Total No. of Questions : 8]

SEAT No. :

P4225

[Total No. of Pages : 3

[4860]-604

M.E. (Civil) (Water Resources and Environmental Engineering)
a - GROUND WATER CONTAMINATION AND TRANSPORT
(2012 Pattern) (Semester - I) (Elective-I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt any three questions from section I and any three questions from section II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Discuss with help of sketch various groundwater formation. **[6]**

b) Define the following terms and briefly discuss their significance. **[8]**

i) Porosity

ii) Permeability

iii) Transmissibility

iv) Specific yield

c) In a flow net analysis, the number of flow line is 18 and the number of hydraulic head drop is 6. Flow is occurring in a medium having hydraulic conductivity 0.005cm/sec and head loss is 30m. Calculate the average discharge. **[4]**

Q2) a) Discuss in detail laboratory method of determination of hydraulic conductivity either by falling head or constant head method. **[8]**

b) In a field test, a tracer took 8 hours to travel between two observation wells which are 56m apart. The difference in water table elevations in these well were 0.7m. The volume of void of the aquifer is 30% of the total volume of the aquifer. Calculate the hydraulic conductivity and intrinsic permeability of the aquifer. Viscosity of water is 0.993×10^{-3} Ns/m^2. **[8]**

P.T.O.

Q3) a) What are the different methods to obtain solution to groundwater flow equation? Explain in detail. **[8]**

b) State Darcy's law. Groundwater flows through an aquifer with a cross sectional area of 1.0×10^4 m^2 and a length of 1500m. Hydraulic heads are 300m and 250m at the ground water entry and exit points in the aquifer, respectively. Groundwater Discharges into a stream at the rate of $1555 m^3$/ day. What is the hydraulic conductivity of the aquifer? If the porosity of the material is 0.3, what is pore velocity of water? **[8]**

Q4) Write note on **[16]**

a) Role of groundwater as a source of water resource of the country.

b) Aquifer exploration

c) Hydrologic cycle

d) Effect of sewage disposal on land.

SECTION-II

Q5) a) Define artificial recharge. Discuss in detail different methods of artificial recharge. **[8]**

b) Explain the groundwater resources development in the view of groundwater pollution. **[6]**

c) Discuss the role of adsorption in organic chemical transfer of soil. **[4]**

Q6) a) Explain dispersion analysis of contaminants transport in fractured rock. **[4]**

b) Discuss **[6]**

i) Molecular diffusion

ii) Homogeneous reaction

as applied to contaminant transport

c) Discuss tracer test for spreading of contamination in groundwater with the help of breakthrough curve. **[6]**

Q7) a) Explain the advantages and disadvantages of numerical methods in groundwater problem. State different numerical methods and discuss finite difference method. **[6]**

b) In context of contaminant transport explain the measurement of parameters such as velocity and dispersivity. **[6]**

c) Discuss the field measurement of index parameters such as pH, redox potential, dissolved oxygen and electrical conductance. **[4]**

Q8) Write note on **[16]**

a) Environmental isotopes

b) Oxidation and reduction process

c) Salt water intrusion

d) Sources of groundwater contamination