Civil Engineering Licensure Exam – Mock Exam (Day 17: Open Channel Flow and Energy Equations)

February 24, 2025

Instructions

- Time Limit: 60 Minutes
- Coverage: Open Channel Flow and Energy Equations
- 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 hydraulic radius of an open channel is defined as:
   (a) Flow area divided by wetted perimeter
   (b) Flow area divided by depth
   (c) Wetted perimeter divided by flow area
   (d) Depth multiplied by velocity
2. The Manning's equation is used to compute:
   (a) Flow velocity in open channels
   (b) Energy loss in closed pipes
   (c) Pressure drop in pipelines

(d) Wave height in coastal engineering

3. The critical depth in an open channel is determined by:

   (a) Froude number = 1
   (b) Reynolds number ¿ 2000
   (c) Mach number ¿ 1
   (d) Flow rate per unit width = 0

4. In an open channel, the flow is classified as subcritical when:

   (a) Froude number ¡ 1
   (b) Froude number ¿ 1
   (c) Reynolds number ¿ 4000
   (d) The channel is circular

5. The specific energy of flow in an open channel is:

   (a) Sum of pressure head, velocity head, and datum head
   (b) Product of velocity and discharge
   (c) The difference in elevation between the water surface and the bottom
   (d) Independent of flow depth

Section B: Problem-Solving

1. A rectangular channel 3 m wide carries a flow of 10 m^3/s. Determine the flow velocity if the flow depth is 1.5 m.

2. A trapezoidal channel has a bottom width of 4 m and side slopes of 2:1 (horizontal: vertical). If the depth of flow is 2 m, determine the wetted perimeter.

3. A 2.5 m wide rectangular channel has a discharge of 8 m^3/s. Compute the critical depth.

4. A channel has a flow velocity of 3 m/s and a depth of 1.8 m. Determine the specific energy of the flow.

5. A rectangular channel with a width of 5 m carries a flow of 20 m^3/s with a depth of 2 m. Compute the Froude number and classify the flow as subcritical, critical, or supercritical.