THE ANNUAL NATIONAL LOWER SECONDARY CURRICULUM PHYSICS SEMINAR HELD ON 29/06/2025 AT SEETA HIGH GREEN CAMPUS

PHYSICS 535/1 AND 535/2

(1) ELEMENTS OF CONSTRUCT FOR PHYSICS PAPER 1 THEORY

NOTE:

- **Section A comprises of three compulsory items**
- **Section B comprises of Part I and Part II each having two questions and the learner answers one question from each part**
- **The paper is for 2 hours 30 minutes**

SECTION A COMPULSORY		
ITEM	**ELEMENT OF CONSTRUCT**	**TOPICS COVERED**
ITEM ONE	Understands how waves are generated, propagated and their application in everyday life	• Nature of light; reflection of light at plane surfaces • Reflection of light at curved surfaces • Refraction, dispersion, and colour • General wave properties • Sound waves
ITEM TWO	Understands the structure of atoms, nuclear processes and their application in everyday life.	• Atomic models • Nuclear processes
ITEM THREE	Understands solar system, galaxies, stars, satellites & digital communication in everyday life	• The solar system • Stars and galaxies • Satellites and communication • Digital electronics
SECTION B		
PART I		
ITEM FOUR AND FIVE	Understands effect of force and heat on properties of matter	• Measurements in Physics • States of matter • Effects of forces • Temperature measurements • Heat transfer • Work, energy, and power • Turning effect of forces, centre of gravity, and stability

		• Pressure in solids and fluids • Linear and non-linear motion • Heat quantities and vapours
PART II		
ITEM SIX AND SEVEN	Appreciates electricity and magnetism in everyday life	• Magnets and magnetic fields • Electrostatics • Introduction to current electricity • Voltage, resistance and Ohm's law • Electromagnetic effects • Electric energy distribution and consumption

(2) PHYSICS PRACTICAL 535/2 OR 3

- **This paper consists of two items and a student is required to attempt only one item**
- **The duration of the paper is 2 hours and the students are expected to use the first fifteen minutes for planning**

ITEM	ELEMENT OF CONSTRUCT	SECTIONS
ITEM ONE OR TWO	Appreciates scientific investigation in physics	• Mechanics • Optics • Electricity

HEAT AND MECHANICS

ITEM ONE

During choosing materials for construction a group was provided with bricks, tiles, iron bars, pieces of wood, gravel, sand, cement and water. Different materials were to be used for different purposes. The walls of the house were to be painted black and use of iron roof but the students argued that the wall should be painted white and the roof made of grass.

Hint the diameter of wood and iron pieces is 0.7mm.

Iron of length10m can withstand a force of 6000N which causes an extension 2.0cm

Wood piece of length 10m can withstand a force of 4000N which causes an extension of 2.5cm

Task; As a learner of physics;

(i) Confirm that iron is stronger than wood
(ii) Briefly give the properties that make any three of the listed materials ideal, for construction
(iii) Give the justification for the choice of colour and nature of the roof materials.
(ST GYAVIIRA HIGH SCHOOL KAKIRI)

ITEM TWO

During transportation of vaccines to the village by a nurse, they have to be kept at low temperatures so as not to cause ailing of their biological nature. The vaccine must be transmitted within a temperature range of -5^0C and 4^0C. The vaccine is carried in a vaccine carrier that gains heat at $200Js^{-1}$. The vaccine of mass 400g and specific heat capacity $2000Jkg^{-1}K^{-1}$ at temperature at -5^0C is packed in the box with 110g of ice at the same temperature. The nurse rides a motorcycle starting from rest at the health-center accelerating at a rate of $2ms^{-2}$ and attains a velocity of $40ms^{-1}$ covering a distance of 800m, then he maintains the constant velocity covering a distance of 8000m. After which the nurse decelerates uniformly at a rate of $4ms^{-2}$ to rest covering a distance of 200m at the delivery point of the vaccine.

Hint

Specific heat capacity of ice = $2100Jkg^{-1}K^{-1}$

Specific latent heat of fusion of ice = $3.36x10^5Jkg^{-1}K^{-1}$

Specific heat capacity of water = $4200Jkg^{-1}K^{-1}$

Task; As a learner of physics;

(a) Find out whether the vaccine was delivered within the recommended temperature range.
(b) Explain why after such a journey the tyres of the motorcycle are found worn out.
(c) Suggest the precautions the nurse should undertake so as to reach safely.
(SHS GREEN CAMPUS)

NUCLEAR AND ATOMIC PHYICS

ITEM THREE

During the manufacture of plastic sheets, Strontium which decays to Yttrium according to the equation below

$$^{90}_{38}Sr \rightarrow ^{90}_{39}Y + ^{a}_{b}X$$

during the monitoring process the following results were obtained

Thickness (mm)	Counts per second
0.11	988
0.26	786
0.37	679
0.50	542
0.73	417
0.90	323

Task; As a learner of physics;

(a) Identify X and explain why it is suitable for detecting thickness of sheets other than any other radiation
(b) If the sheet is folded into 6 thickness and the count rate registered is 305 counts per second, find the thickness of the sheet.
(c) State any precautions that must be taken while using Strontium
(UMAR BILAL)

ITEM FOUR

During production of electrical energy using in a nuclear power plant individuals are advised only to work for two hours and put on coats lined with lead. In the process uranium $^{235}_{92}U$ fuel captures a neutron $^{0}_{1}\cap$ and under goes a reaction producing $^{141}_{56}Ba$, $^{92}_{36}Kr$ and neutrons. This process occurs inside a concrete wall having a graphite moderator and control rods made of boron.

Task; As a learner of physics;

(a) Find the number of neutrons produced in the reaction above.
(b) Briefly explain how electrical energy is produced
(c) Explain the importance of the moderator and the control rods
(d) Explain why the people working in the plant have to take the precautions.

ITEM FIVE

The standards agency of a given country got complaints about a certain Vaseline being sold without the recommendation of the standards agency. The Vaseline had no standards mark which raised more suspicion. The people complained of itching eyes, skin burns and development of sores. The standards agency took samples of the Vaseline and kept it in a dark room wrapped in a photographic film. After 60 days they realised that 60g of the Vaseline had reduced to 7.5 g and the photographic plates had darkened

Task; as a learner of physics help the people to;

(a) Understand the nature of some of the contents in Vaseline
(b) Understand the nature of any one likely emission from the Vaseline
(c) Understand why they were experiencing the listed complaints
(d) To confirm that the half-life the contents in the Vaseline is 20 days

ELECTRICITY AND MAGNETISM

ITEM SIX

A student went for the leadership conference at one of the facilities in their town, during the day the room became hot and the manager of the place switched on a fan that kept rotating and this resulted in cooling of the room. The student remained curious why the fan kept on rotating while connected to electricity. The manager tried to explain that a fan has a circuit that converts the a.c mains to another form of electric current. When the student went for lunch, he noted that the speaker they were using in the room was written 1000W,240V. The manager argued that the resistance of the speaker is less than 60Ω

Task; As a learner of physics;

(a) Explain with a diagram how the fan is able to keep on rotating.
(b) Help the student understand the process of converting the a.c current into another form
(c) Find out whether the manager was right about the resistance
(IBUNI MASUDI)

ITEM SEVEN

In a certain town the land lord noted that the tenants were consuming a lot of electric power, yet he had warned the tenants against using devices that have high power ratings.

There are four tenants and it was discovered that they each use two light bulbs rated 100W for 15 hours every day, one tenant has a flat iron rated 2500W which is used for 20 minutes each day and the other two tenants each uses a loud speaker rated 1800W for 5 hours and one other tenant uses a refrigerator rated 1000W for 1 hour each day. The tenants kept disagreeing with the landlord claiming that he overcharges them for the electrical power. As the tenants were arguing one of them with the refrigerator gave them cold juice and all the others were happy.

Hint; one unit of electric power costs Shs. 900

Monthly bill of electricity that is paid to land lord Shs. 860000

Task; As a learner of physics

(a) Find out whether the land lord was over charging the tenants
(b) Advise the tenant on what can be done to pay a smaller bill
(c) Help the other tenants understand how the speaker produces sound
(WANYANGE S.S.S)

EARTH AND SPACE PHYSICS

ITEM EIGHT

In February 2020, farmers in Teso sub region received information through radio, Tv and sms on their phones that (desert locusts) had crossed from Kenya into Karamoja and were leading towards Teso.

The government of Uganda together with **FAO** used satellites stationed 35,000km above an island in Lake Victoria and other technologies to destroy the large swarms of locusts to reduce their destruction that could result into famine within a short time which left every one surprised.

One of the officers working with **FAO** used a van whose engine could only start if three conditions are satisfied; i.e. the switch is on, seat belt fastened and a thumb pressed on a button.

In a discussion, the officer told them that the security system uses a **logic gate** but did not give details to the group of people that were amazed by the nature of the vehicle

Hint:

The radius of the earth is about 6300km at the equator.

Task

Use your knowledge of physics to:

a) explain to the locals how this would be bad destruction was reduced in a short time using the methods employed.
b) understand the relative speed of the satellites used to overcome the challenge.
c) draw a simple circuit diagram involving a logic gate and the corresponding truth table.
(SEROMA CHS)

ITEM NINE

In a certain rural school, they have no electricity and therefore, teachers can't use projectors, charge phones or students can't read at well in the evening because they use dim kerosene lamps.

In one of the lessons in physics, the teacher told them that the sun which is in plasma state and it lies at the Centre of one solar system and he said that it is the major provider of energy which surprised the learners but the teacher never gave them chance to discuss how this information can be useful in their school.
When the area MP visited the school, the learners asked him find a way of solving their challenge of electricity by securing for them a solar system but he had little knowledge about it. therefor he challenged the s4 learner where you belong to find the size of the panel and battery in terms of watt-hour(wh) that can power 4 LED lamps each of 15W and a small computer that uses 60W so that they can work for 5hours each evening.

Hint:

- ✓ 1 Astronomical unit (AU)=149,600,000km
- ✓ Speed of light =$3.0x10^8$ ms^{-1}
- ✓ Average surface temperature of each=27◦c

TASK

Use your physics knowledge to;

a) Explain to your friends how energy in the sun is produced
b) Understand the statement the teacher made that surprised the learners.
c) Understand the average rate which temperature is reduced from the sources to the earth.
d) Make the MP understand the power of system he can secure for the school.

LIGHT AND WAVES

ITEM TEN

The Physics department has been experiencing minor thefts of equipment such as spring balances, lenses, mirrors and many others.

The laboratory has one entrance and the storage shelves are located at a corner which is at one side of the lab. The laboratory attendant sits at a point near the doorway.

The school has no money to install expensive CCTV cameras and yet this vice should be stopped.

During the study visit to one of the banks of river Nile, they noted that one boat transports people as the cross the Nile, but when the boat in one side and people want it this side, a whistle is used to call and the

students noted that it takes 0.5 seconds for sound to be received. The students were acquisitive to know the width of the river at that point but the locals had no idea.

Hint.

Speed of sound=340ms^{-1}

a) Use an illustration to explain the type of mirror to be used giving reasons why it should be that type to stop the theft.

b) Explain any other application of the mirror used in (a) above.

c) Help the people at the bank to understand the width of river Nile at that point.

ITEM ELEVEN

When one of your friends who is a learner of S.3 visited his home are after some years. It was strange for him to learn that one of the old women he used to be close to had a challenge in recognizing him, even when he moved very close to her which used not to be the case. While interacting with her she openly told him that her sight is worsening every year. The old woman had employed people to sink for her a deep well at a rate of shs 5000 per metre, but this old woman had to determine the exact amount of money to pay since she did not have a perfect measuring instrument. Your friend has a digital watch that can detect echoes.

Hint

Speed of sound =330ms^{-1}

Time to receive the echo =0.365seconds

Task; use your knowledge of physics to;

(a) Make the old woman understand her challenges and how it can be minimized.
(b) Help her understand the exact amount of money to pay to the employees.
(SEROMA CHS)

PHYSICS PRACTICAL

535/2 OR 3

ITEM ONE

A certain organization has donated juice making machine to one of the farmers dealing in fruit business. The farmer plans to stock juice in bottles with tight covers made of rubber. The recommended type of rubber should have density that lies in the range 0.9gcm^{-3}to 1.1gcm^{-3}. The farmer was advised to design the cover using the rubber bung, but not sure whether specification of the rubber material will meet the required standard

Task;

Use the rubber bungs in your physics laboratory to confirm whether it is the type the farmer intends to acquire to be used as bottle covers. **END**