

AUGUST, 2021  
EBS 142  
GENERAL PHYSICS THEORY 1  
50 MINUTES

Candidate's Index Number:
Signature:

UNIVERSITY OF CAPE COAST  
COLLEGE OF EDUCATION STUDIES  
SCHOOL OF EDUCATIONAL DEVELOPMENT AND OUTREACH  
INSTITUTE OF EDUCATION

COLLEGES OF EDUCATION  
FOUR-YEAR BACHELOR OF EDUCATION (B.ED)  
FIRST YEAR, END-OF-SECOND SEMESTER EXAMINATION, JULY/AUGUST, 2021

AUGUST 5, 2021                      GENERAL PHYSICS THEORY 1                      2:50 PM – 3:40 PM

SECTION B

Answer any TWO questions from this section

1. a. State the dimension for each of the following physical quantities, and classify them into scalars and vectors: *potential energy pressure volume weight* (6 marks)
- b. A motorcycle accelerates from rest for 10 seconds up to a velocity of  $20 \text{ ms}^{-1}$ . It continues with a uniform velocity for a further 20 seconds and then decelerates to a stop in 30 seconds.
  - i. Sketch a velocity-time graph for the motion of the motor-cycle. (3 marks)
  - ii. Calculate the acceleration of the motor cycle during the travel. (3 marks)
  - iii. Determine the total distance travelled by the cyclist (3 marks)
2. a. State Newton's second law of motion. (2 marks)
- b. Mention three effects of applying a force on an object (3 marks)
- c. Two forces  $A = (8\text{N}, 150^\circ)$  and  $B = (20\text{N}, 075^\circ)$  act a point on a solid body.
  - i. Represent the information on a diagram. (2 marks)
  - ii. Resolve each force into its respective x and y-components. (4 marks)
  - iii. Determine the resultant force due to the two forces. (4 marks)

3. a. Define *centre of gravity* of a body. (2 marks)
- b. Explain why a body of fixed mass is found to weigh heavier when moved from the moon to the earth's surface. (3 marks)
- c. A **uniform** meter-rule is balanced at the 63 cm mark when a load of 80 g is suspended at the 88 cm mark. Find the weight of the meter rule (Take  $g = 9.8 \text{ ms}^{-2}$ ) (5 marks)
- d. A ball of mass 5.0 kg moving with a velocity of  $10.0 \text{ ms}^{-1}$  collides with a 15.0 kg ball moving with a velocity of  $4 \text{ ms}^{-1}$ . If both balls stick together after collision, calculate their common velocity after impact if they initially move in opposite directions. (5 marks)
4. a. Define each of the following terms: (1 mark)
- Specific latent heat (1 mark)
  - Coefficient of cubical expansion (2 marks)
- b. What is meant by the anomalous expansion of water? (2 marks)
- c. Briefly describe the process of conduction as a mode of heat transfer (3 marks)
- d. A student needs to melt 400 g of a cube of ice at  $-5 \text{ }^\circ\text{C}$  in a laboratory to water at  $60 \text{ }^\circ\text{C}$ . (2 marks)
- Sketch and label a phase diagram for the process (6 marks)
  - Calculate the quantity of heat required for the process  
(Specific heat capacity of water  $c = 4.2 \times 10^3 \text{ Jkg}^{-1}\text{K}^{-1}$ )  
(Latent heat of fusion of water  $l_v = 3.34 \times 10^5 \text{ Jkg}^{-1}$ )