

535/1
PHYSICS
Paper 1
20242 ½ HOURS

YAAKA EXAMINATIONS
PHYSICS
Paper 1

INSTRUCTIONSTO 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*

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SECTION	ITEM	SCORE(S)	EXAMINER'S SIGNATURE
A	1		
	2		
	3		
B	4		
	5		
	6		
	7		
TOTAL			

SECTION A

Answer all the items in this section in the spaces provided.

Item 1

In Uganda, wood and charcoal are the main sources of energy for cooking in many households, especially in rural areas. This reliance on wood fuel has contributed to large-scale deforestation, affecting both the environment and the availability of firewood. The government and environmental organizations are promoting the use of energy-efficient stoves and alternative energy sources to reduce the pressure on forests.

Task:

How does the law of conservation of energy apply to the design of energy-efficient stoves, and how can their use help mitigate deforestation in Uganda?

Item 2

Uganda recently discovered significant oil reserves, and exploration activities are ongoing. While the oil sector is expected to boost the country's economy, there are concerns about environmental degradation and the equitable distribution of the revenue generated from oil production.

Task:

Discuss the principles of pressure and density that are used in the extraction of oil from underground reserves, and analyze the potential environmental impacts of oil drilling in Uganda.

Item 3

As Uganda's urban areas grow, the construction of multi-story buildings has increased. However, some buildings have collapsed due to poor construction practices and a lack of adherence to safety regulations. This has raised concerns about the structural integrity of buildings and the materials used.

Task:

Using the principles of mechanics and forces, explain how engineers can ensure the structural stability of buildings, and discuss the importance of choosing the right materials in the context of Uganda's construction sector.

Item 4

Uganda has been experiencing rising inflation, which has led to an increase in the cost of goods and services. As prices rise, people's purchasing power decreases, affecting their ability to meet basic needs such as food, housing, and healthcare.

Task:

How can the concept of elasticity in physics be used as an analogy to explain the effects of inflation on consumer demand and spending in Uganda's economy?

SECTION B

PART 1

Answer one item from this part

Item 5

A student constructed a hydraulic system to lift a small weight and measured the force applied and the distance moved by the input piston.

Task:

Use your knowledge of physics to:

- (a) Explain how hydraulic systems work and the principle of Pascal's Law.
- (b) Discuss the benefits of hydraulic systems in machinery and vehicles.
- (c) Provide examples of where hydraulic systems are used in everyday life.

Item 6

Students experimented with sound waves using a tuning fork and water, observing the vibrations produced in the water.

Task:

Use your knowledge of physics to help the students:

- (a) Explain how sound waves propagate through different media.
- (b) Discuss the factors that influence the speed of sound.
- (c) Explore real-life applications of sound waves, such as in sonar and ultrasound imaging.

PART II

Answer one item from this part.

Item 7

During a magnetism demonstration, students observed how different materials reacted to a magnet and discussed magnetic fields.

Task:

Use your knowledge of physics to help the students:

- (a) Explain the concept of magnetism and how magnetic fields are created.
- (b) Discuss the applications of magnets in technology, such as in motors and magnetic storage.
- (c) Explore how magnetic fields can affect electronic devices and safety.

Item 8

In many Ugandan schools, particularly in rural areas, students lack access to fully equipped science laboratories. Practical experiments are an important part of learning physics, as they help students understand theoretical concepts through hands-on experience.

Task:

How can the principles of electricity and magnetism be demonstrated in a basic school laboratory using simple materials available in rural areas of Uganda?

END

ANSWERS TO THE TASKS ABOVE

SECTION A

Item 1: The law of conservation of energy states that energy cannot be created or destroyed, only transformed from one form to another. Energy-efficient stoves are designed to maximize the conversion of fuel energy into heat for cooking while minimizing waste. By using less fuel, these stoves reduce the demand for wood and charcoal, leading to decreased deforestation. Promoting energy-efficient stoves helps conserve forests, as less firewood is harvested, preserving ecosystems and biodiversity.

Item 2: In oil extraction, the principles of pressure and density are crucial. Oil is typically found in porous rock formations where it is trapped under layers of rock. The pressure from overlying rock layers causes the oil to flow when a well is drilled. The density of oil is lower than that of water, allowing it to rise to the surface when pressure is released. Environmental impacts of oil drilling in Uganda include habitat destruction, oil spills, and water contamination, which can harm local ecosystems and communities.

Item 3: Engineers ensure structural stability by applying principles of mechanics, such as load distribution, tension, and compression. They calculate the forces acting on a building and design it to withstand these forces through careful planning and analysis. Choosing the right materials is essential; materials must have appropriate strength and durability to support the building's weight and resist environmental factors like wind and earthquakes. In Uganda, using local materials that meet safety standards can enhance construction quality and reduce risks of collapse.

Item 4: The concept of elasticity in physics can be likened to consumer demand in economics. Just as elastic materials stretch or compress under pressure, consumer demand can increase or decrease in response to changes in price. When inflation rises, purchasing power falls, leading to decreased demand for goods and services, similar to how a stretched elastic band may snap if pulled too far. Understanding elasticity helps explain how consumers adjust their spending habits during inflationary periods.

Item 5:

- (a) Hydraulic systems work based on Pascal's Law, which states that when pressure is applied to a confined fluid, the pressure change is transmitted equally throughout the fluid. This allows a small force applied at one piston to generate a larger force at another piston, enabling lifting heavier loads.
- (b) Benefits of hydraulic systems include the ability to lift heavy objects with relatively little input force, smooth and controlled motion, and the ability to transmit power over distances. They are commonly used in machinery and vehicles for lifting, braking, and steering.
- (c) Examples of hydraulic systems in everyday life include hydraulic lifts in garages, brake systems in cars, and construction equipment like excavators and bulldozers.

Item 6:

(a) Sound waves propagate through different media (solids, liquids, gases) by causing particles in the medium to vibrate. In solids, sound travels fastest due to tightly packed particles; in liquids, it is slower, and in gases, it is the slowest.

(b) Factors influencing the speed of sound include the medium's density and temperature. For instance, sound travels faster in warmer temperatures because increased energy causes particles to vibrate more rapidly.

(c) Real-life applications of sound waves include sonar, used in underwater navigation and mapping, and ultrasound imaging, which is employed in medical diagnostics to visualize internal organs and monitor pregnancies.

Item 7:

(a) Magnetism is a force that occurs due to the motion of charged particles. Magnetic fields are created by the movement of electrons in materials. Permanent magnets have aligned magnetic domains, creating a consistent magnetic field.

(b) Applications of magnets in technology include electric motors, which convert electrical energy into mechanical energy, and magnetic storage devices, such as hard drives, which store data using magnetic fields.

(c) Magnetic fields can affect electronic devices by inducing currents in conductive materials, which may lead to interference or malfunction. It is important to shield sensitive electronics from strong magnetic fields to ensure safety and proper function.

Item 8: Principles of electricity and magnetism can be demonstrated in basic school laboratories using simple materials. For example, to show electrical circuits, students can use batteries, wires, and small bulbs to create simple circuits. For magnetism, they can use magnets and iron filings to visualize magnetic fields. Demonstrations can include making a simple electromagnet by wrapping wire around a nail connected to a battery. These hands-on experiments help students grasp theoretical concepts while using readily available materials.



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