

Instructions to candidates

Duration: 01 hour

Number of questions: 3 Essay

Answer TWO (02) questions only

Mark allocation: 50 Marks

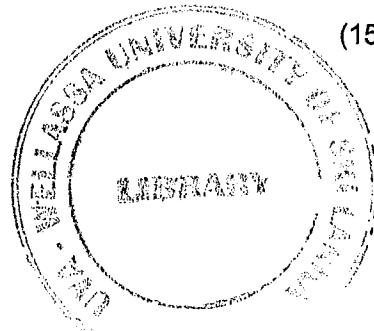
1. For each of the applications listed below, indicate (i) the primary geophysical method(s) that should be used, (ii) why that method is particularly appropriate, (iii) proposed methodology for achieved the task, (iv) one or more limitations of the method(s) that should be considered;
 - a. Identify the possible groundwater sources in agricultural area (5 km x 5 km) which has cross cutting dykes and sills. Some of them are not exposed to the surface.

(10 Marks)
 - b. Geothermal production well is located close proximity to the city area and large amount of hot-water is pumped on daily basis for binary geothermal power plant. Continues monitoring of well is essential for reducing the risk of land subsidence.

(15 Marks)
2. Saline ground water can lead to serious problems for water supply, especially under arid climatic conditions.
 - a. Salt water intrusions are classical target for electrical measurements. Do you agree with this statement? Justify your answer.

(5 Marks)
 - b. Following Figure 01 shows the fresh water pump well located in a coastal area. This is the major feeding well for distributing drinking water to the coastal city. Due to the increasing water demand, e.g. due to tourism, the observation of salt/ fresh water interface is essential to enable a safe water supply. Following table gives you the vertical electrical soundings (VES) conducted in the site before and after development. Plot both VES soundings in the given graph sheet and discuss your results.

(15 Marks)



AB/2	MN/2	App. Resistivity (ohm-m)	
		Before	After
1.5		700	700
2	0.5	680	650
3	0.5	600	550
3	0.5	600	550
5	1	500	500
7	1	350	450
10	1	200	320
10	1	200	320
15	2.5	125	150
20	2.5	120	110
25	2.5	115	90
30	2.5	100	70
40	2.5	60	40
50	2.5	40	30
70	2.5	30	20
100	2.5	25	17

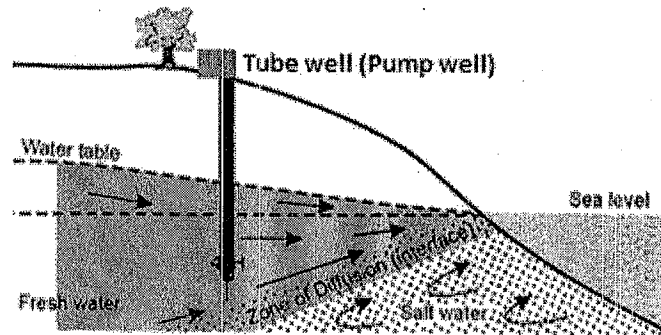


Figure 1

- c. The well area is flooded several times per year and it is observed the difference from VES curves after the flooding. Draw the expected shape of the curve in same graph sheet and discuss your answer.

(5 Marks)

3. The magnetic resonance sounding (MRS) permits a direct detection of water from surface measurement.

- a. Define porosity and permeability. Discuss why it is important to determine those parameters in the field of water exploration.

(10 Marks)

- b. Bound water and free water are 2 types of water. Among those, free water is the most important type in ground water exploration. Discuss how MRS differentiate free water from bound water.

(5 Marks)

- c. Discuss main advantages and disadvantages of MRS technique in ground water exploration task.

(10 Marks)