

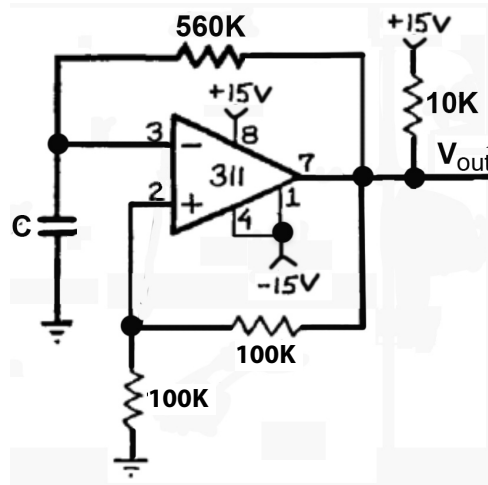
Physics 120 Laboratory Practical Final Examination - 15 June 2017

Name _____ Student no. _____ Section _____

The overarching goal of this exercise is to construct a circuit that blinks an LED at a frequency near 8 Hz.

Relaxation oscillator

(1; 2 pts) Select the value of C so that the output frequency is between 7 and 9 Hz.



(2; 2 pts) Build the circuit.

(3; 2 pts) Demonstrate the desired output with a stable, triggered pattern on the oscilloscope.

FET current source

(4; 2 pts) Measure I_{DSS} for the 2N5486 n-channel FET.

(Hint: Put an ammeter between the Drain supply voltage V_{DD} and the Drain lead of the FET. Mind the connections so that you do not blow the ammeter fuse!)

(5; 2 pts) Measure $V_{GS(off)}$ for the same 2N5486 n-channel FET.

(Hint: Use the variable and metered voltage of the "negative" power supply to vary V_{GS})

(6; 1 pt) Draw a circuit that incorporates the 2N5486 and functions as a current source, i.e., drives a fixed Drain current, denoted I_D with $0 < I_D < I_{DSS}$, through a load.

(7; 2 pts) Calculate the value of the Source resistor for the above current source, denoted R_S , for a $I_D = 5 \pm 1$ mA Drain current.

(8; 3 pts) Build the current source, with $I_D = 5 \pm 1$ mA and $V_{DD} = +15$ V, and add a LED as a load. Use a resistance substitution box, or individual resistors from the bins, to set R_S .

Merged circuit

(9; 2 pts) Connect the relaxation oscillator output to the Gate of the FET current source, noting the wiring change that is necessary to rhythmically drive the current source on and off.

(10; 2 pts) Demonstrate a blinking LED!

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