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PYSICS DEPARTMENT

GENERAL PHYSICS II (0302102) / SECOND EXAM / APRIL 17th 2016

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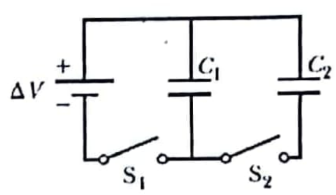
اسم المدرس: رقم الشعبة :

Q1	C	Q2	B	Q3	A	Q4	A B	Q5	E
Q6	B B	Q7	B B	Q8	C	Q9	E	Q10	B
Q11	C A	Q12	E D	Q13	A	Q14	C	Q15	C

$\varepsilon_o = 8.85 \times 10^{-12}$ C²/N.m², $k_e = 9 \times 10^9$ N.m²/C², g = 10 m/s², μC = 10^{-6} C, nC = 10^{-9} C, pC = 10^{-12} C, $m_e = 9.11 \times 10^{-31}$ kg, $m_p = 1.67 \times 10^{-27}$ kg, ρ (Copper) = 1.7×10^{-8} Ω.m, n_e (Copper) = 8.456×10^{28} e/m³, 1 eV = 1.6×10^{-19} J

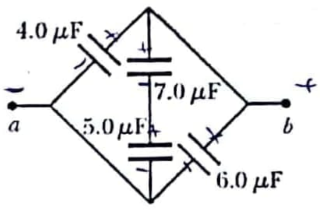
ANSWER ALL THE FOLLOWING QUESTIONS

Q1. Consider the circuit. $C_1 = 6.00$ μF, $C_2 = 3.00$ μF, ΔV = 20.0 V. If S_1 is closed and S_2 is opened until C_1 is fully charged. Now open S_1 and close S_2 and find the final charge (in μC) on C_1.



A) 40.0
B) 120.0
C) 80.0
D) 11.5
E) 0.00

Q2. Find the equivalent capacitance, between *a* and *b*, for the combination (in μF).

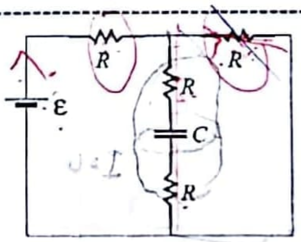


A) 10.9
B) 12.9
C) 8.90
D) 14.9
E) 22.9

Q3. Given the drift velocity of free electrons in a copper wire = 5.58×10^{-4} m/s, calculate the electric field in this wire (in V/m).

A) 0.13 B) 0.95 C) 18.6 D) 4.7 E) 0.18

Q4. In the circuit shown, all the resistors are identical. What is the charge on the capacitor after a very long time?



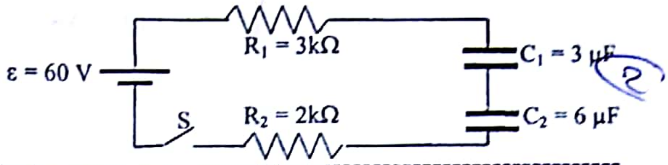
A) $Q = C\mathcal{E}$
B) $Q = C\mathcal{E}/2$
C) $Q = C\mathcal{E}/3$
D) $Q = C\mathcal{E}/4$
E) $Q = 2C\mathcal{E}$

Q = CV, = ε/2R, Q = Cε/2R

Q5. The SI unit of the quantity $(\frac{1}{2}\varepsilon_o E^2)$ is:

A) J/F B) J/C C) J D) J/V E) J/m³

Q6. In the circuit given, the capacitors are initially uncharged. The switch S is closed at time t = 0. Calculate the potential difference across capacitor C_1 at time t = 2 ms.

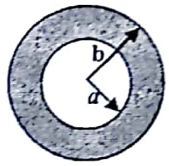


A) 4.83 B) 7.25 C) 40.0
D) 14.5 E) 6.66

Q7. A charged particle is moving in a region of uniform steady magnetic field. Its kinetic energy:
A) Remains constant only if the path is circular. B) Remains constant only if it is moving parallel to the field.
C) Remains constant only if the field is uniform. D) Remains constant regardless of the path or the field.
E) Remains constant only if it is moving normal to the field.

Q8. A proton with a kinetic energy of 0.20 keV follows a circular path in a region where the magnetic field is uniform and has a magnitude of 60 mT. What is the radius (in cm) of this path?
A) 4.8 B) 1.0 C) 3.4 D) 2.7 E) 0.18

Q9. The spherical capacitor shown in the figure is filled with a dielectric material of $\kappa = 3.5$, and the radii are $a = 2$ cm and $b = 4$ cm. The capacitance (in pF) of this capacitor is:

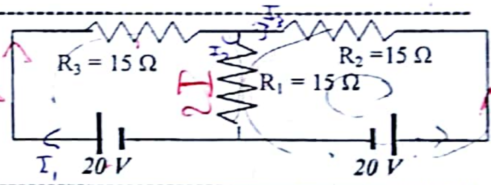


A) 13.3 B) 17.8 C) 8.88
D) 11.1 E) 15.6

Q10. A 2.0-m wire carries a current of 15 A directed along the positive x-axis in a region where a uniform magnetic field is given by $B = (30i - 40j)$ mT. The resulting magnetic force (in N) on the wire is:
A) (+1.2 k) B) (−1.2 k) C) (−1.5 j) D) (−1.8 k) E) (+0.90 k+1.5 i)

Q11. An electron moving in the positive x direction experiences a magnetic force in the positive z direction. If $B_x = 0$, what is the direction of the magnetic field?
A) Negative z direction B) Positive z direction C) Negative y direction
D) Positive y direction E) Negative x direction

Q12. In the circuit given below, the current (in A) through R_1 is:

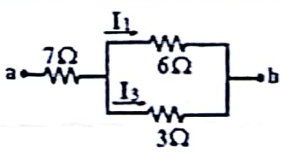


A) 5.11 B) 1.33 C) 0.67
D) 0.89 E) 0

Q13. A Nichrome wire (temperature coefficient of the Nichrome = $0.4 \times 10^{-3}(^\circ C)^{-1}$) has a resistance of 200 Ω at 20 °C. The resistance (in Ω) of the wire at 100 °C is:

A) 206.4 B) 209.6 C) 208 D) 212.8 E) 211.2

Q14. In the figure shown, if V_{ab} = 27 V, the current which passes through the 6 Ω resistor (in A) is:



A) 1.33 B) 2.00 C) 1.00
D) 0.50 E) 2.70

Q15. The power (in Watt) dissipated in a heating coil of 60 Ω resistance designed to operate at 220V is

A) 538 B) 605 C) 807 D) 968 (e) 691
