



UNIVERSITY OF SWAZILAND  
FINAL EXAMINATION PAPER

PROGRAMME: ALL YEAR 1 PROGRAMMES

COURSE CODE:            ABE102

TITLE OF PAPER: PHYSICS

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER  
QUESTIONS

DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE  
CHIEF INVIGILATOR

**Question 1: (Compulsory)**

- a) i) Draw a diagram of a typical periscope, and show the normal, angle of incidence and angle of reflection. [10 Marks]
- ii) State the relationship between the angle of incidence and the angle of reflection [2.5 Marks]
- iii) Suggest the possible use of a periscope [2.5 Marks]
- b) State the law of energy conservation as used in physics [2.5 Marks]
- c) A ball with a mass of 50kg is raised to a height of 60m and then allowed to fall back on its own.  
Assume  $g=10\text{N}$ . What is;
- i) Potential and kinetic energy at 60m height? [5 Marks]
- ii) Potential and kinetic energy at ground level [5 Marks]
- iii) What can you conclude from (i) and (ii) with special reference to the law of energy conservation? [2.5 Marks]
- d) A transformer is needed to convert 12v into 240v. if there are 4000 turns on the primary coil, how many turns should there be on the secondary coil in order to produce the required voltage? [10 Marks]

**Question 2**

- a) Draw an electric circuit and show how each of the following is connected in the circuit; ammeter and voltmeter. Explain why they are connected in that manner. [10 Marks]
- b) Define the following terms and give their dimensions.
- i) Speed
- ii) Velocity
- iii) Electric charge
- iv) Ohm's law and give its expression in relation to resistance, voltage and current [7.5 Marks]
- c) An electric appliance should always be fitted with an earth wire for protection. What is protected by the earth?



- 7
- i) The cable connecting the appliance
  - ii) The fuse in the circuit
  - iii) The heating element of the appliance
  - iv) The person using the appliance

[5 Marks]

### Question 3

- a) What is the importance of studying optics in agriculture? Give four (4) reasons  
[10 Marks]
- b) A 500w heater is used for 10 hours per day heating a chicken shed in winter. What is the monthly cost of electricity costs E2.50 per KWh.  
[15 Marks]
- c) Why is there no sound in space?
  - i. Because there is no air
  - ii. Because there is no gravity.
  - iii. Because there no light.
  - iv. Because there is no magnetic field.[2.5 Marks]
- d) The main reason for the vacuum in a flask is to reduce heat transfer due to;
  - i) conduction only
  - ii) convention only
  - iii) radiation only
  - iv) conduction and convention
  - v) convention and radiation

[2.5 Marks]

### Question 4

- a) what quantity is calculated by multiplying the force by distance
  - i) Acceleration
  - ii) Power
  - iii) Work
  - iv) Pressure[2.5 Marks]
- b) Show that the image of an object is as far behind as it is in front of a plane mirror  
[10 Marks]
- c) The resistance of a wire is 3.35 ohms at 0 degrees Celsius, what is the resistance of the wire at 50 degrees Celsius given that the temperature co efficient is  $4.3 \times 10^{-3}$  degrees Celsius  
[10 Marks]

[10 Marks]

d) A lamp is connected to supply with an input of 220 volts and the lamp is rated 6 volts, 1.8w.

i) Name the type of transformer used and why? **[2.5 Marks]**

ii) Calculate the ratio of the number of turns on the secondary coil to the number of turns on the primary coils. **[5 Marks]**

## ABE 102

## FINAL EXAMINATION

## Question 4 ©

$$\text{Resistance (R)} = R_0 + C R_0 (T - T_0)$$

C – Temperature Coefficient

$R_0$  – Initial resistance

$T_0$  – Initial temperature

T – Final temperature