Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2161307 **Date: 08/05/2017**

Subject Name: Ground Water Contamination

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

MARKS

Q.1 **Short Questions** **14**

1 What is the process by which water enters the small pore spaces between particles in soil or rocks
(1)Transpiration (2) inflitration (3) precipation (4) sublimation

2 The percentage of a rock's total volume that is taken up by pore space is called the _____ .
(1) permeability (2) recharge (3) aquifer (4) porosity

3 The boundary between the saturated zone and the unsaturated zone is called the_____ .
(1) water table (2) aquifer (3) aquiclude (4) porosity

4 The infiltration of water into the subsurface is the _____ .
(1) influent (2) effluent (3) discharge (4) recharge

5 With respect to the Earth's land surface, which of the following expressions is correct?
(1) precipitation = evaporation – runoff
(2) precipitation = runoff - evaporation
(3) precipitation = evaporation + runoff
(4) precipitation = evaporation * runoff

6 Layers that transmit groundwater are called _____.
(1) aquicludes (2) aquifers (3) influent streams (4) unsaturated zones

7 Which of the following can contaminate an aquifer?
(1) landfills (2) agricultural regions (3) gas stations (4) all of these

8 What is an aquifer?
(1) A geyser. (2) A high discharge spring.(3) A permeable rock type.
(4) A reservoir of ground water.

9 What is formed when water is removed from a well?
(1) Cavern.(2) Cone of depression (3) Cone of discharge.(4) Zone of aeration.

10 Darcy's Law states that the volume of water flowing through a cross-sectional area per time is equal to _____.

(1) porosity & hydraulic conductivity
(2) porosity & water table slope
(3) hydraulic conductivity & water table slope
(4) porosity & hydraulic conductivity & water table slope

11 What is an artesian well?
(1) A free-flowing well (2) A geyser.(3) A very deep well.
(4) Any well where water rises above the aquifer itself.

12 Which of the following phenomena results from water being pumped from a well?

(1) The surrounding water table is raised in a upward-pointing cone
(2) The surrounding water table is lowered in a downward-pointing cone
(3) The surrounding water table is raised in a cone that points upslope
(4) The surrounding water table is lowered in a cone that points downslope

13 Permeability is _____

(1) the ability of a solid to allow fluids to pass through (2) the process by which plants release water vapor to the atmosphere
(3) the amount of water vapor in the air relative to the maximum amount of water vapor the air. can hold.
(4) the percentage of pore space in the rock

14 Excessive pumping in relation to recharge can cause_____
(1) the water table to decline (2) a cone of depression (3) the well to go dry
(4) all of these

Q.2 **(a)** Write the assumptions made in dupuit's theory. **03**

(b) Explain the following terms: (1) porosity (2) permeability (3) transmissibility (4) specific yield **04**

(c) Explain the Darcy's law. What are its limitations. Discuss its validity. **07**

OR

(c) Design a tube well for the following data: **07**

(1) yield required = 0.081cumsec

(2) thickness of the confined aquifer=30m

(3) radius of circle influenced =300m

(4) permeability coefficient =60 m/day

(5) drawdown =5.1 m

Q.3 **(a)** Explain the pumping test to estimate the safe yield from an open well. **03**

(b) What is ground water? Discuss the vertical distribution of ground water with neat sketch. **04**

(c) Derive the equation for steady radial flow to well in unconfined aquifer. **07**

OR

Q.3 **(a)** Explain in detail ground water sampling. **03**

	(b)	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	**04**
	(c)	Derive the equation for steady radial flow to well in confined aquifer.	**07**
Q.4	**(a)**	Explain site selection criteria for artificial recharge.	**03**
	(b)	Explain the different methods of waste water recharge for reuse.	**04**
	(c)	What is artificial recharge? Explain different artificial recharge methods of ground water.	**07**

OR

Q.4	**(a)**	Explain induced recharge method with their flow pattern.	**03**
	(b)	Explain in detail different sources responsible for ground water pollution with causes.	**04**
	(c)	Enlist & explain ground water remediation methods.	**07**
Q.5	**(a)**	Discuss in detail ground water budget.	**03**
	(b)	Explain in detail how to monitor groundwater quality	**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)**	Difference between fully and partial penetrating wells.	**03**
	(b)	Explain in detail method of images.	**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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