

MRT 331-3 Applied Geophysics and Engineering Geology

Instructions to candidates

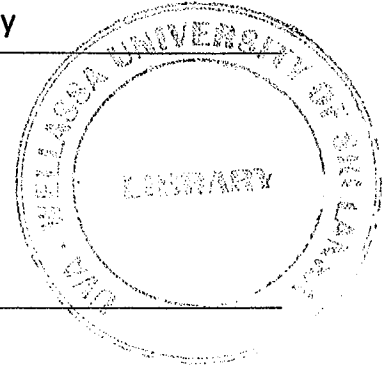
Duration: Three (03) hours

Number of questions: Six (06)

Answer all questions

Mark allocation: 150

Illustrate your answers with sketches/diagrams where necessary



1.

- a) Discuss the development of the science of Geophysics in a historical perspective. (05 marks)
- b) Briefly explain principles of Geophysics. Present an overview of different geophysical methods with their applications. (20 marks)

2.

- a) What are the factors that should be considered in designing a geophysical survey? (05 marks)
- b) Describe how each factor would affect the accuracy of results and the nature of useful information to be derived. (20 marks)

3.

- a) Briefly describe different methods of conduction of electricity through rocks. (05 marks)
- b) Write an account on the electrical resistivity of rocks. (05 marks)
- c) Derive an expression, in terms of current, distance and resistivity, for the voltage at a point on the Earth due to a single current electrode. Expand it to an expression for the potential difference between two points when a current sink is added. How can you use it to find out the resistivity of the ground? (15 marks)

4.

- a) Write short notes on the following. (15 marks)
 - i. Diamagnetism
 - ii. Paramagnetism
 - iii. Ferromagnetism

- b) Discuss the need for applying various corrections to the data acquired from a magnetic survey before they are interpreted.

(10 marks)

5.

- a) Briefly explain how you would carry out a sieve analysis.

(05 marks)

- b) Draw the graph between **cumulative percentage finer** and the **particle size** using the following data on the provided-semi log graph sheet.

Weight of container = 198.5 g

Weight of container+ dry soil = 722.3 g

Sieve Number	Diameter (mm)	Mass of empty sieve (g)	Mass of Sieve + soil retained (g)
4	4.75	116.23	166.13
10	2.0	99.27	135.77
20	0.84	97.58	139.68
40	0.425	98.96	138.96
60	0.25	91.46	114.46
140	0.106	93.15	184.15
200	0.075	90.92	101.12
Pan	-	70.19	301.19

- i) Calculate the Coefficient of Uniformity (C_u) and Coefficient of Curvature (C_c)
 ii) Comment on the uniformity of the soil based on the above values.

(20 marks)

6.

- a) What is soil consistency?

(03 marks)

- b) Explain the role of adhesion and cohesion in soil consistency.

(06 marks)

- c) Discuss the Atterburg limits and their meanings.

(08 marks)

- d) Briefly describe how you would conduct an SPT test in the field.

(08 marks)

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