

INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR

Date: FN/AN Time: 2 Hrs Full marks: 60 No of students: 07
Department of Geology & Geophysics Sub. No. EX 60014 Subject Name:

Groundwater Exploration and Management Examination: Mid semester Spring, 2010

Instruction: Answer all questions

- 1.a) What is Darcy's law? Why is Darcy's law not applicable if the Reynolds number of a fluid flow more than one? (3+3)
- b) Determine hydraulic head for un-confined aquifer, assume flow is unidirectional. (4)
- c) Explain "porosity= specific yield + specific retention" (3)

2. a) Determine hydraulic conductivity of un-confined aquifer assuming flow is radial. (5)

- b) A 70 cm well penetrates 40 m below the static water table. After a long period of pumping at a rate of 50 m³/day, the draw downs in the wells at 15 and 40 m from the pumped well were 4 and 2 m, respectively. Determine the hydraulic conductivity of the aquifer. (5)

- 3) Discuss Theis method (graphical) of determining storativity and transmissivity of confined aquifer. (7)

- 4) Explain the Petrophysical properties of permeable and low permeable rocks for consolidated rock, unconsolidated rock, Clay and till. (7)

- 5) Discuss briefly the physical basis, instruments, conduction of gravity and magnetic field surveys, data processing and interpretation of anomalies for a hard rock terrain applied to Groundwater exploration. (9)

- 6) Discuss radio magnetotellurics technique (RMT) and its utility in Ground water exploration. Derive the relation for apparent resistivity for a RMT set up. (7)

- 7) Explain the concept of Electromagnetic fields, and prove the ellipse of polarization of EM fields for a good conductor and an insulator. (7)