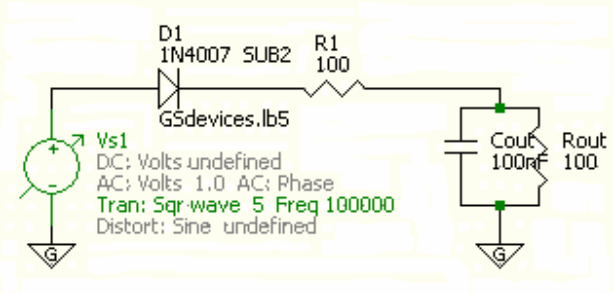
# EEE 202-CIRCUIT THEORY

# SOFTWARE LAB #4

## ANALYSIS AND DESIGN OF A RECTIFIER

### A) PRELIMINARY WORK (30%):

The circuit of a Rectifier is given below.




Perform a transient analysis by hand calculation on the above circuit and obtain the voltage-time plots for 3 periods, for the voltage of the output. Show your work clearly along with the associated equations. Assume the capacitor voltage to be zero before t=0, $V_{s1}$ is a square wave with 5V amplitude, 2.5V DC offset and also the $f_{osc}$=100 kHz.

### B) EXPERIMENTAL WORK (70%):

1. Verify your calculations by simulating your circuit on 5Spice.

i) When $R_{out}$ is 10 KΩ, find the output voltage when the $C_{out}$ is 1nF, 100nF and 1μF respectively. Compare the output voltages and explain the differences between the output voltages in your report.

ii) When $C_{out}$ is 1 nF, find the output voltage when the $R_{out}$ is 100Ω, 1KΩ, 10KΩ and 1 MΩ respectively. Compare the output voltages and explain the differences between the output voltages in your report.

2. Compare the cases when

i) $C_{out}$=100nF, $R_{out}$=100Ω and $C_{out}$=1nF, $R_{out}$=10KΩ

ii) $C_{out}$=1μF, $R_{out}$=1KΩ and $C_{out}$=1nF, $R_{out}$=1MΩ and $C_{out}$=100nF, $R_{out}$=10KΩ

Compare the output voltages and explain the differences between the output voltages in your report.