

**Reading Hospital School of Health Sciences
Medical Imaging Program**

MI132 – Imaging Principles and Equipment
Unit 2 Study Guide
2022-2023

This study guide is recommended to be completed but is not required. If you want faculty to review your answers, please submit to Course Faculty (Stacy Oskam) via e-mail. This must occur by 12:00 PM the day prior to the exam.

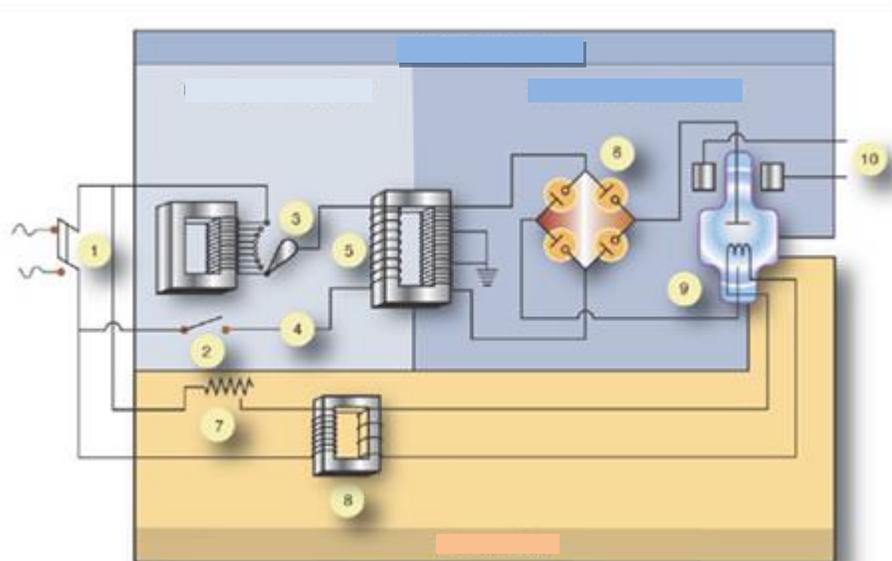
1. List and describe the five Laws of Electrostatics.
2. When comparing two electrified objects, an object that possesses a lesser number of electrons is considered **positively/negatively** charged.
3. What is the purpose of having an electric circuit grounded?
4. What is the unit of electrical charge?
5. List the 3 ways an object can become electrified.
6. List and explain the three classifications of materials based on the effect they have on electron flow.
7. List four things that would **increase** electrical resistance in a wire.

8. Define the following terms and list the units of measurement for each.
 - a. Current
 - b. Potential difference
 - c. Resistance
9. What is the difference between alternating and direct current?
10. What are Oersted and Faraday known for?
11. What is the primary difference between self-induction and mutual induction?
12. What is the purpose of a transformer?
13. How does a step-up transformer affect voltage and current? Step-down?
 - a. What type of relationship exists between number of turns and voltage?
 - b. What type of relationship exists between number of turns and current?
 - c. What type of relationship exists between voltage and current?
14. Explain why transformers will only operate off of alternating current.
15. An autotransformer works off the principle of _____ induction.

16. A transformer is constructed with 2,200 turns on the primary and 1,500 turns on the secondary. If the input voltage is 220 volts, what is the output voltage?
17. There are 100 turns on the primary side of a transformer and 15,000 turns on the secondary side. If 5 A is supplied to the primary winding, what is the current induced in the secondary winding?
18. There are 700 turns on the secondary side of a transformer with 200 turns on the primary side. If 110 Volts is supplied to the transformer, what will the output voltage be?
19. There are 700 turns on the secondary side of a transformer with 200 turns on the primary side. How much current would have to be delivered to the primary side of a transformer to result in an induced current of 7.5 A?

20. Using the diagram of the x-ray circuit:

- a. Label each device identified by a number below (1-9).
- b. Identify the main and filament circuits.
- c. Identify the primary and secondary sides of the main x-ray circuit.



21. What is the purpose of the circuit breaker?
22. What control on the x-ray machine console set the connections on the autotransformer?
23. What device measures and adjusts the incoming line voltage?
24. What device is used to measure the potential difference that will exist in the x-ray tube once the exposure is taken? Is this device located on the primary or secondary side of the x-ray circuit?
25. What is the purpose of the mA meter?
26. What happens to the voltage waveform once the AC current passes through the step-up transformer?
27. What is the purpose of the exposure switch?

28. What are the four types of timers available in x-ray imaging systems? Which are considered manual timers? Which is the most common manual timer?
29. What is the purpose of rectification?
30. Where are the rectifiers located?
31. When using a solid state diode, the _____ potential difference must exist on the n-type material for current flow to exist.
32. How many x-ray pulses are there per cycle and how many x-ray pulses per second for the following generator types?
- a. Fully rectified, Single-phase
 - b. Fully rectified; Three-phase, six pulse
 - c. Fully rectified; Three-phase, twelve-pulse
33. What is the voltage ripple for the following generator types?
- d. Fully rectified, single-phase
 - e. Fully rectified; three-phase, six pulse
 - f. Fully rectified; three-phase, twelve-pulse
 - g. Fully rectified; high frequency
34. What is the purpose of the filament circuit?
35. What type of transformer is located in the filament circuit – step-up or step-down?