GUJARAT TECHNOLOGICAL UNIVERSITY ME- SEMESTER II– EXAMINATION – SUMMER 2015

Subject Code: 2723301 Subject Name: GROUND WATER MANAGEMENT Time: 2:30 PM – 5:00 PM Instructions:

Date:26/05/ 2015

Total Marks: 70

- 1. Attempt all questions.
 - 2. Make suitable assumptions wherever necessary.
 - 3. Figures to the right indicate full marks.
- Q.1 (a) Explain the distribution of subsurface water with the help of a diagram. Also 07 mentioned advantages of ground water compared to surface water.
 - (b) Explain the following terms: specific capacity, specific storage, Intrinsic 07 permeability and perched water table.
- Q.2 (a) Derive the basic differential equation of steady groundwater flow from 07 principle of mass conservation in an unconfined aquifer. State the assumptions involved.
 - (b) A field test for permeability consists in observing the time required for a tracer 07 to travel between two observation wells. A tracer was found to take 10 h to travel between two wells 50 m apart when the difference in the water-surface elevation in them was 0.5 m. the mean particle size of the aquifer was 2 mm and the porosity of the medium 0.3. If $=0.01 \text{ cm}^2/\text{s}$ estimate (a) the coefficient of permeability and intrinsic permeability of the aquifer, and (b) the Reynolds number of the flow.

OR

- (b) Determine the storage coefficient of an aquifer from the following data: 07 porosity = 30%, thickness of aquifer = 25m; bulk modulus of water = 2.1 GN/m^2 ; modulus of elasticity of the soil skelton = $3X10^8 N/m^2$.
- Q.3 (a) Describe a procedure by using Jacobøs method to calculate the aquifer 07 parameters of a confined aquifer by using well pumping data.
 - (b) An unconfined aquifer has thickness of 30 m. a fully penetrating 20 cm 07 diameter well in this aquifer is pumped at a rate of 35 lit/s. the drawdown measured in two observation wells located at a distances of 10 m and 100 m from the well are 7.5 m and 0.5 m respectively. Determine the average hydraulic conductivity of the aquifer. At what distance from the well the drawdown is insignificant?

OR

- Q.3 (a) Derive an expression for discharge under steady radial condition from a well 07 fully penetrating a confined aquifer. State the assumption made in the derivation.
 - (b) A well is located in a 25 m confined aquifer of permeability 30 m/day and 07 storage coefficient 0.005. If the well is being pumped at the rate of 1750 lpm, calculate the drawdown at a distance of 100 m. from the well after 20 h of pumping.
- Q.4 (a) Describe the recovery test to estimate the transmissibility of a confined aquifer. 07

(b) Stream A and B are separated by an unconfined aquifer of width 3.8 km and 07 the depths of flow in them are 18.6 and 12.2 m respectively. Compute the flow from stream A to stream B if the hydraulic conductivity of the aquifer is 0.1 mm/s. Instead of unconfined aquifer, if only confined bed of 8 m exist then find the discharge through it.

OR

Describe the various types of strainers briefly. 07 **Q.4 (a)** Two fully penetrating wells of 20 cm diameter are installed in confined aquifer. 07 **(b)** The distance between the wells is 10 m. Compute their discharge, if drawdown = 1.50 m, thickness of the aquifer = 20 m, coefficient of permeability = 1.10×10^{-4} m/s, R = 180 m. if there is only one well discharging, what would be the percentage increase in the discharge? What are the commonly used methods to assess the recharge of groundwater in Q.5 **(a)** 07 an area? Explain briefly any one method. What are the causes of saline water encroachment? What are the control 07 **(b)** measures for salt water intrusion? OR

Describe the different mechanism of groundwater contamination. Q.5 **(a)** 07 **(b)** Mention the various types of tube wells and write their limitations. 07
