535/1
PHYSICS
Paper 1
July - August 2025
2½ hours

KAMPALA INTEGRATED SECONDARY SCHOOLS EXAMINATIONS BUREAU

KAMSSA

KAMSSA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Theory

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper consists 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.*
- *All answers must be written in the booklets provided.*

SECTION A

Answer all the items in this section

ITEM 1.

A physics teacher presented an activity to senior three students in your school. He wanted them to explain the following occurrences.

- During hot days, the sky appears to have certain colors during mid- day, which are different from those in the morning.
- Similarly, the tarmacked roads seem to have an illusion like a pool of water when observed obliquely from a distance.

The senior three students are unable to do the classroom activity due to lack of knowledge and have approached you for help.

Task:

Assist the senior three students in doing the classroom activity.

Hint

Colour of light	Frequency (Hz)
White	7.9×10^{14}
Blue	6.100×10^{14}

Velocity of electromagnetic radiation=3.0×10^{8} ms^{-1}

ITEM 2

A patient has been taken by parents to a referral hospital, complaining of several pains in the head. A radiotherapist has admitted the patient in an isolated room and decided to examine the patient for a brain tumor. In the process of the examination, a radioactive isotope has been injected into the patient to be used in diagnosis of the tumor.

The activity of the radioactive isotope from the brain is detected and recorded as shown in table 1.

Activity (counts per minute]	250	140	76	38	25	18
Time (minutes]	0	5	10	15	20	25

Whenever the parents of the patient went to check on him in the isolated room, the radiotherapist tells them to wait for the right time (when the activity is equal to the background count rate of 50).

The doctor has also informed the parents that if the right time for them to check on the patient comes, they must observe precautions in the isolated room.

The parents have demanded to know the period they should wait before they can check on their patient but no one answers them. They have also been left wondering what the precautions are and why they should observe them.

You have heard the doctor talking to the parents and they have contacted you to address their concerns.

Task

(a) (i) Use the data to determine how long the parents should wait before they are allowed to check on their patient.

(ii) Explain to the parents why they need to wait for that time before they enter the isolated room.

(b) (i) State the precautions the relatives have to observe inside the isolated room.

(ii) Explain why the parents should observe the precautions while inside the isolated room.

ITEM 3

Some regions in northern Uganda are affected by the changes in seasons that sometimes may lead to famine. Accordingly, the people in that region have been demanding for solutions from the government to ensure that famine does not occur any more.

The government is planning to launch a second satellite into the lower Earth orbit through the support of the international space station (ISS). A number of people have criticized the move claiming that the satellite will not solve the problem of famine in that region.

Task

(a) help the public to understand the occurrence of seasons.

(b) Make the people understand and appreciate the reason why the government of Uganda needs to send these satellites in space.

SECTION B

Part I

Answer one item from this part

ITEM 4

A mountain climber of mass 80 kg is provided with two pairs of shoes where one has sharp spikes and the other has flat soles. The climber decides to follow the path which is slippery and had difficulties in climbing. The climber records the barometric reading at the bottom and the top of the mountain as 76cmHg and 72cmHg respectively. On reaching the top of the mountain, the climber felt very tired, had nose bleeding and had difficulty in getting the food ready. The mountain climber wondered the cause of all these problems.

Hint:

Density of air $=1.20 kgm^{-3}$

Density of mercury $=1.36 \times 10^{4} kgm^{-3}$

Acceleration due to gravity $= 10 ms^{-2}$

Task: As a physics learner help the mountain climber to understand;

(a) why there was difficulty in climbing the mountain.

(b) The cause of;

(i) being very tired

(ii) nose bleeding

(c) why there was difficulty in getting the food ready.

ITEM 5

The operator of a hot air balloon wishes to transport a boat engine from the landing site to the next island. The operator has a mass of 75 kg and the co-operator has a mass of 80 kg and wishes to use a hot air balloon having a fabric of mass 10kg. The balloon has a volume of 200 m^3 and has to be pumped with hot hydrogen gas of density 0.9 kgm^{-3} so as it can fly in air of density 1.25 kgm^{-3}. The inflow and outflow temperature of hydrogen is 100^0C and 10^0C respectively. However, the balloon cannot move if the mass of the engine is more than 79 kg. The co-operator demands to know why the hydrogen to be used must be hot, why the balloon is able to move in air yet it is a solid and how the balloon is able to land back from air and the quantity of heat needed for the hydrogen.

Task

As a learner of physics;

(a) Determine whether the balloon will fly or not.

(b) Address the demands of the co-operator

Hint

The specific heat capacity of hydrogen $=14300 Jkg^{-1}K^{-1}$.

Part II

Answer one item from this part

ITEM 6

The welders in a certain workshop are troubled with their tools being shocked by electricity from a generator of 240V. When they visited a technician, they were advised to wind a copper wire to 3000 turns around a rectangular soft iron frame on the receiving part so as to output 120V suitable for their work shop operations fixed in a box. However, the welders seem bothered of how this will be helpful.

Task

As a learner of physics,

(a) Explain to the welders how the above design will produce power corresponding to their consumption.

(b) Help the welder to determine the number of turns to be wound on the output part of the device.

(c) Comment on how efficient the device is if the ratio of current output to current input is 1.6.

(d) Advise the welders on how to improve the efficiency of the device.

ITEM 7

In one of the secondary schools in a remote village, the students lack enough physics apparatus. The government decided to donate apparatus, including many moving coil galvanometers through a local supplier. However, there was still a scarcity of ammeters in the school. Each galvanometer has a resistance of 4 ohms and a full-scale deflection of 25 mA. The Head teacher wants to return some of the galvanometers back to the supplier in exchange for ammeters. The Head teacher does not know the use and mode of operation of these galvanometers. However, the Physics teacher advises the Head teacher that these galvanometers can be modified to work as ammeters and can read up to a current of 1A. He added that this project can be entrusted to the senior four class where you are the physics class coordinator.

Task

Advise the Head teacher on how you are going to perform this task and explain to him how the galvanometers work.

END

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