

BACHELOR OF CIVIL ENGINEERING 3RD YEAR EXAMINATION, 2018

(1st-Semester Supplementary)

SUBJECT: Ground water Hydrology and Conservation

Time: Three hours

Full Marks 100

Use a separate Answer-Script for each part

No. of Questions	Part I (60 marks)	Marks
	Question numbered 1 is compulsory and any four from the rest. Answer should be brief and to the point. Use pencil for any sketch. Assume any relevant data if not provided	
Q1.	Define: storativity, specific capacity, transmissivity, drawdown in the well, cone of depression, hydrodynamic control, NAPL, point source of ground water pollution, rainwater harvesting, well efficiency	2×10=20
Q2.a)	Write two uses of well other than the water abstraction. Write two basic assumptions regarding unsteady state of drawdown in and around the well from a confined aquifer?	2×2
b)	With a neat labeled schematic diagram deduce the expression of unsteady state of drawdown in and around the well from a confined aquifer.	6
Q3.a)	Deduce the expression of unsteady state of drawdown at the barrier boundary for an abstraction well of 20cm radius located in a confined aquifer pumped at the rate of 2000 lpm with a neat labeled schematic diagram. The abstraction well is located at a distance of 150m from the boundary.	6
b)	Using that expression, determine the drawdown at the barrier boundary if the transmissivity of the aquifer is 0.2 m ² /s. Instead of barrier boundary if it was recharge zone then what may be the effect on the drawdown?	3+1
Q4.a)	Write the name of the two tests to determine the storativity and transmissivity for an aquifer. What is the basic difference between the two tests?	2+1
b)	Write a short note on well loss with a neat sketch.	5
c)	If multiple wells are closely present what may be the effect in the drawdown and why?	2
Q5.a)	Write two methods for pollutants transport through ground water. Name three methods by which you can represent the chemical characteristics of ground water graphically. What do you mean by residual sodium carbonate?	2+3+2
b)	Explain in-situ remediation of ground water contamination with an example.	3
Q6.a)	As per UNEP classify different countries of the world based on the water availability and also write the respective values.	3
b)	Relate the concept of environmental sustainability with the water conservation. Explain four strategies you can suggest for conserving our water resources?	3+4

B. CIVIL ENGG. 3rd YEAR 1st SEMESTER SUPPLEMENTARY EXAMINATION 2018
(1st Semester)

GROUND WATER HYDROLOGY AND WATER CONSERVATION

Time: Three Hours

Full Marks 100

Use a separate Answer-Script for each part

Question No.	Part II (40 Marks)	Marks
<p><i>Answer ANY TWO questions from this Part.</i> <i>Assume reasonable values of data, if not supplied.</i> <i>No code is required to answer the questions of this part</i></p>		
Q.1	a) Illustrate confined and unconfined aquifers.	7
	b) Explain the term "Specific yield" and Storage coefficient".	7
	c) An aquifer has an average thickness of 100 m and an aerial extent of 200 ha. Estimate the available ground water storage in the unconfined aquifer if fluctuation of GWT is observed to be 18 m. Assume specific yield = 16 %.	6
Q.2	a) Explain the phenomenon of saline water intrusion in fresh water aquifer with the help of a neat sketch.	5
	b) What are the possible sources of saline water in fresh water aquifer?	7
	c) Two rivers A and B are separated by a landmass by 1.5 km and form a confined aquifer of thickness 1.5 m. the water levels in river A and B are 40 m and 20 m respectively. The permeability of the aquifer is 12 m/day. Estimate the discharge from A to B.	8
Q.3	a) A confined aquifer has a thickness of 50 m and a porosity of 45 %. If the bulk modulus of elasticity of water and the formation material are 2.2×10^5 N/cm ² and 7800 N/cm ² respectively, calculate storage coefficient, barometric efficiency and tidal efficiency of the aquifer.	8
	b) Illustrate unsteady flow and deduce Laplace's Equation for unsteady flow. Hence bring out the equation for steady flow.	3+6+3 =12