GUJARAT TECHNOLOGICAL UNIVERSITY
ME Semester –II Examination Dec. - 2011

Subject code: 1721201   **Date: 09/12/2011**
Subject Name: Ground Water Management
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)**	State Darcy's law and its limitations.	07
	(b)	Define and explain the terms:	07
		(i) Specific yield. (ii) Aquitard (iii) storage coefficient (iv) Transmissibility coefficient (v) Permeability (vi) Perched aquifer (vii) Field capacity.	
Q.2	**(a)**	Explain the theory of Image well.	07
	(b)	Define permeability and discuss the factors affecting permeability.	07
		OR	
	(b)	Explain the importance of ground water management	07
Q.3	**(a)**	Explain Chow's method for determining aqufer parameter S and T.	07
	(b)	A 30cm well penetrates an aquifer of transmissibility of 2×10^5 lpd/m and a storage co-efficient of 0.004 what pumping rate could be adopted so that the drawdown will not exceed 9m. Within the subsequent two yrs of drought.	07
		OR	
Q.3	**(a)**	Ground water flow is irrotational. Explain in details.	07
	(b)	A fully penetrating artision well is pumped at 1500 m^3/day from a aquifer whose $S = 4 \times 10^{-4}$, $T = 0.145$ m^3/min. Find draw down at a dist r1 = 4m from the pumping well after t = 1hr of pumping & dist = 300m after one day also find the approx value of radius of influence after one hour and one day of continues pumping.	07
Q.4	**(a)**	Write short note on conjunctive use of water resources.	07
	(b)	A pump test was conducted on a leaky artesian aquifer 40m thick situated on an impervious base and overlain by a semi confining layer 10m thick. The well was pumped at a constant rate of 1500 lpm. The steady state drawdown in the observation wells are given below. Determine the aquifer constants.	07

Distance of observation well from the pumped well (m)	10	20	60	100	300
Drawdown (m)	0.64	0.52	0.36	0.24	0.07

OR

Q.4 **(a)** Explain ground water legislation. 07

(b) A aquifer averages 45m in thickness and 100ha in area. Determine the volume in ha.m of water available if (a) the aquifer is unconfined and is completely drained (b) The aquifer is confined and the piezometric head is lowered from 25m to 10m above the aquifer. (c) The aquifer is confined and the piezometric head is lowered 50m. Which brings the watertable 20m below the confining layer. Assume sj=15% and s = 2×10^{-4} 07

Q.5 **(a)** How remote sensing play a vital role in ground water exploration? 07

(b) Explain test drilling and water level measurement methods 07

OR

Q.5 **(a)** Derive the continuity equation for confined aquifer and reduced it to the form $\nabla^2 h = (S.\partial h)/(T\partial t)$ 07

(b) In a homogeneous isotropic confined aquifer of constant thickness of 30m, effective porosity of 20% and permeability of 15m/day. Two observation wells 1100m apart indicate piezometric heads of 5.5m and 3.5m respectively above m.s.l . Assuming uniform flow av grain dia of sand 1mm and ν water = 0.01 cm^2 /sec. state (a) whether Darcy's law is applicable ? (b) What is the av. Flow velocity in pores? 07

****

2