Model Question Paper

SEVENTH SEMESTER B TECH DEGREE EXAMINATION

Branch: Civil Engineering

13.705.5 GROUNDWATER ENGINEERING (Elective-II)

Time: 3Hours   **Max.Mark:100**

PART A

Answer all questions from Part A and all questions carry equal marks
Draw sketches wherever necessary

1. Describe the vertical distribution of subsurface water

2. In a field test a time of 6hour was required for a tracer to travel between two observation wells 42m. If the difference in water table elevation in these wells were 0.85m and porosity of the aquifer is 20%. Calculate the coefficient of the permeability.

3. Define Law of Times. Derive an expression for law of time

4. Describe the recuperation test for the estimation of yield of an aquifer.

5. Derive the Ghyben-Herzberg relationship for seawater intrusion.

                                                                 [5*4 Mark = 20 Marks)

PART B

Answer any one full question from each module.
Draw sketches wherever necessary
Module I

6a. Derive an equation for discharge and phreatic surface, when an infiltration gallery is dug down to the impervious soil layer

                                                                 [10 Marks]

 b. A well penetrates into an unconfined aquifer having a saturated depth of 50m. The discharge is 250 lpm at 8m drawdown. What would be the discharge at 10m drawdown. The radius of influence in both the cases may be taken as same.

                                                                 [10 Marks]

                                        OR

7a.   A confined stratified aquifer has a total thickness of 12m and is made up of three layers. The bottom layer has a coefficient of permeability of 30m/day and a thickness of 5m. The middle and top layers have permeability of 20m/day and 45m/day

respectively and are of equal thickness. Calculate the transmissibility of the confined aquifer and the equivalent permeability, if the flow along the stratification.

[10 Marks]

b. Derive an equation for discharge through a confined aquifer with all assumptions.

[10 Marks]

Module II

8a. Derive the partial differential equation for unsteady groundwater flow with assumptions.

[15 Marks]

b. A 30cm well penetrates an aquifer of transmissibility of 2×10^5 lpd/m and a storage coefficient of 0.005. What pumping rate could be adopted so that the drawdown will not exceed 10 m within the subsequent two years of drought.

[5 Marks]

OR

9a. Describe Chow's method for the estimation of aquifer parameters.

[8 Marks]

b. A well is located in a 25m confined aquifer of permeability 30m/day and storage coefficient 0.005. If the well is being pumped at the rate of 1750lpm, calculate the drawdown at a distance of (i) 100 m and (ii) 50 m from the well after 20 hrs of pumping.

[12 Marks]

Module III

10a. Describe any one method of construction of tube well.

[10 Marks]

b. Describe the electrical resistivity method for the estimation of thickness of subsurface formations in a horizontal surface.

[10 Marks]

OR

11a. What are the applications of electrical resistivity method.

[5 Mark]

b. Describe the seismic refraction method for the estimation of thickness of subsurface formations in a horizontal surface with a neat sketch.

[15 Marks]

Module IV

12a.Describe different methods of graphical representation of groundwater quality data

[15 Mark]

b.What are the sources of groundwater pollution.

[5 Marks]

OR

13a.What are the preventive measures to control seawater intrusion

[8 Marks]

b. Describe the radial collector well with a neat sketch.

[12 Marks]