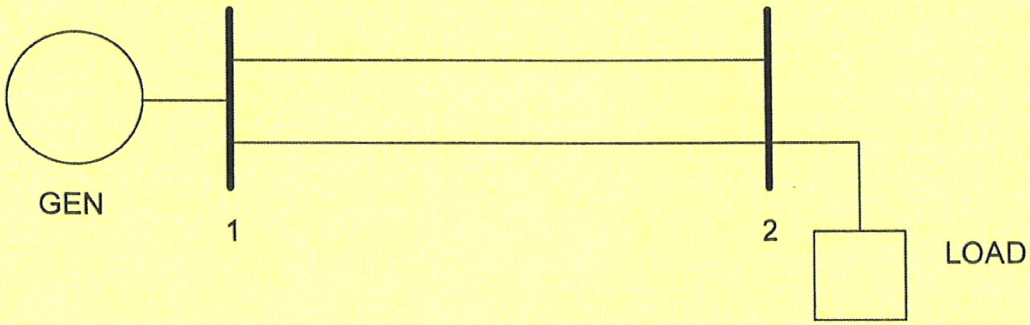
Part a) Power Systems (2 points)

Given the generator on bus 1 connected to a load bus, bus 2, through a pair of identical transmission lines as shown below:



The load at bus 2 draws 2.5 pu MW and 0 pu MVAR from bus 2

The equivalent impedance of the transmission system from bus 1 to bus 2 with both lines in is 0.1j per unit

The Bus 1 voltage is 1.0 per unit volts at zero degrees phase angle, and bus 1 is the reference bus.

With both transmission lines connected the voltage magnitude and phase angle at bus 2 are:

$V_2 = 0.966$ pu volts and $\theta_2 = -15.00$ degrees

The transmission system now suffers a forced outage of one of the transmission lines. The bus voltage at bus 1 remains at 1.0 pu, and the load at bus 2 stays at 2.5 + 0j

Solve for the voltage magnitude and phase angle at bus 2,(phase angle may be expressed in radians or degrees). You may use any method of solution that is appropriate.

Part b) Power Electronics (2 points)

In a Full-bridge converter shown below, $V_{in} = 30V$, $f_s = 300kHz$, and $N_1 / N_2 = 4$. The output voltage is regulated by PWM such that $V_o = 5V$. The output power $P_o = 250W$ and the peak-peak ripple in the output inductor current is 10 percent of its average value at full-load. (1) Calculate the value of the filter-inductor L. (2) Calculate and plot all the waveforms ($v_1, v_A, i_L, i_1, and\ i_{in}$) associated with this converter. Assume the transformer and all the components to be ideal, and the flux waveform to be symmetric with the same positive and negative peak amplitudes.