Civil Engineering Licensure Exam – Mock Quiz (Day 21: Hydraulics and Hydrology)

February 24, 2025

Instructions

- Time Limit: 60 Minutes
- Coverage: Hydraulics and Hydrology
- 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 Bernoulli equation is based on the principle of:
   (a) Conservation of mass
   (b) Conservation of energy
   (c) Conservation of momentum
   (d) Fluid viscosity
2. The Froude number is used to classify:
   (a) Compressible flow
   (b) Subcritical and supercritical flow
   (c) Pipe flow friction loss
   (d) Groundwater recharge rates

3. Manning's equation is used to compute:

   (a) Head loss in pipe flow
   (b) Open channel flow velocity
   (c) Hydraulic gradient in groundwater flow
   (d) Flow resistance in closed conduits

4. The Rational Method is commonly used to estimate:

   (a) Peak runoff discharge
   (b) Pumping power in water systems
   (c) Groundwater infiltration rate
   (d) Friction losses in pipes

5. The unit of hydraulic conductivity in Darcy's law is:

   (a) m/s
   (b) m^3/s
   (c) m^2/s
   (d) L/s

Section B: Problem-Solving

1. A pipeline carries water at a velocity of 3 m/s with a pressure of 120 kPa at one section. If at another section the velocity increases to 5 m/s, determine the pressure at this second section using Bernoulli's equation.

2. A trapezoidal channel has a bottom width of 4 m and side slopes of 2:1 (H:V). If the flow depth is 1.5 m, determine the hydraulic radius.

3. A watershed with an area of 5 km^2 receives a storm with an intensity of 40 mm/hr. Using a runoff coefficient of 0.75, compute the peak runoff using the Rational Method.

4. A 3 m wide rectangular channel has a discharge of 10 m^3/s. Compute the critical depth.

5. A groundwater well extracts water from an unconfined aquifer with a hydraulic conductivity of 8 m/day. If the water table drop over a distance of 500 m is 2 m, determine the Darcy velocity.