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Physics
Paper 1
Jul/Aug 2024
2 ½ Hours

KAYUNGA SECONDARY SCHOOLS EXAMINATIONS COMMITTEE (KASSEC)
JOINT MOCK 2024
Uganda Certificate of Education

PHYSICS

(THEORY)

Paper 1

2 Hours: 30 Minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of **two** sections; **A** and **B**.*
- *The paper 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.*

Turn Over

Item 1

In a certain company, the workers organized end of year party in the company's hall. The hall was decorated and coloured bulbs flashing, yellow, blue and green were connected all around inside and at the entry. Music was played and some special communications from the top managers. Workers were dressed smart in different coloured clothes.

The workers observed that the sound of the music and communications was; confused, noisy and prolonged. They were wondering why that was so. The workers also were puzzled and wondered why the colours of their clothes looked different from the original colours.

Task:

As a student of physics, help the workers understand;

(a) Why the sound of the music and the communications was confused, noisy and prolonged and advise them how it could be minimized.

(b) Why the colour of their clothes kept changing under different lights.

(c) The colour of blue dress with red strips under green light.

Item 2.

A certain man came across the remaining bones of a person when was digging a pit latrine. The man took one piece of the bones to his home and wanted to find out the time the bones had stayed in the soil. The man consulted a scientist who told him that the age of a rotting plant or animal can be determined by a process called carbon-dating. This is because animals and plants contains carbon-14 which is radioactive.

The scientist found out that the activity or counts per second of the bone dug decay from the pit to be 5. The scientist then provided the man with a table of activity or counts per second and time in years obtained when a fresh sample of human bone was used.

Activity/counts per second	640	520	360	280	160	40
Time(year)	0	5	15	25	40	80

The man didn't understand how to use the data to determine the age of the rotting bones which he found in the pit.

Task:

As a student of physics;

(a) Help the man understand the procedure to determine the age of the rotting bones he himself found in the pit using the data provided to him and hence find its age.

(b) Advice the man the dangers associated with exposure to radioactive emissions and precautions one must observe.

Item 3.

People in a certain country were surprised one day at about noon when it became dark as if it was night. Some people told stories that the moon was fighting the sun others said God was annoyed. Then a certain man among the people called a friend in another country using his mobile phone to find out whether they were also experiencing the same.

The friend informed the man that for them, they were in night time and it was approaching 11:00 pm. People were observing the man calling and communication to someone from another country. They wondered how one in one country could communicate with one in another country while the man was also wondering how it could be day and night at the same time. After a short time, the darkness cleared and the day became normal.

Task:

Using the knowledge of physics;

(a) Help the people in that country understand the possibility of darkness to fall on earth in some parts during day for a short time.

(b) Help the man understand why it is day in one part of the earth and at the same time it is night in another part.

(c) Help the people in that country understand how one in one country can communicate to another one in another country.

SECTION B PART I

Answer one item from this part.

Item 4.

In a certain village, most men and women dig out stones from the soil, crash them using hammers into small pieces and sell to builders to make concrete slabs.

One day a man dug out a glittering stone and suspected it to be gold. He declared himself out of poverty immediately and started looking for its market. The man was advised to find out whether the stone was pure gold. He wondered how to find out and was puzzled

Hint: You're provided with the following apparatus; glass measuring cylinder, water, a stiff-uniform metre rule, knife edge, a piece of stone of known mass, M_o and pieces of threads. Density of pure gold is $19.3gcm^{-3}$.

Task:

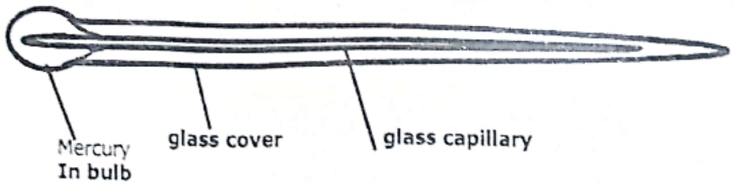
As a student of physics;

(a) Help the man understand to find out whether the stone is pure gold.

(b) Help the man identify potential sources of error and devise strategies to minimize them.

Item 5:

In a certain village, most citizens distil crude waragi called enguli from crushed ripe bananas after fermentation. The enguli is sold in the village and even to neightbouring villages for consumption. Most people who use to consume the product are sickly and look funny. The district healthy officer got concerned and took a small sample and analyzed it in the laboratory. The analysis showed that the enguli had impurities. Which were toxic. The citizens were advised to measure the temperature of the vapour of the distillate to ensure a relatively pure distillate. The citizens collected funds and ordered some mercury –in-glass thermometers such that their job is improved and safe. Unfortunately, the thermometers obtained were not calibrated and needed to be calibrated before they are used.



Task;

As a student of physics;

(a) Help the citizens of the village, using illustrations, to understand how to calibrate their thermometers in Celsius scale.

(b) Explain to the citizens some precautions when calibrating and using their thermometers.

(c) Help the people to understand why mercury was used in glass-capillary instead of alcohol.

PART II
Answer one item from this part.

Item 6.

In a certain grinding mill, a worker poured iron fillings into cassava flour as he was packing in small bags. He had iron fillings he was to take to a certain school. The worker became confused and wondered how he would sort out the filling from the flour .The worker then remembered that iron could be sorted using a magnet. He learnt this when he was in high school. Unfortunately, there was no magnet all around.

Hint;

Provided with, an iron nail of 6 inch, connecting wires of resistance 3.0Ω,four dry cells each of 1.5V and a switch.

Task;

As a student of physics;-

(a) Help the worker to remove the iron fillings from the cassava flour.
(b) If the current of 1.8 A is sufficient in your designed method, comment on the effectiveness of what you have designed.

Item 7

In Uganda, domestic electricity is transmitted at 240V. A man has a house in a certain town and uses electricity. He connected 10 bulbs each withdrawing a current of 4.8A to his house. The bulb light on an average of 10 hours a day. He also has a TV set withdrawing a current of 5A which he uses on an average of 15 hours a day. Also has a flat iron box rated 2400W/240V and uses it on an average of 2 hours a day.

The man is disturbed with electric bills every month. He believes that he is being cheated. The man contacted the board in charge of electricity distribution and was told that the bills were proportional to the number of units consumed monthly. Each unit costs shs. 1000/=.The man was warned about the dangers of the main electricity in his house.

Task;

As a student of physics.

(a) Help the man understand how to find the number of units he uses monthly and cost if a month is 30 days.

(b) Help the man understand how he would reduce on his monthly electric costs without reducing the number of his electric appliances.

(c) Help the man understand the safety devices to minimize dangers of main electricity in his house.

END