UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

(BSC) IN ENVIRONMENTAL HEALTH

FINAL EXAMINATION PAPER 2006

TITLE OF PAPER	:	ENVIRONMENTAL PHYSICS
COURSE CODE	:	EHS 402
DURATION	:	THREE HOURS
MARKS	:	100
INSTRUCTIONS	:	ANSWER ONLY FIVE QUESTIONS
	:	EACH QUESTION CARRIES 20 MARKS
	:	QUESTIONS ONE AND TWO ARE COMPULSARY
	:	NO QUESTION PAPER SHOULD BE BROUGHT INTO NOR OUT OF THE EXAMINATION ROOM
	:	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) One of the four states of matter is the plasma state. Explain how artificial plasmas can be produced. (4 marks)

(b) Name two uses of artificial plasmas (2 marks)

(c) Scientists plan to develop affordable plasma torches. Through your knowledge of environmental physics, name four of these uses. (4 marks)

(d) Name the four properties that can be used to characterize solids (4 marks)

(e) Explain how any three of the properties in (d) above can be used in this characterization (6 marks)

Total 20 marks

QUESTION TWO

(a) A man of mass 70kg loses 84kJ heat energy. If his normal temperature is t = 37^0C, what will it be after the heat loss? Compare this loss with the loss that occurs in an aluminum block of the same size that has lost the same quantity of heat. Take the specific heat capacities of the body and aluminum as 4.19kJ/kg^{0}C and 0.915kJ/kg^{0}C respectively. All calculations must be clearly written (10 marks).

(b) Using the principles of thermal physics, explain the thermoregulatory mechanism in the human body (10 marks)

Total 20 marks

QUESTION THREE

(a) Use both the molecular and kinetic theories to explain the liquid state of matter (10 marks)

(b) What is viscosity? Explain the importance of viscosity liquids in the flow of liquids in living systems. (10 marks)

Total 20 marks

QUESTION FOUR

(a) An acrobatic airplane flying in the skies of Matsapha during an air show flew with a velocity of 360m/s at its lowest point of the loop of a vertical circle of radius

180m. What is the velocity of the airplane at the highest point of its loop? Show all calculations. (10 marks)

(b) Name five instruments that can be used to detect radioactivity (5 marks)

(c) Explain what happens to the atomic numbers and mass numbers of an isotope when it emits (i) alpha, (ii) beta, and (iii) gamma radiations respectively (5 marks)

Total 20 marks

QUESTION FIVE

(a) Radioactivity poses a great hazard to health. Mention four reasons that make you agree that we can never avoid all kinds of radioactivity. (4 marks)

(b) Mention six ways which one can use to reduce the amount of radiation received (6 marks)

(c) The current through an X-ray tube is 2000mA when the voltage is 16000volts. Calculate

   (i)   The number of electrons striking the target per second. Given that, when the potential difference across the tube is in volts, the electron charge (e) is 1.6×10^{-19} Coulombs (4 marks)
   (ii)   The velocity of the electrons when they strike the target. Given that, the mass of the electron is 9×10^{-31} kg. (6 marks)

Total 20 marks

QUESTION SIX

List three advantages and two disadvantages of using the following renewable energy resources:
(a) Geothermal energy (5 marks)
(b) Wind energy (5 marks)
(c) Hydroelectric power (5 marks)
(d) Tidal power (5 marks)

Total 20 marks

GOOD LUCK!!!