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Assiut University		Semester: Fall 2014
Faculty of Science		Date: 11/1/2015
Physics Department		Course: Physics (1) (P100)
Final Exam: 50 Marks		Time Allowed: 2 hours

Teaching Staff

Dr. A. A. Ibrahim (Coordinator), Dr. H. Fares, Dr. M. Omer and Dr. S. Moustafa

ANSWER ALL THE FOLLOWING QUESTIONS

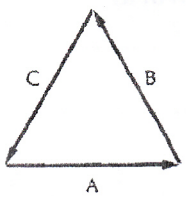
Question I: **(20 Marks, 2 per each)**

Circle the correct answer for all of the following TEN multiple-choice questions.

1. The dimensions of kinetic energy are:

(a) MLT^{-2} (b) ML^2T^{-2} (c) ML^2T^2 (d) ML^2T^{-3}

2. The diagram below shows three vectors which sum to zero, all of equal length. Which statement below is true?



(a) $A + B = A - C$
(b) $A + B = B - C$
(c) $A - B = 2A - C$
(d) $A - B = 2A + C$

3. You launch five projectiles with the same launch speed, but different launch angles. The first projectile has a launch angle of 20^o. What is the launch angle that gives a shorter range than the first?

(a) 40^o (b) 45^o (c) 60^o (d) 80^o

4. A particle moves along a path andits speed increases with time. In which of the following cases are its acceleration and velocity vectors parallel?

(a) the path is circular.
(b) the path is straight.
(c) the path is parabola.
(d) never.

5. You press your physics textbook flat against a vertical wall with your hand. What is the direction of the friction force exerted by the wall on the book?

(a) downward. (b) upward. (c) out from the wall. (d) into the wall.

6. A rock attached to a string swings in a vertical circle. Which free body diagram could correctly describe the force(s) on the rock when it is at the highest point?

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

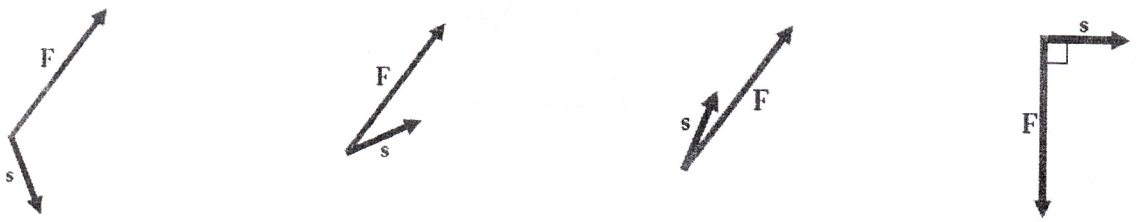
7. A book is placed on a chair. Then an apple is placed on the book. The floor exerts a normal force:

(a) only on the chair.
(b) only on the book.
(c) only on the apple.
(d) on all three.

8. A block is sliding down a slope whose angle to horizontal is θ. Consider the mass of the block is m and the friction coefficient is μ_k. The acceleration of the block depends on:

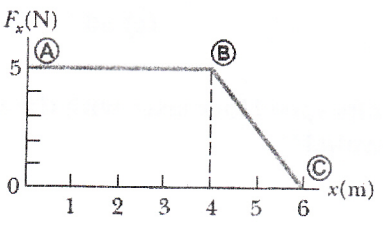
(a) m and μ_k only.
(b) m and θ only.
(c) θ and μ_k only.
(d) m, μ_k, and θ.

9. The figures below show several equal-magnitude forces F and displacements s. Which figure of the following does give the maximum positive work?



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

10. A force acting on a particle varies with x, as shown in the figure below. The work done by the force as the particle moves from x = 0 to x = 4 m is:



(a) 20 J (b) 25 J (c) 15 J (d) 5 J

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Question II: **(30 Marks, 7.5 per each)**

Solve only FOUR of the following SIX problems.

Problem 1

A particle moves along the x axis, with the following equation for the position as a function of time:

$$x = 2.0 + 6.0t - 3.0t^2$$

where x is measured in meters and t is measured in seconds.

(a) What is the position of the particle at $t = 0.50$ s?

(b) What is the instantaneous velocity at this time?

(c) What is the instantaneous acceleration at this time?

Problem 2

Two vectors are given by $\overline{A} = 2\underline{i} + 3 + \underline{k}$ and $\overline{B} = -\underline{i} + 2\underline{j} + B_z\underline{k}$. The magnitude of the resultant $\overline{A} + \overline{B}$ is 6. What are the two possible value of B_z.

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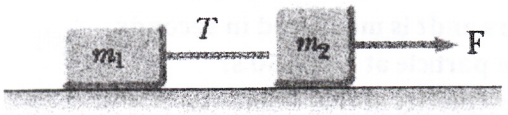
Problem 3

Two blocks connected by a rope of negligible mass are being dragged by a horizontal force F (see the figure below). Suppose that F = 68.0 N, m_1 = 12.0 kg, m_2 = 18.0 kg, and the coefficient of kinetic friction between each block and the surface is 0.100. (a) Draw a free-body diagram for each block. (b) Determine the tension T and the magnitude of the acceleration of the system.



Problem 4

In the Bohr model of the hydrogen atom, the speed of the electron is approximately $2.2\times10^{6}\ m/s$. Find (a) the force acting on the electron as it revolves in a circular orbit of radius $0.53\times10^{-10}m$, and (b) the centripetal acceleration of the electron. Assume that the electron mass is $9.11\times10^{-31}kg$.

Problem 5

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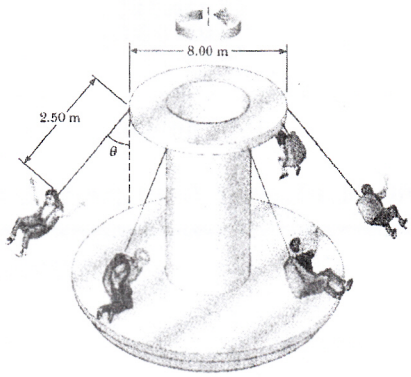
An amusement park ride consists of a rotating circular platform 8.00 m in diameter from which 10.0-kg seats are suspended at the end of 2.50-m massless chains (see the figure below). When the system rotates, the chains make an angle $\theta = 28.0°$ with the vertical. (a) What is the speed of each seat? (b) Draw a free-body diagram of a 40.0-kg child riding in a seat and find the tension in the chain.



Problem 6

A sled of mass *m* is given a kick on a frozen pond. The kick imparts to it an initial speed of 2.00 m/s. The coefficient of kinetic friction between sled and ice is 0.100. Use energy considerations to find the distance the sled moves before it stops.

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End of the Exam ..... ***Good Luck***

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Assiut University
Faculty of Science
Department of Physics

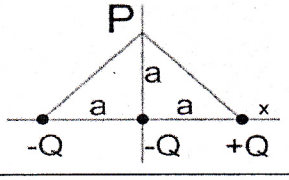
Term: Fall 2014 - 2015
Date : 11 January 2015
Time: 2 hours

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

Answer The Following Question

Q1): Circle the correct answer for the following questions: (10 Marks)

1. Two electric dipoles one of charges (***+ 2q*** and ***– 2q***) and the second of charges (***+3q*** and ***–3q***) are placed inside a cube. The **net electric flux** (Φ) through all surfaces of the cube is
   a. $10q/\varepsilon_0$
   b. $2q/\varepsilon_0$
   c. $3q/\varepsilon_0$
   d. Zero
2. The electric field between two charged, parallel metal plates is 6500 N/C. The plates are 12 cm apart. What is the electric potential difference between them?
   a. 7.8×10^{-2} V
   b. 7.8×10^{2} V
   c. 7.8×10^{4} V
   d. 7.8×10^{5} V
3. If 200 J of work are performed to move one coulomb of charge from a positive plate to a negative plate, what potential difference exists between the plates?
   a. 5.0×10^{-3} V
   b. 2.0×10^{3} V
   c. 200 V
   d. 1.6×10^{-19} V
4. Two point charges of -4 and -6 μC are 10 cm apart in air. The magnitude of the electric field midway between the two charges is approximately
   a. 7.2×10^{6} N/C
   b. 3.6×10^{7} N/C
   c. 1.8×10^{6} N/C
   d. 3.6×10^{5} N/C
5. A charge of +4 μC is 10 cm to the right of a -12 μC charge. The electric potential at a point midway between the two charges is approximately
   a. 1.44 MV
   b. -1.44 MV
   c. 72 MV
   d. -2.16 M
6. Consider the point charges, the electric potential $V(P)$ is :
   a. Zero
   b. kQ/a^2
   c. $-kQ/a^2$
   d. $-kQ/a$.



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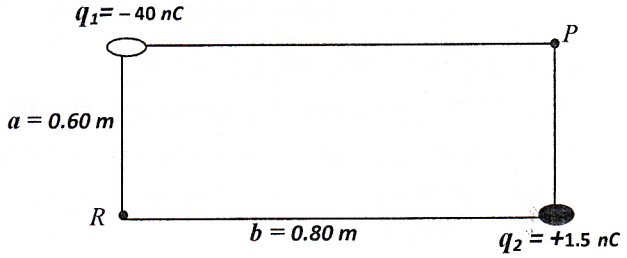
Q2) **(10 points)**

In the figure shown below, a = 0.60 m, b = 0.80 m, $q_1 = -40$ nC, and $q_2 = +1.5$ nC.

a) What is the **magnitude and direction** of the electric field (**E**) at point P ? (5 points)

b) Is the **magnitude** of **E** at point R the same as that at point P? i) Yes or ii) No (2.5 points)

c) Is the **direction** of **E** at point R the same as that at point P? i) Yes or ii)No (2.5 points)



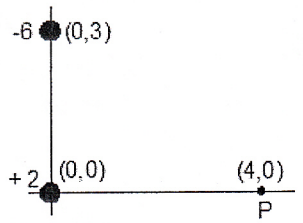
Q3) **(10 points)**

Two charges of 2μC and -6μC are located at positions (0,0) m and (0,3) m, respectively as shown in figure below.

(i) Find the total electric potential due to these charges at point (4,0) m.

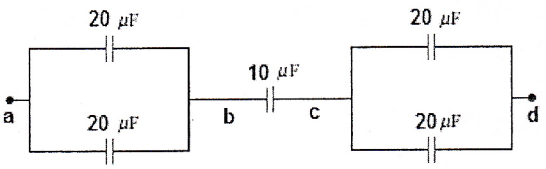
(ii) How much work is required to bring a 3μC charge from ∞ to the point *P*?

(iii) What is the potential energy for the three charges?

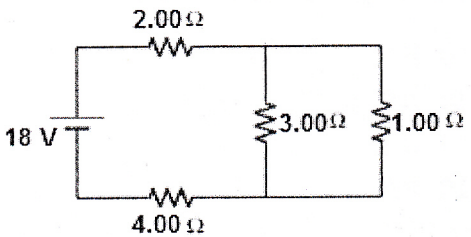


Q4) **(10 points)**

A- If the potential difference between b and c is 15.0 V. What is the potential difference between points a and d?. **(5 points)**



B- Calculate the power delivered to each resistor in the circuit shown in the figure below: **(5 points)**



Q5) **(10 points)**

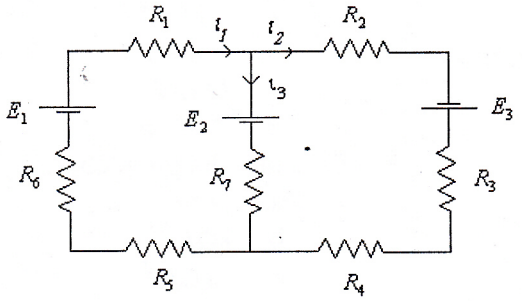
Two batteries and seven resistors are connected as shown in the figure below. Find the currents I_1, I_2 and I_3 where:

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

$R_1 = R_2 = 4\Omega,$

$R_3 = R_6 = R_7 = 6\Omega$

$R_4 = R_5 = 2\Omega$



****Good Luck****