Candidate's Name: ……..…….. Sign: ……

535/1
PHYSICS
Paper 1
2025
2 $^{1}/_{2}$hours

THE SYNDICATE ASSESSMENT BOARD (TSAB)

Uganda Certificate of Lower Secondary Education

PHYSICS

Theory Paper 1

2 hours: 30 minutes

INSTRUCTIONS TO CANDIDATES

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

SECTION A

Answer **all** the items in this section

ITEM 1

On a Sunday – hot day, Majambere from his garden, carrying some maize and moving towards a tall wide tree to take shelter, hears an explosion of a seed near him and after a short time; he hears another successive similar explosion which appears to come from the tree. On his way, very thirsty, he notices a pool of water in front which appears to move away from him as he approaches it. On reaching the tree, he realizes that the tree does not contain explosive seeds. Majambere sees a circular glass under the tree and recalls that he can start fire to roast his maize and eat, after which he sleeps off until dark. The fire was lit successfully when the glass was 20cm from the dry grass. Looking for Majambere,is a friend with a torch who finds him in a black shirt with yellow spots at night. The color of the shirt leaves Majambere and his friend confused.

Hint;

The glass is curved outwards on both surfaces.

Majambere's cloth was blue with red spots during day time.

The second sound was heard after 1.8s

Use:

Speed of sound in air = 330 ms^{-1}.

Task:

As a student of physics,

(a) (i) helpMajambere to know why he hears two similar successive sounds.
(ii) Write down the two major natural phenomena that resulted into the appearance of the pool of water that is seen by Majambere.

(b) Describe to Majambere how the;
(i) Pool of water appeared in front of him.
(ii) Glass managed to burn the glass

(c) Help Majambere and the friend to clear their confusion about the colour of the shirt

(d) Using calculations and giving an appropriate reason where necessary, what is the;
(i) Power of the glass?
(ii) Distance from the tree to where Majambere heard the first explosion.

ITEM 2

It is established that a dairy company produces regular pasteurized milk that contains harmful bacteria. To ensure the effectiveness of the pasteurization process and monitor bacterial growth, the company adds a radioactive isotope tracer, phosphorous-32 (P-32) to the milk. The tracer helps in tracking and ensuring that the bacteria are destroyed during pasteurization process. However, P-32 is harmful for human consumption until its activity is reduced to a safe level. To monitor the activity of P-32 in the milk to safe levels, the company uses a Geiger-Muller (GM) tube to measures the activity over time. the results obtained from the GM tube measurements are given in the table below

Activity/counts per minute	22000	16000	11400	8200	5800	4000	3000	2400
Time (days)	0	2	4	6	8	10	12	14

Task

As a physics student;

(a) Help the company by calculating the period to determine when the milk will be safe for human consumption

(b) Write an advisory note to educate the company on the dangers of exposing themselves to radioactive substances and suggest any safety precautions that should be put into consideration.
(c) Traces of radiations are still found in the milk even though there is no source. This is attributed to background radiations. Explain the concept of background radiations and suggest their common sources.

ITEM 3

Leaners of a certain school were watching a documentary video by NASA who had recently launched the stellar surveyor mission to the ISS to study the solar system, life cycle of stars, as well as energy they evolve. The crew in the mission was equipped with the Hubble telescope and other equipment to collect data. The narrator said that the mission marked a significant milestone in space exploration, demonstrating the ISS's potential as a platform for advanced space exploration. After the lesson, a learner was asked to write an article about the space mission so that it can be published in the school magazine but she couldn't provide enough information.

Task:

As a learner of physics, help the learner come up with a write up to be published in the school magazine about the explanation of the;

(a) Components of the solar system.
(b) Life cycle of stars
(c) Relevancy of the Hubble Telescope and the ISS in the mission.

SECTION B
PART 1

Answer **one** item from this part

ITEM 4

Your family hires three vehicles for a convoy to attend a wedding ceremony of one of your relatives. The hiring company charges a fee according to the distance moved. On a hot day, the team sets off from home with inflated balloons at 7:00am and attains a maximum velocity of 70Km/hr in 60 minutes. On reaching the highway road, it maintains this velocity for 90 minutes, finally it reaches the reception at 10:00am. It was observed that some balloons burst and only a few were left. Later in the evening it rained heavily and cars failed to reach back home due to slippery roads.

Task:

As a physics student;

(a) Help your family members compute the distance from home to church.
(b) Explain to your relatives the reason(s) why most of the inflated balloons burst.
(c) Provide guidance to the car owners to avoid the problem faced during the return journey.

ITEM 5

Two cars collided at a junction: one car was travelling northward and the other southward. The driver of the southbound car claims that the northbound driver was overspeeding. The traffic police are not sure of who is at fault. A witness stated that the cars travelled together after the collision. One of the drivers was not wearing a seatbelt. To identify a vehicle which was over speeding or braking heavily before the crash, the risen tyre temperatures can provide physical temperature of the tyres as follows:

Length of the mercury thread when in contact with the tyre: 40cm
Length of the mercury thread at the ice point: 10 cm
Length of the mercury thread at the steam point : 80 cm

Additional information

- Mass of the car travelling northward: 2000Kg
- Mass of the car travelling southwards: 1800Kg
- Velocity of the car travelling southwards before the collision: 70Km/hr.

- Common velocity of the two cars after the collision: 35Km/hr.
- Speed limit on the road: 70Km/hr.

Task: As a learner of physics,

(a) Guide the police on whether the pickup was overspeeding.
(b) Advise the driver who was not putting on the seat belt on how it can safe guard his live
(c) Assist the police to get the correct tyre temperature.

PART II

Answer **one** item from this part.

ITEM 6

A parent had a small piece of land besides his main house. He decided to put up a two roomed rental for purpose of increasing on his average income. He however set the rentals directly below electric transmission power lines and installed one electric meter to be used by two different occupants of his rentals. Misunderstandings arose as it was not clear which occupant to pay how much of electric bills. It was however discovered that the two occupants used one inside bulb each of different rating and one common security bulb. It was further discovered that;

Occupant of room no. 1 was using a flat iron rated 1000W for 30 minutes per day, TV rated 150W for four hours per day and a light bulb rated 7W for 5 hours per day.

Occupant of room no.2 was using a kettle rated 1500W for 40 minutes per day and a light bulb rated 10W for 5 hours per day.

The security light is rated 10W for 5 hours per day.

Hint; cost of one unit (1KWh = Ugshs. 504/=)

TASK

(a) Prepare a sensitization message to this parent (land lord) and the community why they should not build under electric power lines over long distances.
(b) Help the two different occupants each to understand how much of the total bill is supposed to pay in 30 days.
(c) As a physics student advise the occupants on how they can save on the consumption of power.

ITEM 7

In a newly opened estate, the planner had a specified number of occupants for the estate and the electricity board gave them a transformer that could serve the specified number of occupants. However the number of occupants eventually increased beyond the planned number due to sub division of the plots and transformer could not serve the population any more. All people started to complain that there electrical appliances, security lights and security alarms are no longer working and this has brought insecurity in the estate

Hint;

Power input of the transformer = 12000W, Voltage output = 240V and output current = 20A

Task

As a physics student;

(a) Explain why the transformer could no longer serve the big population of the estate.
(b) Suggest the possible causes of power losses in a transformer and how they can be minimized
(c) Explain how an electric bell(security alarm) works in order to alert people

-END-