minutes
- Coverage: Beams and Frames – Shear and Moment Diagrams
- 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. A shear force at a section in a beam represents:
   (a) The bending moment at that section
   (b) The sum of vertical forces to the left or right of the section
   (c) The total reaction at supports
   (d) The total weight of the beam
2. The maximum bending moment in a simply supported beam with a central point load occurs at:
   (a) One of the supports
   (b) The midpoint of the beam

(c) The quarter points of the beam

(d) Any random location

3. A positive bending moment in a beam causes:

   (a) Tension at the top fibers and compression at the bottom fibers

   (b) Compression at the top fibers and tension at the bottom fibers

   (c) No internal stress in the beam

   (d) Uniform stress throughout the beam

4. A simply supported beam subjected to a uniformly distributed load produces a shear force diagram that is:

   (a) Triangular

   (b) Parabolic

   (c) Constant

   (d) A step function

5. In a beam, the bending moment is maximum where:

   (a) The shear force is zero

   (b) The shear force is maximum

   (c) The load is maximum

   (d) The deflection is maximum

Section B: Problem-Solving

1. A simply supported beam of length 6 m carries a point load of 10 kN at the center. Determine the reactions at the supports and construct the shear force and bending moment diagrams.

2. A cantilever beam of length 5 m is subjected to a uniformly distributed load of 4 kN/m. Determine the reactions at the fixed end and construct the shear force and bending moment diagrams.

3. A simply supported beam carries a triangular load varying from 0 at the left end to 8 kN/m at the right end over a span of 6 m. Determine the reactions at the supports.

4. A beam with a span of 8 m carries a concentrated moment of 20 kN·m at its midpoint. Draw the shear force and bending moment diagrams.

5. A propped cantilever beam of length 6 m has a uniform distributed load of 5 kN/m. Determine the reactions at the fixed and roller supports.