



# Scott Christian UNIVERSITY

## SCHOOL OF PROFESSIONAL STUDIES

### BACHELOR OF INFORMATION COMMUNICATION TECHNOLOGY

#### UNIT CODE/NAME: BCT 116: FOUNDATIONS OF PHYSICS

September – December 2019/2020 End Semester Exam - Time: 2 Hours

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Instructions: Answer Question ONE (Compulsory) and any other TWO questions.

#### QUESTION ONE

- a) Differentiate the following terms:
  - i. Power and Energy
  - ii. Coulomb and Potential difference
  - iii. Specific and latent heat
  - iv. Velocity and speed
  - v. Alpha and beta Decay(10 Marks)
- b) Give **THREE** reasons why water is a good cooling and fire extinguishing agent?  
(6 Marks)
- c) Highlight **THREE** circumstances under which acceleration on an object in motion can occur.  
(6 Marks)
- d) Explain the **THREE** newton's law of motion  
(6 Marks)
- e) Define the term resonance.  
(2 Marks)

#### QUESTION TWO

- a) Stonehenge is an ancient megalithic site in southern England. Some believe it was designed to make astronomical observations, but archaeologists cannot agree on the reason that Stonehenge was constructed. Charcoal samples taken from a series of holes at Stonehenge have about 0.63 pounds of carbon-14 in a one pound sample. Estimate the age of the charcoal pits at Stonehenge. Assume that the half-life of carbon-14 is 5730 years.  
(8 Marks)
- b) Explain any five applications of radiations.  
(5 Marks)
- c) Uranium-238 undergoes an alpha decay to produce Thorium-234. Demonstrate this using a decay equation  
(2 Marks)

#### QUESTION THREE

- a) A boy throws a ball vertically in the air with an initial velocity of  $10\text{ m s}^{-1}$ . How high does the ball rise? How long is it before it returns to his hand? What is its velocity before it returns to his hand? Assume that the acceleration due to gravity is  $10\text{ ms}^{-2}$ .  
(8 Marks)
- b) Prove that  $s = ut + \frac{1}{2}at^2$   
(5 Marks)
- c) Sketch a displacement-time graph for an object moving with a positive acceleration in the positive direction  
(2 Marks)

#### QUESTION FOUR

- a) Two stationary rocks of masses 100 kg and 200 kg respectively are held together. An explosion between the rocks pushes them apart with no loss of mass. The velocity of the 100 kg rock after the explosion is  $-4 \text{ ms}^{-1}$ . Find the velocity of the 200 kg rock after the explosion. Give a reason for your answer. (3 Marks)
- b) List and explain any **three** advantages and **three** disadvantages of friction. (12 Marks)

#### QUESTION FIVE

Determine the following quantities for each of the circuits shown.

- a) The equivalent resistance, (2 Marks)
- b) The total current from the power supply, (2 Marks)
- c) The current through each resistor, (2 Marks)
- d) The voltage drop across each resistor, and (6 Marks)
- e) The power dissipated in each resistor. (3 Marks)

