UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH SCIENCE

Re-sit EXAMINATION PAPER 2021

TITLE OF PAPER	:	PHYSICS FOR HEALTH SCIENCES (NURSING AND ENVIRONMENTAL HEALTH STUDENTS)
COURSE CODE	:	EHS103
DURATION	:	2 HOURS
MARKS	:	100
INSTRUCTIONS	:	READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
	:	ANSWER **ANY FOUR** QUESTIONS
	:	EACH QUESTION **CARRIES 25** MARKS.
	:	WRITE NEATLY & CLEARLY
	:	CALCULATOR, GRAPH PAPERS, RULAR AND A SET OF MATHEMATICAL INSTRUMENTS ARE REQUIRED FOR THIS EXAM PAPER
	:	EXECPT THE GRAPH PAPER, NO OTHER PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM.
	:	STUDENTS ARE ALLOWED TO USE GRAPH PAPERS AND SCIENTIFIC CALCULATORS
	:	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 car moves from rest with a uniform acceleration of 2 m/s^2 for the first 30 s from O to A. it continues at a constant velocity for the next 40 s from A to B and finally takes 15 s to decelerate uniformly to rest at C.

a. Calculate the constant speed reached after 30 s. [4 marks]
b. Sketch a velocity-time graph for the whole journey. [5 marks]
c. From the graph find the total distance covered. [11 marks]
d. Calculate the average speed of the car for the whole journey. [5 marks]

Total 25 marks

QUESTION TWO

1. A horizontal unbalanced force of 40 N is applied to a mass of 100 kg at rest on a smooth horizontal surface. How long does it take for the mass to reach a velocity of 40 m/s? [8 marks]
2. A cage of mass 200 kg is held by a cable. Find the tension in the cable when the cage is
   a. Held at rest. [4 marks]
   b. Lowered with a constant speed of 2 m/s. [2 marks]
   c. Raised with constant acceleration of 2 m/s^2. [8 marks]
   d. State Newton's law of gravitation. [3 marks]

Total 25 marks

QUESTION THREE

1. Static electricity is associated with dangers in hospitals especially in the operating theatres or where oxygen is being used. Name two of these dangers. [2 marks]
2. Name the methods that one can apply to combat the accumulation of static electricity in such places in a hospital setting.
   [6 marks]

3. Briefly describe how one can apply any three of the methods you have mentioned in (2 above) to combat the accumulation of static electricity in a hospital. [9 marks]
4. A health worker moves a trolley that was at rest carrying a patient from an operation theatre with a uniform acceleration of 1.0 m/s^2 for the first 20 s. She then continues at constant velocity for the next 30 s and finally takes 10 s to decelerate uniformly to rest by the bedside upon reaching the ICU ward.
    a. Calculate the constant speed reached after the first 20 s. [3 marks]
    b. Sketch a velocity-time graph for the whole journey, and from the graph find the total distance covered. [5 marks]

Total 25 marks

QUESTION FOUR

State the following laws:

1. Archimedes' principle. [2 marks]
2. Law of flotation. [2 marks]
3. Law of conservation of energy. [2 marks]
4. Boyle's law
5. A mass of 2 kg is 0.6 m above a table top that is 80 cm above the floor. What is the potential energy of the mass relative to:
    a. The top of the table [6 marks]
    b. The floor? [6 marks]
6. Answer the following questions.
    a. A water fall is delivering 800 kg of water per second from a height of 10 m to a small hydroelectric generating station. How much potential energy is available per second to rotate the water turbines? [4 marks]
    b. From (b) above, what is the maximum output of electrical power if the efficiency is 75%? [3 marks]

Total 25 marks

QUESTION FIVE

1. Electricity is used in several therapeutic apparatus. List three examples of these apparatus. [3 marks]
2. List any five properties of x-rays [5 marks]
3. Account for the use of X-rays in medicine. [10 marks]
4. An electric kettle is found to take 4 A at 250 V. Find its wattage. [3 marks]
5. A nurse's bedsitter flat has one electric radiant fire (1000 W), one reading lamp (150 W) and electric kettle (1000 W). Calculate the cost of using theses appliances for 1 hour at E2 per unit. [4 marks]

Total 25 marks