OCTOBER 2023
EBS 142
GENERAL PHYSICS THEORY I
1 HOUR 40 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, SEPT./OCT. 2023

3RD OCTOBER 2023 **GENERAL PHYSICS THEORY I** **3:00 PM – 3:50 PM**

This paper consists of two sections, A and B. Answer ALL the questions in Section A and TWO questions from Section B. Section A will be collected after the first 50 minutes.

SECTION A
(30 MARKS)

Answer ALL the questions in this Section.

Items 1 to 30 are stems followed by four options lettered A to D. Read each item carefully and circle the letter of the correct or best option.

1. The following are all fundamental quantities **except** .....
   A. density.
   B. height.
   C. mass.
   D. time.

2. An example of a quantity which has both magnitude and direction is .....
   A. displacement.
   B. energy.
   C. speed.
   D. volume.

3. What is the fundamental interval on a Fahrenheit temperature scale?
   A. 100°
   B. 180°
   C. 273°
   D. 373°

4. Which of the following processes is the mode of heat transfer through fluids?
   A. Conduction
   B. Convection
   C. Evaporation
   D. Radiation

5. A cadet officer marches 16.0 m due north and then 12.0 m due east on a horizontal board. How far and in what direction is he from the starting point?
   A. 28.0 m, 037°
   B. 14.0 m, 053°
   C. 20.0 m, 037°
   D. 20.0 m, 053°

6. The equation of motion $v = u + at$ is derived from the fundamental definition of .....
   A. acceleration.
   B. displacement.
   C. speed.
   D. velocity.

7. Which of the following instruments is a third-class lever?
   A. Crane
   B. Nutcracker
   C. Scissors
   D. Wheelbarrow

8. The speedometer of a motorbike reads 180 kmh^{-1}. What is the equivalent speed in ms^{-1}?
   A. 50
   B. 60
   C. 90
   D. 120

9. A metal ball of mass 150 g is dropped from the top of a cliff height of 40 m. Determine the potential energy possessed by the ball half-way through its fall. [Take g = 10 ms^{-2}]
   A. 30 J
   B. 60 J
   C. 300 J
   D. 6000 J

10. According to Newton's first law of motion, a body continues in its state of rest or of uniform motion in a straight line .....
   A. as friction opposes the applied force.
   B. provided an external force is applied.
   C. unless there is an external force applied.
   D. until an equal but opposite force is applied.

11. If the velocity of a body is doubled and its mass halved, its kinetic energy is .....
   A. doubled.
   B. halved.
   C. quadrupled.
   D. unchanged.

12. Which of the following units is used to measure pressure?
    A. Coulomb
    B. Newton
    C. Pascal
    D. Watt

13. How far will a train travel if it moves at an average speed of 100 km/h in 75 minutes?
    A. 25 km
    B. 75 km
    C. 125 km
    D. 175 km

14. The equivalent of - 40°C on the Fahrenheit scale is .....
    A. - 40 °F
    B. - 60 °F
    C. 60 °F
    D. 243 °F

15. Determine the final steady temperature if 376.7 kJ of heat energy is supplied to 2 kg of water at 25 ° C. [Specific heat capacity of water is 4.185 $kJkg^{-1}\,^{o}\,C^{-1}$]
    A. 35°C
    B. 45°C
    C. 70°C
    D. 80°C

16. The quantity of heat energy required to convert an amount of liquid into gas is .....
    A. coefficient of volume expansion.
    B. latent heat of fusion.
    C. latent heat of vaporization.
    D. specific heat capacity.

17. A student finds that a meter rule does **not** balance horizontally at the 50 cm mark in a laboratory. This suggests that the .....
    A. meter rule is made of a metal.
    B. meter rule is non-uniform.
    C. room is located above sea level.
    D. student did not take precautions.

18. The energy required to raise the temperature of a unit mass of a substance by 1°C defines the .....
    A. heat capacity.
    B. latent heat of fusion.
    C. latent heat of vaporisation.
    D. specific heat capacity.

19. A steel rod of length 5.0 m, originally at 21°C, extends by 2.0 mm when heated. Find the final temperature if the temperature coefficient of linear expansion for steel is $1.12 \times 10^{-5o}C^{-1}$.
    A. 15°C
    B. 36°C
    C. 42°C
    D. 57°C

20. In a deep mining pit well below sea level, pure water is **likely** to boil .....
    A. at 32°C
    B. at 100°C
    C. above 100°C
    D. below 100°C

21. If a body is positioned such that it has a broad base and a low location of its centre of gravity, it is said to be in ..... equilibrium.
    A. neutral
    B. stable
    C. universal
    D. unstable

22. A boy pulls his toy with a force of 56 N inclined at 30° to a horizontal floor. The effective force pulling the toy along the floor will be .....
    A. 26.0 N
    B. 28.0 N
    C. 48.7 N
    D. 86.1 N

23. Which of the following is the **correct** formula to calculate fluid pressure?
    A. $P = h\,g/\rho$
    B. $P = g/h\rho$
    C. $P = hg\rho$
    D. $P = 1/hg\rho$

24. As a result of its anomalous expansion, at 4°C water attains its .....
    A. maximum viscosity.
    B. minimum density.
    C. minimum mass.
    D. minimum volume.

25. A box dropped from a tall building reaches the ground in 4s. How high is the building?
    A. 20 m
    B. 25 m
    C. 40 m
    D. 80 m

26. The fractional change in the length of a substance per degree rise in temperature is the .....
    A. anomalous expansion of water.
    B. coefficient of cubical expansion.
    C. coefficient of linear expansion.
    D. temperature coefficient of resistance.

27. A body of mass 400 g is released from a height of 30 m. What is the velocity of the body just before hitting the ground? [Take g = 10 ms^{-2}]
    A. 12.0 ms^{-1}
    B. 133.0 ms^{-1}
    C. 14.4 ms^{-1}
    D. 24.5 ms^{-1}