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University of Jordan **First Exam** **Physics 102** **October 31, 2018**

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Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
A	B	C	D	A	B	A	E	C	E	B	E
	C					D		D			A

Q1) Each plate of a capacitor stores a charge of magnitude 1 mC when a 100-V potential difference is applied. The capacitance (in μF) of the capacitor is:

A) 10 B) 5 C) 50 D) 100 E) 20

Q2) Charge is distributed uniformly on the surface of a very large flat plate. The electric field 2 cm from the plate is 30 N/C. The electric field (in N/C) 4 cm from the plate is:

A) 120 B) 60 C) 30 D) 15 E) 7.5

Q3) An electron is accelerated from rest through a potential difference V.
Its final speed is proportional to:

A) V B) V^2 C) $\sqrt{V}$ D) $1/V$ E) $1/\sqrt{V}$

Q4) An electric dipole **p** in a 300-N/C electric field is initially perpendicular to the field, but it rotates so it is in the same direction as the field.
If **p** has a magnitude of 2×10^{-9} C·m, then the work (in J) done by the field is:

A) -12×10^{-7} B) -3×10^{-7} C) 0 D) 6×10^{-7} E) 12×10^{-7}

Q5) Two identical capacitors, each with capacitance C, are connected in parallel. The combination is then connected in series to a third identical capacitor.
The equivalent capacitance of this arrangement is:

A) $2C/3$ B) C C) $3C/2$ D) $2C$ E) $3C$

Q6) A particle with a charge of 5×10^{-6} C and a mass of 20 g moves uniformly with a speed of 7 m/s in a circular orbit around a stationary particle with a charge of -5×10^{-6} C located at the origin. The radius (in m) of the orbit is:

A) 0 B) 0.23 C) 0.62 D) 1.6 E) 4.4

Q7) A solid non-conducting sphere of radius R carries a uniform charge density throughout its volume. At a radial distance $r_1 = R/4$ from the center, the electric field has a magnitude E_0. The magnitude of the electric field at a radial distance $r_2 = 2R$ from the center is:

A) $E_0/4$ B) zero C) $E_0/2$ D) E_0 E) $2E_0$

Q8) If the electric field is in the positive x direction and has a magnitude given by $E = Cx^2$, where C is a constant, then the electric potential is given by $V =$

A) $2Cx$ B) $-2Cx$ C) $Cx^3/3$ D) $-3Cx^3$ E) $-Cx^3/3$

Q9) Two capacitors are identical except that one is filled with air and the other with oil. Both capacitors carry the same charge. The ratio of the electric fields E_{air}/E_{oil} is:

A) between 0 and 1 B) 0 C) 1 D) between 1 and infinity E) infinite

Q10) Two concentric spherical surfaces of radius R and 2R respectively surround a positive point charge Q located at the center of the surfaces. When compared to the electric flux Φ_1 through the surface of radius R, the electric flux Φ_2 through the surface of radius 2R is:

A) $\Phi_2 = \frac{1}{4}\Phi_1$ B) $\Phi_2 = \frac{1}{2}\Phi_1$ C) $\Phi_2 = 4\Phi_1$ D) $\Phi_2 = 2\Phi_1$ E) $\Phi_2 = \Phi_1$

Q11) A wire carrying a charge density of λ C/m is bent into a circle of radius r. The electric potential at the center of the circle is:

A) $\lambda/4\pi\varepsilon_0 r$ B) $\lambda/2\varepsilon_0$ C) $\lambda/4\varepsilon_0$ D) $\lambda/4\pi\varepsilon_0$ E) λ/ε_0

Q12) A parallel-plate capacitor has a plate area of 0.3 m^2 and a plate separation of 0.1 mm. If the charge on each plate has a magnitude of 5×10^{-6} C, then the force (in N) exerted by one plate on the other has a magnitude of about:

A) 5 B) 9 C) 1×10^4 D) 9×10^5 E) 2×10^7