# B TECH
## (SEM VIII) THEORY EXAMINATION 2017-18
## 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 (v) of water = 0.01 cm$^2$/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 $r_1$ = 15m and $r_2$ 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 difference 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 is 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.