

**B TECH**  
**(SEM VIII) THEORY EXAMINATION 2018-19**  
**GROUND WATER MANAGMENT**

Time: 3 Hours

Total Marks: 100

**Note** Attempt all Sections if you require any missing data, do so suitably.

**S E C T I O N**

**1. Attempt the questions brief. 2 x 10 = 20**

- a. What is the surface of seepage and free surface curve?
- b. What is hygroscopic water?
- c. Write the assumptions for steady flow condition for confined and unconfined aquifer.
- d. Explain the terms Specific yield and specific retention of an aquifer.
- e. Define efficiency of well.
- f. What are the merits and demerits of partial penetration of wells?
- g. State Darcy's law and its limitations.
- h. If a water sample has a TDS of 1152 mg/l and EC of 1800 units, calculate the specific resistance in ohms of another water sample which has a TDS of 6400 mg/l.
- i. What is up-coning effect in sea water intrusion?
- j. Write the principle behind the transport of groundwater contamination in aquifer.

**SECTION B**

**2. Attempt any three of the following: 10 x 3 = 30**

- a. Explain the following terms :  
(i) Well loss and specific capacity  
(ii) Interference among wells  
(iii) Real well and image well  
(iv) Confined and perched aquifer.
- b. Derive an expression for discharge from a well fully penetrating a confined aquifer.
- c. A 60 cm well is being pumped at a rate of 1360 litres per minute. At a distance of 6 m from the well being pumped, the draw down was 6m and at 15 m the draw down was 1.5 m. The bottom of the well is 90 m below the groundwater table, (a) Find out K, (b) If all the observed points were on the Dupuit's curve, what was the draw down in the well during pumping? What is the specific capacity of the well? What is the rate at which water can be drawn from this well?
- d. What do you mean by salt water intrusion in coastal aquifer? What is the method to locate it? Explain the various methods to limit salt water intrusion.
- e. Define SAR and give SAR based classification of ground water. What are the components of ground water recharge and write about the catchment or Watershed model approach to the computation of recharge.

## SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Explain the method of determining the coefficient of transmissibility, of a confined aquifer by pumping out test. What do you mean by storage coefficient?
- (b) Discuss briefly as to how the water is stored into the ground water reservoir. Briefly mention the various zones and importance of the zone of saturation in this connection.
4. Attempt any *one* part of the following: 10 x 1 = 10
- (a) (i). Describe in brief various methods of developing a tubewell. What do you mean by recuperation test?  
(ii). Design a tube-well for the following data :
- |                                   |              |
|-----------------------------------|--------------|
| Yield required                    | = 0.08 cumec |
| Thickness of the confined aquifer | = 30 m       |
| Radius of circle of influence     | = 300 m      |
| Permeability coefficient          | = 60 m/day   |
| Draw-down                         | = 5 m.       |
- (b) What is the development of tube wells and also explain tube well development methods.
5. Attempt any *one* part of the following: 10 x 1 = 10
- (a) A 30 cm well completely penetrates an unconfined aquifer of saturated depth 40m. After a long period of pumping at a steady rate of 1500 lpm, the drawdown in two observation wells 25 m and 75 m from the pumping well were found to be 3.5 m and 2.0 m respectively. Determine the transmissibility of the aquifer. Find also the drawdown at the well.
- (b) The aquifer properties S and T of a confined aquifer in which a well is driven are known. Explain a procedure to calculate the drawdown at a location away from the well at any instant after the pump has started.
6. Attempt any *one* part of the following: 10 x 1 = 10
- (a) What is the need for groundwater management models? How database management will be helpful for the groundwater management.
- (b) Explain the physical, chemical and biological water quality standards for various purposes.
7. Attempt any *one* part of the following: 10 x 1 = 10
- (a) How can GIS be useful in artificial recharge of ground water? Discuss in detail.
- (b) Define and explain in detail the ground water basin management ideas and aspects.