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**Question Paper Code : X11188**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020 AND  
APRIL/MAY 2021  
Seventh/Eighth Semester  
Civil Engineering  
CE 8016 – GROUNDWATER ENGINEERING  
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Distinguish between aquifer and unconfined aquifer.
2. Write the Dupuit's equation for a one-dimensional steady groundwater flow ? State its assumptions.
3. State Darcy's law and its application.
4. How does specific capacity help in monitoring well performance ?
5. What is the need for groundwater management model ?
6. Write down the ground water balance equation.
7. Mention the need for water quality standards and what are the industrial quality water requirements ?
8. List any two causes and prevention method of ground water pollution.
9. What is Soil Aquifer treatment ? And list the process involved.
10. List four important factors to be considered for the selection of the region for recharge structure.

PART – B

(5×13=65 Marks)

11. a) Explain the objective of GEC and state the norms given by GEC.

(OR)

- b) Briefly elaborate on the formation constants which characterize an aquifer.

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12. a) Write the assumptions involved in Non equilibrium well pumping.  
(OR)
- b) A 30 cm well fully penetrate a confined aquifer 30 m deep. After a long period of pumping at a rate of 1200 lpm, the drawdown in the well at 20 and 45 m from-the pumping well are found to be 2.2 and 1.8 m respectively. Determine transmissibility of the aquifer. What is the drawdown ?
13. a) Explain four modeling approaches in hard rock aquifer system.  
(OR)
- b) Explain the ground water management system in India use any case study if necessary.
14. a) What are the factors influencing the composition of groundwater and write the chemical composition ?  
(OR)
- b) Describe the physical, chemical and biological water quality standards for various purposes.
15. a) Exemplify the managing steps available to conserve groundwater.  
(OR)
- b) Explain the preventive measures to control seawater intrusion.

PART – C

**(1×15=15 Marks)**

16. a) Discuss in detail about i) Hydrogeological modeling and Boundary condition  
ii) Groundwater flow equation used iii) Software used to model and model design iv) Model calibration.  
(OR)
- b) List out the various methods of artificial recharge and explain any four methods in detail with neat sketch.
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