

# Test 5 Study Guide: Lectures 17-20

## General topics:

- Electrical currents creating magnetic fields
  - Straight wires, solenoids
  - How two wires exert force on each other
- Induced emf
  - Using the magnetic force on charges, for a bar moving in a B-field
  - Using change in magnetic flux
- EM waves
  - Wave properties
  - Power and Intensity
  - Energy density

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Be prepared to deal with the following situations (some will overlap in test questions):

- Determine the magnitude and direction of a B-field created by a straight current-carrying wire
- Add the B-fields created by two wires to get total field
  - In 1D
  - In 2D
- Find magnitude and/or direction of magnetic field created inside a current-carrying solenoid
- Determine information about a moving bar in a magnetic field:
  - current driven through circuit, velocity of bar, and external magnetic field
  - Magnetic force exerted on the bar itself
- Determine magnetic flux through a loop
- Determine change in magnetic flux to get emf through a loop
  - Direction
  - Using or generating graphs
- Interpret properties of waves (frequency, wavelength, amplitude) from a picture of the wave
- Relate frequency and wave speed to wavelength
- Determine intensity of a wave some distance from a source
- Determine time-averaged energy density (electric, magnetic, or total) of a wave given intensity or power