

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

Time: 3 Hours

Total Marks: 100

Note: Attempt all Sections. If require any missing data; then choose suitably.

## SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

- a. What is hygroscopic water?
- b. What do you mean by perched aquifer?
- c. What is Darcy's law?
- d. What do you mean by recuperation test?
- e. Write the advantages and disadvantages of open well irrigation.
- f. Explain the concept of conjunctive use.
- g. How can GIS be useful in artificial recharge of ground water?
- 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. Define SAR.
- j. Why artificial recharging the underground storage is needed?

## SECTION B

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

- a. In a homogeneous isotropic confined aquifer has a constant thickness of 20 m, effective porosity of 20% and permeability of 15 m/day, two observation wells 1200 m apart indicate piezometric heads of 5.4 m and 3.0 m above MSL respectively. Assuming uniform flow, average grain diameter of sand 1 mm and kinematic viscosity ( $\nu$ ) of water =  $0.01 \text{ cm}^2/\text{s}$ , state (a) whether Darcy's law is applicable? And (b) what is the average flow velocity in pores?
- b. Derive an expression for the yield of a well penetrating a confined aquifer stating the assumptions made.
- c. Distinguish between the following:
  - i. Cavity type and slotted type tube well
  - ii. Storage coefficient and transmissibility coefficients
- d. Write short notes on the following :
  - (i) Sources of contamination of groundwater and preventive measures.
  - (ii) Groundwater modelling techniques.
  - (iii) Groundwater drainage.
- e. What are the various design considerations of wells? Also write about the various methods to maintain the wells.

## SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

- (a) 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.

- (b) Explain the following :
- (i) The extent of radius of influence
  - (ii) Assumptions in Dupuit's theory
  - (iii) Cone of depression
  - (iv) Drawdown.

**4. Attempt any *one* part of the following: 10 x 1 = 10**

- (a) A 20 cm well fully penetrates a confined aquifer 20 m deep. Two observation wells located at  $r = 15\text{m}$  and  $r$  m from the pumped well are found to have drawdown of 2 m and 1 m respectively. Determine the pumping rate and the radial distance of second well.
- (b) With the help of neat sketches, differentiate between different types of aquifers. Prove that porosity of an aquifer is sum of the specific yield and specific retention.

**5. Attempt any *one* part of the following: 10 x 1 = 10**

- (a) Explain the terms well development and well shrouding. Also discuss the various methods of well development.
- (b) Two tube wells each of 24 cm diameter are spaced at 96 m distance. Both the wells penetrate fully an artesian aquifer of 16 m thickness. Calculate the discharge if only one well is discharging under depression head of 4 m. What will be percentage decrease in discharge, if both the wells are discharging under the depression of 4 m? Given radius is 300 m and coefficient of permeability as 44 m/day.

**6. Attempt any *one* part of the following: 10 x 1 = 10**

- (a) 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.
- (b) Explain the method of image used in ground water flow and its uses.

**7. Attempt any *one* part of the following: 10 x 1 = 10**

- (a) Write short notes on :
  - (i) Ground Water Budgeting
  - (ii) Surface and sub-surface investigation of ground water.
- (b) What do you mean by interference among wells? How compute discharge from such interfering wells.