Student Number and Name :.....

ECE 246 MID-TERM EXAM APRIL / ~~MARCH~~ **08th, 2010**

5 questions. Exam duration 2 hours. Total points 100. Open book, open notebook. No mobile telephones, wireless devices or laptops. Answer the questions in the spaces given. Calculator can be used. Print your number and name on every page.

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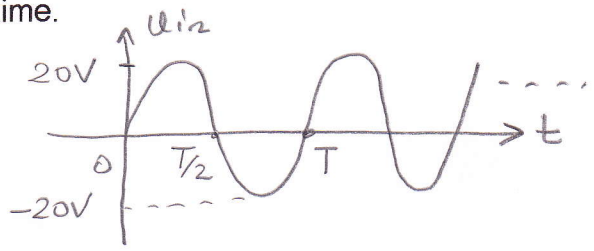
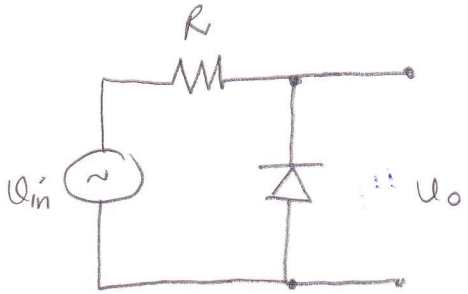
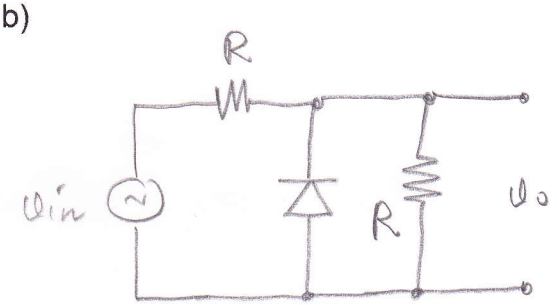
1. (25p) For the circuits, and the input voltage (v_{in}) given below, sketch the output voltages (v_0) versus time.



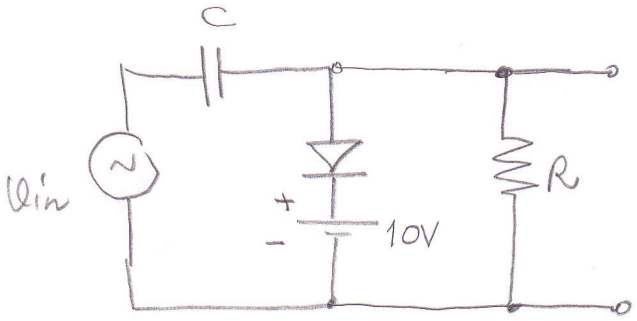
a)



b)



c)



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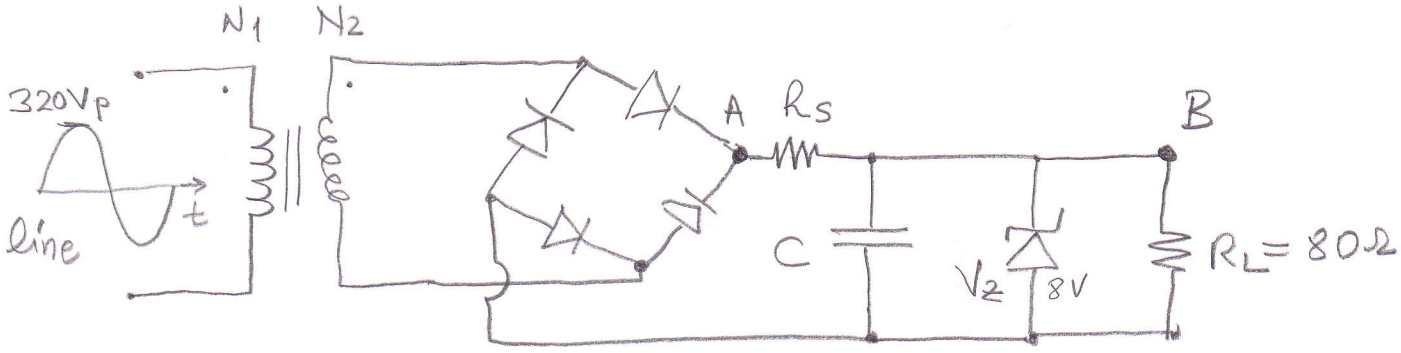
2. (25p) In the circuit given below, $0.1A \le I_z \le 1A$, and $V_z = 8V$. If $\frac{N_2}{N_1} = 10$, the capacitor C is big enough, and the diodes are assumed to be ideal, then



a) Sketch the voltage at point A

b) Determine the min and max values of R_s to keep the zener diode at regulation.

c) Sketch the voltage at point B.

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3. (20p)

a) Explain, by drawing a picture, the mechanism that forms the base current (I_B) in an npn Bipolar Junction Transistor.

b) Sketch the relation between the base current (I_B), and the base-emitter voltage (V_{BE}), and explain the behavior.

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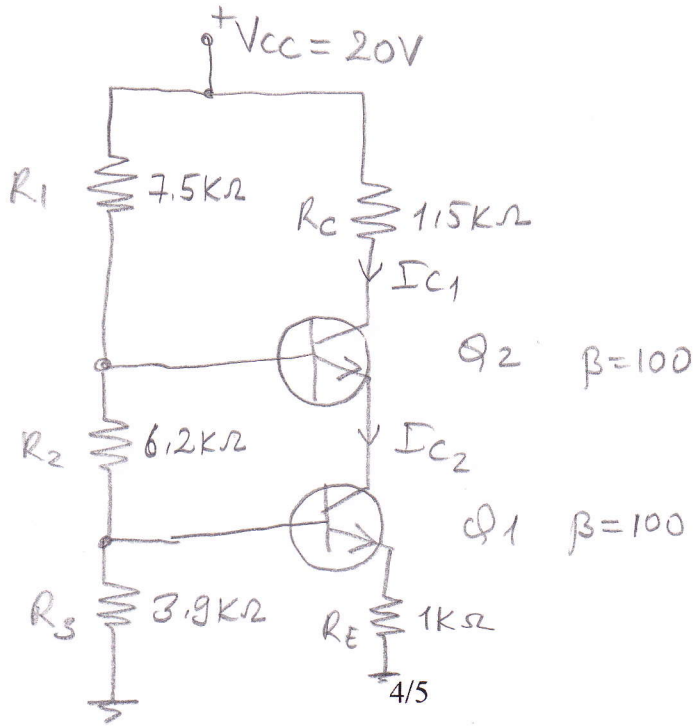
4. (10p) Propose a biasing method with feedback mechanism to stabilize the operating point of a transistor circuit against temperature changes and explain.

5. (20p) For the transistor circuit given below, assuming that Q_1 and Q_2 are identical, calculate $I_{C1}, I_{C2}, V_{CE1}, V_{CE2}$.



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I_{C1}	I_{C2}	V_{CE1}	V_{CE2}