

Electrodynamics(H2) (SC1.102a)
IIIT-H, Semester Winter 24, Assignment 3

Submission deadline: Submissions till 7th May 2024 will be evaluated

1. In class we have shown that for an electromagnetic wave (EM) in free space ($\rho = 0, \vec{J} = 0$) traveling along the z axis, the \vec{E} and \vec{B} and \hat{z} are perpendicular to each other. Repeat the exercise assuming that the wave is traveling along $\vec{r} = \hat{x}x + \hat{y}y + \hat{z}z$. Show that \vec{E} and \vec{B} and \vec{r} are perpendicular to each other. *Hint: Follow Griffiths's book.*
2. EM waves inside a conductor.
 - (a) Obtain the electromagnetic wave equations for \vec{E} and \vec{B} in a conducting media with free charge density ρ and current density \vec{J} . Take the conductivity as σ .
 - (b) Assuming plane wave solutions, show that both \vec{E} and \vec{B} are attenuated inside the conductor.