A. From Exam II

1. (a) Write down Ampere's Law
   \[ \oint \mathbf{B} \cdot d\mathbf{l} = \mu_0 J_{\text{NET}} \]

2. (b) Use Ampere's Law to obtain the magnetic field set up by an "infinitely" long wire carrying current "I". Find \( \mathbf{B} \) at point "P" at a distance of "r" away.
   \[ B = \frac{\mu_0 I}{2\pi r} \]

2. (c) Use your result from part (b) to find the magnetic field \( \mathbf{B} \) (magnitude and direction) at "P" for current \( I_1 = 5 \, \text{A} \) as shown.
   \[ B = \frac{4\pi \times 10^{-7} \times 5}{2\pi (0.5)} = 2 \times 10^{-5} \, \text{T} = 20 \, \mu\text{T} \]

2.B. If the speed of light is \( 3 \times 10^8 \, \text{m/s} \), find the frequency of green light having wavelength = 500 nm.
   \[ C = f \lambda \]
   \[ f = \frac{C}{\lambda} = \frac{3 \times 10^8}{500 \times 10^{-9}} \, \text{Hz} = 6 \times 10^{14} \, \text{Hz} \]

C. Choose from diamagnetic, paramagnetic, ferromagnetic, dielectric constant \( K_e \), relative permeability \( K_m \).

1. (a) is a magnetic material that slightly increases the magnetic field \( \rightarrow \) paramagnetic

1. (b) is a magnetic material that can greatly move the magnetic field \( \rightarrow \) ferromagnetic

1. (c) is a measure of how many times greater that relative a magnetic material has changed the magnetic field permeability \( K_m \)