2-7 QUESTIONS AND PROBLEMS

1. Calculate the effective capacitance of the circuit shown in Figure A.

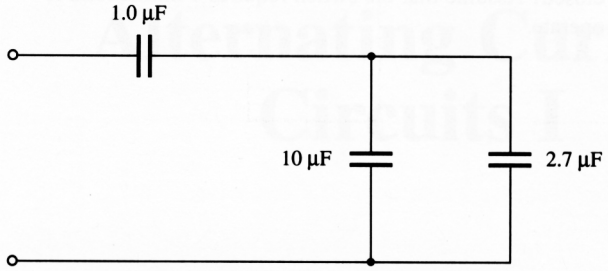

FIGURE A **Circuit for problem 1.**

2. Calculate the effective capacitance of the circuit shown in Figure B.

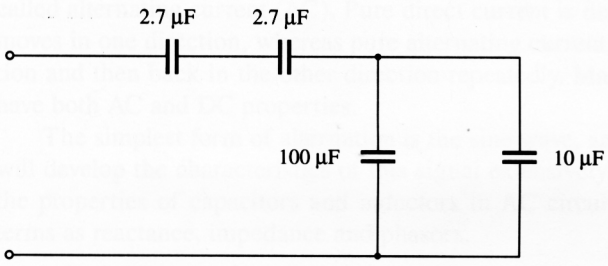

FIGURE B **Circuit for problem 2.**

3. Sketch v_{out} vs. time for the circuit shown in Figure C after the switch is closed.

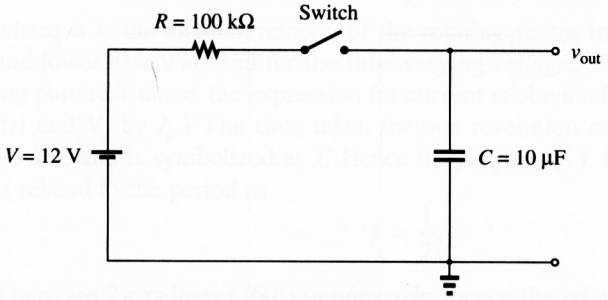

FIGURE C **Circuit for problems 3, 4 and 5.**

4. Given that the tolerance for the resistor is ±5% and that for the capacitor is −20% to +80%, what would be the minimum and maximum values of v_{out} you would expect from the circuit of Figure C after a time of 1.0 second?

5. An RC circuit is needed with a time constant of 1.000 second. Explain why the circuit shown in Figure C is a poor circuit if the capacitor is electrolytic.

6. A designer wishes to replace the circuit shown in Figure D with an RC circuit that has the same voltage vs. time characteristics. Design an acceptable RC circuit.

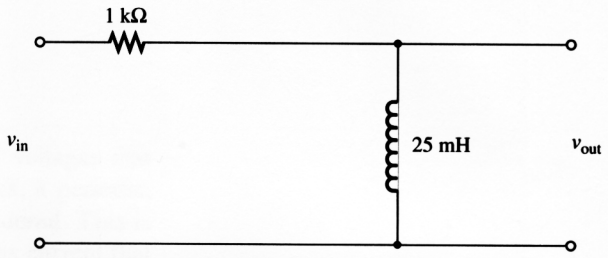

FIGURE D **Circuit for problem 6.**

7. In the circuit shown in Figure E, describe the current that flows from the battery to point A after the switch is closed. In what direction does it flow and what is its value?

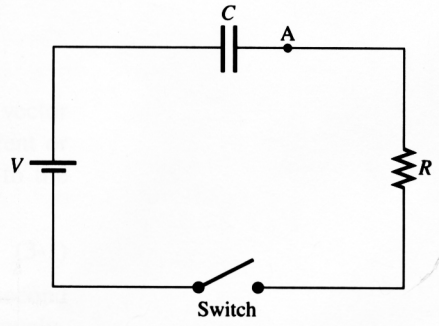

FIGURE E **Circuit for problem 7.**

8. A timing circuit may use the *RC* charging time to control a subsequent stage, as in Figure F. With $R = 1\ M\Omega$, what value of C is needed so that v_c equals 70 V at 10.0 seconds after the switch closes?

9. If the subsequent stage referred to in problem 8 has an effective resistance to ground of 10 kΩ, how long after the