
	Assiut University Faculty of Engineering Mechatronics and Robotics Program	Physics (2)	
البحث المرجعي 2020/2019م			
(a) No. of pages: 9 – No. of questions: 10 (b) The total exam mark is 100.			
		الميكاترونيات والروبوتات	البرنامج:
		الهندسة	الكلية:
		فيزياء عامة 2	المادة:
		الدراسي الثاني 2019 - 2020	الفصل:
			الاسم:
			القسم:
			الدرجة:
			التقييم:

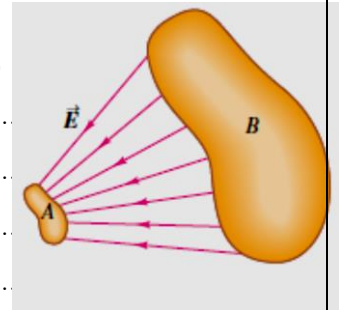
تعليمات هامة:

- 1- يقوم كل طالب بطباعة النموذج وكتابة اسمه بصفحة الغلاف في المكان المحدد لذلك.
 - 2- يقوم كل طالب بالاجابة على جميع الاسئلة بخط اليد وأن تكون الاجابة واضحة.
* الاجابة على الأسئلة في الفراغات المخصصة لذلك بعد كل سؤال.
 - 3- يقوم كل طالب بتحويل الملف بصيغة PDF ويكون بجودة عالية.
* تسمية الملف باسم الطالب وان يكون اسم الملف باللغة العربية.
 - 4- يقوم كل طالب بارسال الملف عن طريق البريد الالكتروني الخاص بالدكتورة/ سوزان عبد الوهاب طبقاً للتوقيتات المعلنة من ادارة الكلية.
البريد الالكتروني هو saa6@aun.edu.eg
- * مع وضع الجملة التالية (البحث المرجعي لفيزياء عامة 2) في عنوان الايميل (Subject)

Solve the following problems:

Question #1 (10 marks):

a) Two irregular objects *A* and *B* carry charges of opposite sign. The opposite figure shows the electric field lines near each of these objects. (i) Which object is positive, *A* or *B*? How do you know? (ii) Where is the electric field stronger, close to *A* or close to *B*? How do you know? **(5 marks)**



.....

.....

.....

.....

.....

.....

.....

.....

.....

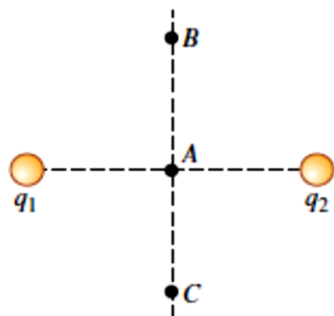
.....

.....

.....

.....

b) The two charges q_1 and q_2 shown in next figure have equal magnitudes. Draw the direction of the net electric field due to these two charges at points A (midway between the charges), B, and C if (i) both charges are negative, (ii) both charges are positive, (iii) q_1 is positive and q_2 is negative. **(5 marks)**



.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Question #2 (10 marks):

a) A very long, straight wire has charge per unit length $1.50 \times 10^{-10} \text{ C/m}$.

At what distance from the wire is the electric field magnitude equal to 2.50 N/C ?

(4 marks)

.....
.....
.....
.....
.....
.....

b) You have two lightweight metal spheres, each hanging from an insulating nylon thread. One of the spheres has a net negative charge, while the other sphere has no net charge. (1) If the spheres are close together but do not touch, will they

(i) attract each other, (ii) repel each other, or (iii) exert no force on each other?

(2) You now allow the two spheres to touch. Once they have touched, will the two spheres (i) attract each other, (ii) repel each other, or (iii) exert no force on each other?

(4 marks)

.....
.....
.....
.....
.....
.....
.....
.....

c) If all of the dimensions of box are increased by a factor of 3, what effect will this change have on the electric flux through the box?

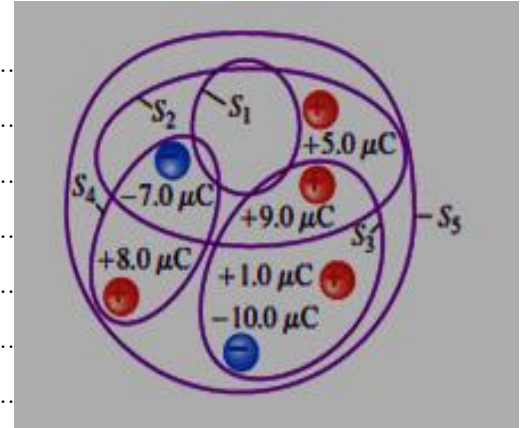
(i) The flux will be $3^2 = 9$ times greater; (ii) the flux will be 3 times greater; (iii) the flux will be unchanged; (iv) the flux will be $1/3$ as great; (v) the flux will be $(1/3)^2 = 1/9$ as great; (vi) not enough information is given to decide.

(2 marks)

.....
.....
.....

Question #3 (10 marks):

- a) The next figure shows six point charges that all lie in the same plane. Five Gaussian surfaces $S_1, S_2, S_3, S_4,$ and S_5 each enclose part of this plane, and the figure shows the intersection of each surface with the plane. Using Gauss's Law Rank these five surfaces in order of the electric flux through them, from most positive to most negative. **(4 marks)**



.....

.....

.....

.....

.....

.....

.....

.....

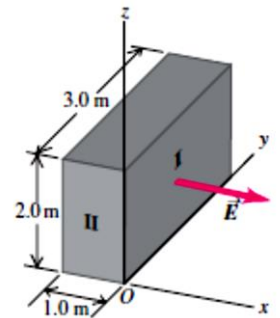
.....

.....

- b) The electric field E in the corresponding figure is everywhere Parallel to the x -axis, so the components E_y and E_z are zero. The E_x component depends on x but not on y and z . At points in the yz plane, $E_x = 125 \text{ N/C}$.

- (i) What is the electric flux through surface I in Fig.?
 (ii) What is the electric flux through surface II?

(3 marks)



.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

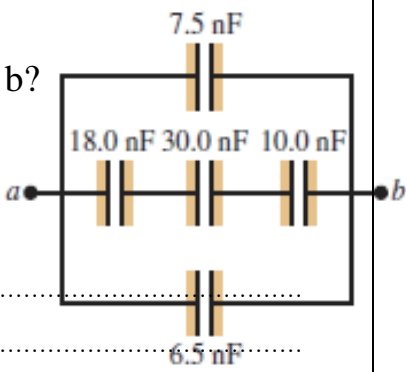
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

b) For the system of capacitors shown in Fig. a potential difference of 25 V is maintained across point ab

(i) What is the equivalent capacitance of this system between a and b?

(ii) What is the potential difference across the 7.5-nF capacitor?

(4marks)



.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

c) A parallel-plate capacitor has capacitance $C_0 = 5.00 \text{ pF}$ when there is air between the plates. The separation between the plates is 1.50 mm .

(i) What is the maximum magnitude of charge that can be placed on each plate if the electric field in the region between the plates is not to exceed $3.00 \times 10^4 \text{ V/m}$?

(ii) A dielectric material with $K = 2.70$ is inserted between the plates of the capacitor, completely filling the volume between the plates. Now what is the maximum magnitude of charge on each plate if the electric field between the plates is not to exceed $3.00 \times 10^4 \text{ V/m}$? **(3 marks)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

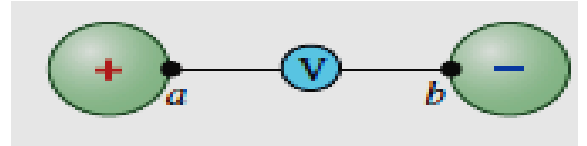
.....

.....

.....

Question #5 (10 marks):

- a) Two oppositely point identical charged, each of radius 0.25m and carrying a uniform charge of magnitude $250\mu\text{C}$ are placed at a distance 1 m from the center of each other (i) If a voltmeter is connected between the nearest points (a and b) on their surfaces, what will it read (the electrical potential)?
- (ii) Which point, a or b is at the higher potential? How can you know this without any calculations? **(5marks)**



.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

