PHYSICS 2424 - Spring 1999
Unit 4: Electromagnetic Induction, AC Circuits, and EM Waves

Reading: Sections 21.0 - 21.10, 21.12
Sections 22.0 - 22.3, 22.5 - 22.7

Homework: Chapter 21 – Questions 3,6
Problems 6,8,14,21,26,33,55,66,87
Problems A,B on this sheet
Chapter 22 - Questions 4,8
Problems 23,31,34,41

Dates:

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READING QUESTIONS FOR CHAPTER 21:

1. Define magnetic flux. 2. What is the SI unit of magnetic flux? 3. Using the variables in the equation for magnetic flux, describe three ways that the magnetic flux be changed. 4. What are the results of a changing magnetic flux? 5. Is there also a similar result if the magnetic flux is not changing? 6. How does Lenz's law determine the direction of the induced emf? 7. What principle allows generators to work, and is responsible for counter emf and eddy currents? 8. Name some ways that energy can be transformed to electricity from other kinds of energy. 9. Why are eddy currents called "current" if there are no wires for the current to flow through? 10. What does a transformer do? 11. What kind of current is required for a transformer to work? 12. What are some practical devices that use the principle of induction? 13. Define inductance? 14. What is the SI unit of inductance? 15. What is inductive reactance and capacitive reactance? 16. What characteristic of an ac circuit causes them to change? 17. How does a capacitor in an ac circuit behave differently than a capacitor in a dc circuit? Final Question: What is one thing from the chapter that you didn't understand or need clarified?

READING QUESTIONS FOR CHAPTER 22:

1. What do changing magnetic fields produce? 2. What do changing electric fields produce? 3. Who predicted the existence of electromagnetic waves? 4. In general, how are electromagnetic waves produced? 5. How is the magnetic field and the electric field in an electromagnetic wave oriented to each other and to the direction of the wave? 6. What is the electromagnetic spectrum? 7. What is the difference between electromagnetic waves in different parts of the spectrum? 8. What is the same for electromagnetic waves in different parts of the spectrum? 9. What are some of the terms we use when referring to electromagnetic waves with different wavelengths? 10. How does the energy carried in the magnetic field of an electromagnetic wave compare to the energy carried by the electric field in the same wave? Final Question: What is one thing from the chapter that you didn't understand or need clarified?

Answers to even numbered and extra questions: 21:6) 9.8 mV; 21.8) (a) counterclockwise, (b) clockwise, (c) zero, (d) counterclockwise; 21.14) (a) 0.56 V, (b) 0.020 A, (c) $4.6 \cdot 10^{-3}$ N; 21:26) 13 A; 21:66) (a) 7.6 kΩ, (b) 0.37 A; 22:34) (a) 1.28 s, (b) 4.3 min; Problem A) 0.090 Wb for the 1.2 · 0.30 m side, 0 Wb for the triangular ends and the bottom side, 0.090 Wb for the 1.2 · 0.50 m side; Problem B) (a) 0.14 kg (b) -1.5 J (c) 1.5 J