PHYS 2326 - Dr. Honan - Test 2 - B Name _____

Possibly Useful Information: $\mu_0 = 4\pi\times10^{-7}$ N/A^2 $e = 1.60\times10^{-19}$ C

Problem 1 Multiple Choice (3 points each)

_____ [i] What is the direction of the force on a vertical wire with an upward current in the earth's magnetic field? (a) north (b) south (c) east (d) west (e) up (f) down (g) cannot be determined

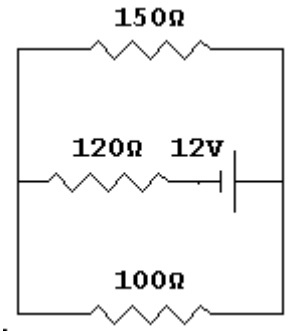
_____ [ii] A particle moves in a clockwise (when viewed from above) circle in a downward pointing constant magnetic field. What charge does the particle have? (a) positive (b) negative (c) zero (d) magnetic charge (e) cannot be determined

_____ [iii] Three 4Ω resistors are connected in series across a 24V battery. What is the power dissipated in each resistor? (a) 16W (b) 48W (c) 144W (d) 432W (e) none of the listed (f) cannot be determined

Problem 2

(a) Complete the table with the current through and the voltage across each resistor in the circuit. (8 points)

	100Ω	**120Ω**	**150Ω**
V			
I			

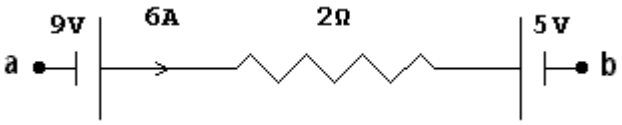


(b) What is the force on an alpha particle (2 protons and 2 neutrons) with a velocity of $\langle 2, -3, -1\rangle \times 10^6 \mathrm{m/s}$ in a magnetic field of 8 mT in the negative z-direction? (6 points)

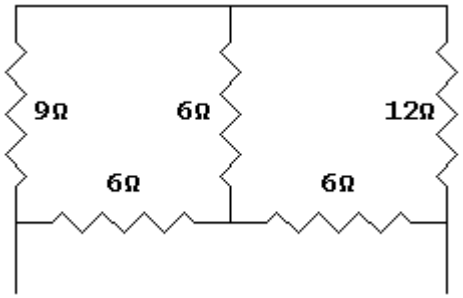
Name _____

Problem 3 (6 points each)

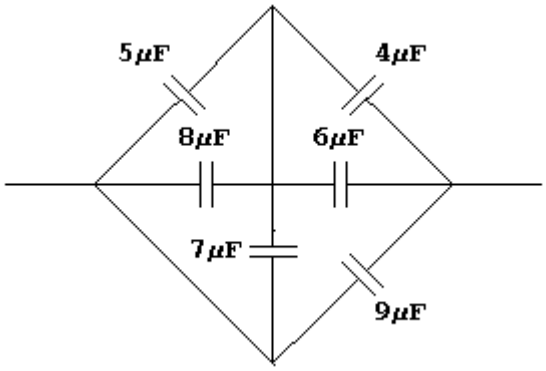
(a) What is $V_b - V_a$?



(b) What is the equivalent resistance of the combination shown?



(c) What is the equivalent capacitance of the combination shown?



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Problem 4 A copper wire with a 3mm diameter is connected across a battery. At 20°C a 6A current flows through the wire. At 20°C: $\rho_{copper} = 1.7\times10^{-8}\ \Omega\cdot m$ and $\alpha_{copper} = 0.0039/C°$

(a) What is the electric field inside the wire? (6 points)

(b) If the temperature is increased to 50°C then what is the current through the wire, assuming the battery's voltage remains constant? (6 points)

Problem 5 When an empty parallel-plate capacitor with a cross sectional area of $3\times10^{-4}m^2$ is connected across 50V, 5nC of charge flows to each plate. (6 points each)

(a) What is the separation of the plates?

(b) How much energy is stored in this capacitor?