

Name _____ Net ID _____

TA Name _____ Discussion Section _____

PHYS 212 James Scholar Assignment #3

Due: 5:00 pm Friday, October 7, 2011

The problems are to be done on paper, **showing all work**. Again, *the presentation should be neat, [legible](#), and easy to follow.*

{Remember to include your name, netID, and Discussion section and ideally TA name on the top of the page! Please turn in your assignment into the Grading Box labeled “Physics 212 James Scholars”, located on the 2nd floor, in the interpass between Loomis and MRL (Materials Research Lab). The interpass is down the hall about 10 meters east of Room 262 Loomis, where half of you have your Lab.}

1. **Many crystals display the phenomenon of 'piezoelectricity'. By looking at the web, textbooks or other articles, explain what this phenomenon is and why it occurs.**
2. **Give 3 practical applications of the piezoelectric effect (in addition to ink-jet printing).**
3. **Explain the two main methods to produce the ink droplets.** (Look at the following link: <http://www.howstuffworks.com/inkjet-printer.htm>)

Now we want to examine a few more details, and totally unique applications of inkjet printer technology. Consult this article (http://online.physics.uiuc.edu/courses/phys212/fall11/james_scholar/03/Inkjet.pdf) and others, if necessary to answer the questions below.

4. **Explain the difference between 'continuous-mode' and 'demand-mode' technologies.**
5. **What are the main advantages and disadvantages of each one?**
6. **What is the minimum droplet size?**
7. **What is the minimum resolution (i.e., the smallest linewidth)?**
8. **Why is the resolution bigger than the droplet size?**
9. **What is one reason we don't yet make printed circuit boards using ink jet printers? (Hint: What is the difficulty in directly writing conductive tracks?)**
10. **Describe in several sentences one of the other possible applications of ink-jet printing technologies.**