535/1

PHYSICS

July/August

Paper 1

2024

2½ Hours

SUCCESS EXAMINATIONS BOARD-KAMPALA

Uganda Certificate of Education

MOCK EXAMINATIONS 2024

Paper 1

Theory

2 Hours 30 Minutes

INSTRUCTIONS TO CANDIDATES:

This paper has **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 item(s) answered will not be scored.

All answers **must** *be written in the booklets provided.*

SECTION A

All items in this section are compulsory.

Item 1

At a stone quarry, workers are surprised whenever explosives are used to crash rocks.

- After an explosive blew off, one worker heard it after 2s while the other heard it after 3.5s which surprised them.
- The workers later heard another faint sound.
- The truck driver continuously complains about pools of water that he sees on a tarmac road in the afternoon. On reaching them, he finds a clear tarmac road.
- People in the neighbouring village complain about the sound from the explosives. The residents of the villages complain that the sound is louder at night than during day.

Use your knowledge of physics to;

a) Explain, with evidence why the workers heard sound from the explosives at different times yet the source of sound was the same.
b) Explain what the faint sound was.
c) Help the driver understand what leads to see the tarmac road appear like it has pools of water.
d) Explain what leads to the difference in the sounds heard.

Item 2

Learners recently approached their teacher about the appearance of the sky at night after they had made the following observations;

- The sky was black at night with stars of different colours and brightness.
- The moon appeared every night but its shape kept on changing.

The learners were also confused on how a more detailed study of the stars could be done.

Use your knowledge of physics to explain;

a) Why the sky is black at night.
b) Why the stars have different colours and brightness.
c) Why the moon appears every night and its shape keeps on changing.
d) How a more detailed study of the stars can be done.

Item 3

A patient who recently visited a hospital was told that he needs to take an X-ray photograph. The relatives of the patient were however surprised since they thought X-rays are used for detecting imperfections in welded joints not in hospital. They also demanded to know how the photograph will be taken and the dangers it might have on their relative.

Use your knowledge of physics to help the relatives of the patient understand;

a) How the X-ray machine works.
b) The structural adjustments made to the machine to make it suitable to be used in a hospital.
c) the dangers associated with X-rays and how they can be mitigated.

SECTION B
PART 1
Attempt one item from this part.

Item 4

During the construction of a storeyed building, workers complained about the concrete blocks of mass 8kg they were using to construct being too heavy. They suggested a pulley system should be used to help reduce how much energy is used. The engineer at the construction site was cautioned that the material of the string of mass 250g and specific heat capacity 2500 $JKg^{-1}K^{-1}$ used would weaken if its temperature reaches 30 ^{o}C. They also could not explain how the pulley system works and what to do to ensure it works better. When testing the pulley, one of the blocks fell from the second floor and made a very loud sound which surprised them.

Hint; Work done on the load is converted to heat energy at the contact points of the pulley system.

Use your knowledge of Physics to;

a) Explain how the pulley system mentioned above works.
b) Determine if the string was suitable for use in the pulley if its initial temperature was 24 ^{o}C.
c) Suggest factors that reduce the efficiency of the pulley system and how it can be improved.
d) Explain why a loud sound was heard when the block fell.

Item 5

Students on a voyage noticed that when cooking at place, P where the atmospheric pressure was 65 cmHg, cooking took much longer than at place, Q where the atmospheric pressure was 74.8 cmHg. This was surprising as the same amount of heat was used to cook the food which was also of the same amount. The students also complained that irrespective of the temperature of the food when it was served, the food would cool very quickly.

Hint; The students were not allowed to cover more than one kilometre in 20 minutes.

Use your knowledge of physics to;

a) Explain why there was a difference in the time required to cook at the two places.
b) Suggest what led to the cooling of the food.
c) Explain how the food can be kept warm for a longer time.
d) Determine if the students moved from Place A to B with the recommended speed.

PART 2

Attempt one item from this part.

Item 6

During a science project, learners are told that electricity at a substation is transmitted at 13 kV with a current of 0.05 A using thick aluminium wires for use inside a house at 240 V. The house has two television sets (TVs) that operate on direct current of 4A.

The learners, however, couldn't get an explanation of the issues mentioned.

Use your knowledge of Physics to;

a) Understand how the voltage is changed from 13 kV to 240 V.
b) Why thick aluminium wires are used during power transmission?
c) Determine if television sets will work if 20% of the electrical energy is lost during voltage change.
d) Understand how the current used in the TV is changed from alternating current (AC) to direct current (DC).

Item 7

A certain household has a set of appliances as listed in the table below.

Appliance	Power rating	Time of use
4 bulbs	25 W each	8 hours every day
Cooker	2200 W	5 hours every day
Flat iron	1800 W	6 hours each week
Electric fence of low resistance wire	2200 W	8 hours every day

The owner of the household while making a budget for how much money would be required every week to cater for the electricity bill. He also wondered how the sockets for those appliances should be connected to ensure high current flows and why low resistance instead of high resistance wire is used.

Hint; The owner only intends to spend sh.150000 on electricity every week and each unit of electricity is Ush.9oo.

Use your knowledge of Physics to;

a) Determine if sh. 150000 would be enough to cater for the electricity bill for a week.
b) Explain how the sockets of the appliances should be connected to ensure maximum current flows in the appliances.
c) Explain why low-resistance wires are used for the electric fence.
d) Suggest measures on how to reduce the electricity bill.