BIRZEIT UNIVERSITY

Physics 132

2nd Hour Exam — **2nd Semester 2017/2018**

Time: 85:00 min — **Date: 13 /5/2018**

Student Name:--- Student NO----------------------

✓	Sec	Instructor Name	Classes Time	✓	Sec	Instructor Name	Classes Time
○	1	Areej Abdel Rahman	S 9:00-9:50	○	8	Hazem Abu Sara	W 12:00-12:50
○	2	Hazem Abu Sara	M 12:00-12:50	○	9	Wael Karain	W 9:00-9:50
○	3	Areej Abdel Rahman	M 14:00-14:50	○	10	Abdallah Sayyed	W 14:00-14:50
○	4	Abdallah Sayyed	S 14:00-14:50	○	11	Abdallah Sayyed	W 11:00-11:50
○	5	Dua' Abu Mura	S 14:00-14:50	○	12	Areej Abdel Rahman	W 12:00-12:50
○	6	GHASSAN ABBAS	W 13:00-13:50	○			
○	7	Areej Abdel Rahman	M 15:00-15:50				

Answer Sheet:

Q#	a	b	c	d	e
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Useful Formulae and Constants

1. $\varepsilon_o = 8.85 \times 10^{-12} C^2/N.m^2$
2. $e = 1.6 \times 10^{-19}\ C$
3. $\mu_o = 4\pi \times 10^{-7}\ T.m/A$
4. $m_e = 9.11 \times 10^{-31}\ Kg$
5. $m_p = 1.67 \times 10^{-27}\ Kg$
6. $g = 10\ m/s^2$
7. $eV = 1.6 \times 10^{-19}\ J$

Capacitance

1. $q = CV$
2. $C = \frac{\varepsilon_o A}{d}$
3. $\frac{1}{C_{eq}} = \sum \frac{1}{C_i}$ $(Series\ connection)$
4. $C_{eq} = \sum C_i$ $(Parallel\ connection)$
5. $U = \frac{q^2}{2C}$
6. $u = \frac{1}{2}\varepsilon_o E^2$
7. $\varepsilon_o \oint \kappa \vec{E} \cdot d\vec{A} = q$

Current and Resistance

8. $\vec{J} = ne\vec{v}_d$
9. $\vec{E} = \rho\vec{J}$
10. $R = \frac{\rho L}{A}$
11. $P = i^2 R$

Circuits

12. $\varepsilon = \frac{dW}{dq}$
13. $V = \varepsilon(1 - e^{-\frac{t}{RC}})$

Magnetic Fields

14. $\vec{F} = q\vec{v} \times \vec{B}$
15. $qvB = \frac{mv^2}{r}$
16. $f = \frac{qB}{2\pi m}$
17. $\vec{F} = i\vec{l} \times \vec{B}$
18. $\vec{\tau} = \vec{\mu} \times \vec{B}$
19. $U = -\vec{\mu} \cdot \vec{B}$
20. $W_a = U_f - U_i$

1- A potential difference of $300V$ is applied to a series connection of two capacitors of capacitance $C_1 = 3\ \mu F$ and $C_2 = 6\ \mu F$. What is the charge on C_1?

a) $1200\ \mu C$

b) $5400\ \mu C$

c) $400\ \mu C$

d) $200\ \mu C$

e) $600\ \mu C$ **

2- Two capacitors, $C_1 = 4\ \mu F$ is charged so its charge is $q_1 = 80\ \mu C$ and $C_2 = 6\ \mu F$ is uncharged . The two capacitors are then connected in parallel. Find the charge on C_1?

a) $80\ \mu C$

b) $32\ \mu C$ **

c) $48\ \mu C$

d) $40\ \mu C$

e) $zero$

3- A certain capacitor has a capacitance of C. After it is charged to a charge q and isolated, the two plates are brought closer together so its capacitance becomes $2C$. Find the work done by the agent?

a) $-\frac{q^2}{2C}$

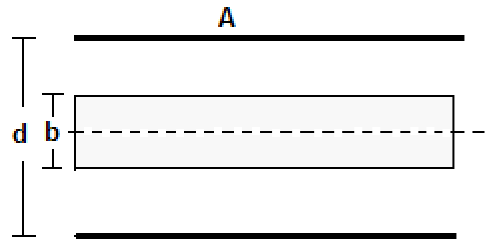
b) $\frac{q^2}{2C}$

c) $\frac{q^2}{C}$

d) $-\frac{q^2}{4C}$**

e) $\frac{q^2}{4C}$

4- A slab of copper of thickness (b) is thrust into a parallel plate capacitor of plate area (A) and plate separation (d) as shown in the figure. What is the capacitance after the slab is introduced?



a) $\frac{\varepsilon_0 A}{d}$

b) $\frac{\varepsilon_0 A}{b}$

c) $\frac{\varepsilon_0 A}{d+b}$

d) $\frac{\varepsilon_0 A}{d-b}$**

e) 0

5- A isolated conducting sphere whose radius is R and has a charge Q. How much potential energy is stored in the electric field of this charged conductor?

a) $\frac{kQ^2}{R}$

b) $\frac{kQ^2}{2R}$**

c) $\frac{kQ}{R}$

d) $\frac{kQ}{2R}$

e) $\frac{kQ}{R^2}$

6- A certain wire has a resistance R. What is the resistance of a second wire, made of the same material, that is twice as long and has twice the radius?

a) $2R$

b) $4R$

c) $R/2$**

d) $R/4$

e) R

7- What is the current in a wire of radius (b) if the magnitude of the current density is variable and given by $J = ar$, in which a is constant and r is the radial distance?

a) πba^3

b) $2\pi ba^2$

c) $\pi ba^3/3$

d) $2\pi ba^3/3$

e) $2\pi ab^3/3$**

8- What is the value of 1 $Ampere.hour$?

a) $3600\ Watt$

b) $3600\ J$

c) $3600\ C$**

d) $3600\ electrons$

e) $1.6 \times 10^{-19}\ C$

9- In the circuit shown, the ideal batteries have $emfs$, $\varepsilon_1 = 20\ V$, $\varepsilon_2 = 5\ V$ and $R_1 = 3\ \Omega$, $R_2 = 2\ \Omega$. If the potential at $\boldsymbol{a}$ is 0 V, what is the potential at $\boldsymbol{b}$?

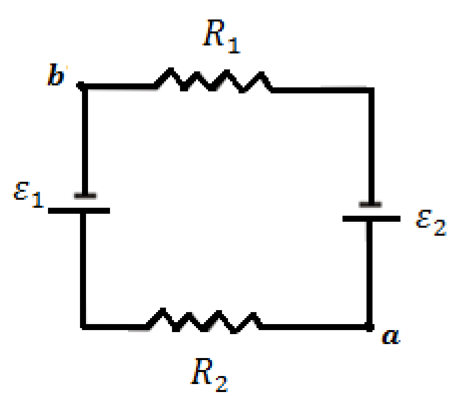
a) $+3\ V$

b) $+4\ V$

c) $-4\ V$

d) $-14\ V$**

e) $+14\ V$



10- In the circuit shown find I_2?

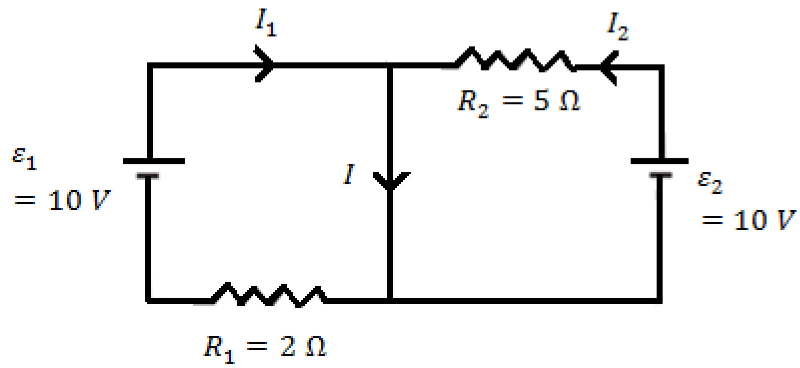
a) $zero$

b) 3.5 A

c) 7 A

d) 2 A**

e) 5 A



11- A capacitor with initial charge q_0 is discharged through a resistor. What is the time taken by the capacitor to lose two-thirds of its charge?

a) 1.1τ**

b) 0.41τ

c) 0.693τ

d) 0.18τ

e) 0.48τ

12- In an RC series circuit, $emf\ \varepsilon = 10\ V$, resistance $R = 2\ M\Omega$, and capacitance $c = 2.5\ \mu F$, the circuit closed at $t = 0$ to begin charging. Find the voltage across the capacitor at $t = 10\ s$?

a) 3.7 V

b) 6.3 V

c) 1.4 V

d) 8.6 V**

e) 9.5 V

13- At one instant, $\vec{v} = (200\hat{\imath} + 300\hat{\jmath})\ m/s$ is the velocity of a electron in a uniform magnetic field $\vec{B} = (0.05\hat{\imath} - 0.15\hat{\jmath}\ )\ T$. At that instant find the force on the electron?

a) $+72 \times 10^{-19}\hat{k}\ N$**

b) $-72 \times 10^{-19}\hat{k}\ N$

c) $-45 \times 10^{-19}\hat{k}\ N$

d) $+88 \times 10^{-19}\hat{\jmath}\ N$

e) $+88 \times 10^{-19}\hat{\imath}\ N$

14- An electron moves with speed v into a region of uniform magnetic field B. The angle between them is $= 65^{\circ}$. Describe the motion of the electron and find the periodic time?

a) Uniform circular motion, $T = \frac{2\pi m}{eB}$

b) Nonuniform circular motion, $T = \frac{2\pi m}{eB}\cos 65$

c) Helical motion, $T = \frac{2\pi m}{eB}$ **

d) Helical motion, $T = \frac{2\pi m}{eB}\cos 65$

e) Helical motion, $T = \frac{2\pi m}{eB}\sin 65$

15- The coil in the figure, which is parallel to the $xz-$ plane, carries current $I = 2\ A$ in the direction indicated, has 3 turns and area of $4 \times 10^{-3}\ m^2$, and lies in a uniform magnetic field $\vec{B} = \left(2\hat{\imath} - 4\hat{\jmath}\ - 3\hat{K}\right) mT$. What is the potential energy of the coil in the magnetic field?

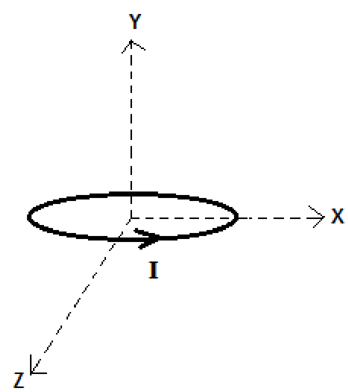
a) $-48\ \mu J$

b) $+24\ \mu J$

c) $+96\ \mu J$**

d) $+72\ \mu J$

e) $zero$



16- A magnetic field CAN:

a) Exert a force on a charge at rest
b) Accelerate a charge moving parallel to the field
c) Change the momentum of a charge **
d) Change the kinetic energy of a charge
e) Not exist