and its availability and characteristics can be challenging to assess. Briefly discuss the following methods that can be used to evaluate groundwater resources, such as tracer tests and geophysical methods.   2.5+2.5

5. a) What are the different types of seawater-groundwater interactions in coastal aquifers, and what are the consequences of these interactions?

   b) How does the Ghyben-Herzberg relationship explain the position of the freshwater-saltwater interface in a coastal aquifer system?

   c) Write a short note on Ganges Water Machine?

                                                          2+1+2

M. Sc. Applied Geology Examination, 2023

(2nd Year, 2nd Semester)

Hydrogeology

Paper – CORE/TH/12

Time : Two hours   Full Marks : 40

(Use a separate Answer script for each Part)

PART – I (20 Marks)

Answer *any two* questions.

1. Explain the methodology adopted for groundwater resources estimation and assessment in India. Write a note on basic chemistry of arsenic and its toxic effect on health.   7+3=10

2. How do you design an ideal irrigation well for groundwater exploration? What are the uses of bentonite mud? An aquifer of an average thickness 50 m is extended over an area of 100 hectare. The ground water level fluctuation is 10 m. The specific yield of the aquifer is 0.20. What will be the dynamic storage of the aquifer?

   6+2+2=10

3. What do you mean by 'Aquifer'? What do you mean by 'Drilling time log'? Which areas of a hard rock terrain would be an ideal location to construct a well? What is Vertical Electrical Sounding (VES)? What is the relationship between porosity and hydraulic conductivity

                                                          [Turn over

of clay bed? 2+2+2+2+2=10

PART – II (20 Marks)

Answer question **no. 1** and any **three** from the rest.

1. Write whether the following statements are True or False:

1×5

a) Groundwater is a nonrenewable resource, meaning that once it is depleted, it cannot be replenished.

b) Groundwater models can be used to simulate the behavior of groundwater systems and predict their response to various factors, including pumping and recharge.

c) The hydraulic conductivity of an aquifer is a measure of both the permeability and porosity of the rock or sediment.

d) The use of tracers, such as isotopes and fluorescent dyes, can help determine the direction and velocity of groundwater flow.

e) Streams can be gaining in some locations and losing in others; however, at a particular location cannot be gaining at some times and losing at others.

2. a) Explain important components and factors of groundwater recharge and storage processes with a relevant diagram.

b) Suppose you are part of a team tasked with designing

a groundwater monitoring network to track changes in groundwater levels over time. Discuss the factors that you would consider when designing this network, including aquifer properties, land use and land cover, geology and topography. 2.5+2.5

3. a) With advances in remote sensing technology, it is now possible to monitor changes in groundwater storage at regional and global scales. Discuss the potential applications of remote sensing data for groundwater management, including tracking the changes in groundwater availability and assessing groundwater-dependent ecosystems.

b) Groundwater is an essential component of the global water cycle, helping to regulate water flow between the atmosphere, land surface, and oceans. Discuss the role of groundwater in the global water cycle and the potential impacts of climate change on groundwater. 2.5+2.5

4. a) Aquifer depletion is a common problem in many parts of the world, and it can significantly impact water availability, land subsidence, and ecosystem damage. Discuss the factors that contribute to aquifer depletion and the strategies that can be used to manage groundwater sustainably.

b) Groundwater is often viewed as a hidden resource,