Total number of printed pages: **02**

PG/1st/PCEW1125

2023

Groundwater Hydrology

Full Marks : 100

Time : Three hours

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

*Answer **ALL** questions.*

1. Write a short notes on the following — 5*2 = 10
   a) Aquifuge
   b) Advantages and disadvantages of artificial recharge

2. During January 2019, the water budget terms for Gaurang River in Kokrajhar included rainfall of 1.9 inch, evaporation of 1.5 inch, surface water inflow of 0 inch, surface outflow of 17.4 inch and change in river volume is negligible. Determine the net groundwater flow for January 2019. — 10

3. Derive the three dimensional advection-dispersion equation for solute transport in porous media. — 15

4. Write a short notes on the following — 5*2 = 10
   a) Transmissivity
   b) Saline water intrusion in aquifers

5. a) Derive the governing equation for a well when aquifer is unconfined homogeneous and isotropic. Consider flow is steady. — 15
   b) Find the solution of question no. 5(a). — 10

6. An unconfined aquifer consist of three layers, each individually isotropic. The top layer has a thickness of 10 m and hydraulic conductivity of 11.6 m/day. The middle layer has a thickness of 4.4 m and a hydraulic conductivity of 4.5 m/day. The bottom layer has a thickness of 6.2 m and a hydraulic conductivity of 2.2 m/day. Compute the equivalent horizontal and vertical hydraulic conductivities. 10

7. A fully penetrating well in a confined aquifer is being pumped at a constant rate of 2000 lpm. The aquifer is known to have a storage coefficient of 0.005 and transmissibility of 480 m^2/day. Find the drawdown at a distance of 3 m from the production well after (i) One hour and (ii) 8 hours of pumping. 10

8. A Confined aquifer has a thickness of 30 m and a porosity of 32%. If the bulk modulus of elasticity of water and the formation material are 2.2 X 10^5 and 7800 N/cm^2 respectively. Calculate the storage coefficient. 10