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Total No. of Pages : 02

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M.Tech Civil Engg EL-III (2016 Batch) (Sem.–3)

# GROUND WATER AND CONTAMINATION HYDROLOGY

Subject Code : MTCE -217

Paper ID : [74766]

Time : 3 Hrs. Max. Marks : 100

**INSTRUCTIONS TO CANDIDATES :**

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.
3. Assume any missing data.

1. Draw diagrams of two realistic field situations in which three piezometers installed side by side, but bottoming at different depths, would have the same water-level elevation.

2. Radiometric measurements on a sample of inorganic carbon from well water indicate a 14C activity of 12 disintegrations per minute (dpm). The background activity is 10 dpm. What is the apparent age of the sample?

3. Sketch flow nets on a horizontal plane through a horizontal confined aquifer:

   a. For flow toward a single steady-state pumping well (i.e., a well in which the water level remains constant).

   b. For two steady-state pumping wells pumping at equal rates (i.e., producing equal heads at the well).

   For a well near a linear, constant-head boundary.

4. Discuss theory of infiltration in detail.

5. Groundwater deep in a sedimentary basin has an electrical conductance of 300 millisiemens (or millimhos).

   a. Make a rough estimate of the total dissolved solids of this water (in mg/1).

   b. What is the dominant anion in the water? Explain.

6. a. Why is a 10-day pumping test better than a 10-h pumping text?

   b. Why are storativities for unconfined aquifers so much larger than those for confined aquifers?

   c. What kind of pumping test arrangement would be required to determine the exact location of a straight, vertical impermeable boundary?

7. In laboratory experiments using a pesticide and samples from a sandy aquifer, it is observed that when water with the pesticide is equilibrated at various concentrations with the sand samples, the partitioning of the pesticide between the liquid and solid phases is as follows: test 1, 100 μg/g adsorbed at 10 mg/ml in solution; test 2, 300 μg/g adsorbed at 220 mg/ml in solution; test 3, 600 μg/g adsorbed at 560 μg/ml in solution; test 4, 1000 μg/g adsorbed at 1000 mg/ml in solution. What distribution coefficient is indicated by these data? Express your answer in milliliters per gram. In sand (porosity = 35%) below the water table, estimate the relative velocity at which the pesticide would migrate in an advection-controlled system.

8. Discuss mechanical dispersion and hydrodynamic dispersion of ground water in detail.