P510/1

PHYSICS

(theory)

Paper 1

JULY 2025

MID TERM II EXAMINATIONS 2025

**S.5 PHYSICS PAPER ONE**

2 HOURS

**INSTRUCTIONS**

*This paper consists of* ***4*** *examination items.*

*Candidates are required to attempt any* ***3*** *items, any extra item attempted will not be scored.*

*All answers* ***must*** *be written on the answer sheets provided.*

*All items carry equal scores*

*Silent non-programmable calculators may be used.*

**Item one**

A technology company is rolling out smart transport cards to facilitate the daily commute of its employees. These employees travel by bus from a trading centre to the company offices located near the main bus park, five days a week.

However, the company is currently facing a challenge in determining the exact amount of money to deposit on each smart card for a full month of travel.

On one particular day, the bus journey was recorded as follows:
It started from rest at the trading centre and accelerated uniformly at 1.25 m/s² until it reached a speed of 72 km/h. The bus then continued at this constant speed for a distance of 50 km before decelerating uniformly at 2 m/s² to come to a complete stop at the bus park.

The transport service charges Ushs 1,000 per kilometre of travel.

**Task:**

1. Represent the entire journey of the bus graphically
2. Advise the company on the minimum amount of money that should be deposited on each smart card to cover a full month’s travel expenses.

**Item two**

As part of your school’s sports science project, your team is working with the athletics coach to help a long jumper improve his performance. During training, he takes off from ground level with an initial speed of 5m/s at an angle of 30° to the horizontal.

To qualify for the upcoming district competitions, a jumper must achieve a minimum horizontal distance of 9.0 metres from the point of take-off to the landing point.

**Task**

1. Help the school administration to know whether the jumper qualifies for the competitions.
2. Using principles of projectile motion, explain with evidence how the jumper can increase his horizontal distance.
3. Derive the equation of trajectory.

**Item three**

A company that manufactures cooking utensils plans to develop a new type of metal saucepans that heat up quickly and uses less energy. However, the company does not yet know how to determine the specific heat capacity of the metal sample they intend to use.

Knowing the SHC of the metal will help the company estimate how much energy is required to raise the temperature of their saucepans, which directly affects cooking time and fuel efficiency.

**Task**

1. Advice the company manager on the steps he can take to determine the specific heat capacity of the sample and how they can ensure accurate results.
2. Using the data below, calculate the specific heat capacity of the metal block:
* Mass of metal block = 1.8 kg
* Voltage = 12 V
* Current = 2 A
* Time of heating = 5 minutes
* Temperature increase = 30°C

**Item four**

Your school has recently acquired new physics lab equipment, including a continuous flow calorimeter designed to measure the specific heat capacity (SHC) of liquids. During a science club session, your group sets up the apparatus for a public exhibition. As part of the demonstration, your team is required to show visiting parents how the setup can be used to determine the SHC of a liquid, such as water.

Task

As a student of physics;

1. Use your set up to explain to the visitors how the specific heat capacity of the liquid can be determined.
2. Help them understand the advantages and disadvantages of using the above method
3. In such a method, 50g of water is collected in 1minute, the voltmeter and ammeter readings are 12.0V and 2.50A respectively. While the inflow and outflow temperatures are 20℃and 28℃ respectively. When the flow rate is reduced to 25gmin-1, the voltmeter and ammeter read 8.8V and 1.85A respectively while the temperatures remain constant. Calculate the specific heat capacity of water

**Good luck**