UNIVERSITY OF SWAZILAND
FACULTY Of HEALTH SCIENCES

DIPLOMA IN ENVIRONMENTAL HEALTH SCIENCE

FINAL EXAMINATION PAPER 2005

TITLE OF PAPER	INTEGRATED BASIC SCIENCES
COURSE CODE	HSC 103
TIME	3 HRS
MARKS	100
INSTRUCTIONS	ANSWER **FIVE** (5) QUESTIONS ONLY
	EACH QUESTION IS WORTH 20 MARKS
	AT LEAST TWO (2) QUESTIONS MUST BE ANSWERED FROM EACH OF SECTIONS A AND SECTION B
	NO FORM OF ANY PAPER SHOULD BE BROUGHT INTO OR TAKEN OUT OF THE EXAMINATION ROOM
	BEGIN THE ANSWER TO EACH QUESTION ON A SEPARATE SHEET OF ANSWER PAPER
	ALL CALCULATIONS / WORKOUT DETAILS SHOULD BE SUBMITTED WITH YOUR ANSWER SHEET

DO NOT OPEN THIS EXAMINATION PAPER UNTIL PERMISSION TO DO SO IS GRANTED BY THE INVIGILATOR.

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SECTION A

ANSWER AT LEAST TWO QUESTIONS FROM THIS SECTION

QUESTION 1   20 MARKS

A.   Express the data below as:

    Common numbers   (i) 2.01×10^{-5} (ii) 3.175×10^{7} (2,2)

    Exponential numbers   (iii) 0.00035   (iv) 5,120,000   (v) 0.0000834   (2,2,2)

B   Work out the number of **significant figures** for the following measurements:

    (i) 0.011L   (ii) 1100ml   (2,2)

C   Perform the following mathematical calculations, and give your answer to the **CORRECT** number of significant figures:

    (i) 10.1mL – 0.20mL   (ii) 4.973g ÷ 5mL   (3, 3)

QUESTION 2   20 MARKS

Classify the following according to the categories: "Element" / "Compound" / "Mixture" / "Physical property" or "Chemical property" (2marks each)

  a. iron

  b. reactivity

  c. water

  d. solubility

  e. air

  f. aluminium oxide

  g. density

  h. sea water

  i. flammability

  j. sulphuric acid

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QUESTION 3   20 MARKS

A. Calculate (show your working).

    (i) the number of **grams** of water that will be produced from 3 mol of H_2 (5)

    (ii) the number of **moles** of water that will be produced from 4 mol of H_2 (5)

    (iii) the number of **molecules** present in 27.0 g of water   (5)

    (iv) the **molecular mass** of sugar   (5)

QUESTION 4   20 MARKS

A.   In a short phrase, relate the common usefulness or application of the following in the field of health.

    (i)   Benzoic acid / salicylic acid:

    (ii)   Formaldehyde:

    (iii)   Ketones:

    (6)

B.   (i)   Which compounds have one or more "other-than-carbon" atom in their ring structure?

    (ii)   How else can "cycloalkenes" be referred to?

    (4)

C.   (i)   When can "plant nutrients" be considered to be pollutants? Substantiate and illustrate.   (4)

    (ii) What are the principal buffer systems in:
        the **extracellular** electrolyte profile?
        The **intracellular** electrolyte profile?   (6)

ANSWER AT LEAST TWO QUESTIONS FROM THIS SECTION

QUESTION 5   20 MARKS

From this list: **a.** Sols ; **b.** Diffusion; **c.** Adhesion; **d.** Capillary action
e Atmospheric pressure; **f.** Gels; **g** Cohesion; **h.** Adsorption

Select the best match that represents the principle applicable in each of the statements below .

Statements

(i)   The use of charcoal to selectively remove poisonous gases from the air uses this principle.

(ii)   The stubborn sticking together of two pieces of glassware in a water bath illustrates this principle

(iii)   The principle that explains the "downward" turn of the mercury meniscus.

(iv)   It's constitution makes it a useful fluid "membrane" that helps to prevent any damage to the body that would otherwise occur during x-ray or scanning procedures.

(v)   Due to this principle, gas cylinders in homes and in places of work, are better placed outside buildings as a safety precaution in case of a gas leak.

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QUESTION 6   20 MARKS

Two actions that you probably have witnessed in real life, involving pressure, are described below.

Read carefully and answer the question according to the format shown.

Action	Discuss what is happening here in terms of the variables involved and how they are influencing each other (3marks)	Show the description you gave in the previous column by way of a formula (3marks)	Which law of physics is being described here (2marks)
1. If you blow into a balloon, tie it and then put the balloon inside a fridge			
2. Creating a fizzy drink at home			

QUESTION 7   20 MARKS

A.   What is the equation that describes work?   (3)

B.   How much work can be done when lifting an object of 10 N onto a table 70cm high?   (3)

C.   Suppose an item is on a table which is 1.2m high and it falls down,. Six joules are released. What is the energy released here known as?   (3)

D.   How much force was involved?   (3)

E.   If 10 joules are used on a 5 kg mass to move from point A to point B, what is the speed? [Kinetic energy $= \frac{1}{2} mv^2$]   (4)

F.   What is meant by "power"   (2)

G.   How is power measured? (write the formula in words with units)   (2)

QUESTION 8   20 MARKS

A Complete the following table.

Source (2 marks)		Name the type of rays (2marks each)	Comment on whether or not the rays have the ability to penetrate body tissues and if so to what extent (2marks each)
(i)	Warm bodies		
(ii)	Neon lamps		
(iii)			

B.   Compare Television and radio waves to X -rays in terms of their wavelengths and frequencies have.   (4,4)

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