PffP Midterm exam 1 Part A – Essay Questions 12 April 2007

Row_____ Seat_____

Last name_____ First_____SID_____GSI_____

Essay questions (20 pts): pick **one** and only one to answer; **circle** the one you choose. Write a page **on the back of this sheet**. This side is for your personal notes only. Cover the important points in a clear and concise manner – as if you have only a few minutes to tell the President, your roommate, or your parent, what that person needs to know. *Clear, effective writing is important*. If English is a new language for you, state so at the top of your essay. If you need to re-write the essay, ask for a new copy of this page.

1. Infrared radiation, abbreviated IR, is a particular kind of invisible light. Discuss IR, its importance and its properties. You should include comments on the following: How does it compare to visible light? What emits IR? What are it's practical applications? Do animals (and humans) sense IR? What role does it play in the Earth's climate?

2. CDs and DVDs are disks used to store movies, photographs, data, and computer programs. The player for these disks uses many physics principles that we discussed in this course. How is the information stored on the disk? Describe how the player reads the disk, starting with the motor that spins the disk and ending with the color screen that produces the picture. How does the player read the bits stored on the disk? What does it do with the signal once it has detected it? How does the screen produce all the colors we see on it? If quantum physics plays a role in any of the steps you described, explain how.

Circle the essay question you chose.

This page is for name and notes only.

The essay should be on the other side.

Last name_____ First_____SID_____GSI_____

PffP Midterm exam 2 Part B – Short Questions 12 April 2007

Last name_____ First_____SID_____GSI_____

Short questions (1 point each, 20 points total). Read the questions carefully so that you don't misinterpret them (e.g. by missing a word such as "not").

1. Permanent magnets get their field from
( ) the motion of electrons around the nucleus
( ) the motion of the nucleus around the atom
( ) the rapid vibration of electrons
( ) the rapid spin of electrons

2. The reason that transformers are useful is because they transform:
( ) electric current to mechanical motion
( ) AC to DC
( ) one voltage to another voltage
( ) mechanical work to electric current

3. An object emitting a sound at frequency f is moving towards you. Sound from that object will be heard at a frequency that is
( ) lower than f
( ) the same as f
( ) higher than f

4. Because we are warm, our bodies emit radiation, mostly:
( ) infrared
( ) visible
( ) ultraviolet
( ) microwave

5. 3-D movies take advantage of
( ) multispectral cameras
( ) polarized light
( ) holograms
( ) spreading waves

6. A tsunami approaches a beach. The typical time for the water to rise from its lowest to highest level is
( ) less than 1/10 second
( ) about 1 second
( ) 2 to 5 seconds
( ) 30 seconds or more

7. Compared to a magnitude 6 earthquake, a magnitude 8 earthquake has
( ) about 10 to 30 times more energy
( ) about 100 to 1000 times more energy
( ) about 8/6 times as much energy
( ) about a million times more energy

8. One indication that sound is a wave is the fact that
( ) it moves at the speed of molecules
( ) louder sounds travel faster
( ) higher frequency sounds travel faster
( ) two tuning forks can create beats

Turn page over for more questions

9. Light is often used instead of microwaves for sending information because it
( ) can carry greater power
( ) has a higher velocity
( ) is less expensive
( ) has a higher frequency

10. Germicidal lamps that kill bacteria make use of
( ) IR
( ) UV
( ) RGB
( ) microwaves

11. The ozone layer was endangered by
( ) carbon dioxide (CO_2)
( ) Freon and other CFCs
( ) high voltage power lines
( ) microwave radiation

12. The electric force between two electrons is stronger than the gravity force by a factor of
( ) 137
( ) 2.718
( ) about a million
( ) a number bigger than a hundred billion.

13. Antimatter is a key feature in
( ) MRI
( ) CAT scans
( ) PET scans
( ) Thermography

14. Small electric motors and earphones are made possible by which technology:
( ) superconductors
( ) semiconductors
( ) rare earth (samarium-cobalt) magnets
( ) selenium photo-emitters

15. Most electricity in wires consists of moving
( ) protons
( ) holes
( ) atoms
( ) electrons

16. Lasers are used for all the following except:
( ) eye surgery
( ) solar cells
( ) reading CDs (compact disks)
( ) laser printers

17. The photoelectric effect is used in all of the following EXCEPT:
( ) Xerox photocopiers
( ) solar cells
( ) digital (CCD) cameras
( ) transistors

18. "High Temperature" superconductors currently operate at
( ) about 150 C
( ) about 150 F
( ) about 150 K
( ) above 1000 C (temperature of tungsten light filaments)

19. Transistors are typically made of
( ) metals or other conductors
( ) semiconductors such as silicon
( ) non-conductors such as quartz
( ) glass or another transparent material

20. The velocity of a sound wave in air depends on
( ) the amplitude
( ) the frequency
( ) the air temperature
( ) all of the above