Civil Engineering Licensure Exam – Mock Exam (Day 32: Influence Lines and Moving Loads)

February 24, 2025

Instructions

- Time Limit: 60 Minutes

- Coverage: Influence Lines and Moving Loads

- 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. Influence lines are used to determine:

    (a) The internal forces in a structure due to moving loads

    (b) The maximum stress at a fixed point

    (c) The settlement of a foundation

    (d) The temperature effects on a beam

2. In an influence line diagram, a peak value indicates:

    (a) The maximum effect of a moving load at that location

    (b) A location where no force acts

    (c) The neutral axis of the structure

(d) A point of zero deflection

3. The Müller-Breslau Principle states that:

    (a) The influence line for a force is the deflected shape of the structure when the force is applied

    (b) The sum of moments in a structure is always zero

    (c) The maximum load always occurs at midspan

    (d) The bending moment is equal to the shear force at any given section

4. For a simply supported beam, the influence line for a reaction is:

    (a) A straight line sloping from 0 to 1

    (b) A parabolic curve

    (c) A horizontal line

    (d) A sine curve

5. The maximum bending moment in a simply supported beam due to a moving concentrated load occurs when:

    (a) The load is at the midpoint of the beam

    (b) The load is near one of the supports

    (c) The load is at a quarter span

    (d) The load is evenly distributed

Section B: Problem-Solving

1. Draw the influence line for the reaction at support A of a simply supported beam of length 8 m.

2. A simply supported beam of length 10 m carries a unit load moving across it. Determine the influence line equation for the shear force at 4 m from the left support.

3. A moving concentrated load of 15 kN crosses a simply supported beam of span 12 m. Determine the maximum bending moment in the beam.

4. A beam carries a uniformly distributed moving load of 5 kN/m over its entire span of 6 m. Determine the maximum reaction at one of the supports.

5. A three-span continuous bridge carries a moving truck with axle loads of 20 kN and 30 kN spaced 4 m apart. Determine the location of the truck for maximum bending moment in the middle span.