Group 12

535/1
Physics
Paper 1
July 2025
2½ Hours

ACEITEKA JOINT MOCK EXAMINATIONS 2025

Uganda Certificate of Education

PHYSICS

Paper 1

Theory

Time: 2 hours 30 Minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of two sections; A and B. It has seven examinations 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 booklet provided*

SECTION A

Item 1

Swimming pool is located between two buildings at a certain school. During swimming practice, a student accidentally dropped her coin UGX. 1000 into the water and she screamed loudly. However, she heard two similar screaming at intervals of 0.12 seconds and 0.20 seconds after the original sound but she did not understand the occurrence. When the water surface had settled saw the coin closer to the water surface but when she tried to pick it she could not reach it. Likely enough, you were near the swimming pool.

Hint: velocity of sound in air = 340ms-1.

Task

As a student of physics;

(a) Help the student to understand why she heard herself twice after screaming.

(b) (i) With an illustration explain why she was not able to pick the coin although it appeared closer to the water surface.

(ii) Identify clearly where the above effect is used in our day to day life

Item 2

During inter house football competition in a certain school, a student got an injury in the leg and was attended to by the schools' nurse but he complained of too much pain and he could not walk by himself.

The nurse advised the head teacher to take the boy to a hospital for better management. The head teacher instructed the school warden to take the learner. When the Doctor examined him, he informed the warden that he needed to do a scan using X-rays to investigate the extent of the injury. The warden asked the doctor what X-rays were, how they are produced and weather they are of different of types, but the doctor just informed him the scan was very urgent however he assured the warden that the process was safe as he took the student to the laboratory. The warden stayed behind in the doctor's room confused about the safety of their student.

Hint:

Wave length of soft X-rays = 1.0×10^{-9}m

Wave length of hard X-rays = 1.0×10^{-10}m

Speed of electromagnetic waves = $3.0 \times 10^{8} ms^{-1}$

Task

As a learner of physics,

(a) Help the warden to understand the nature and production of the radiation to be used, an illustration is advantageous.

(b) Use the data to help the warden to understand the different frequencies of the radiations that can be used.

Item 3

A student from Uganda travelled to a certain country for studies and arrived when it was day time. He immediately contacted his father who informed him that it was night in Uganda and this incident surprised him. During the course of his study, he realized that as it is in Uganda stars were only on the sky during nights. However, in some months, day time was longer than nights and he did not understand this occurrence.

Task

As a learner of physics;

(a) Help the student to understand how it would be day time in one country while in another country it would be night.

(b) Help the student to understand that stars are on the sky during day and night time.

(c) Explain why in the country daytime was longer than nights in some months.

SECTION II

Part I

Item 4

An employee drives from home to his work place every day and the meter of his vehicle is faulty. Therefore, he cannot tell the distance he covers on daily basis. One day he asked his son to escort him from home but before he started the engine of the car he poured 4 liters of water at 30°c into the car radiator which was painted black and had a network of small metallic rods. The son asked his father to explain why he used water but not any other liquids and the importance of the black component but the father just responded 'my son it is a long story'.

When he started to drive from the compound, the son realized that his father accelerated the car to a speed of 72kmh^{-1} for 4 minutes, he maintained this speed for 6 minutes. Realizing he would be late, he increased the speed to 90kmh^{-1} in a period of 10 minutes and finally decelerated to stop at his work place for a further 5 minutes. The modern temperature gauge indicated that the water in the radiator was 95°c. You a friend to this family,

Task

Use your knowledge of physics to;

(a) Explain to the son the importance of the car radiator in a car and why the liquid used was preferred to other liquids.

(b) Help the employee to find out how far his home is from his workplace.

(c) Understand the amount of heat the water absorbed from engine stating any assumptions made.

Item 5

A mother to a newly born 5kg child was advised to always bathe her child with water at temperature ranging from 32°C to 38°C. She instructed her maid of mass 55kg to boil some water and keep it in a vacuum flask during evening hours of a particular day. In the morning of the following day, she got 1.5 litres of water from the flask and instructed the maid to mix it with 4 litres of cold water at a temperature of 25°C in a basin. However, the maid was surprised when the water from the flask was still hot in the morning and she did not understand how the flask prevented it from cooling. The maid complains of getting tired whenever she

carries the baby to the 2rd floor of the house 9m high in 2minutes. You hard this maid talking to herself,

Hint:

Temperature of hot water	=	70°C
Mass of 1 liter of water	=	1kg
Heat capacity of the basin	=	$1500JK^{-1}$
Specific heat capacity of water	=	$4200JK^{-1}K^{-1}$

Task

Use the physics knowledge;

(a) With an illustration, help the maid understand why the vacuum flask was able to surprise her.

(b) Determine whether the water mixture in the basin was safe for the child's bath stating any assumptions made.

(c) Help the maid to understand why feels tired.

SECTION B

Part 2

Item 6

A man who is at the last stages of constructing his house has decided to fabricate his doors and windows from the site but he is to connect electricity temporarily from the neighbor whom he has promised to pay for the electrical energy consumed but not sure of how much. He intends to use a welding machine labeled 240v, 600w, for 8 hours a day.

An electric drill labeled 240v, 200w is to be used for 2 hours a day and 4 LED bulbs each of 10w to be used for 10 hours a day and a unit of electricity costs shs.900. VAT inclusive.

For permanent connection of electricity to his house, he has been advised to secure a transformer because the electricity lines near his new home carry a voltage of 600V and yet he needs only 240V in his house.

He ordered for a transformer and he was supplied with one labeled Ns=480 and Np=1200 which he can't interpret well.

As the work comes to an end, his new compound is full of rusty sharp steel metal cut offs which are now injuring bare footed individuals because they are invisible. He also discovered a strong magnet from an old loud speaker can work but he lacks knowledge of how to make use of it.

As he was discussing with his colleagues, you heard them talking

TASK

Use the physics knowledge to,

a) Explain to him to understand how much to be paid to the neighbor after one week.

b) Explain to him to understand if the transformer supplied will serve the purpose.

c) Explain to him to understand how the component he got from the speaker can help him to clear his compound.

Item 7

As part of the preparation for the following Sunday church service, one girl decided to iron her silk dress but in the process, power went off and there was total darkness.

On lifting it from the ironing board, she saw sparks made by her dress and some sound was produced which puzzled her.

On Sunday morning while hurrying for church service, her coins of different condemnations dropped in a drum full of water for home use.

One family member thought of using a strong magnet tied on a string to pick the coins but to their surprise, some coins were picked but others were not.

After the handover of UMEME to UEDCL, the next village is lucky because they are going to be connected to a national grid carrying 900V.

The chairman L.C.III secured a transformer with 1500 turns in the primary coil and 400turns in the secondary coil because the village needs electricity at 240V but he is not sure of the suitability of what he bought.

TASK

As a physics learner,

a) Explain to the girl to understand

   (i) Why the cloth produced light and sound.

   (ii) Why not all coins were picked.

b) Explain to the L.C.III chairman using an illustration the **structure** and **mode of operation** of what he secured and its **suitability** for the purpose.

END