1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D

5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D

9	A	B	C	D
10	A	B	C	D

1. For a mass of a gas at pressure P and v... V, $PV^{\gamma} = C$, where γ and C are constants. Which of the following gives the value of γ after mea... values of P at different values of V in an experiment?
   A. Intercept on a graph of P on y-axis ... V on x-axis
   B. Slope of a graph of log P on y-axis ag... log V on x-axis
   C. Slope of a graph of log V on y-axis aga... P on x-axis
   D. Slope of a graph of P on y-axis against ... axis

2. The viscous force F on an object moving in a liqu... elated to the contact area A and to the velocity gradient $\frac{\Delta v}{\Delta x}$ as: $F = \eta A \frac{\Delta v}{\Delta x}$. The dimensions of the consta... c:
   A. MLT B. M^2LT C. ... T^{-1} D. MLT^2

3. If for vectors **A** and **B**, the resultant **A** + **B** = 0, which ... following statements is NOT correct about the two vectors.
   (A) **A** . **B** = 0 (B) **A** × **B** = 0 (C) **B** × **A** = 0 ... two vectors are equal in magnitude

4. Which of the following is true about the distance covered b... bject and its displacement in a given time?
   A. Displacement is equal in magnitude to distance only in ... ight line motion.
   B. Displacement is always equal in magnitude to distance c... d.
   C. Displacement is always less in magnitude than distance co...
   D. Displacement is equal to distance covered only for a circul... ion.

5. A Red Cross aircraft traveling horizontally at 40 m/s at 100 m above an IDP camp drops a relief material to the camp when it is vertically above point A. If the relief material hits the ground at point B, the distance between points A and B is:
   A. 100 m B. 816.4 m C. 408.2 m D. 180.8 m

6. The velocity vector (m/s) of the above relief material on hitting the ground is:
   A. $V = 100i + 40j$ B. $V = 40i - 44.3j$ C. $V = 40.8i + 100j$ D. $V = 44.3i + 100j$

7. The error introduced in the value of the period of a simple pendulum of length 0.8 m when allowed to become a conical pendulum making angle 30° to the vertical is:
   A. 1.777s B. 0.166s C. 0.125 s D. 0.090 s

A stone of mass 500 g tied to a string of length 50 cm is whirled in a vertical plane at 500 revolutions per minute. The minimum and maximum tension (T_{max}, T_{min}) in the string are:
A. (880.7 N, 680.8 N) B. (680.8 N, 660.6 N) C. (890.6 N, 680.8 N) D. (690.6 N, 680.8 N)

satellite is said to be parked
A. When its period is equal to the period of rotation of the earth about its axis
B. When the radius of its orbit is approximately equal to the radius of the earth
C. When its period is equal to the period of motion of the earth around the sun
. When it experiences zero gravitational force towards the earth

masses 3 kg and 5 kg connected by string which passes over a frictionless pulley to form an Atwo... e. The tension in the string is
5.58 N B. 36.75 N C. 26.61 N D. 18.42 N

UNIVERSITY OF IBADAN
DEPARTMENT OF PHYSICS
B.SC (PHYSICS) DEGREE EXAMINATION – FIRST CONTINUOUS ASSESSMENT TEST - 2018/2019 SESSION
PHY 103: INTRODUCTORY HEAT AND THERMODYNAMICS

NAME: _____ MATRIC NO: _____
DEPARTMENT: _____ DATE: Wednesday, 8 August 2019

INSTRUCTIONS. Attempt all questions. Use **HB Pencil** to shade the **CORRECT** option out of the four alternatives in the **GRIDDED BOX** provided below. Submit the question and the work sheet before leaving the hall. Time Allowed: **30 minutes**
All symbols retain the same meaning as defined during lectures.
Specific heat capacities of water and iron are 4186 and 448 J/Kg/°C, respectively. Latent heat of vapourisation is 2.26×10^6 J/kg
Gas constant, R=8.315 J/mol/K; Boltzmann constant, $k = 1.38 \times 10^{-23}$ J/K, 1 Atm = 1.013×10^5 Nm^{-2}

1	A	B	C	D
2	A	B	C	D
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4	A	B	C	D

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7	A	B	C	D
8	A	B	C	D

9	A	B	C	D
10	A	B	C	D

1. Which of the following options is **not true**? The change in internal energy of a system
   A. depends partly on energy transfer by heat and partly on mechanical work done on the environment
   B. is zero for an isolated system
   C. is different for two distinct processes that start and end at the same states
   D. is only related to translational kinetic energy for monoatomic gas at very low pressure

2. During an iso-volumetric process, Q amount of heat is expelled from a system. Which of the following statement is **true**?
   A. The temperature of the system increases
   B. The internal energy is constant
   C. The internal energy decreases
   D. Work done is not negligible

Use this information to answer questions 3 and 4, sequentially.
The resistance R_t of a substance at temperature t °C which is measured by a mercury thermometer is $R_t = \frac{R_0}{1+at^2}$
where R_0 is the resistance of the substance at 0 °C, and $a = 5 \times 10^{-5} C^{-2}$.

3. Calculate the resistance of the substance at 100 °C and 80 °C as measured by mercury-in- glass thermometer.
   A. $R_{100} = 0.6667\ R_0$ and $R_{80} = 0.757\ R_0$
   B. $R_{100} = 0.3333\ R_0$ and $R_{80} = 0.4170\ R_0$
   C. $R_{100} = 0.5664\ R_0$ and $R_{80} = 0.8111\ R_0$
   D. $R_{100} = 0.2336\ R_0$ and $R_{80} = 0.4411\ R_0$

4. What is the reading of the resistance thermometer when the reading of mercury-in-glass thermometer is 80°C? You may assume the two thermometers agreed perfectly at the fixed points
   A. 82.1 °C B. 70.1 °C C. 80 °C D. 72.6 °C

5. A container holds a mixture of hydrogen and oxygen in thermal equilibrium at a temperature of 400 K. The mass of hydrogen molecule is 3.34×10^{-27} kg. Given that it is only translational motions of the molecules that are important, find the root-mean-squared speed of oxygen molecules if an oxygen molecule is 16 times more massive than a hydrogen molecule. A. 430 m/s B. 557 m/s C. 445 m/s D. 272 m/s

6. A system with volume V_s is in thermal contact with its environment. If the environment has properties that respond to temperature changes, what size V_e of the environment can be regarded as a thermometer.
   A. $V_e = 2\ V_s$ B. $V_e = V_s$ C. $V_e = 0.5\ V_s$ D. $V_e = 5 \times 10^{-5}\ V_s$

Use this information to answer questions 7 and 8, sequentially.
A black-smith heated 1.0 kg piece of iron to a temperature of 700 °C and dropped it in water bath containing 3.0 kg of water at 15 °C

7. Calculate the final equilibrium temperature of the system
   A. 38.6 °C B. 29.8 °C C. 100°C D. 47.1 °C

8. How much water evaporated?
   A. 171 g B. 205 g C. 131g D. 189 g

e this information to answer questions 9 and 10.
mole of ideal monoatomic gas initially at 77 °C and 0.250 atm is compressed isothermally to 1.00 atm.

9. alculate the final volume of the gas
   A. 2.87×10^{-2} m^3 B. 11.49×10^{-2} m^3
   C. 7.56×10^{-2} m^3 D. 1.23×10^{-2} m^3

10. Calculate the energy transferred by heat out of the system
    A. -3001 J B. 4503 J C. 3210 J D. 4034