Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 08

M.Tech (Civil Engg.) EL-III (2019 Onwards) (Sem.–3)

GROUND WATER AND CONTAMINATION HYDROLOGY

Subject Code : MTCE -217

M.Code : 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. **Use of Non-Programmable Scientific Calculator is allowed.**

1. a) Explain how the infiltration rate curve is obtained? Discuss the use of the same.

   b) Two wells are drilled 200 m apart along an east-west axis. The west well has a total head of 30.5 m and the east well has a 29.8 m head. A third well located 90 m due south of the east well has a total head of 30.0 m. Find the magnitude and direction of the hydraulic gradient.

2. a) A confined aquifer 20.2 m thick has two monitoring wells spaced 450 m apart along the direction of groundwater flow. The difference in water level in the wells is 1.8 m. The hydraulic conductivity is 40.0 m/d. Estimate the rate of flow per meter of distance perpendicular to the flow.

   b) Suppose the aquifer (a) above has become contaminated upgrade of the two wells. Consider the upgradient well as a monitoring well whose purpose is to provide early detection of the approaching plume to help protect the second, drinking-water well. How long after the monitoring well is contaminated would take the drinking water well to be contaminated?

3. a) From the basic principles derive the Dupuit's equation for estimating discharge of a well. State the assumptions.

   b) A 35 cm well penetrates 26 cm below the static water level. After a long period of pumping at a rate of 1200 1pm, the draw down in the observation wells at 15 m and 35 m from the pumped well are 1.4 m and 0.7 m, respectively. Determine

      i) the transmissibility of well

      ii) the specific capacity of the well.

4. From the basic principles, develop the governing equations and explain the procedure for conducting a tracer experiment in an aquifer.

5. Explain with neat figures, any two filed procedures for control of groundwater plumes.

6. List and explain the water quality plots with respect to groundwater quality analysis. Discuss any two in detail.

7. a) Explain clearly the solute transport models, as applied to groundwater contamination.

   b) Explain :

      i) Piper's trilinear diagrams

      ii) Bar diagram for ionic characteristics of groundwater

8. Write short notes on :

   a) Flow net

   b) Thiem's theory

   c) Image wells

   d) Spacing of wells

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.