UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

(BSC) IN ENVIRONMENTAL HEALTH

FIRST SEMESTER SUPPLEMENTARY EXAMINATION PAPER 2009

TITLE OF PAPER	:	ENVIRONMENTAL PHYSICS 1
COURSE CODE	:	EHS 411
DURATION	:	TWO HOURS
MARKS	:	100
INSTRUCTIONS	:	ANSWER ONLY FOUR QUESTIONS
	:	EACH QUESTION CARRIES 25 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) 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)

(c) Use the kinetic theory to explain the solid state of matter. (5 marks)

TOTAL 25 MARKS

QUESTION TWO

(a) One of the four states of matter is the plasma state. Explain how artificial plasmas can be produced. (4 marks)

(b) Name any four types of change of state of matter. (4 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 any three of the properties in (d) above how they can be used in this characterization (9 marks)

TOTAL 25 MARKS

QUESTION THREE

(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)

(c) Draw and label a clinical thermometer. (5 marks)

TOTAL 25 MARKS

QUESTION FOUR

(a) List and describe three types of coal. (9 marks)

(b) Indicate which is preferred for burning and which is most available. (2 marks)

(c) List four advantages and five disadvantages of using coal as a fuel source. (9 marks)

(d) Calculate the energy required to:
- (i) Raise the temperature of 1 kg of water from 0^0c to 100^0c. (3 marks)
- (ii) Change 1 kg of water at 100^0c to steam. (2 marks)
  (Take specific heat of water as $4200 \text{Jkg}^{-1}\text{K}^{-1}$, $L_v = 2300000 \text{Jkg}^{-1}$)

TOTAL 25 MARKS

QUESTION FIVE

(a) List five types of thermometers. (5 marks)

(b) Differentiate between hypothermia and hypothermia and expand on the factors that may expose someone to them. (8 marks)

(c) Define the following:
- (i) heat capacity
- (ii) specific heat capacity
- (iii) latent heat
- (iv) energy efficiency (4 marks)

(d) A well-insulated hot-water tank for a house contains 140 kg of water at 15^0c. the tank itself has a heat capacity of 6000JK^{-1}. Find how long it will take an immersion heater to raise the temperature of the water to 50^0c if the tank is well insulated and the power of the heater is 2200W. (the specific heat of the water is $4200 \text{Jkg}^{-1}\text{c}^{-1}$). (8 marks)

TOTAL 25 MARKS

GOOD LUCK!!!!!!