



ELIZADE
UNIVERSITY

ILARA-MOKIN

FACULTY: Basic and Applied Sciences
DEPARTMENT: Physical and Chemical Sciences
SECOND SEMESTER EXAMINATIONS
2017/2018 ACADEMIC SESSION

COURSE CODE: AGP 420

COURSE TITLE: GEOPHYSICS AND GEOTHERMAL ENERGY

DURATION: 2Hrs: 30 minutes

(Signature)

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 3 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. Detach and submit Figure 1 to answer question 5.

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FACULTY OF BASIC AND APPLIED SCIENCES

DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCES

PROGRAMME: APPLIED GEOPHYSICS EXAM TITLE: DEGREE EXAMINATION

COURSE CODE & TITLE: AGP 420 – GEOPHYSICS AND GEOTHERMAL ENERGY

TIME ALLOWED: 2 1/2 Hours

SEMESTER/SESSION: 2nd / 2017/2018

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

- 1a In thermal propagation within the earth;
- Show that temperature, $T_{(z,t)} = A_0 e^{-\alpha z}$.
 - Define the parameters A_0 , α , and z .
 - Explain skin depth.
- 1b Explain the behaviour of heat with depth in an extreme cold region. (15 marks)
- 2a What is the relevance of geothermal energy to national development?
- 2b Outline the various geothermal systems and their distinct characteristics.
- 2c What factors influence the occurrence and distribution of geothermal fields? (15 marks)
- 3a Seismic and electrical resistivity methods were proposed for the evaluation of the geothermal potential of a region in Southwestern Nigeria. Review the basis, application and limitations (if any) of these methods in geothermal exploration.
- 3b Distinguish between a thermal area and a thermal field and discuss the three broad classes of both. (15 marks)
- 4a Imagine that you are working at the statistical office of the IEA. Your task is now to complete part of the energy balance of the country Enthalpia which is given below:

Part of energy balance of Enthalpia (in PJ)

	Coal	Oil	Gas	Nuclear	Hydro/wind	Geothermal	Total
Production	3400	3300	4200				
Imports	3600	2400	1500	0	0	0	
Exports	-800	-1500	-2000	0	0	0	
Intl. Bunkers	0		0	0	0	0	
Stock changes	100		100	0	0	0	
TPES							

Use the following information to complete this table:

- Transport by aircraft and ships originating in Enthalpia uses 1250 PJ, 36% of which is domestic transport inside Enthalpia.
- 25 PJ oil was added to the stocks.
- Nuclear power plants in Enthalpia produced 400 TWh electricity.
- Hydropower and wind turbines in Enthalpia produced 500 TWh electricity.
- Geothermal power plants produced 60 TWh electricity.
- Geothermal heat plants produced 100 PJ heat for domestic heating.

(15 marks)

Present the complete table for Enthalpia (on your answer sheet) and explain how you obtained the missing values.

4b Define briefly geothermal energy.

(15 marks)

5 Integrated geophysical methods were used for the evaluation of Coso geothermal area, California, USA. Figure 1 shows the aeromagnetic contour map derived from a low-altitude aeromagnetic survey of the area. The contour interval is 200 nT.

- Delinate (shade) area(s) of suspected high geothermal potential.
- What is the basis of your answer in (a) above.
- Shallow temperature measurements were also carried out in the area. What factors influence the reliability of shallow temperature surveys?

(15 marks)

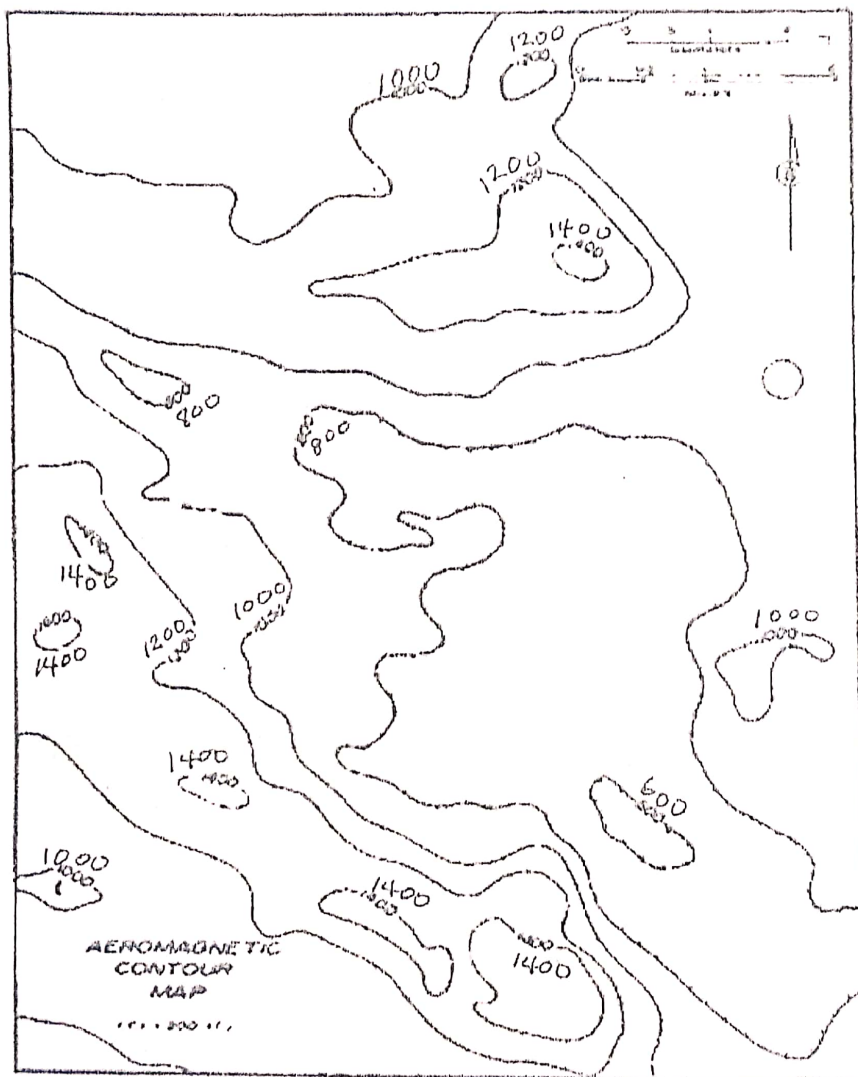


Figure 1: Low-altitude aeromagnetic survey of the Coso geothermal area, California, USA. Contour interval is 200 nT