1. A coaxial transmission line with perfectly conducting conductors and a lossless dielectric has an inner conductor radius of $a = 1.2$ mm and an outer conductor radius of $b = 4.2$ mm. (a) If $\mu = \mu_0$ and $\varepsilon = 2.25\varepsilon_0$, find the characteristic impedance of the line. (b) If a load of $Z_L = 50 + j50$ Ω is attached to the line, calculate the reflection coefficient. (c) If a load of $Z_L = j50$ Ω is attached to the line, calculate the reflection coefficient. (d) If a load of $Z_L = 50$ Ω is attached to the line, calculate the reflection coefficient.

2. (a) Write the complete expression (incident and reflected waves) for the voltage on a transmission line in the phasor domain given the following information: $\alpha = 0$, $\beta = 20\pi$ rad/m, the phase angle is $0.2\pi$ rad, the maximum amplitude of the incident wave is 5 V, and $\Gamma = 0.5571e^{j1.9513}$. Use $z$ for the space coordinate. (b) If the phase velocity of the wave is $2 \times 10^8$ m/s, convert the phasor expression to the time domain including the radian frequency.