كل اسئلة

جامعة اسيوط (يونيو 2016) المادة : التفكير العلمى
كلية العلوم   رقم المادة : 14 م ج   الزمن : ساعتان

==

سؤال اجبارى : (20 درجة)
الانسان يصطنع منهجا يتيح له الاتصال المباشر بالواقع ، عن طريق
الجمع بين العقل والتجربة ، إلا فى مرحلة متأخرة من تاريخه . فلا بد
إذن أن عقبات أساسية حالت دون تحقيق هذا الاتصال المباشر بين
الإنسان والعالم عن طريق العلم .   فما هى هذه العقبات التى أخرت
ظهور العلم ، والتى لاتزال تشوه صورة المعرفة العلمية حتى يومنا
هذا عند فئات كثيرة من البشر ؟
==

اجب عن سؤالين فقط

السؤال الاول : (15 درجة)
التفكير العلمى هو ذلك النوع من التفكير المنظم .. الذى يمكن ان
نستخدمة فى شئون حياتنا اليومية .. أو فى النشاط الذى نبذله حين
نمارس أعمالنا المهنية المعتادة .. أو فى علاقاتنا مع الناس ... تكلم
بالتفصيل عن سمات التفكير العلمى .

السؤال الثانى : (15 درجة)
ليس العلم ظاهرة منعزلة ، تنمو بقدرتها الذاتية وتسير بقوة دفعها
الخاصة وتخضع لمنطقها الداخلى البحت ، بل أن تفاعل العلم مع المجتمع
حقيقة لا ينكرها أحد .   تكلم بالتفصيل عن الابعاد الاجتماعية للعلم
المعاصر.

السؤال الثالث :   (15 درجة)
وضح الاتى : 1- العناصر الاخلاقية فى شخصية العالم .
2- العلاقه بين العلم و التكنولوجيا.

تمنياتى لكم بالتوفيق
أ.د. محمد زيدان

كلية العلوم

الزمن: ساعتان

الفصل الدراسي الثاني

المادة: تاريخ العلوم (١٢م.ج)

امتحان لطلاب كليه العلوم

٢٠١٦/٢٠١٥م

اليوم: الاحد

المستوى الاولي

التاريخ: ٢٠١٦/٦/١٩م

تاريخ العلوم

أجب عن جميع الاسئلة الاتيه

السؤال الاول: ضع علامة صح او خطا امام العبارات الاتية: (٣٠ درجة)

(١) يعتبر ابن ملكا من الرواد الاوائل في علم الارض   (   )

(٢) يعتبر اقليدس من مؤسسي علم الجبر في عصرة عند اليونانين (   )

(٣) من اشهر علماء العرب في الاحياء ابن الهيثم   (   )

(٤) من اهم انجازات الخازن هو كتاب القانون المسعودي   (   )

(٤) الجاحظ اول من لقب بشيخ النباتين العرب وله كتاب الجامع لصفات اشتات النبات (   )

(٦) يعتبر ارسطو اول من وضع طريقة للتقطير في العالم   (   )

(٧) تعتبر النسبية العامة الزمن لا يمثل احد الابعاد الاساسية في الكون   (   )

(٨) هيتون هو اول من قال ان الارض تشبه صدفة محاطه بالمياه وان السماء تغطي هذه الصدفة(   )

(٩) يعتبر الدينوري اول من الف موسوعة القانون (   )

(١٠) اول من ابتكر مخدر قبل الجراحه وسماه المرقد هو ابو سينا (   )

السوال الثاني: (١٠ درجة)

(أ) اذكر اسهامات العرب في تطور علم الارض.

(ب) أذكر أهم عشر علماء ساهموا في تطور العلوم عبر التاريخ من وجهة نظرك.

السوال الثالث: (١٠ درجة)

(أ) اكتب شرح مبسط للنظرية النسبية لاينشتاين.

(ب) تكلم عن تطور علم الارقام عبر التاريخ.

مع تمنياتي لكم بالتوفيق

أستاذ دكتور/ أحمد ماهر عبدالباسط

Ministry of Higher Education
Assiut University
Faculty of Science

Final Exam
Term II, Year: 2015/2016
Second Year
Course Title: English Language (2)
Date of Exam: Wednesday 15/6/2016
Time Allotted: 120 Minutes

Answer the following questions:

Part I: Read the following passage _Carefully_, then answer the Questions below.

(20 points)

Thomas Edison was born February 11, 1847 in Milan, Ohio. He was nicknamed "Al" at an early age. At age 11, Edison moved to Michigan where he spent the remainder of his childhood.

Thomas Edison struggled at school, but learned to love reading and conducting experiments from his mother who taught him at home. At age 15, Edison became a "tramp telegrapher", sending and receiving messages via morse code, an electronically-conveyed alphabet using different clicks for each letter. Eventually, he worked for the Union Army as a telegrapher. Edison often entertained himself by taking things apart to see how they worked. Soon, he decided to become an inventor.

In 1870, Edison moved to New York City and improved the stock ticker. He soon formed his own company that manufactured the new stock tickers. He also began working on the telegraph, and invented a version that could send four messages at once. Meanwhile, Edison married Mary Stillwell, had three children and moved his family to Menlo Park, New Jersey where he started his famous laboratory.

In 1877, Edison, with help from "muckers", individuals from around the world looking to make fortunes in America, invented the phonograph. The phonograph was a machine that recorded and played back sounds. He perfected the phonograph by recording "Mary had a Little Lamb" on a piece of tin foil! In 1878, Edison invented the light bulb as well as the power grid system, which could generate electricity and deliver it to homes through a network of wires. He subsequently started the Edison Electric Light Company in October of 1878.

In 1884, after he attained great fame and fortune, Mary Stillwell died. Edison remarried 20 year-old Mina Miller in 1886. He had three more children and moved to West Orange, New Jersey. At West Orange, Edison built one of the largest laboratories in the world. He worked extremely hard and registered 1,093 patents.

Edison continued to invent or improve products and make significant contributions to x-ray technology, storage batteries and motion pictures (movies). He also invented the world's first talking doll. His inventions changed the world forever. They still influence the way we live today. Edison worked until his death on October 18, 1931.

Questions:

1. In what state did Thomas Edison NOT live?
    a. Michigan
    b. Ohio
    c. Massachusetts

2. How many children did Thomas Edison have?
    a. 3
    b. 5
    c. 6

3. What best describes Morse Code?
    a. A language for deaf people
    b. A system of clicks that stand for letters
    c. A system of clicks that stand for words

4. What was one of Thomas Edison's first accomplishments?
    a. Inventing an improved stock ticker
    b. Inventing an improved x-ray
    c. Inventing tin foil

5. A phonograph is most similar to:
    a. A walkie-talkie
    b. A record player
    c. A television

6. What is a "mucker"?
    a. Someone from another country
    b. Someone from another country hoping to find a home in America
    c. Someone from another country hoping to make a fortune in America

7. Select all of the following that Thomas Edison did not invent.
    a. The first storage battery
    b. A power system that could deliver electricity to homes
    c. The first stock ticker

8. What does the quote "Genius is 1 percent inspiration and 99 percent perspiration" mean?
    a. Only geniuses should think of new ideas
    b. Geniuses have to sweat a lot to come up with good ideas.
    c. Great ideas take more hard work than ingenuity
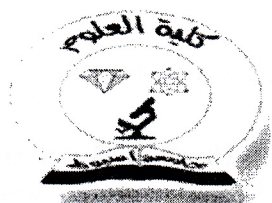
Assiut University
Faculty of Science
Second Semester Final Examination
(June 2016)

Subject: English Language I　　　　　　　Code:　015UR

Students: Level One　　　　　　　　　　Time Allowed: 2 hours

I- Identify the topic sentence in the following paragraph:　　　(4 marks)

Some people leave too many lights on around the house. Some aren't careful about how much water they use. Americans waste a lot of resources. Most people buy products with a lot of unnecessary packaging that isn't good for the environment.

II- Find out the irrelevant sentence in the following paragraph:　　(4 marks)

Mr. Phillips is the principal of Lake Ridge School. He makes announcements every morning at 8:15 to greet all students and to get the day started. Every morning he makes a quick visit to all the classes and usually waves to the students. Mr. Phillips also walks around in the cafeteria to make sure students are safe. He likes to eat tacos. He also directs traffic on the cross walk at the end of each day.

III- Read the following passage then answer the questions below:　　(18 Marks)

When you imagine the desert, you probably think of a very hot place covered with sand. Although this is a good description for many deserts, Earth's largest desert is actually a very cold place covered with ice: Antarctica.

In order for an area to be considered a desert, it must receive very little rainfall. More specifically, it must receive an average of less than ten inches of precipitation—which can be rain, sleet, hail, or snow—on the ground every year. Antarctica, the coldest place on earth, has an average temperature that usually falls below the freezing point. And because cold air holds less moisture than warm air, the air in Antarctica does not hold much moisture at all. This is evident in the low precipitation statistics recorded for Antarctica. For example, the central part of Antarctica receives an average of less than 2 inches of snow every year. The coastline of Antarctica receives a little bit more—between seven and eight inches a year. Because Antarctica gets so little precipitation every year, it is considered a desert.

When precipitation falls in hot deserts, it quickly evaporates back into the atmosphere. The air over Antarctica is too cold to hold water vapor, so there is very little evaporation. Due to this low rate of evaporation, most of the snow that falls to the ground remains there permanently, eventually building up into thick ice sheets. Any snow that does not freeze into ice sheets becomes caught up in the strong winds that constantly blow over Antarctica. These snow-filled winds can make it look as if it is snowing. Even though snowfall is very rare there, blizzards are actually very common on Antarctica.

1) The main purpose of paragraph 1 is to

A. accept a conclusion　　　　　　　B. introduce an argument

C. provide a brief history　　　　　　D. deny a common belief

(Go to the back of this sheet)

2) The best title for this passage would be
A. Earth's Many Deserts   B. Antarctica: The Coldest Place on Earth
C. A Desert of Ice   D. Unusual Blizzards

3) Africa's Sahara Desert is the second-largest desert on earth. Based on the information in the passage, what characteristic must the Sahara share with Antarctica?
A. low temperatures   B. high temperatures
C. frequent blizzards   D. low precipitation

4) As used in paragraph 2, which is the best definition for <u>precipitation</u>?
A. moisture in the air that falls to the ground
B. any type of weather event
C. weather events that only happen in very cold areas
D. a blizzard that occurs in areas with limited snowfall

5) In paragraph 2 the author writes, "And because cold air holds less moisture than warm air, the air in Antarctica does not hold much moisture at all." Using this information, it can be understood that
A. air in Africa holds more moisture than the air in Antarctica
B. air surrounding a tropical island holds less moisture than the air in Antarctica
C. air in the second floor of a house is typically warmer than air on the first floor
D. air at the mountains is typically colder than the air at the beach

6) Based on the information in the final paragraph, it can be understood that blizzards in Antarctica are mainly the result of
A. freezing cold temperatures   B. large amounts of snowfall
C. low amounts of precipitation   D. strong winds

IV- <u>Correct the following sentences:</u>   **(24 Marks)**

1) Each of the girls sing well.
2) Fifty percent of the pie have disappeared.
3) Ten dollars are a high price to pay.
4) Neither she nor they was willing to predict the election.
5) Please give it to John or myself.
6) Whoever you elect will serve a four-year term.
7) Some of the pies is missing.
8) You should check your spelling, grammar, and punctuating.
9) The order was requested six weeks ago, therefore I expected the shipment to arrive by now.
10) I must study english and math.
11) The folder, not the letters, were misplaced.
12) He is not unwilling to help.

(Best Wishes)
Examiners:
Dr. Sherin Abdel Ghaffar
Dr. Yasser Ahmed Gomaa

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

1) Dimensional analysis can give you the numerical value of constants of proportionality that may appear in an algebraicexpression.
a. True.
b. False.

2) The distance between two cities is 100 mile. What is the numberof kilometers between the two cities?
a. smaller than 100.
b.larger than 100.
c.equal to 100.

3) The equation for the change of position of a train starting at x = 0m is given by $x = \frac{1}{2}at^2 + bt^3$. The dimensions of b are
a. T^{-3}
b. LT^{-3}
c. LT^{-2}

4) If a car is traveling eastward and slowing down, what is the direction of the force on the car that causes it to slow down?
a. eastward.
b. westward.
c. neither of these.

5) After a ball is thrown upward and is in the air, its speed
a. decreases
b. increases and then decreases
c. decreases and then increases

6) A component of a vector is -------- large than the magnitude of the vector.
a. Always
b. Never
c. sometimes.

7) A projectile is thrown from the top of a building with an initial velocity of 30 m/s in the horizontal direction. If the top of the building is 30 m above the ground, how fast will the projectile be moving just before it strikes the ground? Select one:
a. 39 m/s
b. 43 m/s
c. 54 m/s

8) In an isolated system, which of the following is a correct statement of the quantity that is conserved?
a. kinetic energy
b. kinetic energy plus potential energy
c. both kinetic energy and potential energy

9) If the rectangular coordinates of a point are given by (2, 5) and its polar coordinates are (r, 30°), so r is equal:
a. 2.3
b. 1.7
c. 4.3

10) The mass of an atom of iron molar mass A_{Fe}=55.9 gm/mol is
a. 9.3×10^{-23}gm
b. 9.3×10^{-23}gm/mol
c. 9.3×10^{-23}gm/atom

Part II- Solve <u>four (4) questions only</u> from the following problems: (30 Marks)

1) The frequency of vibration (f) of a mass (m) at the end of a spring that has a constant (k) is related to m and k by the relation of the form (f = constant $m^a k^b$). Use dimensional analysis to find (a) and (b) from the fact that $[f] = [T^{-1}]$, $[m] = [M]$ and $[k] = [MT^{-2}]$.

2) A particle starts from rest and accelerates as shown in Figure P2.12. Determine (a) the particle's speed at $t = 10.0$ s and at $t = 20.0$ s, and (b) the distance traveled in the first 20.0 s.
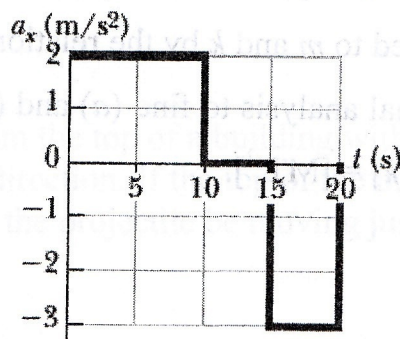
3) A force acting on a particle varies with x, as shown. Calculate the work done by the force as the particle moves from x = 0 to x = 6.0 m.

F_x(N)

Ⓐ   Ⓑ

5

                    Ⓒ
0   x(m)
   1   2   3   4   5   6
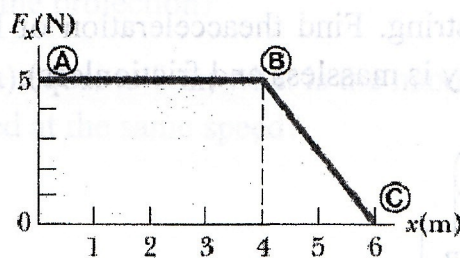
4)Block A, with a mass of 10 kg, rests on a 30° incline. The coefficient of kinetic friction is 0.20. Block B, with a mass of 3.0 kg, is attached to the dangling end of the string. Find theacceleration of B and the tension of string. (Hint: the pulley is massless and frictionless).
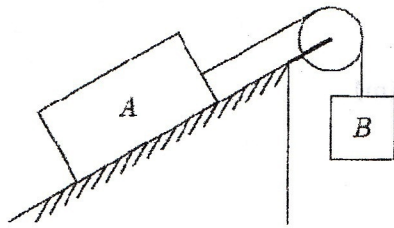
5) A projectile is fired in such a way that its horizontal range is equal to its maximum height.

(a) What is the angle of the projection?

(b) if the range in part (a) equal to 8 m; what is the maximum range the rock can attain if it is launched at the same speed?

Part I- Choose the correct answer: (16 Marks)

1- To make an uncharged object have a positive charge:

a) remove some neutrons

b) add some neutrons

c) add some electrons

d) remove some electrons

2- A 200-N/C electric field is in the positive x-direction. The force on a proton in this field is:

a) 200N in the positive x-direction

b) 200N in the negative x-direction

c) 3.2×10^{-17} N in the positive x-direction

d) 3.2×10^{-17} N in the negative x-direction

3- Charge is placed on the surface of a 2.7 cm radius isolated conducting sphere. The surface charge density is uniform and has the value 6.9×10^{-6} C/m^2. The total charge on the sphere is:

a) 5.6×10^{-10} C

b) 2.1×10^{-8} C

c) 4.7×10^{-8} C

d) 6.3×10^{-8} C

4- A particle with a charge of 5.5×10^{-8} C is 3.5 cm from a particle with a charge of -2.3×10^{-8} C. The potential energy of this two-particle system, relative to the potential energy at infinite separation, is:

a) 3.2×10^{-4} J

b) -3.2×10^{-4} J

c) 9.3×10^{-3} J

d) -9.3×10^{-3} J

5- Two identical capacitors, each with capacitance C, are connected in parallel and the combination is connected in series to a third identical capacitor. The equivalent capacitance of this arrangement is:

a) $2C/3$

b) C

c) $3C/2$

d) $3C$

6- 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) $R/2$

c) R

d) $2R$

7- A total resistance of 4.0 Ω is to be produced by combining an unknown resistor R with a 12 Ω resistor. The value of R and how is it to be connected to the 12 Ω resistor is:

a) 6.0 Ω, parallel

b) 6.0 Ω, series

c) 3.9 Ω, parallel

d) 3.9 Ω, series

8- The equivalent resistance between points 1 and 2 of the circuit shown is:

a) 3 Ω

b) 4 Ω

c) 5 Ω

d) 6 Ω

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1) Three point charges are located on a circular arc as shown. (a) What is the
total electric field at P, the center of the arc? (b) Find the electric force that
would be exerted on a -5 nC point charge placed at P.
$(K=9 \times 10^9 \ Nm^2/C^2)$.
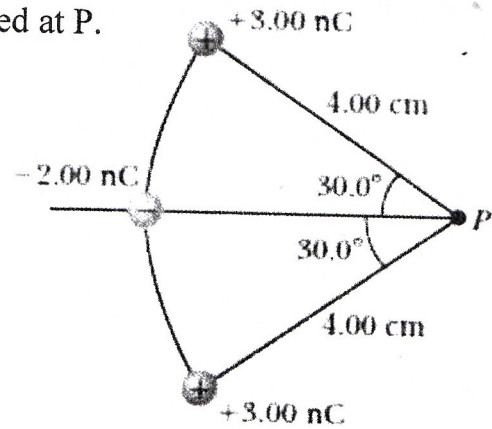
2) A charge $+q$ is at the origin. A charge $-2q$ is at $x = 2.00$ m on the x-axis. For what finite value(s) of x is (a) the electric field zero? (b) the electric potential zero?

3) A spherical conductor has a radius of 14.0 cm and charge of 26.0 µC. Calculate the electric field and the electric potential (a) $r = 10.0$ cm, (b) $r = 20.0$ cm, and (c) $r = 14.0$ cm from the center. (K=9x10⁹ Nm²/C²).

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1) A parallel-plate capacitor in air has a plate separation of 1.50 cm and a plate area of 25.0 cm^2. The plates are charged to a potential difference of 250 V and disconnected from the source. The capacitor is then immersed in distilled water ($K = 80$). Determine (a) the charge on the plates before and after immersion, (b) the capacitance and potential difference after immersion, and (c) the change in energy of the capacitor. Assume the liquid is an insulator. ($\epsilon_o = 8.85 \times 10^{-12}$ C^{2}N^{-1}m^{-2}).

2) The current in the 8.0 Ω resistor in the drawing is 0.50 A. Find a) the voltage across the 20.0 Ω resistor and b) current in 9.00 Ω and 18 Ω resistors.
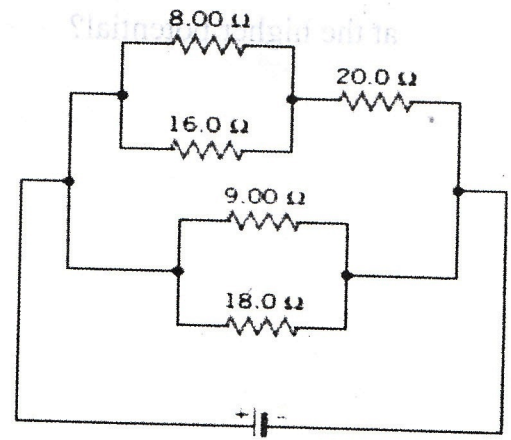
3) Using Kirchhoff's rules, (a) find the current in each resistor in the circuit. (b) Find the potential difference between points c and f (V_f- V_c). Which point is at the higher potential?

/13
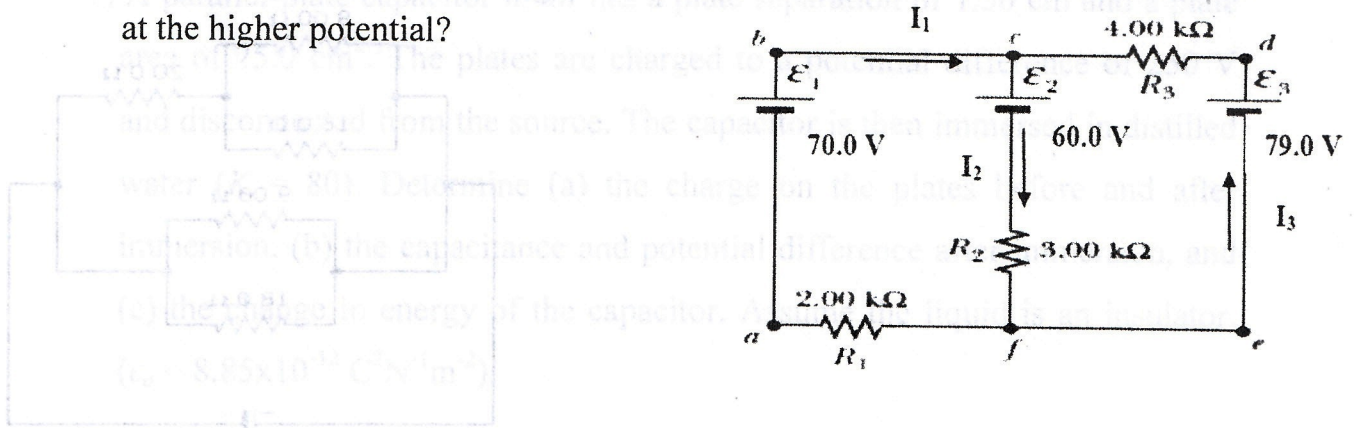
Assiut University		Term: Summer 2016
Faculty of Science		Date: August 25, 2016
Department of Physics		Time: 2 hours

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

Constants: Electron charge e = -1.6x10^{-19} C, Electron mass m = 9.1x10^{-31} kg, K_e = 9x10^9 Nm^2/C^2, ε_0 = 8.85x10^{-12} C^2/Nm^2

Answer All the Following Questions (Total Mark 50 points)

Q1) Circle the correct answer for the following questions: (15 Marks)

1. Two positive point charges Q and 2Q are separated by a distance R. If the charge Q experiences a force of magnitude F when the separation is R, what is the magnitude of the force on the charge 2Q when the separa on is 2R ?

    a. F/4   b. F/2   c. F   d. 2F   e. 4F

2. In the figure, point **A** is a distance L away from a point charge Q. Point **B** is a distance 4L away from Q. What is the ratio of the electric field at **B** to that

    a. 1/16   b. 1/9   c. 1/4   d. 1/3

    e. This cannot be determined since neither the value of Q nor the length L is specified.
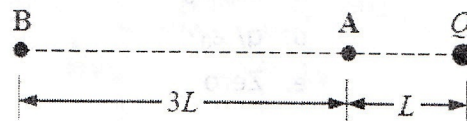
3. What is the electric flux passing through a Gaussian surface that surrounds a +0.075 C point charge?

    a. 8.5 × 10^9 N·m^2/C   b. 1.3 × 10^7 N·m^2/C   c. 7.2 × 10^5 N·m^2/C

    d. 6.8 × 10^8 N·m^2/C   e. 4.9 × 10^6 N·m^2/C

4. A charge q = −4.0 μC is moved 0.25 m horizontally to point **P** in a region where an electric eld is 150 V/m and directed vertically as shown. What is the change in the electric potential energy of the charge?

    a. −2.4 × 10^{-3} J   b. +1.5 × 10^{-4} J   c. −1.5 × 10^{-4} J

    d. +2.4 × 10^{-3} J   e. zero joules
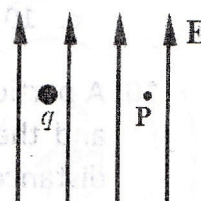
5. What is the direction of the net electric field at point P?

    a. ←   b. ↗   c. →

    d. ↙   e. ↑
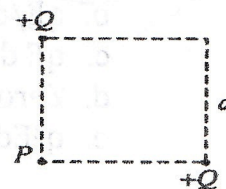
6. A charge of **5μC** is given a displacement of **0.5m** and the work done in the process is **10μ J**, the **potential difference** between the two points is

a. 2V   d. 25V

b. 0.25 V   e. Zero

c. 1V

**7.** A solid <u>conducting sphere</u> of radius $a = 5m$ is charged such that the potential of its surface is $10V$. The <u>electric field</u> at any point inside the sphere will be

$a = 5 m$

$V_s = 10V$

$E = ?$

    a. 50V/m

    b. 10V/m

    c. 2V/m

    d. 5V/m

    e. Zero
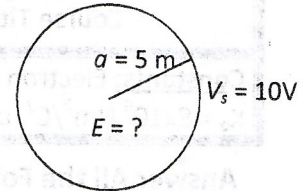
8. Two electric dipoles one of charges (+ $2q$ and – $2q$) and the second of charges (+$3q$ and –$3q$) are placed inside a cube. The <u>net electric flux</u> (Φ) through all surfaces of the cube is

    a. $10q / \varepsilon_0$

    b. $2q/\varepsilon_0$

    c. $3q/ \varepsilon_0$

    d. q/ ε_0

    e. Zero
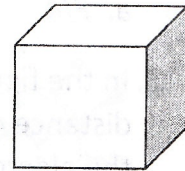
9. What is the <u>maximum electric flux</u> (Φ) that can be produced by a uniform electric field of magnitude $E = 10N/C$ through as circular surface of *radius 0.1m*?

    a. $\pi /100$ N.m^2/C

    b. $\pi /10$ N.m^2/C

    c. 1 N.m^2/C

    d. 100 N.m^2/C

    e. 10 N.m^2/C

10. A particle of mass m and charge + q is placed at rest in uniform electric field $\underline{E}$ and then released. The <u>kinetic energy</u> attained by the particle after moving distance d is

E

q

d

    a. qEd^2

    b. qE/d

    c. qE d

    d. Zero

    e. q^{2}Ed
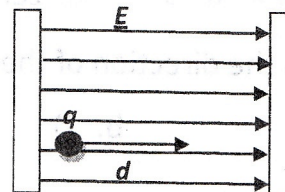
Q2) (15 points)

Three point charges are located at the ver ces of an isosceles (2 equal sides) triangle as shown below. Point **P** is **midpoint** of the base.

a) *Calculate* the magnitude and direction of the electric field at point **P**? **(12 points)**

b) *Calculate* the electric potential at point **P**? **(10 points)**

c) *Calculate* the work required to bring a positive test charge (q_0 = + 4 μC) from infinity to point **P**? **(8 points)**

q_1= +3 μC

5 m   5 m

q_2 = - 1 μC q_3= - 1 μC

P

6 m
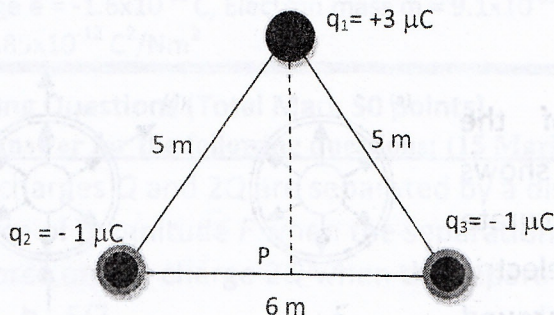
Q3) (10 points)

Two batteries and three resistors are connected as shown in the figure below. If ε_1 = 30 V and ε_2 = 10 V, find:

a) The currents I_1, I_2 and I_3. **(7 points)**

b) The potential difference ($V_a - V_e$). **(3 points)**
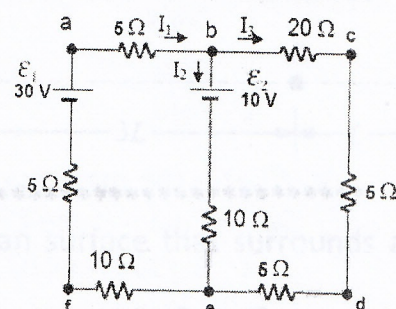
Q4) (10 points)

A solid, conducting sphere of radius *a* carries an excess charge of +6 μC. This sphere is located at the center of a hollow, conducting sphere with an inner radius of *b* and an outer radius of *c* as shown. The hollow sphere also carries a total excess charge of +6 μC.
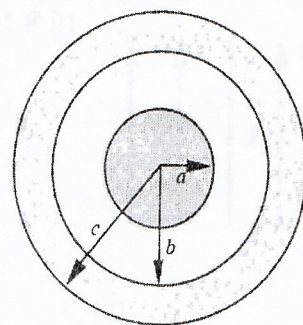
1. *Determine* the excess charge on the *inner surface* of the outer sphere (a distance *b* from the center of the system).

   (a) zero coulombs

   (b) +12 μC

   (c) −6 μC

   (d) −12 μC

   (e) +6 μC

2. Determine the excess charge on the *outer surface* of the outer sphere (a distance c from the center of the system).
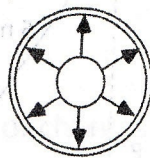
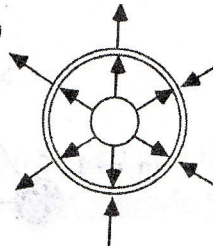   (a) zero coulombs

    (b) +6 µC

    (c) −12 µC

    (d) −6 µC

    (e) +12 µC

3. Which one of the following figures shows a qualitatively accurate sketch of the electric field lines in and around this system?
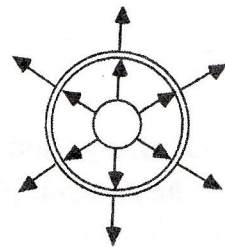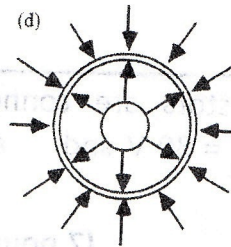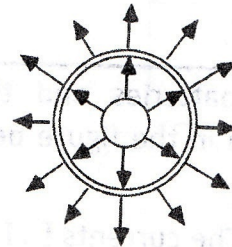

(a)   (b)   (c)   (d)   (e)

******************************* Good Luck *******************************

Prof. Dr. A. A. Ebrahim

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

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1) Dimensional analysis can give you the numerical value of constants of proportionality that may appear in an algebraic expression.
   a. True.
   b. False.

2) The distance between two cities is 100 mi. What is the number of kilometers between the two cities?
   a. smaller than 100.
   b. larger than 100.
   c. equal to 100.

3) The equation for the change of position of a train starting at x = 0m is given by $x = \frac{1}{2}at^2 + bt^3$. The dimensions of b are
   a. T^{-3}
   b. LT^{-3}
   c. LT^{-2}
   d. LT^{-1}

4) If a car is traveling eastward and slowing down, what is the direction of the force on the car that causes it to slow down?
   a. eastward.
   b. westward.
   c. neither of these.

5) After a ball is thrown and is in the air, its speed
   a. decreases.
   b. increases and then decreases.
   c. decreases and then increases.

6) A component of a vector is -------- large than the magnitude of the vector.
   a. Always
   b. Never
   c. sometimes.

7) In an isolated system, which of the following is a correct statement of the quantity that is conserved?
   a. kinetic energy.
   b. potential energy.
   c. kinetic energy plus potential energy.
   d. both kinetic energy and potential energy.

8) If the rectangular coordinates of a point are given by (2, 3.8) and its polar coordinates are (r, 30°), so r is equal:
a. 2.3
b. 1.7
c. 4.3

9) The distance between two cities is 100 mi. What is the number of kilometers between the two cities?
a. smaller than 100.
b. larger than 100.
c. equal to 100.

10) The mass of an atom of iron molar mass $A_{Fe}=55.9$ gm/mol is
a. 9.3×10^{-23} gm
b. 9.3×10^{-23} gm/mol
c. 9.3×10^{-23} gm/atom

## Part II- Solve <u>four (4) questions only</u> from the following problems: (30 Marks)

1) Suppose we are told that the acceleration a of a particle moving with uniform speed v in a circle of radius r is proportional to some power of r, say r^n, and some power of v, say v^m. Determine the values of n and m and write the simplest form of an equation for the acceleration.

2) A particle starts from rest and accelerates as shown in Figure P2.12. Determine (a) the particle's speed at $t =10.0$ s and at $t =20.0$ s, and (b) the distance traveled in the first 20.0 s.
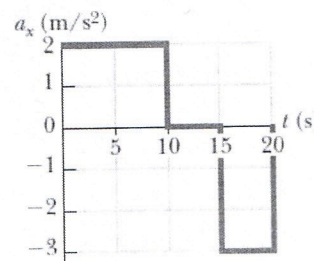
3) A man cleaning a floor pulls a vacuum cleaner with a force of magnitude $F=50.0$ N at an angle of 30.08 with the horizontal as shown in the figure.
   a) Calculate the work done by the force on the vacuum cleaner as the vacuum cleaner is displaced 3.00 m to the right.
   b) Find the work done by the man on the vacuum cleaner if he pulls it 3 m with a horizontal force of 32 N.

4) A ball of mass $m_1 =10Kg$ and a block of mass $m_2=5Kg$ are attached by a lightweight cord that passes over a frictionless pulley of negligible mass as in the Figure. The block lies on a frictionless incline of angle $\theta =45°$. Draw the free body diagram for the two objects and then find the magnitude of the acceleration of the two objects and the tension in the cord.
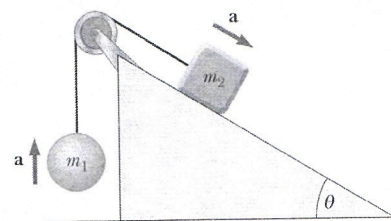
5) A particle moving in the xy plane undergoes a displacement given by $\Delta r =(2 \hat{i}+3\hat{j})$ m as a constant force $F =(5 \hat{i}+2\hat{j})$ N acts on the particle.
   a) Calculate the magnitude of the displacement and that of the force.
   b) Calculate the work done by F.
   c) Calculate the angle between F and Δr.