

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN
MINING PHYSICS (GEOPHYSICS)**

GPHY 121: GEOPHYSICS PRACTICAL I

STREAMS: BSC

TIME: 2 HOURS

DAY/DATE: MONDAY 16/12/2024

11.30 A.M – 1.30 P.M.

INSTRUCTIONS:

- **Answer ALL the questions.**

QUESTION ONE.

- (a) (i) Give two types of igneous rocks (2marks)
(ii) Explain three conditions necessary for the growth of coral polyps (6 marks)
- b. State four uses of rocks (4marks)
- (c) You are planning to carry out a field study on the rocks within Chuka University environment
- (i) Give two secondary sources of information you would use to prepare for the field study (2marks)
- (ii) State why you would need the following items during the field study: i. A fork jembe
ii. A polythene bag (2 mark)
- (iii) Suppose during the field study you collected marble, sandstone and granite, classify each of these samples according to its mode of formation (2 marks)
- d. (i) State two characteristics of sedimentary rocks (ii) Give two examples of chemically formed sedimentary rocks (2 marks)

QUESTION TWO

(i) Define the following terms

- a. Heat capacity
- b. Specific heat capacity
- c. Steady state temperature

(6 marks)

(ii) In an experiment to measure the specific heat capacity of water by joules' method, Mutua, a mining & Physics student at Chuka University obtained the values in the Table 1 below

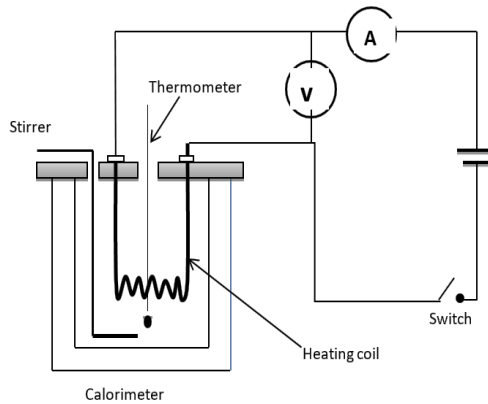


Figure 1; Specific heat capacity setup.

Measurement no.	m_w (kg)	τ (s)	Δt (°C)	C_w (j.kg ⁻¹ .k ⁻¹)
1	0.110	180	17.0	
2	0.103	200	19.8	
3	0.110	200	18.8	
4	0.108	190	18.5	
5	0.104	210	20.6	
6	0.095	195	20.4	
7	0.111	185	17.0	

Table 1; Results of an experiment to measure the specific heat capacity.

The remaining parameters were unchanged in all measurements, namely;

Specific heat capacity of calorimeter (C_c) = $896 \text{ J} \cdot \text{kg}^{-1} \cdot \text{K}^{-1}$

Mass of calorimeter (m_c) = 0.031 kg

The supplied voltage (V) = 25.9 V

Supplied current (I) = 1.85 A

m_w = mass of water

τ = Time in seconds

C_w = specific heat capacity of water

- Using the formula, $C_w = \frac{W_e - C_c m_c \Delta t}{m_w \Delta t} = \frac{VI\tau - C_c m_c \Delta t}{m_w \Delta t}$, Calculate the values of the last column of specific heat capacity of water. (7 marks)
- Given that the specific heat capacity of water is $4180 \text{ J} \cdot \text{K}^{-1} \cdot \text{kg}^{-1}$, Perform the error analysis of the value of the average value of C_w obtained in (a) above. (3 marks)
- State any two sources of error in this experiment and how they can be mitigated. (4 marks)

QUESTION THREE

A mining physics student conducted an experiment to measure the acceleration due to gravity 'g' by simple pendulum and obtained the results in table 2 below.

L (m)	Trials (secs)			Period T (s)	T ² (s ²)	g = $4\pi^2 L / T^2$ ()
	T ₁	T ₂	T ₃			
0.30	22.15	22.30	22.18			
0.40	25.75	25.90	25.75			
0.50	29.36	28.57	28.97			
0.60	30.90	31.08	30.99			
0.70	33.68	33.17	33.43			
0.80	35.50	35.51	35.50			
0.90	37.93	36.64	35.56			
1.00	39.45	38.91	39.45			
						Mean "g" :

Table 2; Results of an experiment to measure the acceleration due to gravity.

Using the results in table 2 above,

- Calculate the values for the last three columns. (4 marks)
- Using the data in table 1 above, draw a graph of l versus T^2 (6 marks)
- Clearly indicate the error bars for each axes. (2 marks)

- d. Use the graph in (ii) above to calculate the value of g . (4 marks)
 - e. Calculate the value of the error in g obtained in (iv) above. (2 marks)
 - f. Compare the value of g obtained from the graph with the average value of g from the table and account for the comparison. (2 marks)
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