Civil Engineering Licensure Exam – Mock Exam (Day 18: Hydrology – Rainfall, Runoff, and Groundwater Flow)

February 24, 2025

Instructions

- Time Limit: 60 Minutes
- Coverage: Hydrology – Rainfall, Runoff, and Groundwater Flow
- 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 term "hydrologic cycle" refers to:
   (a) The movement of water through the environment
   (b) The study of fluid mechanics
   (c) The process of groundwater contamination
   (d) The transportation of sediment in rivers
2. The intensity of rainfall is typically measured in:
   (a) Millimeters per second
   (b) Cubic meters per hour
   (c) Millimeters per hour

(d) Liters per second

3. The Rational Method is used to estimate:

   (a) Groundwater recharge rate
   (b) Peak runoff from a watershed
   (c) River flow velocity
   (d) Soil erosion rate

4. Infiltration refers to:

   (a) The process of water evaporating from plants
   (b) The movement of water into the soil
   (c) The transport of sediment in rivers
   (d) The flow of groundwater into lakes

5. The water table represents:

   (a) The upper surface of a confined aquifer
   (b) The boundary between soil and rock
   (c) The upper surface of the zone of saturation
   (d) The depth of a river bed

Section B: Problem-Solving

1. A storm produces 25 mm of rainfall over a 5-hour period. Determine the average rainfall intensity.

2. A watershed has an area of 2 km^2. Using the Rational Method with a runoff coefficient of 0.6 and a rainfall intensity of 50 mm/hr, determine the peak runoff.

3. A soil sample has an infiltration rate of 5 mm/hr. If a rainfall event lasts for 3 hours with a constant intensity of 12 mm/hr, determine the total infiltration volume over a 500 m^2 area.

4. A groundwater well draws water from an unconfined aquifer with a hydraulic conductivity of 10 m/day. If the water table drops by 3 m over a horizontal distance of 500 m, determine the Darcy velocity.

5. A river section has a base flow of 2 m^3/s. After a storm event, the peak runoff contribution from a watershed is 8 m^3/s. Determine the total river discharge during the peak event.