جامعة بيرزيت
BIRZEIT UNIVERSITY
Physics Department
phys 132

First Hour Exam
Time: 75 minutes

2nd Summer term 2012
Date: 21.07.2012

Student name: [illegible] Student #: [illegible]

Answer Sheet

Q. #	A	B	C	D	E
1			X		X
2	X		X		
3		X			
4	X				
5		X			
6				X	
7					X
8	X				
9			X		
10					X
11	X				
12		X		X	

Do NOT write below this line

For Instructor:

Part I	9 /12
Part II	9 /11
Total Grade	18 /23

Best of Luck 100%

4. The electric potential in a certain region is given by $V = 7x - 3x^2y + 2yz^2$. The electric field over this region is given by:

A) $\mathbf{E} = (6xy - 7)\mathbf{i} + (3x^2 - 2z^2)\mathbf{j} - 4yz\,\mathbf{k}$
B) 0
C) $\mathbf{E} = -(6xy - 7)\mathbf{i} - (3x^2 - 2z^2)\mathbf{j} - 4yz\,\mathbf{k}$
D) $\mathbf{E} = (6xy - 7)\mathbf{i} - (3x^2 - 2z^2)\mathbf{j} + 4yz\,\mathbf{k}$
E) $\mathbf{E} = -(6xy - 7)\mathbf{i} - (3x^2 + 2z^2)\mathbf{j} - 4yz\,\mathbf{k}$

5. An electric dipole has a dipole moment of 2×10^{-9} C.m in the negative x-direction. A torque of 3.5×10^{-7} N.m in the positive z-direction is exerted on the dipole when it is in a uniform electric field. The magnitude and direction of the electric field is:

A) 5.7×10^{-3} N/C, positive y-axis
B) 175 N/C, negative y-axis
C) 175 N/C, negative z-axis
D) 175 N/C, negative x-axis
E) 175 N/C, positive y-axis

6. Five positive charges are placed in a box. The first charge has a magnitude q. The second charge has a magnitude which is twice the first charge. The third charge has a magnitude which is twice the second charge. The fourth charge has a magnitude which is twice the third charge. The fifth charge has a magnitude which is twice the fourth charge. The net electric flux through the box is 6.8×10^7 N.m^2/C. The magnitude of the charge q is:

A) 425 μC B) 1.6×10^{-19} C C) 47.2 μC D) 19.4 μC E) 16.6 μC

7. Charge is distributed uniformly on the surface of a large flat plate. The electric field at 2 mm from the plate is 35 N/C. The electric field at 4 mm from the plate is:

A) 16.5 N/C B) 37 V/m C) 66 N/C D) 8.25 V/m E) 35 V/m

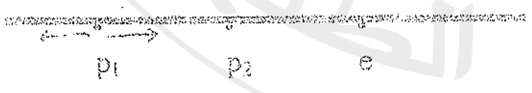
$\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/N.m^2$ $\qquad e = 1.6 \times 10^{-19}\ C$

Part I: Multiple-Choice Problems. 1 Point Each

1. A "free" electron and a "free" proton are placed in an identical electric field. Which of the following is the CORRECT statement?
   A) The magnitude of the electrostatic force acting on the proton is greater than that acting on the electron
   B) The direction of the electrostatic force acting on the proton is the same as that acting on the electron
   C) The magnitude of the acceleration of the proton is less than that of the electron
   D) The magnitude of the acceleration of the proton is greater than that of the electron
   E) The magnitude of the acceleration of the proton is equal to that of the electron

2. A positively charged glass rod attracts an object suspended by a nonconducting thread. This means that:
   A) The object is definitely negatively charged
   B) The object is possibly positively charged
   C) The object is possibly negatively charged
   D) The object is definitely positively charged

3. Two protons (p_1 and p_2) and an electron e lie on a straight line as shown. The directions of the electrostatic force from p_2 on p_1; the force from e on p_1 and the total force on p_1, respectively, are:



A) →, ←, 0 B) ←, →, ← C) ←, →, 0 D) →, →, → E) ←, ←, →

6) For the electric dipole shown in the figure, the electric field on the positive y-axis, at y = a , is given by:

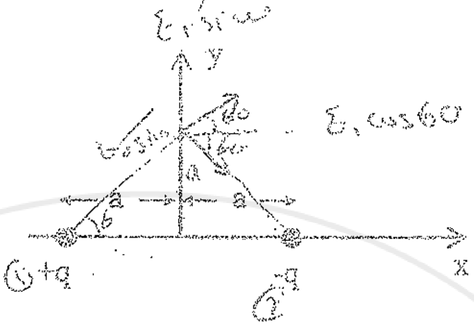
A) $\frac{1}{4\pi\varepsilon_0}\frac{q}{\sqrt{2}\,a^2}\hat{i}$

B) $\frac{1}{4\pi\varepsilon_0}\frac{q}{\sqrt{2}\,a^2}\hat{j}$

C) $\frac{1}{4\pi\varepsilon_0}\frac{q}{a^2}\hat{i}$

D) $\frac{-1}{4\pi\varepsilon_0}\frac{q}{\sqrt{2}\,a^2}\hat{i}$

E) zero



7) The magnitude of the force exerted by a 400 N/C electric field on a 0.2 μC point charge is:

A) 0.08 N
B) 8.0×10^{-3} N
C) 8.0×10^{-5} N
D) 8.0 N
E) 2.0×10^{11} N

8) At the center of a uniformly charged ring, choose the correct statement regarding the electric field E and the electric potential V:

A) E = 0 and V = 0
B) E ≠ 0 and V = 0
C) E ≠ 0 and V ≠ 0
D) E = 0 and V ≠ 0
E) E = 0 only if the ring is conductor and V ≠ 0

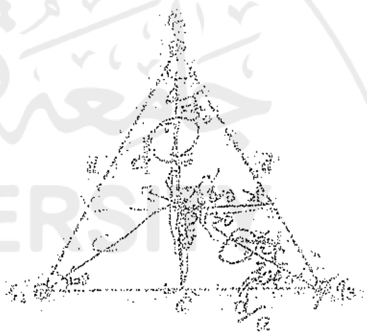
9) Two thin spherical shells, one of radius R and the other of radius 2R, surround an isolated point charge. The ratio (النسبة) of the electric flux through the large sphere to the electric flux through the small one is:

A) 1/2
B) 1/4
C) 4
D) 2
E) 1

8. The energy stored in a 12-μF capacitor is 1[illegible] μJ. The charge on the capacitor is:
A) 56 μC B) 65 μC C) 312 μC D) 60 μC E) 47 μC

9. A parallel-plate capacitor having air between its plates is charged to 38.5 V. The capacitor is then isolated from the charging source and the space between the plates filled with Plexiglas (κ = 3.12). The new potential difference across the capacitor is:
A) 38.5 V B) 15.5 V C) 12.3 V D) 95 V E) 14.5 V

Three equal positive charges of magnitude q each are placed at the corners of an equilateral triangle of sides d as shown in the figure. Answer the following three questions:



10. The magnitude of the electric potential at the center (the point p) of the triangle is:
A) $3\ q/(4\pi\varepsilon_0 d^2)$
B) 0
C) $3\sqrt{3}\ q/(4\pi\varepsilon_0 d^2)$
D) $3\ q^2/(4\pi\varepsilon_0 d)$
E) $3\sqrt{3}\ q/(4\pi\varepsilon_0 d)$

11. The magnitude of the electric field at the center (the point p) of the triangle is:
A) 0
B) $3\ q^2/(4\pi\varepsilon_0 d)$
C) $3\sqrt{3}\ q/(4\pi\varepsilon_0 d^2)$
D) $3\ q/(4\pi\varepsilon_0 d^2)$
E) $3\sqrt{3}\ q/(4\pi\varepsilon_0 d)$

12. The electric potential energy stored in the system of the three charges is:
A) $3\ q/(4\pi\varepsilon_0 d^2)$
B) $3\ q^2/(4\pi\varepsilon_0 d)$
C) $3\sqrt{3}\ q/(4\pi\varepsilon_0 d^2)$
D) 0
E) $3\sqrt{3}\ q/(4\pi\varepsilon_0 d)$

Part II:

Essay Problem 1:

A nonconducting solid sphere of radius R has a nonuniform volume charge density $\rho(r) = A/r + Br^2$ with the radial distance r is measured from the sphere's center and A and B are constants.

a) What are the SI units of the constant A? (2 points)

SI unit of A is $\frac{C}{m^2}$ (2)

b) What are the SI units of the constant B? (2 points)

SI unit of B is $\frac{C}{m^5}$ (1)

c) What is total charge on the sphere? (4 points) (3)

$q = \int_0^R \left(\frac{A}{r} + Br^2\right) 4\pi r^2 dr$

$4\pi \int_0^R (Ar + Br^4)\, dr$ ok

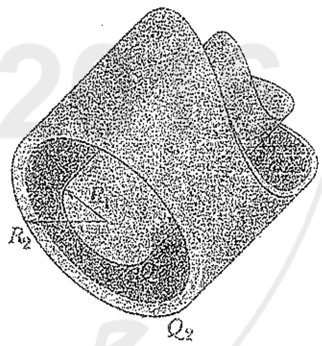
$4\pi \left(\frac{Ar^2}{2} + \frac{Br^5}{5}\right)\Big]_0^R = 4\pi\left(\frac{AR^2}{2} + \frac{BR^5}{5}\right)$

$V = \frac{4}{3}\pi r^3$

$dV = 4\pi r^2 dr$

Essay Problem 2:

The figure shows a section of a conducting rod of radius R_1 and length L inside a thin coaxial conducting cylindrical shell with radius R_2 and length L. The net charge on the rod $Q_1 = +3\ \mu C$. The net charge on the shell $Q_2 = -6\ Q_1$.



a) What is the charge on the interior surface of the shell? (2 points)

~~q = ... 6~~ NO! −3μ (1)

b) What is the charge on the exterior surface of the shell? (2 points)

$Q_2 + Q_1 = (-6 \times 3) + 3 = -18 + 3 = -15C$ (2)

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جامعة بيرزيت

BIRZEIT UNIVERSITY

-Physics Department-

-physics 132-

1st Lour Exam

Time: 75 Minutes

First Summer 2013

23/6/2013

Student Name:...Lubna....Fwal...

Student Number:...[redacted]...

ضع علامة (X) هنا	Instructor Name	Section No.
X	عدنان عبد الرازق	4D
	وفاء خاطر	2،3D
	غسان عليان	1D

Answer Sheet

Q#	A	B	C	D	E
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		

Constants:

$\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/N.m^2$ $\quad e = 1.6 \times 10^{-19}\ C$ $\quad m_e = 9.11 \times 10^{-31}\ kg$ $\quad m_p = 1.67 \times 10^{-27}\ kg$

1. A "free" electron and a "free" proton are placed in an identical electric field. Which of the following is the True statement?

   A) The magnitude of the electrostatic force acting on the proton is greater than that acting on the electron

   B) The direction of the electrostatic force acting on the proton is the same as that acting on the electron

   C) The magnitude of the acceleration of the proton is less than that of the electron

   D) The magnitude of the acceleration of the proton is greater than that of the electron

   E) The magnitude of the acceleration of the proton is equal to that of the electron

2. A charge of 9 μC is to be split into two parts that are then separated by 3mm. The maximum possible magnitude of the electrostatic force between those two parts is:

   A) 2×10^4 N

   B) 8×10^3 N

   C) 2.4×10^3 N

   D) 7.3×10^3 N

   E) 4.5×10^{-6} N

3. The electric potential in a certain region is given by $V = 7x - 3x^2y + 2yz^2$. The electric field over this region is given by:

   A) $\mathbf{E} = (6xy - 7)\mathbf{i} + (3x^2 - 2z^2)\mathbf{j} - 4yz\,\mathbf{k}$

   B) 0

   C) $\mathbf{E} = -(6xy - 7)\mathbf{i} - (3x^2 - 2z^2)\mathbf{j} - 4yz\,\mathbf{k}$

   D) $\mathbf{E} = (6xy - 7)\mathbf{i} - (3x^2 - 2z^2)\mathbf{j} + 4yz\,\mathbf{k}$

   E) $\mathbf{E} = -(6xy - 7)\mathbf{i} - (3x^2 + 2z^2)\mathbf{j} - 4yz\,\mathbf{k}$

4. An electric dipole has a dipole moment of 2×10^{-9} C.m in the negative x-direction. A torque of 3.5×10^{-7} N.m in the positive z-direction is exerted on the dipole when it is in a uniform electric field. The magnitude and direction of the electric field is:

   A) 5.7×10^{-3} N/C, positive y-axis

   B) 175 N/C, negative y-axis

   C) 175 N/C, negative z-axis

   D) 175 N/C, negative x-axis

   E) 175 N/C, positive y-axis

5. Five positive charges are placed in a box. The first charge has a magnitude q. The second charge has a magnitude which is twice the first charge. The third charge has a magnitude which is twice the second charge. The fourth charge has a magnitude which is twice the third charge. The fifth charge has a magnitude which is twice the fourth charge. The net electric flux through the box is 6.8×10^7 N.m^2/C. The magnitude of the charge q is:

A) 425 μC B) 1.6×10^{-19} C C) 47.2 μC D) 19.4 μC E) 16.6 μC

6. A spherical conducting shell has a positive charge Q. A particle with a positive charge q is placed at the center of the cavity. The charge on the inner surface of the shell and the net charge on the outer surface of the shell, respectively, are:

A) Q, 0
B) 0, Q
C) q, $Q - q$
D) $-q$, $Q + q$
E) $-q$, 0

7. A nonconducting solid sphere of radius R has a nonuniform volume charge density $\rho(r) = A/r + Br^2$ with the radial distance r is measured from the sphere's center, A and B are constants. The SI units of the constants A and B respectively are:

A) C/m^3, C/m^3
B) C/m^2, C/m^5
C) C/m^5, C/m^5
D) C/m^5, C/m^2
E) unit-less, unit-less

8. An infinitely long, nonconducting, solid cylinder of radius R has a nonuniform volume charge density given by $\rho(r) = \gamma r^2$ where γ is a positive constant and r is the radial distance from the axis of the cylinder. The magnitude of the electric field at a radial distance z > R is:

A) $(\gamma R^4) / (4z\varepsilon_0)$
B) $(\gamma z^3) / (4\pi\varepsilon_0)$
C) 0; because the cylinder is infinitely long
D) $(\gamma z^3) / (4\varepsilon_0)$
E) infinity; because the cylinder is infinitely long

$C = \frac{\varepsilon_0 A}{d}$

9. The capacitance of a parallel-plate capacitor can be increased by:

A) increasing the charge
B) decreasing the charge
C) decreasing the distance between the plates
D) increasing the distance between the plates
E) decreasing the plate area

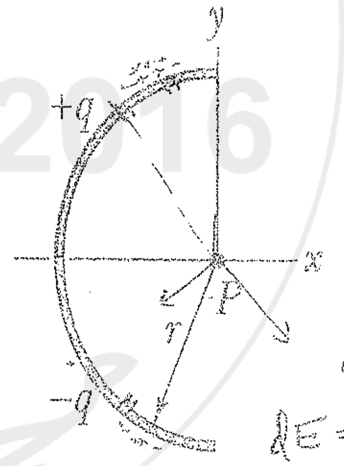
10. An electron moves in a circular path around a proton of radius 5.29×10^{-11} m. The proton is at rest at the center of the circle, the kinetic energy of the circulating electron is :

A) 4.4×10^{-18} J
B) 2.18×10^{-18} J
C) 8.7×10^{-18} J
D) 8.2×10^{-18} J
E) -4.4×10^{-18} J

11. Charge is distributed uniformly on the surface of a large flat plate. The electric field at 2 mm from the plate is 35 N/C. The electric field at 4 mm from the plate is:

A) 16.5 N/C B) 37 V/m C) 66 N/C D) 8.25 V/m E) 35 V/m

A thin glass rod is bent into a semicircle of radius r. A charge +q is distributed uniformly along the upper half, and a charge −q is distributed uniformly along the lower half as in the figure. Answer the following two questions.



12. The magnitude and direction of the electric field at point P at the center of the semicircle is:

A) $q/(\pi^2 \varepsilon_0 r^2)$ vertically downward
B) $q/(\pi^2 \varepsilon_0 r^2)$ vertically upward
C) zero
D) $q/(\pi^2 \varepsilon_0 r)$ vertically downward
E) $q/(\pi^2 \varepsilon_0 r^3)$ vertically downward

13. The electric potential at point P at the center of the semicircle is:

A) $q/(\pi^2 \varepsilon_0 r^2)$
B) $q/(\pi^2 \varepsilon_0 r^2)$ vertically upward
C) $q/(\pi^2 \varepsilon_0 r)$
D) zero
E) $q/(\pi^2 \varepsilon_0 r^3)$ vertically downward

14. The energy stored in a 12-μF capacitor is 150 μJ. The charge on the capacitor is:

A) 65 μC B) 60 μC C) 517 μC D) 80 μC E) 47 μC

Three equal positive charges of magnitude q each are placed at the corners of an equilateral triangle of sides d as shown in the figure. Answer the following three questions: (See Geometry of equilateral triangle below)

15. The magnitude of the electric potential at the center (the point p) of the triangle is:

A) $3\,q/(4\pi\varepsilon_0 d^2)$
B) [illegible]
C) $3\sqrt{3}\,q/(4\pi\varepsilon_0 d^2)$
D) $3\sqrt{3}\,q/(4\pi\varepsilon_0 d)$
E) $3\,q^2/(4\pi\varepsilon_0 d)$

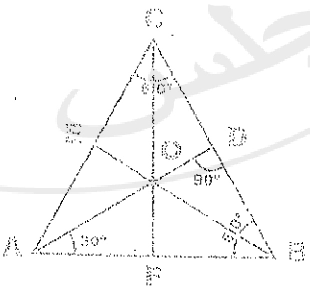
16. The magnitude of the electric field at the center (the point p) of the triangle is:

A) 0
B) $3\,q^2/(4\pi\varepsilon_0 d)$
C) $3\sqrt{3}\,q/(4\pi\varepsilon_0 d^2)$
D) $3\,q/(4\pi\varepsilon_0 d^2)$
E) $3\sqrt{3}\,q/(4\pi\varepsilon_0 d)$

17. The electric potential energy stored in the system of the three charges is:

A) $3\,q/(4\pi\varepsilon_0 d^2)$
B) $3\sqrt{3}\,q/(4\pi\varepsilon_0 d^2)$
C) $3\,q^2/(4\pi\varepsilon_0 d)$
D) 0
E) $3\sqrt{3}\,q/(4\pi\varepsilon_0 d)$

Geometry:
For equilateral triangle,
Length of CO = 2/3 length of CF
Length of BO = 2/3 length of BE
Length of AO = 2/3 length of AD



جامعة بيرزيت
BIRZEIT UNIVERSITY
-Physics Department-
-physics 132-

1st Hour Exam
Time: 80 Minutes

Summer Semester 2013-2014
20/7/2014

Student Name:....Hana' Hubaneh..........
Student Number:....1110939..........

ضع علامة (X) هنا	Instructor Name	Section No.
	غسان عباس	1L
	وفاء خليل	2L
✓	غسان عباس	3L
	عزيز شوابكة	4L

Answer Sheet

Q#	A	B	C	D	E
1			✓		
2			✓		
3		✓			
4		✓			
5				✓	
6	✓				
7			✓		
8	✓				
9				✓	
10		✓			
11	✓				
12	✓				
13			✓		
14	✓				
15					✓
16		✓			

$e = 1.6 \times 10^{-19} C$
$\mu_o = 4\pi \times 10^{-7}$ T.m/A

$M_e = 9.11 \times 10^{-31}$ kg
$M_p = 1.67 \times 10^{-27}$ kg

$\epsilon_o = 8.85 \times 10^{-12}\ C^2/N.m^2$
$1\ eV = 1.6 \times 10^{-19} J$

Name: ______________________ Class: __________________ Date: __________ ID:

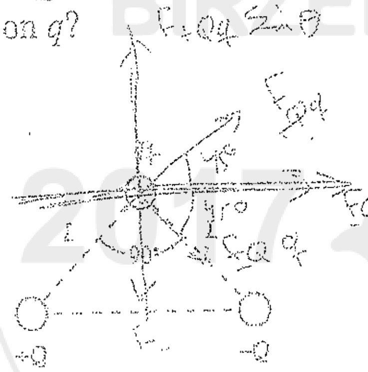
phys132-first

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. A particle (charge = +40 μC) is located on the x axis at the point x = −20 cm, and a second particle (charge = −50 μC) is placed on the x axis at x = +30 cm. What is the total electrostatic force on a third particle (charge = −4.0 μC) placed at the origin (x = 0)?

a. −36i N
b. 16i N
c. −56i N
d. 36i N
e. 56i N

____ 2. If Q = 25 μC, q = 10 μC, and L = 40 cm in the figure, what is the electrostatic force on q?



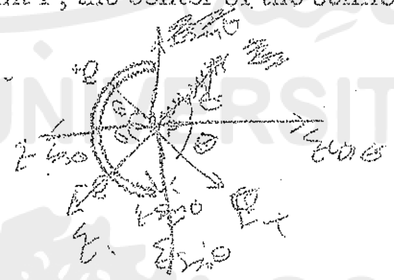
a. 28j N
b. −22i N
c. 20i N
d. 14i N
e. zero

Name: ______________________ ID:

3. A particle with a charge of 5×10^{-6} C and a mass of 20 g moves uniformly with a speed of 7 m/s in a circular orbit around a stationary particle with a charge of -5×10^{-6} C. The radius of the orbit is:

a. 0
b. 0.23 m
c. 0.62 m
d. 1.6 m
e. 4.4 m

4. Positive charge $+Q$ is uniformly distributed on the upper half of a semicircular rod and negative charge $-Q$ is uniformly distributed on the lower half. What is the direction of the electric field at point P, the center of the semicircle?



a. ↑
b. ↓
c. ←
d. →
e. ↗

5. The dipole moment of a dipole in a 300N/C electric field is initially perpendicular to the field, but it rotates so it is in the same direction as the field. If the moment has a magnitude of 2×10^{-9} C · m the work done by the field is:

a. -12×10^{-7} J
b. -6×10^{-7} J
c. 0
d. 6×10^{-7} J
e. 12×10^{-7} J

Name ______________________

6. A 24nC charge is distributed uniformly along the x axis from $x = 2$ m to $x = 6$ m. Which of the following integrals is correct for the magnitude (in N/C) of the electric field at $x = +8$ m on the x axis?

a. $\int_2^6 \frac{54dx}{(8-x)^2}$
b. $\int_2^6 \frac{216dx}{(8-x)^2}$
c. $\int_2^6 \frac{54dx}{x^2}$
d. $\int_2^6 \frac{216dx}{x^2}$
e. $\int_0^8 54dx/(8-x)^2$

7. A particle ($q = 3.0$ mC, $m = 20$ g) has a speed of 20 m/s when it enters a region where the electric field has a constant magnitude of 80 N/C and a direction which is the same as the velocity of the particle. What is the speed of the particle 3.0 s after it enters this region?

a. 68 m/s
b. 41 m/s
c. 56 m/s
d. 80 m/s
e. 36 m/s

8. The flux of the electric field $(24\text{ N/C})\hat{i} + (30\text{ N/C})\hat{j} + (16\text{ N/C})\hat{k}$ through a 2.0 m^2 portion of the xy plane is:

a. 32 $N \cdot m^2/C$
b. 34 $N \cdot m^2/C$
c. 42 $N \cdot m^2/C$
d. 48 $N \cdot m^2/C$
e. 60 $N \cdot m^2/C$

Name: ______________________ ID: A

____ 9. Charge Q is distributed uniformly throughout an insulating sphere of radius R. The magnitude of the electric field at a point $R/4$ from the center is:

a. $Q/4\pi\varepsilon_0 R^2$
b. $Q/\pi\varepsilon_0 R^2$
c. $3Q/4\pi\varepsilon_0 R^2$
d. $Q/8\pi\varepsilon_0 R^2$
e. $Q/16\pi\varepsilon_0 R^2$

____ 10. Three particles lie on the x axis: particle 1, with a charge of 1×10^{-8} C is at $x = 1$ cm, particle 2, with a charge of 2×10^{-8} Cis at $x = 2$ cm, and particle 3, with a charge of -3×10^{-8} C, is at $x = 3$ cm. The potential energy of this arrangement, relative to the potential energy for infinite separation, is:

a. $+5 \times 10^{-4}$ J
b. -5×10^{-4} J
c. $+9 \times 10^{-4}$ J
d. -9×10^{-4} J
e. zero

____ 11. A conducting sphere of radius 5 cm has a charge density of 2×10^{-6} C/m^2 on its surface. Its electric potential is:

a. 1.1×10^{4} V
b. 2.2×10^{4} V
c. 2.3×10^{5} V
d. 3.6×10^{5} V
e. 7.2×10^{6} V

Name: ____________________ ID: ____

___ 12. The electric field in a region of space is given by $E_x = (3.0x)$ N/C, $E_y = E_z = 0$, where x is in m. Points A and B are on the x axis at $x_A = 3.0$ m and $x_B = 5.0$ m. Determine the potential difference $V_B - V_A$.

$V_B - V_A = -\int E_x \cdot dx = -\int_3^5 3x\,dx = -\left[\frac{3x^2}{2}\right]_3^5$

$37.5 - 13.5$

a. −24 V
b. +24 V
c. −18 V
d. +30 V
e. −6.0 V

___ 13. When a positive charge is released and moves along an electric field line, it moves to a position of

a. lower potential and lower potential energy.
b. lower potential and higher potential energy.
c. higher potential and lower potential energy.
d. higher potential and higher potential energy.
e. greater magnitude of the electric field.

___ 14. The electric potential at any point in space is given by $V=3xy^2z$, the electric field at any point in space is given by:

$E_x = -3y^2z\,\hat{i}$

$E_y = -6xyz\,\hat{j}$

$E_z = -3xy^2\,\hat{k}$

a. $-3y^2z\mathbf{i}-6xyz\mathbf{j}-3xy^2\mathbf{k}$
b. $3y^2z\mathbf{i}+6xyz\mathbf{j}+3xy^2\mathbf{k}$
c. $-6y\mathbf{j}$
d. $-6xyz\mathbf{k}$
e. $-3x\mathbf{i}-6y\mathbf{j}-3z\mathbf{k}$

جامعة بيرزيت

BIRZEIT UNIVERSITY

Physics 132

Coordinator: Tayseer AROURI

1st. H. EXAM
TIME: 75 min

2nd Sem. 2014
13.4.2014

Student Name: Mohammed Rateb Shebana   Student No.: 112060

ضع إشارة (X) في كل من المربع المقابل لمدرس شعبتك ودائرة على رقم الشعبة.

الشعبة	المدرس		شعبة	المدرس	
1 , 5 , 6	اسماعيل بدران	☐	2	تيسير عاروري	☐
3 , 4	يعقوب عنيني	☐	8 ، 11	غسان عباس	☒
7 , 9	لميس نداف	☐	10	وفاء خاطر	☐

تعليمات:

1) لا تفتح ورقة الامتحان حتى يسمح لك بذلك.
2) اكتب اسمك ورقمك في أعلى هذه الصفحة.
3) اختر الجواب الأكثر قربا للجواب الصحيح وانقله على هذه الصفحة، وذلك بوضع إشارة (X) في الخانة المناسبة.
4) السؤال الذي له أكثر من إجابة يعطى علامة صفر.
5) يجب إعادة أوراق الامتحان كاملة.
6) عدد الأسئلة 13 سؤالاً.

13

	1	2	3	4	5	6	7	8	9	10	11	12
A						X	X					X
B			X					X	X			
C	X									X	X	
D		X										
F				X	X							

11
2

ϵ_0 = 8.85 x 10^{-12} $C^2/N m^2$
e = [illegible] x 10^{-19} C

1. A particle with a charge of 5×10^{-6} C and a mass of 10 g moves uniformly with a speed of 17 [illegible] in a circular orbit around a stationary particle with a charge of -48×10^{-6} C. The radius of the orbit is:

A) 0.75 m
B) 0.23
C) 1.50 m
D) 0.62 m
E) 3.00 m

2. 16 C of charge are placed on a spherical conducting shell. A 9 C-point charge is placed at the center of the cavity. The net charge in coulombs on the outer surface of the shell is:

A) -7 C
B) +7 C
C) 0 C
D) +25 C
E) +16 C

3. The work in joules required to carry a 15.0-C charge from a 15.0-V equipotential surface to a 6.0-V equipotential surface and then to a 11.0-V surface is:

A) zero
B) -60 J
C) 60 J
D) 45 J
E) -45 J

4. The electric potential in a certain region of space is given by $V = -5r^2 + 3r$, where V is in volts and r is in meters. In this region the equipotential surfaces are:

A) concentric cylinders with the x axis as the cylinder axis
B) planes parallel to the yz plane
C) unknown unless the charge is given
D) planes parallel to the x axis
E) concentric spheres centered at the origin

5. An electric dipole with dipole moment
$p = (3.0i + 6.0j) \times 10^{-24}$ C.m
is in an electric field $E = (i + 2.0k) \times 10^{3}$ N/C
The torque acting on the dipole is:

A) $(18i - 9j - 12k) \times 10^{-21}$ N.m
B) $(18i + 9j + 12k) \times 10^{-21}$ N.m
C) $(12i + 6j + 6k) \times 10^{-21}$ N.m
D) $3.0 \times 10^{[illegible]}$ N.m
E) $(12i - 6j - 6k) \times 10^{-21}$ N.m

6. Two point charges $q_1 = 27 \times 10^{-9}$ C is located at (0,0) m, and $q_2 = -125 \times 10^{-9}$ is located at (4,0) m . The electric field at point P(0,3)m is:

A) 36i N/C
B) 36j N/C
C) 27i + 72j N/C
D) 27i + 36j N/C
E) 27i N/C

7. A 8×10^{-8} C charge is fixed at the origin. A -5×10^{-8} C charge is moved from x = 10 cm on the x axis to y = 20 cm on the y axis. The change in potential energy is:

A) 1.8×10^{-4} J
B) zero
C) -1.1×10^{-4} J
D) -1.8×10^{-5} J
E) 9.0×10^{-5} J

8. A 8-cm radius conducting sphere has a charge density of 5×10^{-6} C/m^2 on its surface. Its electric potential, relative to the potential far away, is:

A) 1.1×10^{4} V
B) 7.2×10^{6} V
C) 2.2×10^{4} V
D) 4.5×10^{4} V
E) 3.6×10^{5} V

9. The electric potential at points in an xyz space is given by:
$V = 3x^2y - 3y^2z + 4xz^2$ V/m³. The electric field at the point p(1,0,2) is

A) E = 0
B) E = -16i - 3j - 16k N/C
C) E = -16i + 9j + 4k N/C
D) E = -16i + 5j N/C
E) E = -12i - 3j + 12k N/C

10. A charged oil drop with a mass of 8.0×10^{-3} kg is held suspended by an upward electric field of 200 N/C. The charge on the drop is:

A) $+2 \times 10^{-4}$ C
B) $+2.5 \times 10^{-4}$ C
C) $+4 \times 10^{-4}$ C
D) -2.5×10^{-4} C
E) -4×10^{-4} C

11. The flux of the electric field (4i + 5j + 8k) N/C through a 4.0 m^2 portion of the xy plane is:

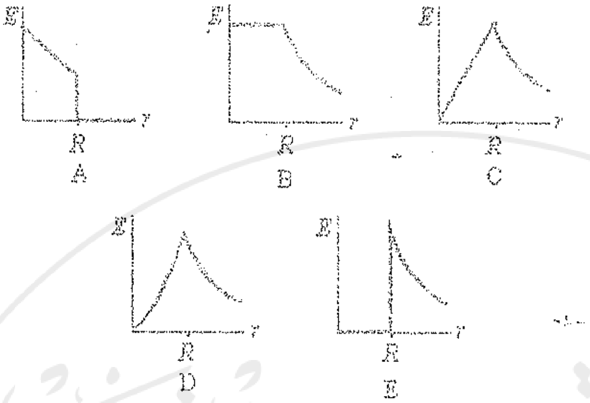
A) 24 N·m²/C
B) 16 N·m²/C
C) 32 N·m²/C
D) 20 N·m²/C
E) 64 N·m²/C

12. An alpha particle has a mass of 6.64×10^{-27} kg and a charge +2e is released from rest in a uniform electric field of magnitude 4.00×10^4 N/C. The acceleration of the particle in m/s² is:

A) 1.93×10^{12}
B) 3.86×10^{12}
C) 0.48×10^{12}
D) 0.96×10^{12}
E) 2.41×10^{12}

Name: ____________________ ID:

____ 15. Which of the following graphs represents the magnitude of the electric field as a function of the distance from the center of a solid charged conducting sphere of radius R?



a. A
b. B
c. C
d. D
e. E

____ 16. Charge of uniform linear density (4.0 nC/m) is distributed along an infinite thin wire placed on the x-axis. Determine the magnitude of the electric field on the y axis at $y = 2.5$ m.

a. 36 N/C
b. 29 N/C
c. 43 N/C
d. 50 N/C
e. 58 N/C

-PHYSICS 132-

MIDTERM EXAM
Time: 1:45 Minutes

First Summer 2014/2015
28/6/2015

Student Name: [redacted]
Student Number: [redacted]

ضع (X) مقابل	Instructor Name	Section No.
X	*Ghassan Abbas*	1/2
	Ismael Badran	3

Answer Sheet

Q#	A	B	C	D	E
1	A ✗				
2	E ✗				
3	A ✗				
4	C ✗				
5	E ✗				
6	B ✓				
7	B ✗				
8	B ✗				
9	D ✗				
10	B ✓				
11	A ✗				
12	B ✗				
13	A ✗				
14	A ✗				
15	D ✓				
16	B ✓				
17	B ✗				
18	[illegible] ✗				
19	E ✗				
20	B ✗				

Ch 5 : electric current
Ch 6 : electric circuit
→ test bank

Q1. At a certain distance from a charged particle, the magnitude of the electric field is 500V/m and the electric potential is -3 kV. The electric charge on the particle is:

(A) 2 μC

B. 4 μC

C. −2 μC

D. 0.5 μC

E. 6 μC

Q2. An electron is moving in a circular path around a long, uniformaly charged wire carrying λ =2.5 nC/m. the speed of the electron is:

A. 2.8×10^{6} m/s

B. 1.4×10^{6} m/s

C. 2.8×10^{4} m/s

D. 2×10^{6} m/s

(E) 5.6×10^{6} m/s

Q3. A spherical charge distribution of radius R is given by $\rho = \rho_0 r^2/R^2$, where r is the radial distance and ρ is the volume charge density. The total charge is:

(A) $4\pi\rho_o R^3/3$

B. $4\pi\rho_o R^2/5$

C. $4\pi\rho_o r^5/5R^2$R

D. $\rho_o R^3/5$

E. $4\pi\rho_o R^3/5$

Q4: A small object has charge Q. Charge q is removed from it and placed on a second small object. The two objects are placed 1m apart. For the force that each object exerts on the other to be a maximum q should be:

A. Q/2

B. Q/4

C. Q

D. Q/3

E. 2Q/3

Q5: Positive charge +Q is uniformly distributed on the upper half a semicircular rod of radius R and negative charge −Q is uniformly distributed on the lower half. What is the magnitude and direction of the electric field at point P, the center of the semicircle?

A. $Q/(\pi\varepsilon_0 R^2)$ and ↑

B. $Q/(\pi^2\varepsilon_0 R^2)$ and ↓

C. $Q/(\pi^2\varepsilon_0 R^2)$ and ←

D. $Q/(4\pi\varepsilon_0 R^2)$ and ↓

E. 0

Q6: Two conducting spheres are far apart. The smaller sphere carries a total charge Q. The larger sphere has a radius that is twice that of the smaller and is neutral. After the two spheres are connected by a conducting wire, the charges on the smaller and larger spheres, respectively, are:

A. Q/2 and Q/2

B. Q/3 and 2Q/3

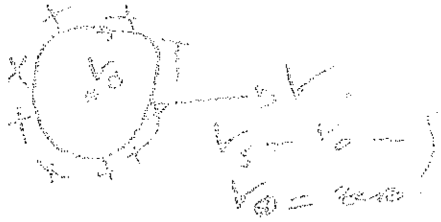
C. 2Q/3 and Q/3

D. zero and Q

E. 2Q and −Q

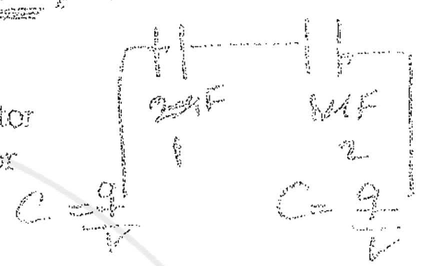
Q7: A hollow conducting sphere is charged to a potential V. The potential at its center is:

A. [illegible]V
B. 0
C. −V
D. 2V
E. V



Q8: A 2-μF and a 1-μF capacitor are connected in series and a potential difference is applied across the combination. The 2-μF capacitor has:

A. twice the charge of the 1-μF capacitor
B. half the charge of the 1-μF capacitor
C. twice the potential difference of the 1-μF capacitor
D. half the potential difference of the 1-μF capacitor
E. none of the above

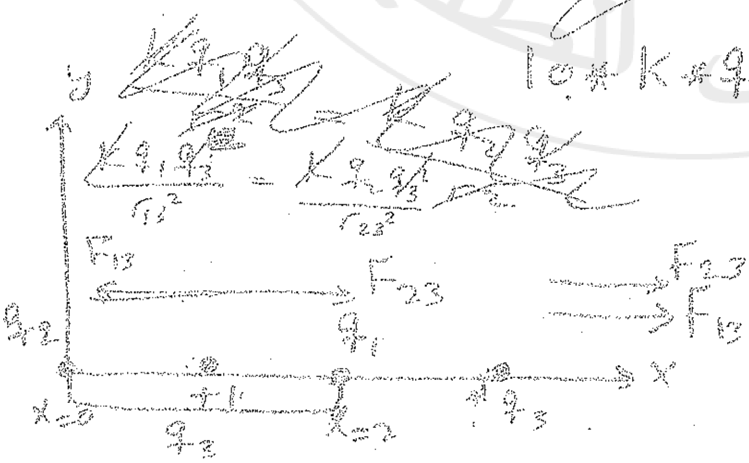


Q9: Three 10μC charges, initially far apart, are brought into a line where they are spaced by 100 μm intervals. The work required to assemple this charge distribution is:

A. Zero
B. 50 J
C. 9×10^3 J
D. 4.5×10^4 J
E. 2.25×10^4 J

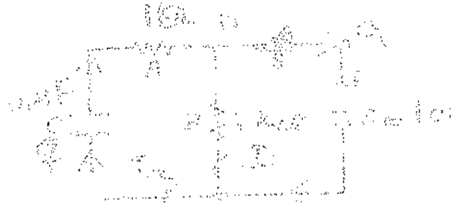
Q10: Three point charges lie along the x axis. The positive charge $q_1 = 15\mu C$ is at x = 2 m, the positive charge $q_2 = 6$ μC is at the origin, and the net electrostatic force on q_3 is zero. The position of q_3 is:

A. 0.500 m
B. 0.775 m
C. -0.775 m
D. 2.775 m
E. -0.500 m



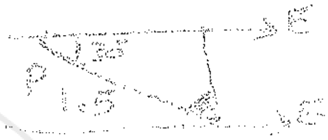
Q11/ For the circuit shown if R=1 kΩ, C = 10 μF, and ε = 10 V. If S is closed at t =0 s. The charge on the capacitor at t = ∞ is:

A. 10 μC
B. 50 μC
C. 200 μC
D. 100 μC
E. None of these



Q12: A dipole with dipole moment1.5 nC.m is oriented at 30° to 4.0 MN/C electric field. The magnitude of the torque on the dipole is:

A. 3×10^{-3} N.m
B. $5.2 10^{-3}$ N.m
C. $6 10^{-3}$ N.m
D. 3×10^{3} N.m
E. 6×10^{3} N.m



Q13:An electric field is given by $\vec{E} = E_o\left(1+\frac{z}{a}\right)\hat{j}$, Where E_o and a are constants. The electric flux through the square in the x-z plane bounded by the points (0,0,0), (0, 0, a), (a,0,0), (a,0, a) is:

A. 0
B. $3E_oa^2/2$
C. $E_oa^2/2$
D. E_oa^2
E. None of the above

Q14/ Two conductors a are made of the same material and have the same length. Conductor A is a solid wire of diameter 1.0 mm. Conductor B is a hollow tube of outer diameter 2.0 mm and inner diameter 1.0mm. The ratio of R_A/R_B is:

A. 1/3
B. 1
C. 2
D. 4
E. 3

Q15: The electric potential (in Volts) at points in space is given by

$V = x^2 + y^2 + z^{3/2}$. The magnitude of the electric field (in volts/m) at the point (1m, -2m, 0m) are:

A. $(5)^{1/2}$
B. $(6)^{1/2}$
C. Zero
D. $(20)^{1/2}$
E. 6

Q16: A battery has an emf of 16 V. The terminal voltage of the battery is 12 V when delivering 20 W of power to an external resistor R. The values of R and the internal resistor r_{in} are:

A. 6.73 Ω and 1.97 Ω

B. 7.2 Ω and 2.4 Ω

C. 10 Ω and 1 Ω

D. 10 Ω and 2 Ω

E. need more information to answer

Q17: Two concentric imaginary spherical surfaces of radius R and $2R$ respectively surround a positive point charge Q located at the center of the surfaces. When compared to the electric flux Φ_1 through the surface of radius R, the electric flux Φ_2 through the surface of radius $2R$ is

A. $\Phi_2 = \Phi_1/4$

B. $\Phi_2 = \Phi_1/2$

C. $\Phi_2 = \Phi_1$

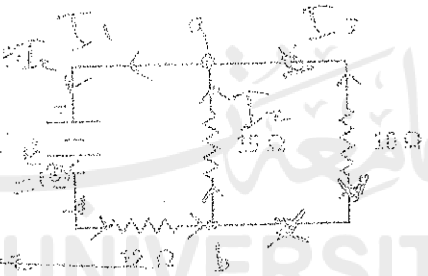
D. $\Phi_2 = 2\Phi_1$

E. $\Phi_2 = 4\Phi_1$

Q18: The sum of the currents entering a junction equals the sum of the currents leaving a junction because

A. charge is neither created nor destroyed at a junction
B. there are no transformations of energy from one type to another in a circuit loop.
C. capacitors tend to maintain current through them at a constant value.
D. current is used up after it leaves a junction.
E. the potential of the nearest battery is the potential at the junction.

Q19: How much heat is produced in the 10-Ω resistor in 5.0 s when ε = 18V



A. 72 J
B. 32 J
C. 50 J
D. 18 J
E. 90 J

Q20: : A 10 kΩ resistor and a capacitor are connected in series and then a 12 V potential difference is applied across them. The potential across the capacitor rises from zero to 5V in 1.3 μs. The capacitance of the capacitor is:

A. 161 μF
B. 161 pF
C. 240 pF
D. 90 μF
E. 40 pF