**Registration no:** | | | | | | | | | | |

**Total Number of Pages: 02** **B.TECH**
**PECI5402**

# 7th Semester Regular / Back Examination 2015-16
# GROUND WATER HYDROLOGY
## BRANCH: CIVIL
## Time: 3 Hours
## Max marks: 70
## Q.CODE: T345

**Answer Question No.1 which is compulsory and any five from the rest.**
**The figures in the right hand margin indicate marks.**

**Q1** **Answer the following questions:** **(2 x 10)**

**a)** Define Aquifer. How is it different from aquitard?
**b)** How do Septic tank and Cesspool pollute groundwater?
**c)** How do seasonal and secular variations affect groundwater fluctuation?
**d)** Write down the water balance equation.
**e)** What do you mean by origin of groundwater?
**f)** Differentiate between depression spring and contact spring.
**g)** What are the three assumptions of steady flow of groundwater?
**h)** What is the basic difference between confined and unconfined aquifer?
**i)** How saline water doesintrudeinto fresh water aquifer?
**j)** Write down the Laplace equation of groundwater flow

**Q2** **a)** What are the different methods of construction of shallow wells? Differentiate between dug wells and bore wells. **(5)**

**b)** Describe briefly about Cable tool method of drilling deep well. **(5)**

**Q3** **a)** How can one distinguish between steady state flow in confined aquifer with constant thickness and variable thickness? Elaborate the answer using equations. **(5)**

**b)** Two water bodies A and B are separated by an aquifer of 5.0 km with a 1m thick layer of clay sloping from 10m level at one end and 6m level on the other end. The water table at both the ends is 20m and 12m from the datum respectively. Assuming K=18 m/d find the total discharge. **(5)**

**Q4** Why artificial recharge of groundwater is becoming mandatory in most of the cities in India? Name the different methods of artificial recharge of groundwater. Describe the concept and need of rainwater harvesting. **(10)**

**Q5** **a)** Define Darcy's Law. Derive the equation with suitable diagram including its validity? **(5)**

**b)** Determine the daily flow capacity and transmissivity for a sandstone aquifer18m thick, 600m wide and 2km length. The drop in piezometric head is 3m along the entire length, assuming hydraulic conductivity to be $6\times10^{-7}$ m/s. **(5)**

**Q6** **a)** What are the different conditions for steady radial flow into a well in an unconfined aquifer is as per the 'Dupit's assumption'? **(5)**

**b)** Pumping @ 1500 lpm from a 30 cm diameter test well penetrating into 60 m. of an unconfined aquifer gives draw down of 2.0 m. at 120 m. and 1.1 m. at 160 m. away from it. Calculate: **(5)**

i) Hydraulic conductivity of the aquifer
ii) Draw down of the pumping well

**Q7** **a)** How is Remote Sensing applications helpful in groundwater investigation? **(5)**

**b)** What is infiltration Gallery? Describe with neat sketch. **(5)**

**Q8** **Write short notes on any two:** **(5 x 2)**

**a)** Vertical distribution of groundwater
**b)** Geological formations of groundwater
**c)** Describe hydrologic cycle with neat sketch.
**d)** Theis equation for unsteady flow into a well