

U.S.N.								
--------	--	--	--	--	--	--	--	--

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E.

Semester: VII

Branch: Civil Engineering

Duration: 3 hrs.

Course Code: 22CV7PEGWH / 21CV7PEGWH

Max Marks: 100

Course: Groundwater Hydrology

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I			CO	PO	Marks
1	a)	With neat sketch, enumerate the different zones of subsurface water.	1	1	07
	b)	Distinguish between confined and unconfined aquifers with sketches.	1	1	07
	c)	Write a note on the importance of groundwater resources in India.	1	1	06
OR					
2	a)	Explain Darcy's Law and discuss its assumptions and limitations.	1	1	07
	b)	An artesian aquifer 20 m thick has a porosity of 20% and bulk modulus of compression 10^8 N/m^2 . Estimate the storage coefficient of the aquifer with respect to the types of soil, given bulk modulus of elasticity of water as $2.1 \times 10^9 \text{ N/m}^2$.	1	1	07
	c)	Differentiate between specific yield and storage coefficient.	1	1	06
UNIT - II					
3	a)	Explain Theis method to determine aquifer constants S and T for the unsteady radial flow towards a well. Also, state the assumptions involved.	2	1	10
	b)	A well that pumps at a constant rate of $0.5 \text{ m}^3/\text{s}$ fully penetrates a confined aquifer of 34 m thickness. After a long period of pumping at a steady rate, the measured drawdowns at two observation wells 50 m and 100 m from the pumping well are 0.9 m and 0.4 m, respectively.	2	1	10
	i)	Calculate the hydraulic conductivity of the aquifer			
	ii)	Estimate the expected drawdown in the pumping well, if the radius of the well is 0.4 m.			
OR					

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

	4	a)	Derive the discharge equation for steady radial flow into a well in a confined aquifer and list the assumptions involved.	2	1	10
	b)	A well penetrating a confined aquifer is pumped at a uniform rate of 2,500 m ³ /day. Drawdowns during the pumping period are measured in an observation well 60 m away; observations of t and s of the Theis equation are listed in the table below. Determine the transmissivity T and the storage coefficient S for this confined aquifer.				
UNIT - III						
5	a)	Explain the process and the methods of artificial groundwater recharge with appropriate neat sketches.	2	1	10	
	b)	Elaborate on the sources and impact of groundwater pollution.	3	1	10	
OR						
6	a)	List the main factors affecting the quality of ground water. Also, explain the concepts of advection and dispersion in analyzing the quality of groundwater.	3	1	12	
	b)	Elaborate on groundwater salinity and the remediation methods.	3	1	08	
UNIT - IV						
7	a)	State and derive the Ghyben-Herzberg relation representing the hydrostatic equilibrium between the freshwater and saline waters.	3	1	10	
	b)	Explain the phenomenon of salt water intrusion. Also, explain the shape and structure of fresh and saline water interface.	3	1	10	
OR						
8	a)	Elaborate on the upconing of saline water in coastal aquifers.	3	1	08	
	b)	Explain with neat sketches, different scientific approaches to control the seawater intrusion into coastal aquifers.	3	1	12	
UNIT - V						
9	a)	Elaborate on the electrical resistivity method of groundwater exploration and state its advantages.	3	1	10	
	b)	With neat sketches, compare the electric logging and radioactive logging methods in groundwater exploration.	3	1	10	
OR						
10	a)	Illustrate the groundwater exploration by seismic refraction method and list the challenges involved in the method.	3	1	10	
	b)	Compare the induction logging and sonic logging methods in groundwater exploration.	3	1	10	
