535/1

PHYSICS

Paper 1

APIRL 2025

KING SOLOMON'S COLLEGE, KYATEGA

SENIOR FOUR MOCK TWO EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Theory

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- Attempt five items
- Attempt all items in section **A** and two in section **B**. In section B **a**ttempt one in each part.
- *Begin each item on a* ***fresh page***

For examination scorer's use only. Do not write anything in this table

Item	**IR**	**MC**	***TOTAL SCORES***	***Initials***
1				
2				
3				

SECTION A

This section consists of three COMPULSORY items.

Item 1:

In a class room activity, senior three students of your school are presented with the learning aids shown in figures 1(a) and 2(a).

Figure 1(a): Natural phenomenon

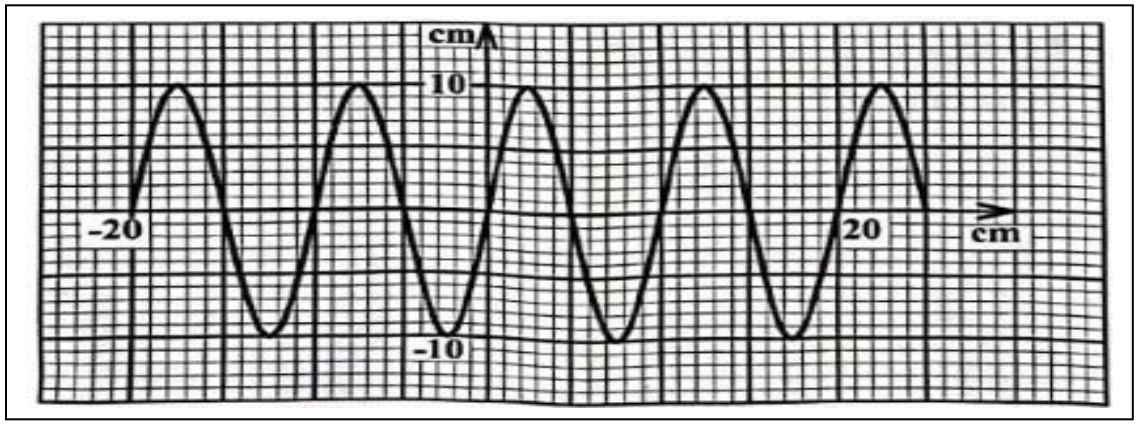


Figure 2(a): Wave form on a CRO

Hint:

- Velocity of sound in air is 330 ms^{-1}

Task:

The students are required to;

(a) State the phenomenon in ***figure 1 (a***) and describe the formation of the phenomenon.

(b) Use ***figure 2 (a)*** to determine the;

(i) Amplitude of the sound waves.

(ii) Frequency of the sound waves.

(c) Explain any two properties of waves that make them useful in the society.

Item 2:

A certain factory that makes car tyre releases its waste into the river is under investigation for releasing radioactive materials into the river. The factory manager was tasked to take a sample of their waste for testing and results are given in the table below.

Activity (per hour)	600	310	135	75	40	18
Time(hour)	0	5	10	15	20	25

Hint

- ***Back ground radiation in an area is 50 counts per hour***
- ***The company uses electromagnetic radiation to know the structure of polymers used to make a* specific *tyre.***

Use your knowledge of physics to,

(a) Determine if the waste was radioactive

(b) Determine when to release the waste to the river.

(c) Explain the electromagnetic radiation used to know the structure of polymers and with aid of well labeled diagram, describe how the electromagnetic radiation is produced.

Item 3:

Kibuuka and Kiguli were watching the English premier league match on a television at 10:00pm in the night. As they were watching, they noticed that in the pitch sunshine was there which indicated that it was day the other side. It confused them and they developed interest in knowing why it was like that. As time went on, the commentators said that “summer is soon ending and we are soon starting winter. People should prepare for it”. Upon hearing that, Kiguli asked Kibuuka what summer and winter means and Kibuuka responded by telling him that they are

seasons and that we don't experience them here in Uganda. That left Kiguli in amusement and questions what causes the two seasons and why in Uganda we don't experience them.

Task:

As a physics student,

(a) Help the two people to know what causes the people in England to experience day yet in Uganda its night.

(b) Explain to kiguli what causes the two seasons and why Uganda does not experience them as told by Kibuuka.

SECTION B

This section consists of two parts. Part I and Part II

PART 1

Attempt any one item from this part.

Item 4:

During a party, **2 liters** of water at **24 °C** were served to a man and a woman. They complained that it was warm and were given **50 g** of ice at **– 10 °C** blocks. They mixed the water and blocks in a wooden container with negligible specific heat capacity. They were surprised by the ice cubes disappearing in the water. The man put his mixture in a plastic (**S.H.C = 2,800 $Jkg^{-1}k^{-1}$**) while the woman put her mixture in a metallic container (**S.H.C = 800 $Jkg^{-1}k^{-1}$**). They were surprised to find their water at different temperatures after some time.

Hint:

- Specific heat capacity of water = **4,200 $Jkg^{-1}k^{-1}$**
- Latent heat of fusion of ice = **336,000 $Jkg^{-1}k^{-1}$**

Tasks:

a) Determine if the water cooled when mixed with ice.

b) Why do ice cubes disappear when mixed with water?

c) Explain why there was a difference in temperature in the water in the plastic and the metallic container.

Item 5:

The construction company is constructing a tall building and engineers are unable to take the building materials to the top of the building without aid of machines. The engineers are planning to use to design a pulley system of ***4 wheels*** and efficiency ***80 %.*** The engineer wishes to lift 10 bags of cement each of mass 50 kg but he is not sure of the minimum effort to apply to lift the cement and he is also not sure of the alternative ways of lifting materials to the top of the building.

Task:

Help the engineer to,

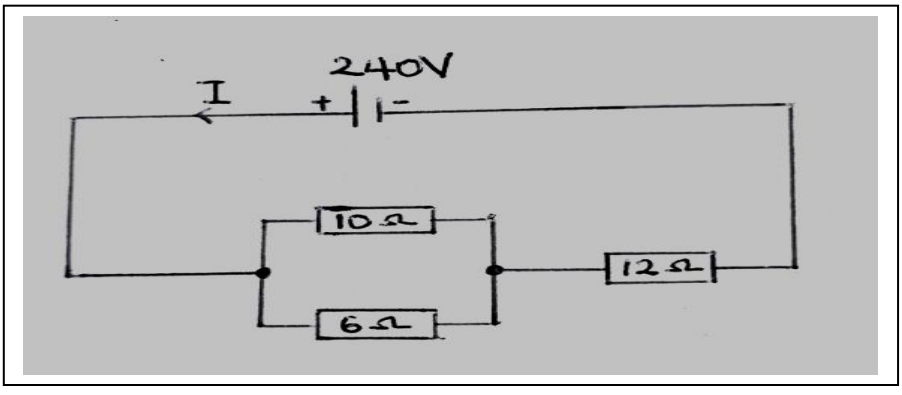
(a) Know how the pulley system will look and how it will work.
(b) Determine minimum effort required to lift cement.
(c) Besides using pulleys, suggest the alternative ways cement can be taken to the top of the building.

PART 2

Attempt any one item from this section.

Item 6:

Your neighbor has just completed constructing his house and he plans to install electricity in all rooms in his house. He has three rooms and, in each room, he plans to connect appliances such as flat iron, refrigerator and heater along lighting system. He contacted an electrician about it and he was advised that the house would be connected as in the circuit diagram in the figure below.



The engineer does not know the total current in the circuit. The house owner has bought a **lead-acid accumulator** that he will use as a source of voltage for current supply though wondered how to maintain it.

Task:

As a physics student, help your neighbor to know;

(a) How much current will flow in the circuit.

(b) How to maintain his accumulator so that it last for long.

Item seven

In an experiment to study the property of magnet, a student suspends a bar magnet freely using a thread. The magnet comes to rest with its north facing in the geographical north and the south pole facing the geographical south. The student repeated experiment and got the same results.

In the same session, the teacher told the student that there is an instrument that can arrest lightning. This wondered him how can lighting be arrested,

Task

As a learner of physics,

(a) Help the student to understand why a bar magnet rests in the stated position.

(b) Explain any two uses of a magnets and magnetic fields

(c) With aid of a well labeled diagram, describe to the student how lightning can be arrested.

THE END