

2022

GROUND WATER HYDROLOGY

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ALL questions.

1. a) Write in details about the following 10*2 = 20
- i.* Advantages and disadvantages of artificial recharge
 - ii.* Time-drawdown relationships in well hydraulics for constant, discrete and variable pumping cases
2. a) Derive the governing equation for equivalent hydraulic conductivity for parallel strata to flow direction. 10
- b) Discuss about various ground water flow modelling techniques and their applications. 10
3. a) A well 0.5 m in diameter penetrates 33 m below the static water table. After a long period of pumping at a rate of $80 \text{ m}^3/\text{hr}$, the drawdown in wells 18 and 45 m from the pumped well were found to be 1.8 and 1.1 m respectively. 10
- i)* What is the transmissivity of the aquifer?
 - ii)* What is the approximate drawdown in the pumped well?
 - iii)* Determine the radius of influence of the pumping well.
- b) Write in details about various techniques of ground water recharge. 10
4. a) Derive the governing equation for a well when aquifer is unconfined homogeneous and isotropic. Consider flow is steady. 10
- b) Find the solution of question no. 4(a). 10

5. a) Derive the three dimensional advection-dispersion equation for solute transport in porous media. 10
- b) Discuss about any two methods of estimation of ground water recharge. 10

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