Fields and Waves
Tutorial-3 2nd February, 2016

Ques1: A lossless transmission line having Z_0= 120 Ω is operating at ω=5×10^8 rad/s. If the velocity on the line is 2.4×10^8 m/s, find: (a) L (b) C (c) let Z_L be represented by an inductance of 0.6 μH in series with a 100 Ω resistance. Find the reflection coefficient and Voltage Standing Wave Ratio.

Ques2: Express the unit vector which points from z=h on the z-axis towards $(r, \emptyset, 0)$ in the cylindrical coordinate system.

Ques3: Convert point P (1, 3, 5), T (0, -4, 3) from Cartesian to cylindrical and spherical coordinate system.

Ques4: A lossless transmission line having Z_0= 75 Ω is operating at frequency of 150 MHz . The line is terminated in an unknown load impedance ZL. VSWR is measured to be 3. The nearest minima from the load is found to be at 20cm. Calculate ZL.

Home Assignment to be submitted and discussed during tutorial session.

Ques1: Given Vectors $\vec{A} = 2\hat{a}_x + 4\hat{a}_y + 10\hat{a}_z$ and $\vec{B} = -5\hat{a}_\rho + \hat{a}_\emptyset - 3\hat{a}_z$. Find

(a) A+B at P(0,2,-5)
(b) The angle between $\vec{A}$ and $\vec{B}$ at P
(c) Scalar component of $\vec{A}$ along $\vec{B}$ at P

Ques2: If $\vec{A} = 5\hat{a}_\rho + 2\hat{a}_\emptyset - \hat{a}_z$ and $\vec{B} = \hat{a}_\rho - 3\hat{a}_\emptyset + 4\hat{a}_z$. Find

(a) $\vec{A}.\vec{B}$
(b) $\vec{A} \times \vec{B}$
(c) Angle between $\vec{A}$ and $\vec{B}$
(d) Unit normal vector normal to plane containing both $\vec{A}$ and $\vec{B}$
(e) Vector projection of $\vec{A}$ onto $\vec{B}$