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| **Benha University**  **Faculty of Engineering at Shoubra**  **Electrical Engineering Department** | **she3ar** | **Microwave fundamentals**  **3rd Year Communications**  **(2013-2014)** |

**Sheet1**

Starting from the transmission line model, derive an equation for the attenuation constant and phase constant of transmission line in terms of R, L, C, G.

Use the telegrapher equation, and general solution of wave equation to derive an equation for the characteristic impedance of transmission line.

The current on a transmission line is given as i (t) =1.2Cos (1.51×1010*t*-80.3*z*) A.

Determine (a) the frequency, (b) the wavelength, (c) the phase velocity, and

(d) The phasor representation of this current.

A transmission line has the following per unit length parameters: L=0.2µH/m, C=300pF/m, R=5Ω/m and G=0.01S/m. Calculate the propagation constant and the characteristic impedance of this line at 500MHz. Recalculate these quantities in the absence of loss (R=G=0).

RD-402U semi-rigid coaxial cable has an inner conductor diameter of 0.91 mm, and a dielectric diameter (equal to the inner diameter of the outer conductor) of 3.02 mm. Both conductors are copper and the dielectric material is Teflon. Compute the R, L, G, and C parameters of this line at 1 GHz, and use these results to find the characteristic impedance and attenuation of the line at 1 GHz.

Given: Teflon relative permittivity=2.08bcopper conductivity σ=5.813X107 s/m, surface resistivity Rs= (𝝎𝝁/2σ).5

**REPORT**

The characteristic impedance of a certain lossless transmission line is 72 Ω. If

L = 0.5µH / m, Find C, νph and β If f = 80MHz.

**Good Luck**

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