ELIZADE UNIVERSITY
ILARA-MOKIN
ONDO STATE

FACULTY: Basic and Applied Sciences
DEPARTMENT: Physical and Chemical Sciences
FIRST SEMESTER EXAMINATIONS
2016/2017 ACADEMIC SESSION

COURSE CODE: AGP 307

COURSE TITLE: Self Potential, Induced Polarization and

Electrical Resistivity Methods

DURATION: 2½ hours

HOD's SIGNATURE

TOTAL MARKS: 70 MARKS

Matriculation Number: _____

INSTRUCTIONS:

1. Write your matriculation number in the space provided above and also on the cover page of the exam booklet.
2. This question paper consists of 3 pages.
3. Answer all questions in the exam booklet provided.
4. Attempt Questions 1 and 5, and any other two questions

ELIZADE UNIVERSITY
FACULTY OF BASIC AND APPLIED SCIENCES
DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCES
PROGRAMME: APPLIED GEOPHYSICS   EXAM TITLE: DEGREE EXAMINATION
COURSE CODE & TITLE: AGP 307: Self Potential, Induced Polarization and Electrical
Resistivity Methods

TIME ALLOWED: 2½ hrs   SEMESTER/SESSION: FIRST / 2016/2017
INSTRUCTIONS: Answer questions 1 and 5, and any other TWO Questions.
Write your matriculation number only on your answer script(s) and NOT your name

1. (a) Table 1 is a Vertical Electrical Sounding (VES) data acquired from a Basement terrain.
    (i) Plot the data.
    (ii) Through partial curve-matching, evolve the geoelectric model parameters for the field data.
    (iii) State the curve type generated and show the layer resistivity combinations.

    (b) Draw a columnar section from the geoelectric model parameters derived from your interpretation.
    (c) List **two** applications of the Induced Polarization method.
    (d) Highlight **four** factors that control the resistivity of earth medium.
                                                                    (22 marks)

2.   (a) Discuss the Sato and Mooney electrochemical half-cell theory. Support your discussion with an appropriate diagram.
    (b) List **four** factors that influence the magnitude of Membrane Polarization. With appropriate diagram(s), illustrate the variations of **two** of the mentioned factors.
                                                                    (14 marks)

3 (a) In the electrical resistivity method, various electrode arrays are applied. Discuss any **three** of the arrays with clearly drawn field layout.

    (b) Use the generalized apparent resistivity equation to deduce the apparent resistivity equations for any **two** arrays discussed above.   (14 marks)

4. (a) Discuss **four** major application areas of the Electrical Resistivity Method.

    (b) State **three** ways the frequency domain Induced Polarization (IP) effect can be measured. Support your answer with relevant equations.   (14 marks)

5. (a) Distinguish between Gradient array and Total field array adopted in Self Potential method. Which of these would you adopt in a rugged terrain and why?

    (b) Using the appropriate array equation, compute and complete the field data record on Table 2. Give **G** to 2 decimal places, ρ_a to the nearest whole number. Take Π as 3.142. Show your workings. Define terms in the equation you have used for your computation.
                                                                    (20 marks)

Table 1: Vertical Electrical Sounding (VES) Data

ELECTRODE SEPARATION (m)	APPARENT RESISTIVITY (Ohm-m)
(AB/2)	VES 1
1	349
2	290
3	210
4	177
6	166
6	137
8	157
12	176
15	196
15	198
25	276
32	295
40	314
40	361
65	491
85	614

Table 2: Field Data

Station Number	Electrode separation (AB/2) m	Potential Electrode (MN) m	Resistance, R (Ohm)	Geometric factor, G	Apparent Resistivity, ρ_a (Ohm-m)
1	1	0.5	54.46		
2	2	0.5	6.37		
3	3	0.5	1.79		
4	4	0.5	0.74		
5	6	0.5	0.23		
6	6	1.0	0.44		