KISII UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN PHYSICS
FIRST SEMESTER 2022/2023
[SEPTEMBER-DECEMBER, 2022]

PHES 111: ENVIRONMENTAL PHYSICS

STREAM: Y1S1   **TIME: 2 HOURS**

DAY: MONDAY, 12:00 – 2:00 PM   **DATE: 05/12/2022**

INSTRUCTIONS
1. *Do not write anything on this question paper.*
2. *Answer question ONE and any other TWO questions.*

QUESTION ONE

a) State any three characteristics of electromagnetic waves   (3 marks)

b) An x-ray machine produces radiation of 1.0×10^{-11} m. Calculate
   i)   The frequency of the radiation   (2 marks)
   ii)   Its energy content   (2 marks)

c) The earth radiates approximately as a blackbody at 255K. Calculate the wavelength at which the blackbody distributed peaks and compare the result with the wavelength at which the emission from the sun peaks (the sun can be approximated by a blackbody at 5800K)   (5 marks)

d) Define the following terms   (4 marks)
   i.   Thermal conductivity
   ii.   Specific heat capacity
   iii. Groundwater
   iv.   Relative humidity

e) State work-energy theorem   (2 marks)

f) A shot-putter heaves a 7.26kg shot with a final velocity of 7.50 m/s.
   i.   What is the kinetic energy of shot?   (2 marks)

ii. If the shot was initially at rest, how much work was done on it to give this kinetic energy? (2 marks)

g) Describe four Forces that controls the wind (8marks)

QUESTION TWO

a) Define the term dew point (2 marks)

b) Give five differences between clouds and fog (10 marks)

c) At a given temperature 1m³ of air can hold 10g of water vapour. What is the relative humidity at the temperature if 1m³ of air is holding 9g of water (3 marks)

d) An electric motor lifts an elevator that weighs 1.20 x 104 N a distance of 9.00m in 15s. Calculate the work done in lifting the elevator and the power of the electric motor. (5 marks)

QUESTION THREE

a) Define atmospheric circulation (2 marks)
b) State any five factors that affect global atmospheric circulation. (5 marks)
c) Discuss the importance of the atmospheric boundary layer (8 marks)

d) A boat heads directly across a river 41m wide at 3.8 m/s. The current is flowing downstream at 2.2 m/s.What is the resultant velocity of the boat and how much time does it take the boat to cross the river (5 marks)

QUESTION FOUR

a) State any three types of aquifers. (3 marks)

b) Discuss various sources of groundwater contamination and pollution (12 marks)

c) A wind with a velocity of 40.0 km/h blows towards 30.0^0. What is the component of the wind velocity towards :
   i. 90° (3 marks)
   ii. 0° (2 marks)

QUESTION FIVE

a) Describe the various forces that cause tides and affect tidal patterns (10 marks)

b) Describe a watershed and its drainage systems (10 marks)