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الجامعة الأردنية
THE UNIVERSITY OF JORDAN

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Pysics Department

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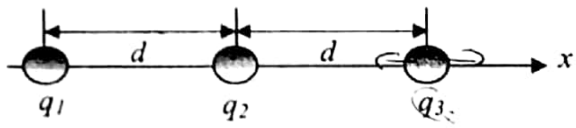
Q1	c a	Q2	d	Q3	b	Q4	c	Q5	b
Q6	c	Q7	b	Q8	b	Q9	c	Q10	a

Answer All The Following Questions

$\varepsilon_o = 8.85\times10^{-12}$ C²/Nm², $k_e = 9\times10^9$ Nm²/C², g = 10 m/s², μC = 10^{-6}C, nC = 10^{-9}C, pC = 10^{-12}C

Q1. Three charged particles lie on a straight line as shown below. Charges q_1 and q_2 are held fixed and charge q_3 is free to move. If q_3 is in equilibrium (no net electrostatic force acts on it), then q_1 in terms of q_2 (in magnitude) is:



(a) $q_1 = 2\,q_2$
(b) $q_1 = 1/4\,q_2$
(c) $q_1 = 4\,q_2$
(d) $q_1 = 1/2\,q_2$
(e) $q_1 = q_2$

Q2. A charge of − 6 nC is placed on the x-axis at x = 3 m. A second charge of + 8 nC is placed on the y-axis at y = 2 m. The resulting electric field (in N/C) at the origin is:

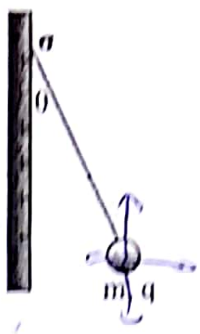
(a) $\vec{E} = 6\hat{i} + 18\hat{j}$ (b) $\vec{E} = -6\hat{i} + 18\hat{j}$ (c) $\vec{E} = -6\hat{i} - 18\hat{j}$
(d) $\vec{E} = 6\hat{i} - 18\hat{j}$ (e) $\vec{E} = 18\hat{i} + 6\hat{j}$

Q3. A particle with a mass of 1×10^{-8} kg and a charge of 3 μC is released from rest in a uniform electric field E = 200 N/C. The speed (in m/s) of this particle 5 s after being released is:

(a) 1.2×10^5 (b) 1.8×10^5 (c) 2.4×10^5 (d) 3×10^5 (e) 3.6×10^5

Q4. A uniform electric field $\vec{E} = 3\hat{i} + 5\hat{j} + 6\hat{k}$ N/C intersects a surface of area 2 m². The flux (in N . m²/C) through this area if the surface lies in the xy-plane is:

(a) 6 (b) 10 (c) 12 (d) 18 (e) 30



Q5. A small non-conducting ball of mass $m = 1.0$ mg and charge $q = 20$ nC hangs from an insulating thread (حبل خفيف) that makes an angle $\theta = 30°$ with a vertical uniformly charged non-conducting sheet. Considering the gravitational force on the ball and assuming that the sheet extends far vertically, the surface charge density σ (in nC/ m^2) of the sheet is:

(a) 4.1 (b) 5.1 (c) 10.2
(d) 6.8 (e) 3.4

Q6. An insulating solid sphere of radius 20 cm carries a uniform volume charge density $\rho = 30$ nC/m^3. The electric field (in N/C) at 10 cm away from its center is:

(a) 131.8 (b) 169.6 (c) 113 (d) 188.3 (e) 150.7

Q7. A charge $q_1 = 70$ nC lies on the x-axis at $x = -3$ m. At what distance (in m) on the x-axis one must put a second charge $q_2 = -20$ nC to make the electric potential (relative to infinity) at the origin equals 60 V?

(a) x = 1.06 (b) x = 1.20 (c) x = 2 (d) x = 1.64 (e) x = 1.38

Q8. The work (in J) needed to move a charge $q = 10$ μC in a uniform electric field of strength 4×10^6 N/C a distance of 5 cm is:

(a) 1.6 (b) 2 (c) 2.4 (d) 2.8 (e) 3.2

Q9. Three equal positive charges (each of charge Q) are at the corners of an equilateral triangle (مثلث متساوي الأضلاع) of side a, the potential energy stored in this system is:

(a) $3k_eQ^2/a^2$
(b) k_eQ^2/a
(c) $3k_eQ^2/a$
(d) $2k_eQ^2/a$
(e) $3k_eQ^2/2a$

Q10. A charge Q is distributed uniformly on a ring of radius 10 cm. If the electric potential (relative to infinity) at the center of this ring is 135 V, then the magnitude of Q (in nC) is:

(a) 1.5 (b) 2 (c) 2.5 (d) 3 (e) 3.5
