EE3140 Hour Exam 2, Fall 2017

There are 4 problems. All units are mks. Show your work for full credit.

1. A wave propagates between two parallel plates of infinite extent which are $a = 10$ cm apart and perpendicular to the x-axis. The magnetic field of the wave is:

$$H_y = H_1 \cos(40\pi x)e^{-j\kappa_z z}$$

What mode, including number, is propagating? (for example, $TE_1$) (8 points)

mode = ________

2. A load is measured to be $Z_L = 50 + j50\Omega$ using $50\Omega$ cable. What is the reflection coefficient, $\Gamma_L$? (8 points)

$\Gamma_L = ________$
3. A pulse generator having an internal resistance of 75Ω produces a pulse of amplitude 20V and duration 1µs with no transmission line connected. A 50Ω line, 400m long and open-circuited at the far end, is connected to the generator. In the spaces below, sketch the voltage reflection diagram and the voltage at z=400m, assuming that z = 0 is at the load and the phase velocity is 200m/µs. All relevant voltage amplitudes must be labeled. (4 points each).
4. A 100-j100Ω load is connected to a 50Ω line. Assuming single-stub tuning in order to create a match, what is the minimum distance from the load that the stub should be placed? What is the length of the shorted stub in order to give a perfect match? Give your answers in wavelengths. (8 points)