



ELIZADE UNIVERSITY
ILARA-MOKIN
ONDO STATE

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

COURSE CODE: AGP 417

COURSE TITLE: ENGINEERING GEOPHYSICS

DURATION: 2 1/2 Hours

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HOD's SIGNATURE

TOTAL MARKS: 60 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 4 pages including this page.
3. Answer all questions in the exam booklet provided.
4. At the end of this examination, place the question paper inside the exam booklet.
5. Answer questions 4 and 5 and any other two questions.
6. Make use of the graph sheet where necessary.

ELIZADE UNIVERSITY

FACULTY OF BASIC AND APPLIED SCIENCES

DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCES

PROGRAMME: APPLIED GEOPHYSICS EXAM TITLE: DEGREE EXAMINATION

COURSE CODE & TITLE: AGP 417 – ENGINEERING GEOPHYSICS

TIME ALLOWED: 2 1/2 Hours SEMESTER/SESSION: First / 2016/2017

INSTRUCTIONS: Answer Questions 4 and 5 and any other Two Questions

1a Depth to and composition of bedrock, and fracture/flow seepage detection can be effectively investigated by suite of geophysical methods. Fill the characteristic attributes of each technique by completing the table below using the symbol: (+) for **Applicable**, (o) for **Limited applicability** and (–) for **Not applicable**

Technique	Depth to and composition of bed rock			Fracture/Flow seepage detection		
	Applicable	Limited Applicability	Not Applicable	Applicable	Limited Applicability	Not Applicable
Gravity						
Magnetic						
Self potential						
Resistivity+IP						
Electromagnetic						
Ground radar						
Radioactivity						
Seismic refraction						
Seismic reflection						

1b What are the possible field operational problem(s) of electrical resistivity method in engineering investigation.

(20 marks)

2a Outline 10 ranges of geological processes that can modify the origin rock type.

2b The development of a ground model will assist in the selection of the most appropriate geophysical technique(s) to be used and in their specific design. Discuss 5 physical factors that will limit the effectiveness of the geophysical techniques.

(20 marks)

3a Given the below parameters within a proposed building site located in an area underlain by Basement rock; $V_p = 6500$ m/s, $V_s = 0.6V_p$, $\rho = 15,000$, $V_f = 1500$, $V_m = 6,600$ and $\mu = 50,000$ Pa. Determine the poisson ratio (σ), Bulk Modulus (K), Young Modulus (E) and porosity (ϕ) of the formation beneath the site.

3b Evaluate the competency of the site for the proposed structure using the determined Bulk Modulus (K) and Porosity (ϕ).

(20 marks)

- 4a Using appropriate Seismic Refraction geometry, derive an equation that relate arrival time (t) and offset (x) for a planar two layer case.
- 4b The table below shows a seismic refraction data along a proposed pedestrian bridge.
- Plot the $T_1 - X$, and $T_2 - X$ values on the same graph paper.
 - Find the velocities and intercept times at the ends of the survey aperture.
 - Generate the geologic model along the proposed bridge.

FORWARD		REVERSE	
Offset (m)	Arrival Time (ms)	Offset (m)	Arrival Time (ms)
5	3.3	5	6.7
10	16.7	10	20.0
15	31.7	15	33.4
20	43.4	20	45.1
25	50.1	25	56.8
30	58.5	30	65.1
35	63.5	35	75.2
40	66.8	40	76.8
45	71.8	45	80.2
50	73.5	50	80.2
55	75.2	55	81.8
60	80.2	60	81.8

(30 marks)

- 5 Figure 1 presents the result of a geophysical investigation of a failed road segment in basement complex area. Study the figure and answer the following questions.
- What are the geoelectric characteristics of the failed and stable segments of the road?
 - What do you think is responsible for the road failure?
 - Is there the tendency for the current stable segment of the road to remain stable? Give reason(s) for your answer.
 - What supplementary investigation technique could one have adopted in this study?

(30 marks)

Figure 1:

