Fields and Waves
Tutorial-2 19th January, 2016

Ques1: A Telephone line has $R = 30\,{}^{\Omega}/_{km}$, $L = 100\,{}^{\mathrm{mH}}/_{km}$, G=0 and $C = 20\,{}^{\mu\mathrm{F}}/_{km}$. Obtain characteristic impedance of the line, propagation constant and phase velocity at 1MHz.

Ques2: A transmission line of characteristic impedance of 600Ω is terminated by a reactance of j150Ω, find the input impedances of sections 25cm long and 50 cm long at angular frequency 1884 M radians/sec.

Ques3: The following characteristics have been measured on a lossy transmission line at 100MHz:

$$Z_0 = 50 + j0$$
$$\alpha = 0.01\,\frac{dB}{m}$$
$$\beta = 0.8\pi\ rad/m$$

Determine R,L,G and C.

Home Assignment to be submitted and discussed during tutorial session.

Ques1: A transmission line has$R = 10.4\,{}^{\Omega}/_{km}$, $L = 3.666\,{}^{\mathrm{mH}}/_{km}$, $G = 0.08\,{}^{\mu\mathrm{mho}}/_{km}$and $C = 0.00835\,{}^{\mu\mathrm{F}}/_{km}$ at an angular frequency of 5000 radians/sec. Calculate attenuation constant, phase constant, phase velocity and characteristic impedance of the transmission line.

Ques2: A signal generator having an internal resistance 1 Ω and an open circuit voltage $v_g(t) = 0.3\cos(2\pi 10^8 t)$ (V) is connected to a 50 Ω lossless transmission line. The line is 4m long and velocity of wave propagation is 2.5*10^8 m/s. For a matched load, find (a) instantaneous expressions for current and voltages at arbitrary positions on line (b) instantaneous expressions for current and voltages at load (c) average power transmitted.