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: Storage co-efficient of a confined aquifer, Specific yield, Specific retention, Transmissibility, Intrinsic Permeability, Aquiclude and Aquifer.	**07**
	(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: $$\nabla^2 h = \frac{S}{T}\frac{\partial h}{\partial t}$$	**07**
		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: Advection, Diffusion and Dispersion.	**07**
		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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