

535/1
PHYSICS
PAPER 1
JULY/AUG.2024
2 ½ HOURS

UGANDA CERTIFICATE OF EDUCATION
MOCK EXAMINATIONS
PHYSICS
PAPER 1
2 ½ HOURS

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of **two** sections, **A** and **B**. it has seven examination items.*
- *Section **A** has **three** compulsory items.*
- *Section **B** has **two** parts: **I** and **II**. Answer one item from each part.*
- *Answer **five** items in all.*
- *Any additional items(s) answered will not be scored.*
- *All answers must be written in the booklets provided.*

SECTION A

WAVES AND OPTICS

1. The students in a particular class visited a laboratory with a white bulb and a red one, to observe a glass tank filled with water with a white base at the bottom. Modifications were made to create a shallow end on one side of the tank using glass material. To their surprise, when they struck the water's surface at the shallow end with a long rectangular rod at a frequency of 80 Hz, they noticed that the spacing between successive crests changed from 2.5cm to 5cm. additionally, they were disturbed by the distortion of ripples as they struck the tank walls. They were also surprised to see the base turning black when it was replaced with a yellow sheet and the red lights switched on.

Hint; the glass tank would break if the velocity of the waves that hit it is greater than 20ms^{-1} .

Use your knowledge of physics to

- (a) Determine if the ripple tank will break.
- (b) Explain the reason for the change in the distance between the ripples and its impact on the velocity of the ripples.
- (c) Explain what distorted the waves and how it could have been reduced.
- (d) Explain why the yellow sheet changed colour when the red lights were switched on.

SATELLITES AND COMMUNICATION

2. An article in the newspaper gave information that on 2nd December 2022, Uganda engineers launched a satellite. The literature teacher who picked interest in the article found new words like artificial and natural satellites. He developed a number of unanswered questions which could be answered by a physics learners like you.
 - (a) Explain the difference between the two types of satellites in the article.
 - (b) With reasons, justify why Uganda should spend all that much money to launch its own satellite.
 - (c) Incase Uganda is to develop a super rocket capable of reaching different planets. List with reasons the planets it can land on and planets it cannot land on.

MODERN PHYSICS

3. The government has discovered a precious and rare mineral in a certain part of the country. a team of men picked samples and kept them in a store of one of the hospitals where photographic plates are also stored. The mineral was checked on regularly and they made the following observations;
 - All photographic plates had darkened
 - Its mass reduced spontaneously with time as shown below.

Mass (g)	200	150	70	35	25
Time (days)	0	4	16	28	30

As a physics learners,

- (a) Support the view that the mineral is radioactive.
- (b) Use the graph to estimate its half-life
- (c) Explain the best way of storing this rare mineral.
- (d) What are the dangers of exposing this mineral to the public?

SECTION B

Part I (do only one item)

Item 4

On a rainy day, due to a leaking roof, materials used to prepare tea got wet, as result tea process delayed. An emergence meeting was organized so as to accelerate process. Eventually decided to pour 4cm^3 of water at 15°C was poured in a metallic container having wooden handles was used. After one hour heating, water was allowed to boil for ten minutes before serving started with optional cups, metallic or clay make.

Hint:

Boiling point of water	=	100°C
Density of water	=	1000kgm^{-3}
Specific heat capacity of water	=	$4200\text{Jkg}^{-1}\text{K}^{-1}$
Specific latent heat of vapourisation	=	2260000Jkg^{-1}

Task

Using physics knowledge:

- (a) Suggest ways of accelerating process of making tea.
- (b) Determine total quantity of heat needed to make tea ready
- (c) Explain practical role of wooden handle on the metallic container.
- (d) Recommend with support, type of cup to be used such that the learners are not late for lesson.

Item 5

Commercial boats are made from materials of negligible mass. 100 bags of cement are to be transported by a 80kg mass boat operator using the boat. The operators seat is 30cm from the centre of a uniform boat by structure and departure time is a noon.

Hint:

Density of water	=	1000kgm^{-3}
Sun's intensive heating	=	at noon
Bag of cement	=	50kg
Acceleration due to gravity	=	10ms^{-2}
Cross-sectional area of boat	=	200m^2

Task

As a learner of physics;

- How far should the bags of cement be, before boat balances horizontally on water.
- Identify and state law governing the boats movement.
- How deep does boat sink before the above law is applicable?
- Comment on the safety of the boat, in relation to the departure time.

PART TWO (do only one item)

Item 6

During rural electrification national programme, water has been collected and stored in valley dams. Through pipes, water flows and falls on water wheel attached to generator and in process, generator is driven, inducing current in the generator. The electric power generated through cables is used to operate electrical devices like in our homes after p.d of 120KV applied to cable, having 10A through the cable.

Hint:

Resistance of cables = 3Ω

Task

As a learner of physics;

- (a) State the energy transfers which occur during this process of producing electricity.
- (b) Draw the structure of a simple generator and briefly describe its mode of operation to produce electricity using this method.
- (c) Is it an effective method for operating an electrical device like electrical flat iron rated (60W, 200V)?
- (d) Recommend scientific ways of improving on quantity of electricity produced using this approach.

Item 7

In preparation for project work on model of an electric motor, a technician realizes that one more magnet is needed. The model motor is to be used to drive a maize mill to mill one tone of maize for the school consumption. Iron bar, steel bar and bar magnet are available in lab only.

Hint;

100kg require = 10KW

1KWh cost = 700/=

Milling one tone = 1 day

Using knowledge of physics;

- (a) Discuss steps to be taken using available materials to make the second required bar magnet.
- (b) Compare magnetic differences between first choice as iron and second choice as steel in making a second magnet.
- (c) Suggest ways of improving on constructed motor model to meet the demand of milling school maize.
- (d) Determine cost of milling one tone of maize as per school need.

END