



**ELIZADE UNIVERSITY**

**FACULTY OF BASIC AND APPLIED SCIENCES**

**DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCES**

**PROGRAMME: APPLIED GEOPHYSICS EXAM TITLE: DEGREE EXAMINATION**

**COURSE CODE & TITLE: AGP 421- BOREHOLE GEOPHYSICS**

**TIME ALLOWED: 2 hrs 30 mins**

**SEMESTER/SESSION: FIRST / 2020/2021**

**INSTRUCTIONS:** Write your matriculation number on the cover page of the exam booklet.

**Answer ALL QUESTIONS.**

**HOD's SIGNATURE**

1. (a) List seven uses of well logging in hydrocarbon exploration  
(b) Determine the true sonic porosity at an interval containing oil with the following Parameters;  $\Delta t_{\log} = 86 \mu\text{sec/ft}$ ,  $\Delta t_{\text{ma}} = 55.5 \mu\text{sec/ft}$  and  $\Delta t_f$  is fresh water mud  
(c) Consider the logging tools listed below:  
(i) Gamma ray log. (ii) Resistivity log (iii) Spontaneous potential log  
Mention the importance of each in petrophysical analysis/hydrocarbon exploration and groundwater exploration (use log signature diagrams where necessary)
2. (a) Carefully study the suite of logs shown in Figure 1.  
(i) Identify and indicate the gas, oil and water zones in UNIT A.  
(ii) Mark out the gas-oil and oil-water contacts.  
(iii) What is the role of the neutron/density log in achieving the above objectives?  
(iv) Why is the gamma ray log better than the SP log in a marine environment (offshore)  
(v) What is the gamma ray (GR) reading of the sandstone in UNIT A  
(b) Discuss the following terms: (i) Open hole logging (ii) Cased hole logging
3. The suite of wireline logs in Fig. 2 with "X" as the target zone, was acquired from an offshore oilfield, Niger Delta.  
(a) Calculate the gamma ray index of the formation.  
(b) Calculate the volume of shale using the mathematical method (where the GR reading of the formation is 28API at 13,570ft)  
(c) Mention five rock types that can also exhibit high gamma ray log response like shale
4. (a) What is resistivity logging?  
(b) Explain all you know about drilling fluid invasion  
(c) Outline six functions of drilling fluid