

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

Subject Code: 2723301**Date: 26/05/ 2015****Subject Name: GROUND WATER MANAGEMENT****Time: 2:30 PM – 5:00 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) Explain the distribution of subsurface water with the help of a diagram. Also mentioned advantages of ground water compared to surface water. **07**
- (b) Explain the following terms: specific capacity, specific storage, Intrinsic permeability and perched water table. **07**

- Q.2** (a) Derive the basic differential equation of steady groundwater flow from principle of mass conservation in an unconfined aquifer. State the assumptions involved. **07**
- (b) A field test for permeability consists in observing the time required for a tracer 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 $\nu = 0.01 \text{ cm}^2/\text{s}$ estimate (a) the coefficient of permeability and intrinsic permeability of the aquifer, and (b) the Reynolds number of the flow. **07**

OR

- (b) Determine the storage coefficient of an aquifer from the following data: porosity = 30%, thickness of aquifer = 25m; bulk modulus of water = 2.1 GN/m^2 ; modulus of elasticity of the soil skeleton = $3 \times 10^8 \text{ N/m}^2$. **07**
- Q.3** (a) Describe a procedure by using Jacob's method to calculate the aquifer parameters of a confined aquifer by using well pumping data. **07**
- (b) An unconfined aquifer has thickness of 30 m. a fully penetrating 20 cm 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? **07**

OR

- Q.3** (a) Derive an expression for discharge under steady radial condition from a well fully penetrating a confined aquifer. State the assumption made in the derivation. **07**
- (b) A well is located in a 25 m confined aquifer of permeability 30 m/day and 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. **07**

- 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 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. **07**

OR

- Q.4 (a)** Describe the various types of strainers briefly. **07**

- (b) Two fully penetrating wells of 20 cm diameter are installed in confined aquifer. 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? **07**

- Q.5 (a)** What are the commonly used methods to assess the recharge of groundwater in an area? Explain briefly any one method. **07**

- (b) What are the causes of saline water encroachment? What are the control measures for salt water intrusion? **07**

OR

- Q.5 (a)** Describe the different mechanism of groundwater contamination. **07**

- (b) Mention the various types of tube wells and write their limitations. **07**
