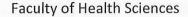
# UNIVERSITY OF ESWATINI



Department of Environmental Health Science

DEGREES IN ENVIRONMENTAL HEALTH SCIENCE AND NURSING SCIENCE

### MAIN EXAMINATION PAPER FEBRUARY 2021

TITLE OF PAPER

PHYSICS FOR HEALTH SCIENCES

(ENVIRONMENTAL HEALTH SCIENCE AND NURSING SCIENCE STUDENTS)

COURSE CODE

: EHS103

**DURATION** 

2 HOURS

**MARKS** 

100

**INSTRUCTIONS** 

**READ THE QUESTIONS & INSTRUCTIONS** 

**CAREFULLY** 

: ANSWER ANY FOUR QUESTIONS

EACH QUESTION **CARRIES 25** MARKS.

: WRITE NEATLY & CLEARLY

: CALCULATOR, GRAPH PAPERS, RULAR AND A SET OF MATHEMATICAL INSTRUMENTS ARE ALLOWED FOR

THIS EXAM PAPER

: NO OTHER PAPER SHOULD BE BROUGHT INTO THE

**EXAMINATION ROOM.** 

: STUDENTS ARE ALLOWED TO USE GRAPH PAPERS AND

SCIENTIFIC CALCULATORS

: BEGIN EACH QUESTION ON A SEPARATE SHEET OF

PAPER.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

### **QUESTION ONE**

A.	State	e the la	ws of	reflec	tion as	s it con	cerns a	plane mirror	•		[4 ma	rks]
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B. What is meant by lateral inversion and lateral displacement in the study of optics?

[4 marks]

C. Give two examples of the application of plane mirrors.

[4 marks]

D. Name three applications of curved mirrors in hospitals.

[3 marks]

- E. During ultrasound imaging on a patient at the Mbabane hospital, ultra sound is incident at an angle of 10<sup>0</sup> in soft tissue, onto a plane soft tissue-bone boundary. If the angle of refraction in the bone is 27.4<sup>0</sup>, calculate the following:
  - I. The speed of ultrasound in the bone given that it is 1.54 km/s in the soft tissue. [6 marks]
  - II. The refractive index when the ultrasound is traveling from the bone to the soft tissue. [4 marks]

## **Total 25 marks**

# **QUESTION TWO**

- A. Draw the structure of a human eye and label the following parts: lens, pupil, cornea, retina, iris, vitreous humour, ciliary muscle and the optic nerve. Then, answer the following questions: [8 marks]
  - I. What is presbyopia? Explain how a person can get such a condition.

[5 marks]

II. How can an ophthalmologist correct this condition?

[1 marks]

- B. You examine make Nolwazi who has a problem with her vision. You find that she has a near point of 1.5 m. Given that the near point of a normal eye is 25 cm from the eye,
  - I. What sight condition is make Nolwazi having?

[1 mark]

II. How are you going to correct this condition of make Nolwazi?

[1 marks]

III. Calculate the focal length of the lenses you are going to prescribe for make Nolwazi's eyeglasses that she can read a book held at 25 cm. [5 marks]

IV. Calculate the power of the lens.

[4 marks]

### **Total 25 marks**

# **QUESTION THREE**

A. State the following laws:

I. Boyle's law

[2 marks]

II. Charles's law

[2 marks]

III. Pressure law [2 marks]

- B. The density of argon is 1.60 kgm<sup>-3</sup> at 27<sup>0</sup> C and a pressure of 750 mmHg. What is the mass of argon in an argon-filled electric lamp bulb of volume 100 cm<sup>3</sup> if the pressure inside is 750 mmHg when the average temperature of the gas is 120<sup>0</sup> C? [8 marks]
- C. Why do we say humans are homoeothermic and fish are poikilothermic? [2 marks]
- D. What do you understand by the terms endothermy and hyperthermia? [2 marks]
- E. Explain how a person can get the condition of hyperthermia and describe how would you help such a person who is suffering from hyperthermia to recover? [7 marks]

## **Total 25 marks**

#### QUESTION FOUR

A. Define radioactivity. [2 marks]

B. Name the three types of emissions that result from radioactivity [3 marks]

C. Make a table as shown below for the three types of emissions you have named in (B) above and in the table list three properties of each emission in the appropriate columns. [9 marks]

Emission 1 (you must give	Emission 2 (you must give	<b>Emission 3</b> (you must give the name of the emission			
the name of the emission	the name of the emission				
here)	here)	here)			
1.	1.	1.			
2.	2.	2.			
3.	3.	3.			

D. List five medical applications of radioactivity.

[5 marks]

E. Calculate the energy released when 1 kg of  $^{235}_{92}$ U undergoes nuclear fission. Assume energy per fission is 200 MeV and Avogadro's number =  $6.02 \times 10^{23}$  mol<sup>-1</sup>. [6 marks]

### **Total 25 marks**

# **QUESTION FIVE**

- A. Differentiate between a **scalar quantity** and a **vector quantity** and give an example of each. [4 marks]
- B. State Newton's law of inertia. What are the two clauses or parts contained in the statement of this law? [4 marks]
- C. Two blocks of masses 4 kg and 6 kg are joined by a string and rest on a frictionless horizontal table. If a force of 100 N is applied on the 6 kg block to move them, find the acceleration of each block and the tension in the string. [6 marks]

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- D. When a 10  $\Omega$  resister is connected across the terminal of a cell of electromagnetic force, E, and internal resistance, r, a current of 0.1 A flows through the resistor. When the 10  $\Omega$  resistor is replaced by a 3  $\Omega$  resistor, the current increases to 0.24 A. find the values of E and r. [9 marks]
- E. Static electricity is associated with dangers in hospitals especially in the operating theatres or where oxygen is being used. Name two of these dangers. [2 marks]

**Total 25 marks** 

End of examination