Assiut University **Faculty of Science** **Department of Physics**		**Second semester 2016-2017** **Date: 19 / 5 / 2017** **Time: 2 hours**
Course Title: General Physics (II) – Code: P105 – Final Exam (50%) **Exam in 6 Pages**		

Constants: [$e = 1.6 \times 10^{-19}$ C, $k_e = 9 \times 10^9$ N.m^2/C^2 and $\varepsilon_0 = 8.85 \times 10^{-12}$ C^2 / N.m^2]

Part I- Choose the correct answer: (7 Marks)

1- The number of electrons needed to make up one coulomb of charge is:

A. 1.6×10^{-19}	**B.** $1.6 \times 10^{+19}$	**C.** 6.25×10^{-18}	**D.** 6.25×10^{18}

2- The electrostatic force equation for two charged objects, q_1 and q_2, gives a positive result if:

A. q_1 is positive and q_2 is negative	**B.** q_1 is negative and q_2 is positive	**C.** q_1 and q_2 have the same sign	**D.** q_1 and q_2 are neutral

3- The electrostatic force equation for two charged objects, q_1 and q_2, gives a negative result if:

A. q_1 repels q_2	**B.** $q_2 = q_1$	**C.** $q_1 = \frac{1}{2} q_2$	**D.** q_1 attracts q_2

4- The electric field between two point charges (+Q) and (–Q) separated by a distance (d) points:

A. on a straight line from +Q to –Q	**B.** radially toward +Q	**C.** radially toward –Q	**D.** on a straight line from –Q to +Q

5- When a capacitor is connected to a battery, the plate connected to the _____ terminal becomes _____:

A. positive, positive	**B.** negative, positive	**C.** positive, negative	**D.** positive, neutral

6- If a capacitor is connected to a battery of potential difference V, the capacitor becomes fully charged when the potential difference between its plates equals:

A. 0	**B.** V	**C.** V/2	**D.** 2V

7- The following quantities are all scalar, except for

A. electric current	**B.** electric field	**C.** electric charge	**D.** electric potential

Part II- Choose the correct answer: (20 Marks)

1- The attractive force between two charges $q_1 = \frac{1}{3}$ C and $q_2 = -\frac{1}{3}$ C separated by 1 km is:

A. 100 N	**B.** 10 N	**C.** 1000 N	**D.** 1 N

2- A group of charges (Q) exert a net force F = 10 N on a charge q = 0.2 C located at point (X). This means that the magnitude of the electric field resulting from Q at X equals:

A. 0.2 N/C	**B.** 5 N/C	**C.** 10 N/C	**D.** 50 N/C

3- A charge q = 0.5 C located at point (X) has electric potential energy PE = 10 J caused by a group of charges (Q). This means that the electric potential resulting from Q at X equals:

A. 20 V	**B.** 10 V	**C.** 5 V	**D.** 0.5 V

4- If a light bulb in a 220 V electric circuit draws 0.5 amperes, its power rating is:

A. 110 W	**B.** 440 W	**C.** 40 W	**D.** 75 W

5- A classroom has ten 25 W compact fluorescent lamps (CFL). If these lamps are turned on for 10 hours every day, their energy consumption in 20 days is:

A. 10 kWh	**B.** 50 kWh	**C.** 5 kWh	**D.** 1 kWh

6- A 10 km copper wire (resistivity = 1.7×10^{-8} Ω.m) has cross-sectional area = 1 mm^2. Its resistance is:

A. 1.7 Ω	**B.** 17 Ω	**C.** 170 Ω	**D.** 1700 Ω

7- An electric circuit consists of a 24 Ω resistance connected across the terminals of a 12 V battery. The electric current in this circuit is:

A. 24 amperes	**B.** 12 amperes	**C.** 2 amperes	**D.** 0.5 amperes

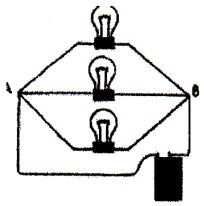
8- Three identical light bulbs, each of resistance 12 Ω, are connected in series to a 12 V battery. The current passing through each light bulb is:

A. ⅓ A	**B.** ⅔ A	**C.** 1 A	**D.** 3 A

9- In an electric circuit consisting of two resistances (10 Ω and 5 Ω) connected in series, if the current through the 10 Ω resistance is 1 A, the current through other resistance is:

A. 0 A	**B.** 0.5 A	**C.** 1 A	**D.** 2 A

10- Three identical light bulbs, each of resistance 12 Ω, are connected in parallel to a 12 V battery. Their equivalent resistance is:



A. 4 Ω	**B.** 12 Ω	**C.** 24 Ω	**D.** 36 Ω

Part III- Solve and Choose the correct answer: (15 Marks)

1- A total charge of 6.3×10^{-8} C is distributed uniformly throughout a 2.7 cm radius sphere. The volume charge density is:

A. 3.7×10^{-7} C/m^3	**B.** 6.9×10^{-6} C/m^3	**C.** 7.6×10^{-4} C/m^3	**D.** 6.9×10^{-6} C/m^2

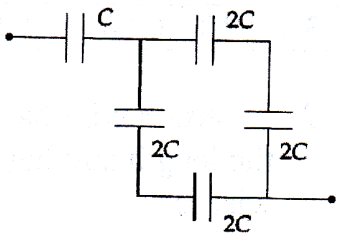
2- A certain wire has resistance R. Another wire, of the same material, has half the length and half the diameter of the first wire. The resistance of the second wire is:

A. R/4	**B.** 2R	**C.** R/2	**D.** R

3- A conducting solid sphere of radius 40.0 cm has a total positive charge of 26.0 μC. The magnitude of the electric field at 10.0 cm and 60.0 cm from the center of the sphere are respectively:

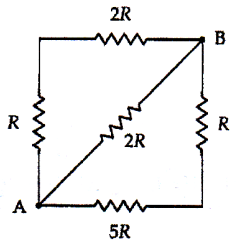
A. Zero, 6.49×10^5 N/C	**B.** 3.65×10^5 N/C, 6.49×10^5 N/C	**C.** 1.46×10^6 N/C, 6.49×10^5 N/C	**D.** Zero, 3.65×10^5 N/C

4- Determine the equivalent capacitance of the combination shown when $C = 24\ \mu F$.



A. 20 μF	**B.** 16 μF	**C.** 36 μF	**D.** 45 μF

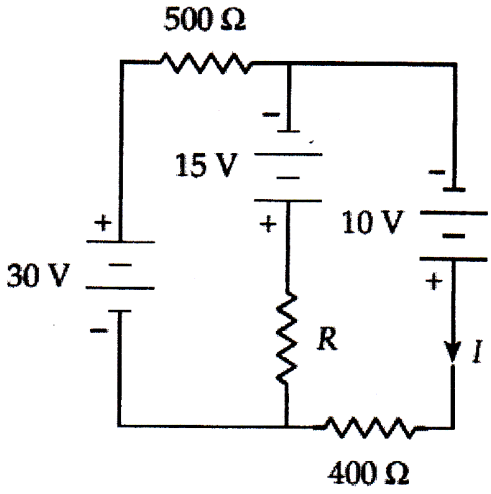
5- What is the equivalent resistance between points A and B in the figure when $R = 10\ \Omega$?



A. 25 Ω	B. 20 Ω	C. 10 Ω	D. 15 Ω

Part IV- Solve and Choose the correct answer: (8 Marks)

1- Determine the magnitude and sense (direction) of the current in the 500 Ω resistor when $I = 30$ mA.



A. 56 mA left to right	**B.** 56 mA right to left	**C.** 48 mA left to right	**D.** 48 mA right to left

Best Wishes

Dr. Ghada Abbady, Dr. Ahmed Tamer, Dr. Hani Negm, Dr. Mohmed Abd-Elkareem

Assiut University **Faculty of Science** **Department of Physics**		**Term: Fall 2016 - 2017** **Date :** ٢٧/ ٥/ ١٩ **Time : 2 hours**

Course Title: General Physics (2) - Code: P105 - Final Examination (50 %)

Instructor : prof Dr. A. AAlamir

Constants: Electron charge e = -1.6×10^{-19} C, Electron mass m = 9.1×10^{-31} kg,
$K_e = 9\times10^{9}\ Nm^2/C^2$, $\varepsilon_0 = 8.85\times10^{-12}\ C^2/Nm^2$

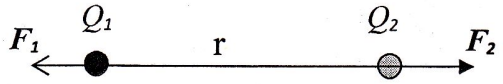
Part I: Circle the correct answer for (8) only of the following questions: (25 Marks)

1. Which of the following is **NOT** a unit of electric field?

a. N/C
b. V/m
c. J/C . m
d. V . m/C

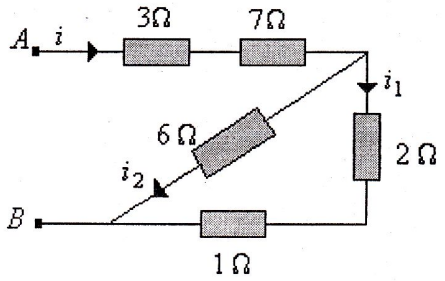
2. Two charged particles, $Q_1 = +2\,\mu C$ and $Q_2 = +6\,\mu C$, are a distance r apart. $\underline{F}_1$ is the force Q_2 exerts on Q_1. $\underline{F}_2$ is the force Q_1 exerts on Q_2. Which statement is true?.

a. $\underline{F}_1 = -3\underline{F}_2$
b. $3\underline{F}_1 = -\underline{F}_2$
c. $\underline{F}_1 = -\underline{F}_2$
d. $\underline{F}_1 = 12\underline{F}_2$



2. The resistance between points A and B is :

a. ٢١ Ω
b. ١٢ Ω
c. ٢ Ω
d. ١9 Ω



4. If the work required to move a charge q= + 0.50 C from point A to point B is W = + 125 J, then the potential difference between the two points is:

a. Zero V
b. 62.5 V
c. 31.25 V
d. 250 V

5. What is the potential at the center of the square shown in figure shown below. Assume that $q_1 = +1\times10^{-8}$C, $q_2 = -2\times10^{-8}$C, $q_3 = +3\times10^{-8}$C, $q_4 = +2\times10^{-8}$C, and a =1m.

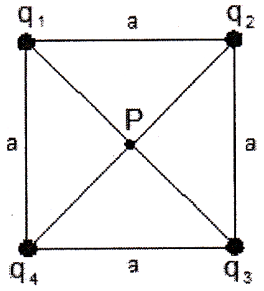
Marks of Q

a. 500V

b. 1014V

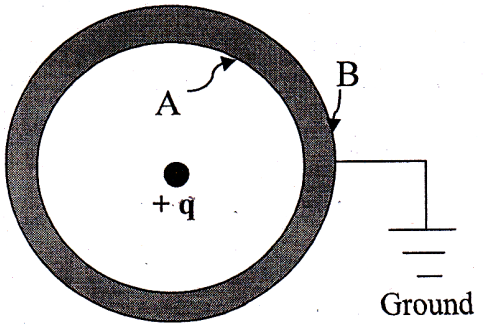
c. 255V

d. 360V



6. A positive point charge + q is placed at the center of a neutral conducting spherical shell. The outer surface is then grounded as shown. A is the inner surface and B is the outer surface. Which statement is correct?

a. The charge on A is - q; that on B is + q.
b. The charge on B is - q; that on A is + q.
c. There is no charge on either A or B.
d. The charge on A is – q; there is no charge on B.



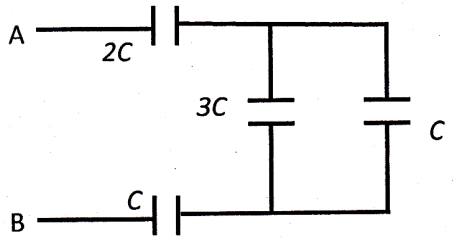
7. For the combination shown, If $C = 50\ \mu F$ and $\Delta V_{AB} = 10V$, the equivalent capacitance (C_{eq}) is:

a. 28.6 μF

b. 42.9 μF

c. 187.5 μF

d. 40 μF



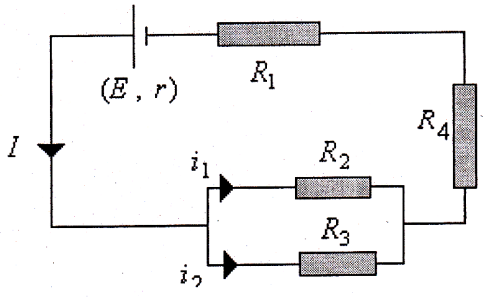
8. In the figure below, the electric current i_2 through the resistance R_2 is:

a. 0.3 A

b. 0.5 A

c. 1 A

d. 1.5 A



$E = 3.1V,\ r = 0.2\Omega,$
$R_1 = 2\Omega, R_2 = 3\Omega$
$R_3 = 6\Omega,\ R_4 = 2\Omega$

9. If an electron moves with linear speed 4.7×10^{6} m / s in a direction perpendicular to a uniform magnetic field 0.35 T , what is the radius of its circular orbit?

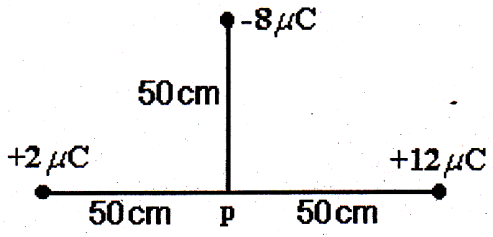
a. 7. $\times10^{-5}$m *b.* - 13093 m *c.* 1.22×10^{-23} m *d.* 14.0×10^{-2} m

Marks of Q

Part II : Answer Three (3) only of the following questions (75Marks) :

Q1) 25 Marks

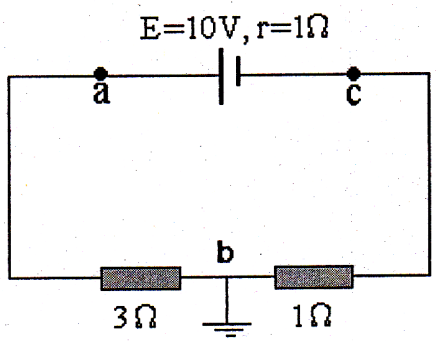
1- In the figure shown below: what is the **magnitude and direction** of the electric field (**E**) at point P ?



2- In the circuit shown below, find :

a) The current I

b) The potential difference $(V_a - V_c)$.



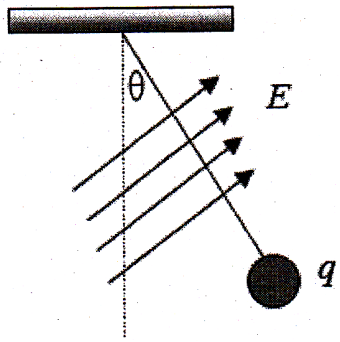
Marks of Q

Q2) 25 Marks

A charged cord ball of mass 1g is suspended on a light string in the presence of a uniform electric field as in figure below. When **E=(3i+5j) x10^5 N/C**, the ball is in equilibrium at $\theta = 37^\circ$.

Find: **a)** The charge on the ball

b) The tension in the string.



Marks of Q

Q3) **25 Marks**

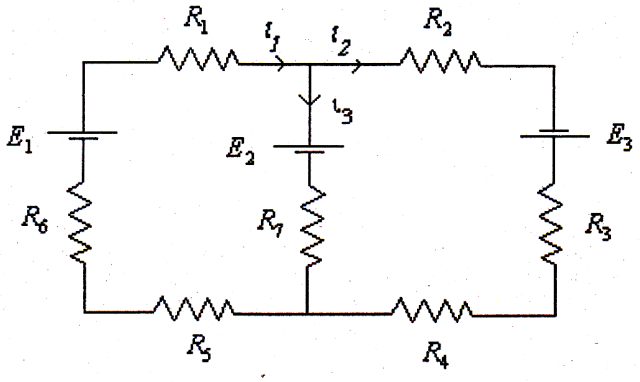
Two batteries and seven resistors are connected as shown in the figure below. Find the currents i_1, i_2 and i_3 where:

$E_1 = 4\,V,\ E_2 = 24\,V,\ E_3 = 12\,V,$

$R_1 = R_2 = 4\Omega,$

$R_3 = R_6 = R_7 = 6\Omega$

$R_4 = R_5 = 2\Omega$



Marks of Q

Q4) **25 Marks**

A parallel-plate air capacitor of capacitance of 100 pF has a charge of magnitude 0.1 μC on each plate. The plates are 0.5 mm apart.

a) What is the potential difference between the plates?

b) What is the area of each plate?

c) What is the electric field magnitude between the plates?

d) What is the surface charge density on each plate?.

Good Luck

Assuit University Faculty of Science Department of Physics		Second Semester 2016 - 2017 Date: 19 / 5 / 2017 Time: 2 hours
Course Title: General Physics (1) – Code: P100 – Final Exam (50%)		

Part I- Choose the correct answer: **(22 Marks)**

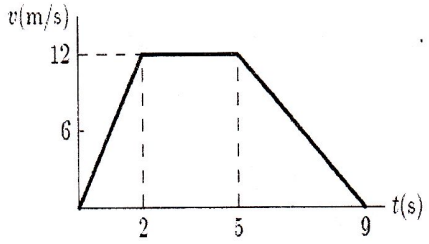
1- During a short interval of time the acceleration a in m/s^2 of an automobile is given by $a = ct^2 + dt$, where the time t is in seconds. The units of c and d are respectively:

A) m/s^3; m/s^4
B) s^3/m; s^4/m
C) m/s^2; m/s^3
D) m/s^4; m/s^3

2- Suppose A = BC, where A has the dimension L/M and C has the dimension L/T. Then B has the dimension:

A) $[M^{-1}L^2T]$
B) $[M^{-1}L^2T^{-1}]$
C) $[MTL^2]$
D) $[M^{-1}T]$

3- The graph represents the straight line motion of a car. How far does the car travel between t = 2 s and t = 5 s?



A) 16 m
B) 8 m
C) 36
D) 12

4- A particle moving with a constant acceleration has a velocity of 0.2 m/s when its position is x = 0.1 m. Its position 7.0 s later is x = –0.3 m. What is the acceleration of the particle?

A) $-0.11\ m/s^2$
B) $-0.089\ m/s^2$
C) $-0.073\ m/s^2$
D) $-0.15\ m/s^2$

5- Which one of the following statements is correct for an object released from rest?

A) The average velocity during the first second of time is 4.9 m/s
B) During each second the object falls 9.8 m
C) The acceleration changes by 9.8 m/s^2 every second
D) The object falls 9.8 m during the first second of time

6- An object is thrown vertically upward at 35 m/s. Taking g = 10 m/s^2, the velocity of the object 5 s later is:

A) 15 m/s down
B) 7.0 m/s up
C) 15 m/s up
D) 85 m/s down

7- A vector in the *xy* plane has a magnitude of 25 and *x* component of 12 m. The angle it makes with the positive *x* axis is:

A) 30^o
B) 61^o
C) 241^o
D) 300^o

8- The polar coordinates of a point is [5.50 m, 240°]. The Cartesian coordinates (*x*,*y*) of this point, in meter, is:

A) (2.75, 4.76)
B) (-2.75, -4.76)
C) (4.76,-2.75)
D) (-4.76,2.75)

9- A particle moving in the *xy* plane with constant acceleration has an initial velocity of $\bar{v}_i = 3.0\,\hat{i} - 2.0\,\hat{j}$ m/s at $t = 0$ and $\bar{v}_f = 9.0\,\hat{i} + 7.0\,\hat{j}$ m/s at $t = 3$ s. The acceleration of the particle ($\bar{a}$) is:

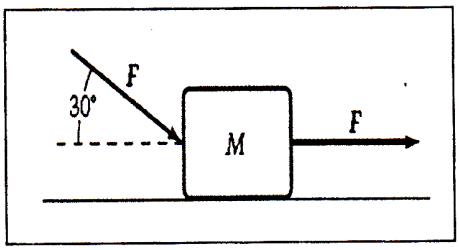
A) $(2.0\,\hat{i} + 3.0\,\hat{j})$ m/s^2
B) $(-3.0\,\hat{i} - 2.0\,\hat{j})$ m/s^2
C) $(3.0\,\hat{i} - 2.0\,\hat{j})$ m/s^2
D) $(-3.0\,\hat{i} + 2.0\,\hat{j})$ m/s^2

10- A particle moves along a path and its speed increases with the time. The acceleration and velocity vectors are parallel:

A) in the circular path
B) in the straight path
C) in the parabola path
D) never

11- The horizontal surface on which the block slides is frictionless. If F = 20 N and M = 5.0 kg, what is the magnitude of the resulting acceleration of the block?

A) 5.3 m/s^2
B) 6.2 m/s^2
C) 7.5 m/s^2
D) 4.7 m/s^2



/22

Part II- Solve only Four (4) out the following five problems: **(28 Marks)**

---

1) **A particle starts from rest at x = 0 and moves for 10 s with an acceleration of +2.0 cm/s^2. For the next 20 s, the acceleration of the particle is –1.0 cm/s^2. What is the position of the particle and its velocity at the end of this motion?**

2) **A stone thrown from the top of a building is given an initial velocity of 20.0 m/s straight upward. The building is 50.0 m high. Find:**

a) **The time at which the stone reaches its maximum height.**
b) **The maximum height**
c) **The position and velocity of the stone at t = 5 s**
d) **The velocity of the stone just before it hits ground. [use: g = -10 m/s^2]**

3) **A person begins a trip by first walking 25.0 km southeast (45^{o}) from his car, and then, he stops. On the second day, he walks 40.0 km in a direction 60.0° north of east. Determine the magnitude and the direction of the resultant displacement?**

4) At $t = 0$, a particle leaves the origin with a velocity of 5.0 m/s in the positive y direction. Its acceleration is given by $\vec{a} = (3.0\,\hat{\imath} - 2.0\,\hat{\jmath})$ m/s^2. At the instant the particle reaches its maximum y coordinate how far is the particle from the origin?

5) The only two forces acting on a body have magnitudes of 20 N and 35 N and directions that differ by 80°. The resulting acceleration has a magnitude of 20 m/s^2. What is the mass of the body?

/28