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

Midterm Examination
General Physics (2) 211102
Date: 31/05/2022 Tuesday
Time: 75 Minutes

Name: **Student number:**

Check your section with [X] below:

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

General Physics (211102)

Section	(Lecture time)	[X] Lecturer
1	(11:15 – 12:45)	[ ] Dr. Zuheir El-bayyari
2	(11:15 – 12:45)	[ ] Dr. Zuheir El-bayyari
3	(09:45 – 11:15)	[ ] Mr. Mustafa Al-zyout
4	(12:45 – 14:15)	[ ] Mr. Mustafa Al-zyout

Q. No.	A	B	C	D
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Useful information:

$g = 9.8\, m/s^2$	$\epsilon_o = 8.85 \times 10^{-12}\, C^2/N.m^2$
$k_e = 1/4\pi\epsilon_o = 9 \times 10^9\, N.m^2/C^2$	$e = 1.6 \times 10^{-19} C$
$m_e = 9.11 \times 10^{-31} kg$	$m_p = 1.67 \times 10^{-27} kg$
$G = 6.67 \times 10^{-11}\, N.m^2/kg^2$	$\rho_{Cu} = 1.6 \times 10^{-8} \Omega.m$
$\rho_{Ag} = 1.47 \times 10^{-8} \Omega.m$	$n_{Cu} = 8.47 \times 10^{28} m^{-3}$
$n_{Ag} = 5.86 \times 10^{28} m^{-3}$	$1\, e.V = 1.6 \times 10^{-19} J$
$r_{Earth-Moon} = 3.84 \times 10^8 m$	$M_{Earth} = 5.97 \times 10^{24} kg$
$M_{Moon} = 7.35 \times 10^{22} kg$	$R_{Earth} = 6.37 \times 10^6 m$

- Each of the following problems has 2.0 points.
- You have a total of 15 questions.
- The use of a non-programmable calculator is allowed only.

Good Luck

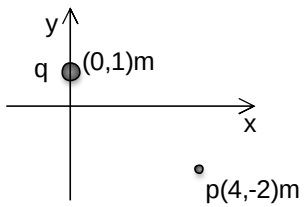
Dr. Zuheir El-bayyari (Internal examiner) & Mr. Mustafa Al-Zyout (Module Coordinator)

Q.01) A piece of plastic has a net charge of $+25\ \mu C$. How many more protons than electrons does this piece of plastic have?
(A) 2.81×10^{14} (B) 3.44×10^{14} (C) 1.56×10^{14} (D) 2.19×10^{14}

Q.02) What must be the distance between point charge $Q_1 = 25\ \mu C$ and point charge $Q_1 = 50\ \mu C$ for the electric force between them to have a magnitude of 9 N (in m)?
(A) 1.268 (B) 1.5 (C) 1.936 (D) 1.118

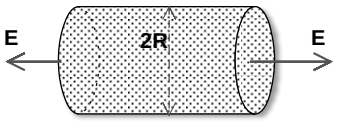
Q.03) What is the magnitude of an electric field that balances the weight of a water droplet of mass $2 \times 10^{-6}\ kg$ that has been charged to $-3\ nC$ (in N/C)?
(A) 26.1×10^3 (B) 6.53×10^3 (C) 13.1×10^3 (D) 19.6×10^3

Q.04) A point charge of $q = 3 \times 10^{-9}\ C$ is located at $(0\ m, 1\ m)$. What is the x component of the electric field due to the point charge at $P\ (4\ m, -2\ m)$ (in N/C)?



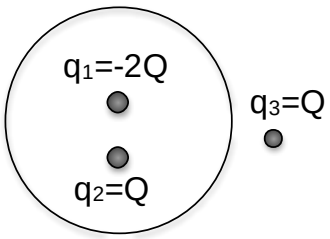
(A) 0.864 (B) 1.44
(C) 2.02 (D) 2.59

Q.05) The net electric flux through the closed cylindrical surface shown in the figure is:



(A) 0 (B) $2\pi R^2 E$
(C) $4\pi RE$ (D) $4\pi R^2 E$

Q.06) Find the net electric flux through the spherical closed surface shown in the figure (in $N.m^2/C$). (*Assume*: $Q = 12 \times 10^{-12} C$)

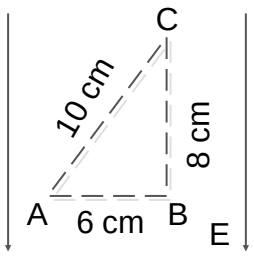


(A) -1.58 (B) -1.81
(C) -2.03 (D) -1.36

Q.07) A negative charge, if free, will tend to move
(A) from high potential to low potential (B) in the direction of the electric field
(C) from low potential to high potential (D) toward infinity

Q.08) Find the electric potential difference required to stop a proton moving with an initial speed of $2.6 \times 10^7\ m/s$ (in V).
(A) 3.53×10^6 (B) 3.26×10^6
(C) 3.01×10^6 (D) 2.76×10^6

Q.09) The figure shows a uniform electric field that points in the negative y direction; the magnitude of the field is $750\ V/m$. The electric potential difference between (A) and (C) (in V) is:



(A) 36 (B) 24
(C) 60 (D) 48

Q.10) An electric dipole consisting of charges of magnitude $1.5\ nC$ separated by $6.2\ \mu m$ is in an electric field of strength $1200\ N/C$. Calculate the magnitude of the torque on the dipole when the dipole moment is perpendicular to the electric field (in $N.m$).
(A) 1.40×10^{-11} (B) 1.12×10^{-11}
(C) 1.21×10^{-11} (D) 1.30×10^{-11}

Q.11) The electrostatic potential in a particular coordinate system is given by: $V(x, y, z) = 2xyz\ (V)$. The electric field (in V/m) at the point $(1m,\ 2m,\ 3m)$ is:
(A) $\vec{E} = \left(-16\hat{\imath} - 8\hat{\jmath} - 4\hat{k}\right)$ (B) $\vec{E} = \left(-8\hat{\imath} - 4\hat{\jmath} - 4\hat{k}\right)$
(C) $\vec{E} = (-4\hat{\imath} - 2\hat{\jmath} - 4\hat{k})$ (D) $\vec{E} = (-12\hat{\imath} - 6\hat{\jmath} - 4\hat{k})$

Q.12) A circular ring of charge with radius (b) has total charge (q) uniformly distributed around it. What is the magnitude of the electric potential at the center of the ring?
(A) $\underline{k_e q/b}$ (B) $2k_e q/b$ (C) $k_e q/b^2$ (D) 0

Q.13) Consider two closely spaced and oppositely charged parallel metal plates. The plates are square with sides of length L and carry charges Q and $-Q$ on their facing surfaces. What is the magnitude of the electric field in the region between the plates?
(A) $Q/2\varepsilon_\circ L^2$ (B) $4Q/\varepsilon_\circ L^2$ (C) $\underline{Q/\varepsilon_\circ L^2}$ (D) 0

Q.14) A uniformly charged disk of radius $35\ cm$ carries charge with a density of $6 \times 10^{-6}\ C/m^2$. Calculate the electric field at the center of the disk (in N/C).
(A) 1.7×10^5 (B) 3.4×10^5 (C) 2.8×10^5 (D) 2.3×10^5

Q.15) A solid conducting sphere of radius $40\ cm$, has a total positive charge of $26\ \mu C$ uniformly distributed throughout its volume. Calculate the magnitude of the electric field $25\ cm$ from the center of the sphere (in N/C).
(A) $\underline{0}$ (B) 37.4×10^5 (C) 5.9×10^5 (D) 9.14×10^5

Answer Table for form A

(Midterm Exam on Tuesday 31/05/2022. G. Physics 211102)

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			