Kingdom of Saudi Arabia

Ministry of higher Education

Al-Imam Mohammad Ibn Saud Islamic University

بسم الله الرحمن الرحيم

المملكة العربية السعودية

وزارة التعليم العالي

جامعة الإمام محمد بن سعود الإسلامية

College: Science

Department: Physics

Course Name: General Physics

Course Code: 101

Semester/Year: Semester(I)- 1437-

Duration: 2-Hours

نوع الاختبار: نهائي

السنة الدراسية: 1437/1436هـ – **الفصل الدراسي الاول**

المادة: فيز ١٠١

المستوى: الاول

اليوم والتاريخ: الاثنين الموافق 17 /3/١٤٣٧هـ.

التعليمات:

١- **إجابتان على نفس السؤال تلغي الدّرجة.**

٢- تكتب الإجابة **بقلم الحبر** في ورقة الأسئلة.

٣- **مسموح:** الآلة الحاسبة .

٤- **اكتب اسمك ورقمك الجامعي** في المساحة المخصصة لذلك وفي بداية كل صفحة.

٥- عند حاجتك لمساحة إضافية في الحل، فبإمكانك استخدام ظهر الصفحات لإكمال الحل.

خاص بالأستاذة		
السؤال	**الدرجة**	**الدرجة المكتسبة**
الأول	13	
الثاني	5	
الثالث	5	
الرابع	4	
الخامس	5	
السادس	5	
السابع	3	
المجموع	**40**	

اسم الطالبة	الرقم الجامعي	الشعبة

Answer all the following questions

Question1: [13 points] using g = 9.8 m/s^2

choose the correct answer

1- How long does a bicycle with acceleration of 0.6 m/s^2 take to go from 4 to 10 m/s ?

(a) *6.4s* (c) *10s*

(b) *15s* (d) *26s*

2- What is the magnitude of the vector $\vec{r}$ if r_x= 3.5 m and r_y=4 m?

(a) 37.2 m (c) 5.32 m

(b) -0.44 m (d) 0.44 m

3- What is the direction relative to the positive x-axis for the position vector:

$\vec{r}$ = (6m)$\hat{\imath}$- (5m)$\hat{\jmath}$

(a) -40.8° (c) 40.8°

(b) -39.8° (d) 49.1°

4- Vectors $\vec{C}$ and $\vec{D}$ have magnitudes of 3 units and 4 units, respectively. What is the angle between the directions of $\vec{C}$ and $\vec{D}$ if $\vec{C}.\vec{D}$ equals 12 ?

(a) 180° (c) 45°

(b) 90° (d) 0°

5- A child of mass 22.0 kg rides curved slide of height *h* = 2.00 m, the child starts from rest at the top. What his speed at the bottom, assuming no friction is present.

(a) 8.61 m/s (c) 6.26 m/s
(b) 5.42 m/s (d) 4.32 m/s

6- When a particle moves along the x axis according to the equation: $x = -2t^2 - 3t + 4$, its acceleration (a) is:

(a) Zero (c) 2 m/s^2
(b) - 4 m/s^2 (d) 3 m/s^2

7- The work done by a constant force $\vec{F} = -3\vec{i} + 2\vec{j}$ (N) acting on a particle that undergoes a displacement $\vec{s} = \vec{i} + 4\vec{j}$ (m) is…

(a) 0 J (c) 5 J

(b) 14.8 J (d) 10 J

8- The **speed** of an automobile moving on a straight road is given in meters per second as a function of time (t) in seconds by the following equation: $v = 5 + 3t^3$

What is the acceleration of the automobile at t = 2 seconds?

(a) 12 m/s^2 (c) 18 m/s^2

(b) 36 m/s^2 (d) 24 m/s^2

9- A 600-kilogram sports car accelerates uniformly from rest, reaching a speed of 30 meters per second in 6 seconds. During the 6 seconds, the car has traveled a distance of:

(a) 100 m (c) 180 m

(b) 130 m (d) 90 m

10- At t = 1s, a particle moving in xy plane with constant acceleration has velocity of $\vec{v} = 3\hat{\imath} - 4\hat{\jmath}$ m/s. But at t = 4 s, the particle's velocity is $\vec{v} = 9\hat{\imath} + 5\hat{\jmath}$ m/s. Find the acceleration of the particle.(a=?)

(a) $4\hat{\imath} + 5\hat{\jmath}$ m/s^2 (c) $2\hat{\imath} + 3\hat{\jmath}$ m/s^2

(b) $2\hat{\imath} - 4\hat{\jmath}$ m/s^2 (d) $4\hat{\imath} - 7\hat{\jmath}$ m/s^2

11- A charged particle (q = – 8.0 mC), which moves in a region where the only force acting on the particle is an electric force, is released from rest at point A. At point B the kinetic energy of the particle is equal to 4.8 J. What is the electric potential difference $V_B - V_A$?

(a) –0.60 kV (c) +0.80 kV

(b) +0.60 kV (d) –0.80 kV

12-Two positive charges q_1 and q_2 are 50 cm apart, if the charge q_2 is 40 μC and the two charges are repelled one from the other by a force of magnitude 2.0 N. Determine the magnitude of the smaller charge q_1.

(a) 1.4 μC (c) 2.0 μC

(b) 17 μC (d) 3.3 μC

13- Electric charge is always conserved in an isolated system.

(a) False (c) None of these

(b) True

Question 2: **[5 points]**

A single constant force $\vec{F} = (3\vec{i} + 5\vec{j})$ N acts on a 4.00-kg particle.

(a) Calculate the work done by this force if the particle moves from the origin to the point having the vector position $\vec{r} = (2\vec{i} - 3\vec{j})$ m. Does this result depend on the path? Explain.

(b) What is the speed of the particle at (r) if its speed at the origin was 4.00 m/s ?

(c) What is the change in the potential energy?

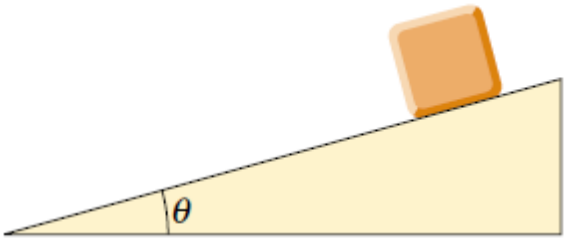
Question 3: **[5 points],** $g = 9.8\ m/s^2$

A 3.00-kg block starts from rest at the top of a 30.00 incline and slides a distance of 2.00 m down the incline in 1.50 s.

(a) Draw the free-body diagram of the block?

(b) Find the magnitude of the acceleration of the block? (a=?)

(c) Find the speed of the block after it has slid 2.00 m? (v_f=?)



Question 4: (4 points)

A particle moving in the xy plane undergoes a displacement $\vec{s} = (2\vec{i} + 3\vec{j})$ m while a constant force $\vec{F} = (5\vec{i} + 2\vec{j})$ N acts on the particle.

(a) Calculate the magnitude of the **displacemen**t and that of the **force**.

(b) Calculate the work done by $\vec{F}$.

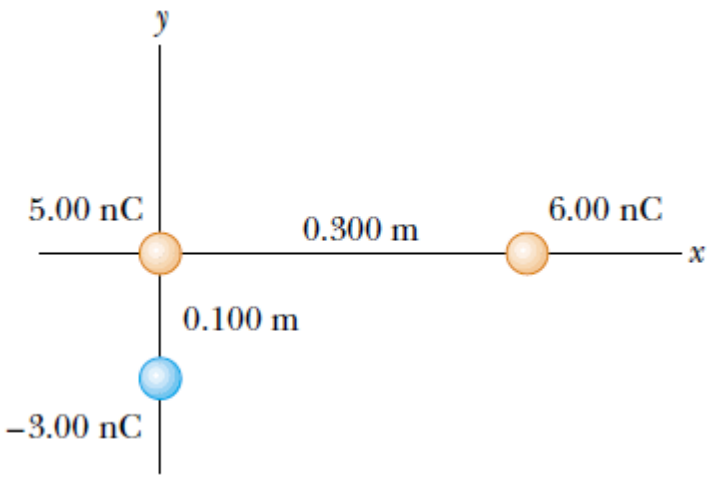
(c) Calculate the angle between $\vec{F}$ and $\vec{s}$.

Question 5: (5 points), $k_e = 8.99 \times 10^9$ N.m^2/C^2

Three point charges are arranged as shown in Figure below.

(a) Find the vector electric field that the 6.00-nC and -3.00-nC charges together create at the origin.

(b) Find the vector force on the 5.00-nC charge.

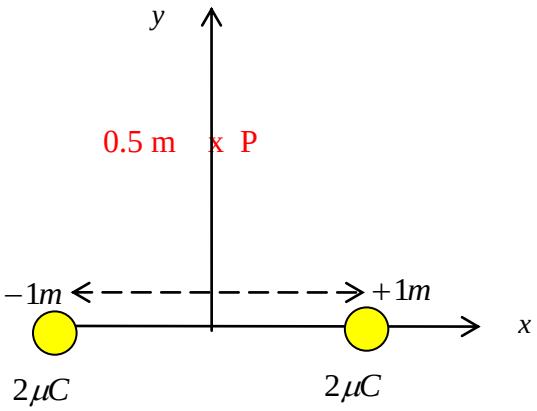


Question 6: (5 points), $k_e = 8.99 \times 109\ \text{N.m}^2/\text{C}^2$

Two point charges each of magnitude 2.00 µC are located on the x axis. One is at x= +1.00 m, and the other is at x = −1.00 m.

(a) Determine the electric potential the y axis at y = 0.500 m.

(b) Calculate the change in electric potential energy of the system as a third charge of -3.00 µC is brought from infinity far away to a position on the y axis at y = 0.500 m.



Exercise 7: (3 points)

Consider the displacement vector $\vec{A} = (3\vec{i} + 2\vec{j})$m, $\vec{B} = (\vec{i} + 3\vec{j})$m, and $\vec{C} = (-2\vec{i} + 5\vec{j})$m. Use the component method to:

(a) Determine the magnitude of the vector $\vec{D} = \vec{A} + \vec{B} + \vec{C}$.

(b) Determine the direction of the vector $\vec{D} = \vec{A} + \vec{B} + \vec{C}$.