Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- V EXAMINATION-SUMMER 2023

Subject Code: 3151311 Date: 23/06/2023

Subject Name: Groundwater Hydrology and Contamination

Time: 02:30 PM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1*	**(a)**	Differentiate between Confined and Unconfined aquifer.	**03**
	(b)	Explain the Darcy's law. What is its limitation? Discuss its validity.	**04**
	(c)	What is ground water? Discuss vertical distribution of ground water with neat Sketch.	**07**
Q.2	**(a)**	Write the assumptions made in dupuit's theory.	**03**
	(b)	Differentiate between Groundwater and Surface water.	**04**
	(c)	Derive the expression for steady radial groundwater flow in Unconfined aquifer.	**07**
		OR	
	(c)	Derive the expression for steady radial groundwater flow in Confined aquifer.	**07**
Q.3	**(a)**	What is Cone of depression? Explain with Diagram.	**03**
	(b)	Explain the recuperation test to estimate the safe yield of an open well.	**04**
	(c)	Water is pumped out at the rate of 2500 lit/min from a well of 0.3 m diameter, penetrating fully in an aquifer of 30 m thickness. The draw downs observed in two adjoining wells at 20 m and 120 m from the pumping well are 8 m and 0.6 m respectively. Determine the average hydraulic conductivity.	**07**
		OR	
Q.3	**(a)**	What do you mean by Artesian well?	**03**
	(b)	Explain the pumping test to estimate the safe yield from an open well.	**04**
	(c)	Design a tube well for the following data. 1) yield required = 0.081cumsec 2) Thickness of confined aquifer = 30 m 3) Radius of circle influenced = 300 m 4) Permeability coefficient = 60 m/day 5) Draw down = 5.1 m	**07**
Q.4	**(a)**	A pumping test was conducted for an open well of diameter 3.6m. the water was pumped out at a constant rate of 300lit/min. find Specific yield. Take h=3.5 m.	**03**
	(b)	Enlist the site selection criteria for artificial recharge.	**04**
	(c)	Enlist Groundwater pollution remediation methods and explain any one in detail.	**07**
		OR	
Q.4	**(a)**	Explain the different methods of waste water recharge for reuse.	**03**

	(b)	Explain artificial recharge for "energy purpose".	**04**
	(c)	Explain in detail different sources responsible for ground water pollution with causes.	**07**
Q.5	**(a)**	Give the difference between fully and partial penetrating wells.	**03**
	(b)	Explain induced recharge method with their flow pattern.	**04**
	(c)	An artesian tube well has a diameter of 20 cm. the thickness of an aquifer is 30m and its permeability is 40 m/day. Find its yield under a drawdown of 5 m at the well face use radius of influence as recommended by sichardt.	**07**

OR

Q.5	**(a)**	Explain the following terms: (1) porosity (2) permeability (3) transmissibility.	**03**
	(b)	Write down Indian standards for Groundwater quality.	**04**
	(c)	A well penetrates fully a 10 m thick water bearing stratum of medium sand having coefficient of permeability of 0.05 m/sec. the well radius is 10cm and is to be worked under a drawdown of 5 m at the well face. Calculate the discharge from the well. What will be the percentage increase in the discharge if the radius of the well is doubled? Take R= 300m in each case.	**07**

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