



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SET 430: GROUNDWATER EXPLORATION AND EXPLOITATION

DATE: THURSDAY, 1ST DECEMBER 2011

TIME: 8.00 A.M. – 10.00 A.M.

Instructions: Answer question 1 and any other two questions

1. (a) A detailed comprehensive study of groundwater and conditions under which it occurs can be made by both surface and subsurface groundwater investigations. Describe any three groundwater surface investigations methods clearly stating their advantages and disadvantages (12 marks)

- (b) State the Archie's law of resistivity as used in groundwater flow and then determine the conductivity and salinity of various types of water shown in the Table below;

Type of water	Resistivity (ohm.m)	Conductivity	Salinity (mg/l)
Very Fresh	200	-	-
Fresh	20	-	-
Salted (little)	10	-	-
Sea water	0.3	-	-

(8 marks)

- (c) A seismic survey data from field investigations yielded data for dipping a two layer case in which the following values were obtained; Velocity in layer 1 of the seismic refraction $V_1 = 1570$ m/s, the slope of the downdip $m_d = 1.54 \times 10^{-4}$ s/m, the slope of the updip $m_u = 1.67 \times 10^{-4}$ s/m, and the intercept time for the downdip and updip was $T_{id} = 0.046$ s, $T_{iu} = 0.050$ s respectively. Calculate;

- The velocity of the lower bed V_2
- The depth of the lower layer at the updip end Z_u
- The depth of the lower layer at the downdip end Z_d

(10 marks)

2. With the aid of diagrams describe all the components of a water well design and installation and describe all the factors to be considered when deciding the location of the well (20 marks)
3. There are two main types of wells each distinguished by the diameter of the borehole. Describe the types of wells clearly and any two primary methods used in drilling (20 marks)

4. Describe the terms; “well completion” and “well development” as applied in water well design and installation (20 marks)
5. Discuss the sources of groundwater pollution and the groundwater treatment remedies that can be applied to protect the groundwater resources. (20 marks)
