Ex./M.Sc.-II/G-II/XI/6/2017

MASTER OF SCIENCE EXAMINATION, 2017

(2nd Year, 1st Semester)

APPLIED GEOLOGY

Paper : XI

Geophysical Exploration

Time : Two hours Full Marks : 50

Answer any ***four*** questions.

All questions carry equal marks.

1. (a) What are the different types of electrode configurations in resistivity survey (RS)? Briefly discuss the field procedure of RS? Draw relevant sketches and write down their working formula.

   (b) Comment on the advantages and disadvantages of the different electrode configurations in geophysical exploration.

2. In a Schlumberger resistivity survey, the following results were obtained. Plot them in tracing paper (supplied) using logarithmic scale graph paper.

(Turn Over)

Half the Separation of Electrodes AB/2 (in meter)	Apparent Resistivity ρ (in ohm-meter)
4	11.2
6	11.8
8	12.4
10	13.7
20	18.2
50	35.6
100	65.3
200	85.4
300	90.7
400	98.6

Calculate the resistivity of two layers and their corresponding depth using two-layer Master Curves.

3. Derive mathematical expressions for Direct–and Refracted–wave reaching the seismic instrument from the shot point. Explain how the layer thickness is calculated from the expressions of refracted wave.

4. Describe the gravitational method of geophysical survey giving emphasis on the principles and corrections involved in the survey. Define gravity anomaly.

5. Write short notes on (any ***three***) :
   (a) Cross Over Distance in Seismic Survey
   (b) Different types of resistivity curves in three-layer case
   (c) Topographic correction in Gravity survey
   (d) Secular Variation
   (e) Mechanical instruments
   (f) Paramagnetism

6. (a) Briefly discuss the mechanisms for induced magnetization of crustal rocks.
   (b) Describe a Proton Precession Magnetometer with a schematic diagram.
   (c) How will you determine a buried dyke with a considerable magnetic intensity covered by sediments using magnetic method ? 3+5+4.5=12.5

7. (a) Exploration magnetic surveys should not be conducted during times of magnetic strom. Why ? Explain with a suitable example.
   (b) What does the magnetic anomaly look like if a magnetic sphere buried somewhere at the Equator ? Explain with a diagram.
   (c) What is magnetic saturation circuit ? How does it act ?

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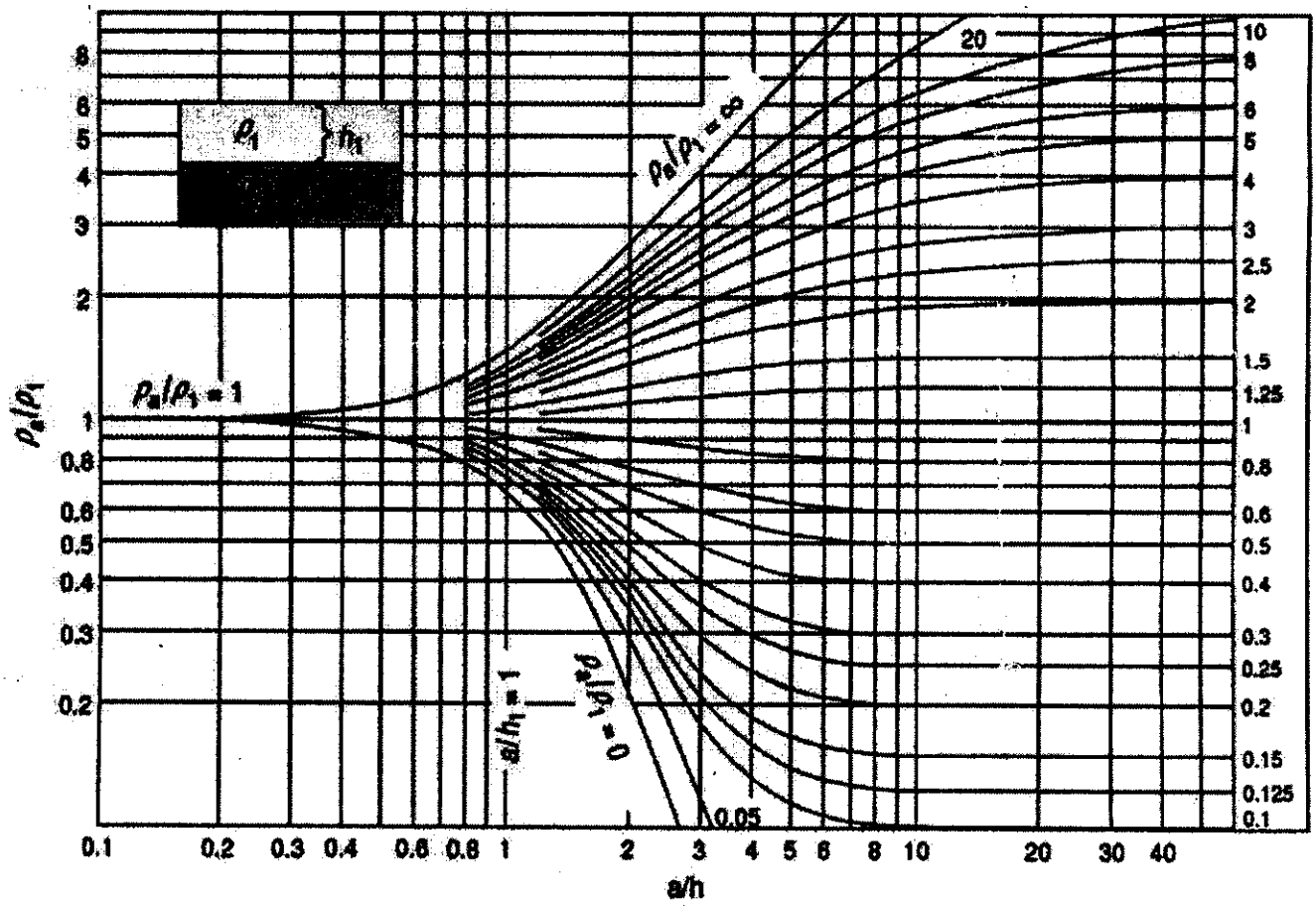
ρ_1
h_1
$\rho_a/\rho_1 = \infty$
20
$\rho_a/\rho_1 = 1$
$a/h_1 = 1$
0
0.05
ρ_a/ρ_1
a/h
0.1
0.2
0.3
0.4
0.6
0.8
1
2
3
4
5
6
8
10
20
30
40
0.125
0.15
0.25
1.25
1.5
2.5