Philadelphia University
Faculty of Science
Department of Basic Sciences
Fall 2021 / 2022

Final Examination
General Physics 0211109
Date: 24/ 01/ 2022 Monday
Time allowed: 120 Minutes

Name: **Student number:**

Check your section with [X] below:

General Physics for Health Sciences (0211109)

Section	(Lecture time)	[X]	Lecturer
50	(08:15 – 09:45) Sun, & Tues.	[ ]	Dr. Zuheir El-bayyari
2	(11:15 – 12:45) Sun, & Tues.	[ ]	Dr. Zuheir El-bayyari
3	(08:15 – 09:45) Mon. & Wedn.	[ ]	Dr. Zuheir El-bayyari
4	(11:15 – 12:45) Mon. & Wedn.	[ ]	Dr. Zuheir El-bayyari
5	(14:15 – 15:45) Sun, & Tues.	[ ]	Mr. Mustafa Al-zyout
6	(12:45 – 14:15) Mon. & Wedn.	[ ]	Mr. Mustafa Al-zyout

*Check your correct answer with **X** in the table below:*

Q. No.	A	B	C	D
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Useful information:

$g = 9.8\ m/s^2$	$G = 6.67 \times 10^{-11}\ N.m^2/kg^2$
$k_B = 1.38 \times 10^{-23}\ J/K$	$N_A = 6.023 \times 10^{23}$ Molecule/mole
$R = 0.08207$ litre.atm /mole^{-1} K^{-1}	$R = 8.314$ J mole^{-1}K^{-1}
$1\ au = 1.66 \times 10^{-27}$ kg	$1\ atm = 1.013 \times 10^5\ N/m^2$
$K = 9 \times 10^9\ Nm^2/C^2$	$\varepsilon_o = 8.85 \times 10^{-12}\ C^2/Nm^2$
$m_e = 9.11 \times 10^{-31}$ Kg	$m_p = 1.67 \times 10^{-27}$ kg
$1\ e = 1.6 \times 10^{-19}$ C	$1\ eV = 1.6 \times 10^{-19}$ J
$r\ (H) = 5.29 \times 10^{-11}$ m	M(H)=1.008 au
M(Ar) = 40 au	M(He) = 4 au
M(N)=14.007 au	M(O)=15.999 au
c (Lead) = 128 J/kg.K	c (water) = 4.169 kJ/ kg.K
c (ice) = 2.01 kJ/ kg.K	c (Copper) = 387 J/kg.K
L_f (ice) = 333 KJ/kg	L_v(water) = 2255 KJ/kg
α (glass) = 0.4×10^{-5} K^{-1}	α (Al) = 2.4×10^{-5} K^{-1}
α (steel) = 11×10^{-6} K^{-1}	α (Brass) = 19×10^{-6} K^{-1}
α (Concrete) = 1.0×10^{-5} K^{-1}	β(Mercury) = 18×10^{-5} K^{-1}
Y(Al) = 7×10^{10} N/m^2	$Y_{steel} = 2 \times 10^{11}$ N/m^2
$B_{Cu} = 14 \times 10^{10}$ N/m^2	0 K= −273.15 °C

- Each of the following problems has 2.0 point each (20x2.0 = 40.0 in Total).
- The use of a non-programmable calculator is allowed only.

Good Luck

Dr. Zuheir El-bayyari (Module Coordinator) & (Internal examiner)

Q.01) The position of an object is given by: $x = 2t^3 + 1$, where x in meters and t in seconds. What is the average velocity (in m/s) of the object between (t = 0 s) and (t = 2 s)?

(A) 32.25 (B) 18.3 (C) 8.0 (D) 50.0

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Q.02) A stone is thrown vertically upward from the top of a building with an initial speed of (10 m/s), the flight time is (4 s). What is height of the building (in m)?
(A) 38.4 (B) 118.4 (C) 72.5 (D) 251

Q.03) Find the tension (in N) in an elevator cable if the (600 kg) elevator is descending with an acceleration of (1.2 m/s^2) downward.
(A) 11600 (B) 6600 (C) 5880 (D) 5160

Q.04) A block of mass (m = 2.2 kg) is released from rest at the top of a smooth (30°) inclined plane. The magnitude of the acceleration of the block (in m/s^2) is:
(A) 8.5 (B) 4.9 (C) 5.9 (D) 7.8

Q.05) An object moving at a constant speed requires (6 s) to go once around a circle with a radius of (2 m). The magnitude of its acceleration (in m/s^2) is:
(A) 4.9 (B) 3.2 (C) 2.2 (D) 8.8

Q.06) A (4 kg) mass attached to a string rotates in a circular motion on a horizontal frictionless table. The mass has a constant speed of (2 m/s) and the radius of the circle is (0.8 m). The magnitude of the resultant force acting on the mass (in N) is:
(A) 32 (B) 22.9 (C) 26.7 (D) 20

Q.07) A car of a mass of (1200 kg) is traveling at (22 m/s) slows down to stop at a traffic light. The work done by the frictional force (in J) is:
(A) -2.9×10^5 (B) -2.6×10^5 (C) -3.2×10^5 (D) -3.5×10^5

Q.08) A force $\vec{F} = 7\hat{i} + 5\hat{j}\ (N)$ acts on an object displace it a displacement $\vec{d} = 4\hat{i} + 3\hat{j}\ (m)$. The work done on the object (in J) is:
(A) 40 (B) $28\hat{i} + 15\hat{j}$ (C) 43 (D) $28\hat{i} + 12\hat{j}$

Q.09) Five H_2O molecules are found to have velocities of 100, 200, 300, 400, and 500 (m/s) respectively. The root mean square speed of these molecules in (m/s) is:
(A) 424.26 (B) 331.66 (C) 616.44 (D) 519.62

Q.10) A 0.01m long rod of steel is set at distance of 5.0 μm apart from a 0.03m long brass rod at the standard room temperature. What is the change in temperature ΔT in (°C) that will make the two rods touch each other?
(A) 7.4 (B) 13.2 (C) 10.3 (D) 16.2

Q.11) A can of steel contains an ideal gas at a 202 Kpa pressure and volume of 125 cm^3 at temperature of 22 °C, if the temperature increases to 195 °C what is the final pressure on the gas in (Kpa)? Assume any change in the volume of the can is negligible
(A) 479.00 (B) 796.24 (C) 320.40 (D) 637.63

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Q.12) A cubic meter of an ideal gas is at 20 °C and atmospheric pressure; known that Avogadro's number of this ideal gas has a mass of 31.9 g. Then the mass of the ideal gas in (kg) is:
(A) 1.3 (B) 1.2 (C) 0.90 (D) 0.49

Q.13) Consider a mixture of helium (He) and argon (Ar) gas at 150 ^{o}C, which statement is correct:
(A) The root mean square speed of He and Ar are equal.
(B) The root mean square average speed of He is larger than Ar.
(C) The average kinetic energy of He and Ar are equal.
(D) Both (B) and (C)

Q.14) A 50.0 g sample of Copper is at 25.0 °C. If 1200 J of energy is added to it as heat. What is the final temperature of Copper sample in (°C)?
(A) 96 (B) 87 (C) 77 (D) 66

Q.15) Air molecules are moving in 3-D inside a container at a temperature of 32 K, accordingly the average kinetic energy per molecule in (Joule) is:
(A) $8.7x10^{-22}$ (B) 1.28×10^{-21} (C) $1.08x10^{-21}$ (D) $6.62x10^{-22}$

Q.16) A helium-filled balloon has a volume of 2 m^3 whose initial temperature is 20°C and pressure of 1 atmosphere. As it rises in the Earth's atmosphere, its volume expands and the final temperature reaches –40°C, and the pressure is 0.1 atmospheres. The new volume of the gas (in m^3) is:
(A) 24.74 (B) 40 (C) 15.91 (D) 25.15

Q.17) The average translational speed of an Oxygen molecule at a temperature of 20°C is approximately (in m/s)
(A) 478 (B) 444 (C) 676 (D) 125

Q.18) A 500 kg object is hung from the end of a wire of cross sectional area 0.010 cm^2. The wire stretches from its original length of 200.0 cm to 200.50 cm. What is the stress on the wire (in N/m^2)?
(A) $4.41x10^9$ (B) 4.9×10^9 (C) $5.39x10^9$ (D) $3.92x10^9$

Q.19) The coefficient of linear expansion of steel is 11×10^{-6} K^{-1}. A steel ball has a volume of exactly 100 cm^3 at 0°C. When heated to 100°C, its volume becomes (in cm^3):
(A) 100.11 (B) 100.22 (C) 100.33 (D) 0.33

Q.20) The specific heat capacity is defined as:
(A) The amount of heat required to rise the temperature of a unit mass of a substance by a unit degree of temperature
(B) The amount of heat added to the temperature rise in the system.
(C) The amount of heat added to the temperature rise in the system per mole.
(D) The amount of heat follows from one substance to another because of the temperature difference.

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Answer Table for form A

(Final Exam on Monday 24/01/2022. General Physics 0211109)

Q. No.	A	B	C	D
1			X	
2	X			
3				X
4		X		
5			X	
6				X
7	X			
8			X	
9		X		
10	X			
11			X	
12	X			
13				X
14		X		
15				X
16			X	
17	X			
18		X		
19			X	
20	X			

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