

CHUKA

UNIVERSITY



UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF BACHELOR OF SCIENCE IN
PHYSICS

GPHY 344: WELL LOGGING AND FORMATION EVALUATION

STREAMS: BSc. PHY

TIME: 2 HOURS

DAY/DATE: TUESDAY 09/04/2024

2.30 P.M. – 4.30 P.M.

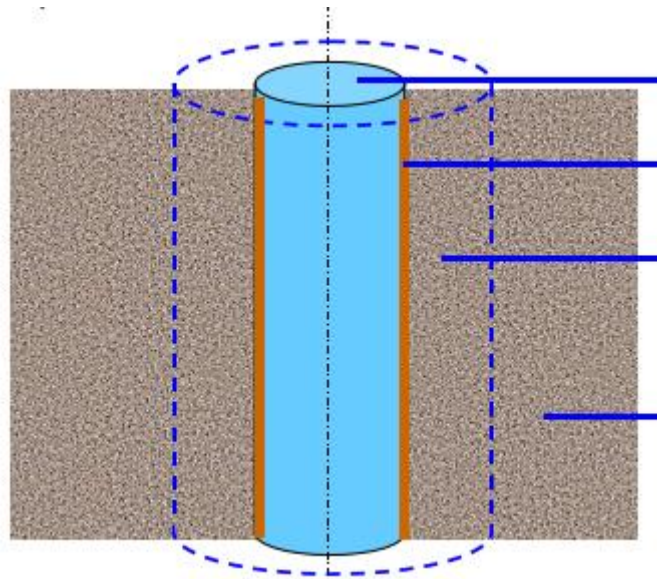
INSTRUCTIONS

- *Attempt ALL questions in section A and any other two questions from section B.*

SECTION A

Question One (Compulsory): (30 marks)

- Highlight any four well logging methods? [4 marks]
- Describe the four components of wireline logging setup [4 marks]
- Give five applications of acoustic/sonic logs [5 marks]
- Explain the two important steps before log interpretation is done [4 marks]
- Discuss the indicators used for quick identification of permeable beds [5 marks]
- Explain any four objectives of log measurements [4 marks]
- Name different regions in the section of a permeable borehole in the diagram below [4 marks]



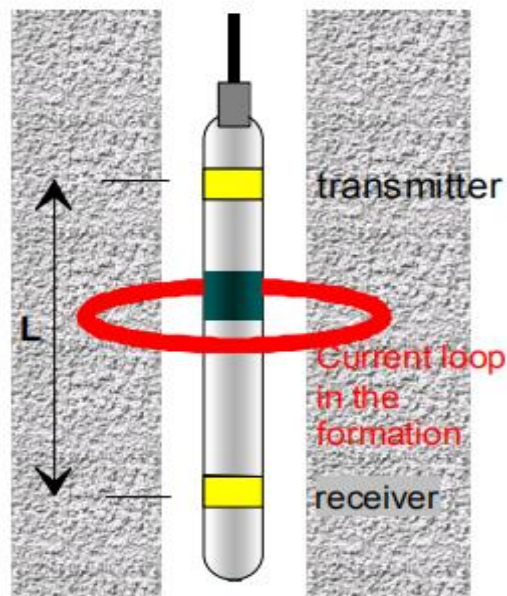
SECTION B: Answer any two questions in this section

Question Two: (20 marks)

- a) What type of log do we use for porosity calculation? Explain [4 marks]
- b) Discuss the two different types of electrical logs [10 marks]
- c) Presence of shale results in a decrease in reservoir quality, explain. [6 marks]

QUESTION THREE (20MARKS)

- a) The figure below shows the set up of an induction log, explain how it works [8 marks]



- b) Sketch a graph showing its radial sensitivity [4 marks]
- c) Explain the principle of resistivity calculation by an inversion process [8 marks]

QUESTION FOUR (20MARKS)

- a) Explain giving examples of the two classifications of logging methods [6 marks]
- b) Explain the four benefits of measurement while drilling (MWD) or logging while drilling (LWD) techniques. [8 marks]
- c) Explain the factors that creates non-homogeneous environment in borehole measurements [6 marks]

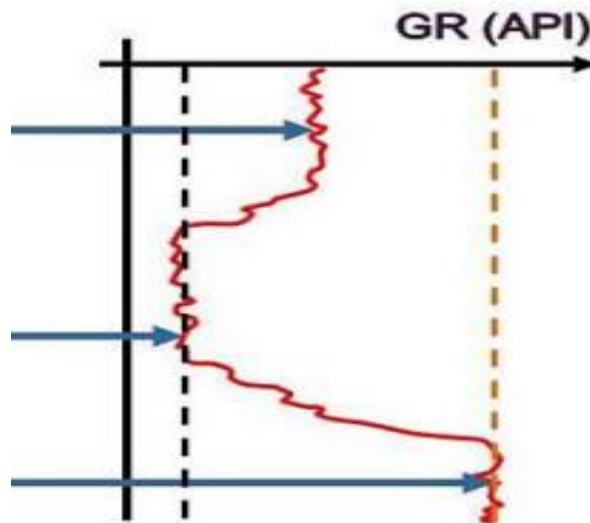
QUESTION FIVE (20MARKS)

- a) The resistivity of a water-bearing sand was found to be 0.8 Ohm-m. If the porosity of the formation is 0.31 and for this formation the relationship between the formation factor, F, and porosity has been established as.

$$F = \frac{0.81}{\phi^2}$$

What is the resistivity of the formation water? [6 marks]

- b) Explain any three corrections necessary in gammalogs [6 marks]
- c) The figure below shows the gammalog response in different geological zones. Discuss each zone as marked in the diagram [8 marks]



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