

## More E&M, answers

### Problem 1:

(B)  $j_D = \partial D / \partial t$ ,  $\partial D / \partial t = 0 \rightarrow \partial E / \partial t = 0$

### Problem 2:

(C) At  $t = 0$  the current through the resistor has its maximum value and the current through the inductor is zero.

### Problem 3:

(E)  $I_1 R_1 = I_2 R_2$ ,  $I_1 R_s = I_2 R_x$ ,  $R_x = (R_2 / R_1) R_s$ .

### Problem 4:

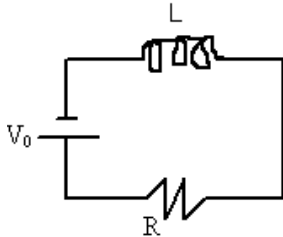
(E) Lenz's rule and  $\mathbf{F} = i\mathbf{L} \times \mathbf{B}$ ,  $i$  = induced current in the loop.

### Problem 5:

(D)  $B(r') = \mu_0 I / (2\pi r')$ ,  $\mathbf{F}_{\text{left}} = -\mu_0 I i b / (2\pi r) \mathbf{i}$ ,  $\mathbf{F}_{\text{right}} = \mu_0 I i b / (2\pi(r+a)) \mathbf{i}$ ,  
 $F = |\mathbf{F}_{\text{left}} + \mathbf{F}_{\text{right}}| = \mu_0 I i b a / (2\pi r(r+a))$ .

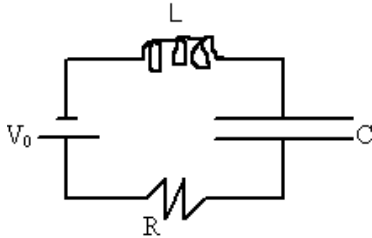
### Problem 6:

(A)  $V - L dI/dt - RI = 0$ ,  $dI/dt + (R/L)I - V/L = 0$ . How do you solve such an equation?



### Problem 7:

(C)  $V - L dI/dt - RI - Q/C = 0$ .  $d^2 Q/dt^2 + (R/L)dQ/dt + Q/(LC) - V/L = 0$ .  
How do you solve such an equation?



### Problem 12:

(D) Larmor formula:  $P = -dE/dt = [q^2 / (6\pi\epsilon_0 c^3)] a^2$ .  
 $P_B / P_A = q_B^2 a_B^2 / (q_A^2 a_A^2) = 4 * 16 = 64$ .