BIYAYA SECONDARY SCHOOL

UGANDA ADVANCED CERTIFICATE OF EDUCATION

PHYSICS 2 PRACTICAL

TIME: 2 Hrs

INSTRUCTIONS TO CANDIDATES:

1. ***Do not open*** *this booklet or adjust any laboratory apparatus until you are explicitly permitted to do so by the invigilator.*
2. *This paper consists of* ***two*** *context-based scenario items and you are required to attempt* ***only one*** *item.*
3. *Read the real-world situations carefully to identify the core physics problem before beginning.*
4. *The first* ***15 minutes*** *are strictly allocated for reading through the items, planning your investigation steps, and confirming that all required apparatus are present at your workstation.* ***No writing or assembly*** *is allowed during this period.*
5. *Identify the* ***independent, dependent, and controlled variables*** *related to the scenario context before executing your procedure.*
6. *Record all raw data, measurements, and physical observations in* ***blue or black ink*** *directly into your answer script as soon as they are made.*
7. *Do not waste time writing out a fair copy of your experimental results onto separate sheets. Marks are awarded for original, authentic, and well-structured primary data tables.*
8. *All mathematical analysis, coordinate selections from your line of best fit, and calculations* ***must be explicitly shown****.*
9. *You are required to state any* ***safety precautions taken*** *and identify potential sources of experimental limitations inherent to your chosen method.*
10. *You must provide a clear, data-driven* ***contextual conclusion and recommendation*** *that directly addresses the problem faced by the individual or organization in the scenario.*
11. *Mathematical tables, graph papers, and* ***non-programmable silent electronic calculators*** *are permitted for use.*

Item 1

A local technician who repairs electric clay ovens and water heaters has bought a coil of unmarked heating element wire. He suspects it is nichrome but needs to know its characteristic electrical constant to calculate the safe length needed for a new design so that it does not melt under intense heat. The technician knows that the length and thickness of the wire affect its overall resistance, but he cannot quantify the internal electrical nature of the metal itself. He decides to consult physics students to help him investigate the wire sample.

Task:

As a Physics student, you are required to conduct an experiment to determine the intrinsic material constant that characterizes the electrical nature of the wire provided to help the technician identify if it is authentic nichrome.

ITEM 2

A mechanical workshop in Jinja is calibrating automated sorting arms used in a sugar packaging plant. The sorting arms rely on precise timing circuits to push bags of sugar off a fast-moving conveyor belt. If a bag is underfilled or overfilled, its resistance to a change in motion—its **inertial mass**—alters the timing of the mechanical arm, causing sorting errors.

To fine-tune the automation sensors, the plant engineers need to map how the period of an inertial system shifts when different loads are added. The workshop technician has been tasked with building an **inertial balance** model. This setup allows the measurement of inertial mass directly, completely isolated from and independent of gravitational forces, ensuring the sorting arm sensors function reliably regardless of local gravity variations.

Task;

Assuming you are the workshop technician, write a comprehensive laboratory manual entry for this investigation.

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