Alexandria University
Final Exam, June 2016

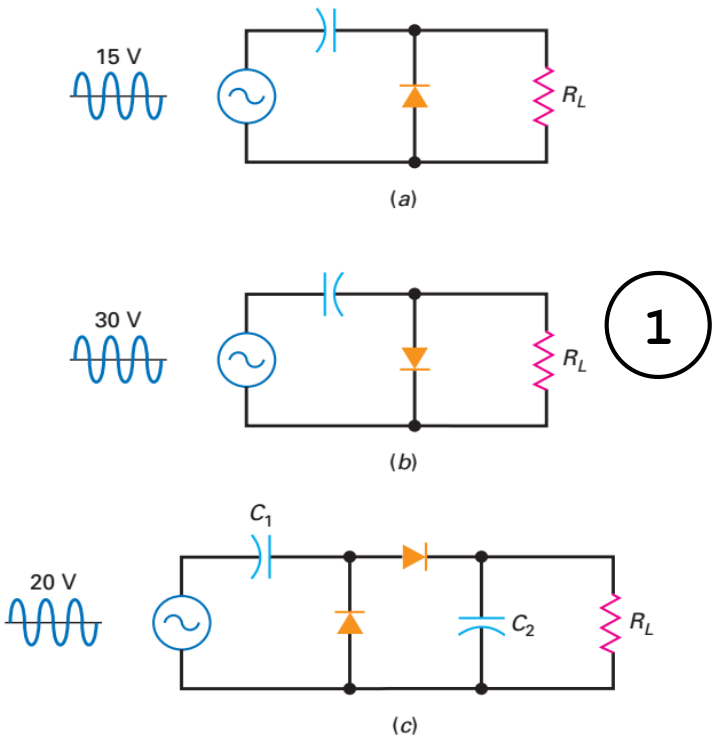
جامعة الإسكندرية
امتحان نهاية الفصل الدراسي الثاني (يونيو ٢٠١٦)

Course Title and Code Number:
Principles and Applications of Electronic Engineering
Second Year (Agricultural Engineering)
Time Allowed: Two hours

اسم المقرر والرقم الكودي له:
مبادئ الهندسة الإلكترونية وتطبيقاتها
السنة الدراسية الثانية (هندسة زراعية)
الزمن: ساعتين

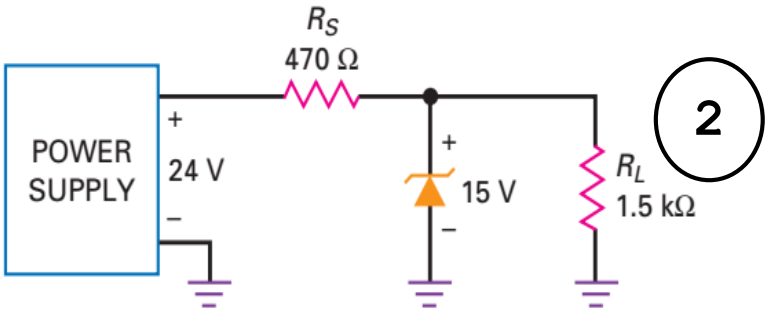
Answer All Questions (Each Question is 30 marks): **(180 marks)**

1. For the circuit shown in Figure 1:
   a. Sketch the output waveform of Figure (a). What is the maximum positive and negative voltages?
   b. Sketch the output waveform of Figure (b). What is the maximum positive voltage? The maximum negative?
   c. Sketch the output waveform of the clamper and final output in Figure (c). What is the DC output voltage with ideal diodes? To a second approximation?



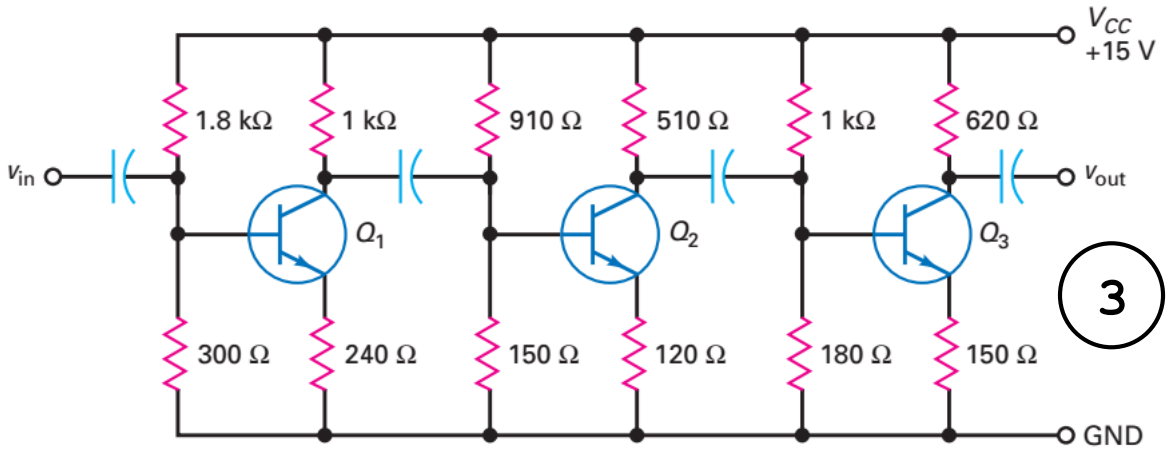
1

2. For the circuit shown in Figure 2:
   a. Calculate all three currents.
   b. If the Zener diode is disconnected, what is the load voltage?
   c. If the Zener diode has a resistance of 14 Ω, and the power supply has a ripple of 1 $V_{p\text{-}p}$, what is the ripple across the load resistor?



2

3. Determine the mode of operation and calculate the collector voltage for each transistor in Figure 3 (β=100 for Q_1, Q_2, Q_3). Calculate the output voltage v_{out} for input voltage v_{in} of 0V. What is the name of this biasing method?



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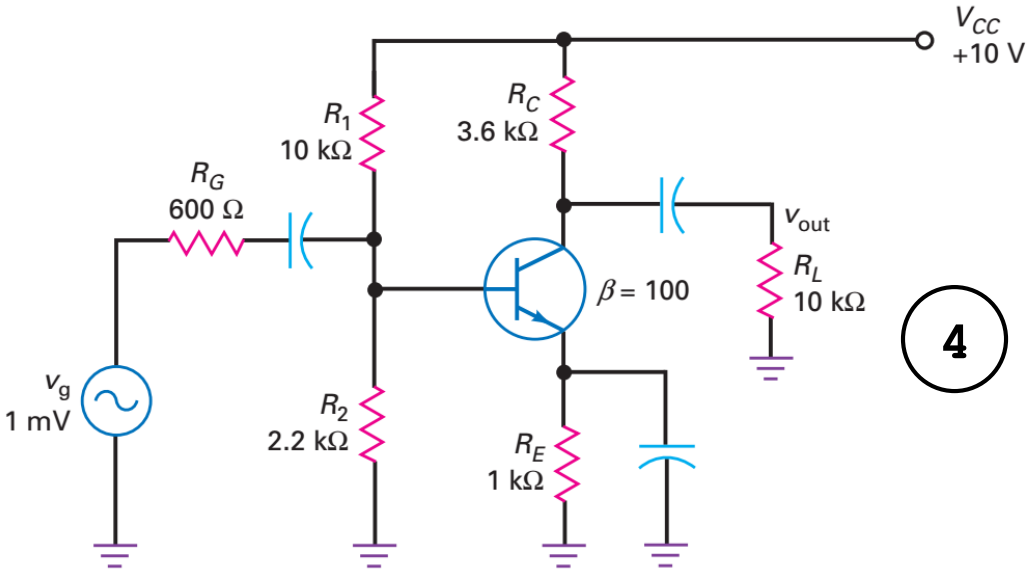
4. For the circuit shown in Figure 4:
   a. Draw the load line. What is the collector current at the saturation point? The collector-emitter voltage at the cutoff point?
   b. What is the ac resistance of the emitter diode?
   c. What is the input impedance of the base?
   d. Draw the ac-equivalent circuit of this amplifier and find the output voltage and ac voltage gain.



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5. For the circuit shown in Figure 5:
    a. Is this an inverting or non-inverting amplifier?
    b. Find the voltage gain v_o/v_{in}
    c. Calculate the voltage gain v_o/v_{in} for R_1=10 kΩ, R_2 = 100 kΩ
    d. Find the input resistance

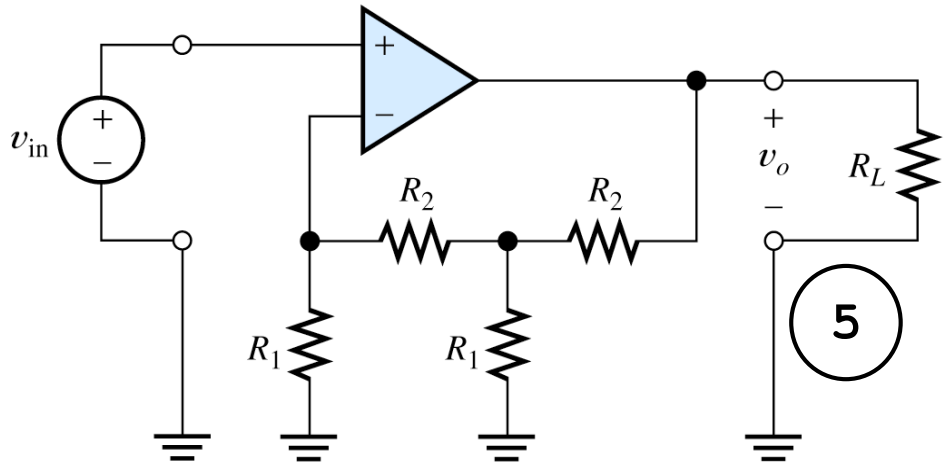

Figure 14.15 Circuit for Exercise 14.6.

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6. Find the voltage gain $A_v = v_o/v_{in}$ and input impedance for the amplifier shown in Figure 6.
    a. With the switch open
    b. With the switch closed
    c. Is this an inverting or non-inverting amplifier?

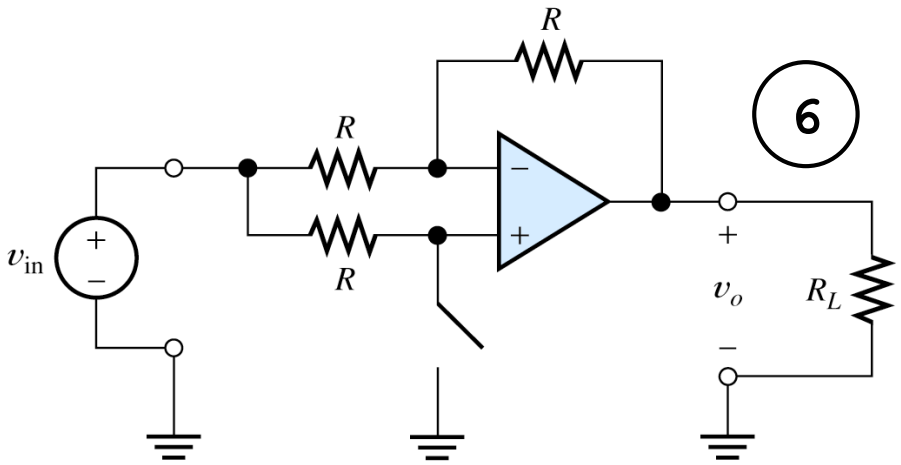

Figure 14.13 Inverting or noninverting amplifier. See Exercise 14.4.
