Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 711805N Date: 16-01-2013

Subject Name: Ground Water Hydrology and Contamination

Time: 02.30 pm – 05.00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Define the following terms: **07**
Storage co-efficient of a confined aquifer, Specific yield, Specific retention, Transmissibility, Intrinsic Permeability, Aquiclude and Aquifer.

(b) A fully penetrating gravity well having radius 0.3 m is being pumped at the rate of 1800 liters per minute. The depth of water in the well was 40 m before pumping started. The drawdown in an observation well located at 10 m is 3.8 m and, another well located at 20 m is 1.8 m. Find, i) Co-efficient of permeability, ii) radius of the cone of depression and, iii) drawdown in the pumping well. **07**

Q.2 **(a)** Discuss methods of artificial groundwater recharge. **07**

(b) Derive the following equation governing unsteady groundwater flow in a confined, isotropic aquifer; using standard notations: **07**

$$\nabla^2 h = \frac{S}{T}\frac{\partial h}{\partial t}$$

OR

(b) Discuss Theis method of pumping test analysis. Also state simplification given by Jacob method. **07**

Q.3 **(a)** Describe method of groundwater sampling. Also give standards for groundwater quality. **07**

(b) Discuss point-source and non-point source groundwater pollution. **07**

OR

Q.3 **(a)** Give classification of numerical groundwater flow models. Briefly discuss their applications. **07**

(b) What are key reactions influencing groundwater chemistry? Discuss any one reaction in detail. **07**

Q.4 **(a)** Write short note on Biodegradation reactions. **07**

(b) Define and explain following mass transport processes: **07**
Advection, Diffusion and Dispersion.

OR

Q.4 **(a)** Write governing equation for advective-dispersive transport. Give outline of its numerical modeling. **07**

(b) Discuss methods of ground water remediation. **07**

Q.5 **(a)** Explain Darcy's law and give necessary conditions for its application. **07**

(b) With a neat sketch, explain vertical distribution of subsurface water. **07**

OR

Q.5 **(a)** Write short note on interference among wells. **07**

(b) A pumping test of confined aquifer was conducted at a constant discharge of 480 m^3/day. Corresponding time-drawdown data were collected at an observation well 290 m away, as follows: **07**

Time (min.)	1	2	5	10	30	90	150	300	1000
Draw-down (m)	0.03	0.15	0.5	0.95	1.6	2.5	2.9	3.5	4.4

Determine transmissibility and storage coefficient of the aquifer using Jacob's method.

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