

UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

(BSC) IN ENVIRONMENTAL HEALTH

SECOND SEMESTER MAIN EXAMINATION PAPER MAY 2015

TITLE OF PAPER : ENVIRONMENTAL PHYSICS II
COURSE CODE : : EHS 412
DURATION : TWO HOURS
MARKS : 100
INSTRUCTIONS : ANSWER ONLY FOUR QUESTIONS
: EACH QUESTION CARRIES 25 MARKS
: QUESTIONS ONE AND TWO ARE COMPULSARY
: BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER
REQUIREMENT : PROVISION OF A PERIODIC TABLE

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

QUESTION ONE

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1. Describe how a light water fission reactor works and indicate what fuel is used in it. How can the chain reaction be maintained and controlled? [15]
2. Describe the difference between passive and active solar systems. What features are needed in a home to make passive solar energy work well? [10]

Total 25 marks

QUESTION TWO

1. Radioactivity poses a great hazard to health. Discuss four reasons that make you to agree that we can never avoid all kinds of radioactivity. [4]
2. In what ways can one reduce the amount of radiation one is exposed to? [5]
3. Work out the decay equations for the following:
 - a. Americium – 243, ${}_{95}\text{Am}$ (an alpha emitter). [2]
 - b. Thorium – 230, ${}_{90}\text{Th}$ (an alpha and gamma emitter). [2]
 - c. Radon – 222, ${}_{86}\text{Rn}$ (an alpha emitter). [2]
 - d. Technetium, ${}_{43}\text{Tc}$ (a gamma emitter). [2]
 - e. Phosphorus – 32, ${}_{15}\text{P}$ (a beta emitter). [2]
 - f. Rhenium – 187, ${}_{75}\text{Re}$ (a beta emitter). [2]
 - g. Krypton – 87, ${}_{38}\text{Kr}$ (a neutron emitter). [2]
 - h. Tantalum - 177, ${}_{73}\text{Ta}$ (an electron capture). [2]

Total 25 marks

QUESTION THREE

1. Energy efficiency can help us meet our future energy needs. Discuss this statement. [15]
2. Explain how we can get energy from biomass. [10]

Total 25 marks

QUESTION FOUR

Discuss the use of Coal under the following themes

1. Merits. [5]
2. Demerits. [5]
3. Its sustainability on a national basis. [5]
4. Propose solutions to the demerits. [5]
5. What is the situation in Swaziland and what should be done to improve access by all to coal as a source of energy? [5]

Total 25 marks

QUESTION FIVE

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Discuss the use of geothermal energy under the following themes:

1. Merits. [5]
2. Demerits. [5]
3. Its sustainability on a national basis. [5]
4. Propose solutions to the demerits. [5]
5. What is the situation in Swaziland and what should be done to improve access by all to coal as a source of energy? [5]

Total 25 marks

END OF EXAMINATION

