## Test Information for Test 3:

### Formulas to memorize:

- **Inductors**
  \[
  E = -L \frac{dI}{dt} \\
  \dot{E} = -\frac{d\Phi_B}{dt}
  \]

- **Units**
  \[H = V \cdot s/A\]

### Formulas to know how to use, but you need not memorize:

- **Constant**
  \[\mu_0 = 4\pi \times 10^{-7} \text{ T} \cdot \text{m/A}\]

- **EM waves**
  \[E_0 = cB_0, \quad S = \frac{1}{\mu_0} (E \times B), \quad \langle S \rangle = cB_0^2/2\mu_0, \quad P = \langle S \rangle/c\]

- **Faraday’s Law**
  \[\mathcal{E} = -\frac{d\Phi_B}{dt}\]

- **Impedance**
  \[P = I\Delta V \quad \langle P \rangle = I_{\text{rms}}^2 R \quad I_{\text{max}} = \Delta V_{\text{max}}/Z\]

- **Frequency & wavelength**
  \[\omega = \frac{2\pi}{f} \quad f = \frac{1}{T} \quad k\lambda = 2\pi\]

- **Speed of Light**
  \[\frac{\omega}{k} = \frac{f}{\lambda} = c \quad c = 3.00 \times 10^8 \text{ m/s}\]

- **Power & Pressure**
  \[\mathcal{P} = \langle S \rangle \sigma \quad F = P\sigma \quad \text{Reflection: } F = 2P\sigma\]

### Other things to know:

- Inductors oppose changes in current, capacitors in voltage
- What type of current gets through a capacitor? Through an inductor?
- How are \(E\), \(B\), and the direction of a wave related?
- How does the power absorbed and pressure change if the target is partly reflecting/transparent/absorbing?
- The order of the seven types of electromagnetic radiation
- The order of at least six visible colors (ROYGBV)
Material for test 3:
Chapter 31 Faraday’s Law
Chapter 32 Inductance
Chapter 33 AC Circuits
Chapter 34 Electromagnetic Waves

Organization of the Test:

Part I: Multiple Choice [20 points]
For each question, choose the best answer (2 points each)

[questions 1-10]

Part II: Short answer [20 points]
Choose two of the following questions and give a short answer (1-3 sentences) (10 points each).

[questions 11-13]

Part III: Calculation: [60 points]
Choose three of the following four questions and perform the indicated calculations (20 points each)

[questions 14-17]