

Last name _____ First
name _____ SID _____

Essay questions (20 pts): pick **one** and only one to answer. Write a page or two (or whatever is appropriate) on this sheet. Cover the important points in a clear and concise manner – as if you have only a few minutes to tell the President, Mayor, or your roommate, what that person needs to know. Clear, effective writing is important.

1. Modern medical imaging can do much more than take a simple x-ray. List the techniques now available, briefly describe what they measure, and say something about the applications.
 2. Lasers have several different properties that make them very useful. List these properties, and for each describe practical applications.
-

Last name _____ First
name _____ SID _____

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. The quantum chain reaction refers to
 - semiconductor
 - superconductor
 - laser
 - hydrogen spectra
2. An "inversion" refers to
 - cool air near the ground
 - change of voltage
 - the path of sound in a channel
 - unique property of diamond and zircon
3. Magnetism is used (check all that apply)
 - to make an electric motor turn
 - to move air in loudspeakers
 - to change voltage in transformers
 - to melt metal in electric fuses
4. Which list is in the correct order of low to high frequency?
 - gamma rays, infrared, radar, ultraviolet light.
 - UV, microwaves, gamma rays, radio waves.
 - x-rays, UV, visible light, microwaves.
 - IR, visible light, radio waves, x-rays.
5. The "bad" gas that can lead to sunburn is:
 - Freon
 - carbon dioxide
 - ozone
 - nitrous oxide
6. Stinger missiles are attracted to things that emit
 - radio waves
 - UV radiation
 - IR radiation
 - microwaves
7. Most scientists hope that they can
 - eliminate the Greenhouse effect
 - strongly reduce the Greenhouse effect
 - keep the Greenhouse effect where it is
 - strengthen the Greenhouse effect
8. According to Muller, the ozone hole problem
 - is a severe danger to the environment
 - has been solved by existing treaties
 - never was a real problem
 - will raise temperatures by 2 to 6 degrees
9. We know the Earth has a solid inner core because it is reached by
 - P waves
 - S waves
 - L waves
 - Rayleigh waves
10. Light travels fastest in
 - vacuum
 - water
 - air
 - glass

11. Which of the following are electromagnetic waves?

- proton
- x-ray
- electron
- gamma-ray

12. MRI used to be called

- nuclear magnetic resonance
- computer-aided tomography
- positron emission tomography
- x-ray

13. Landfill can be a dangerous place to live because

- earthquakes go faster
- earthquakes go slower
- earthquakes start there
- they focus earthquakes

14. Electric current usually refers to

- flow of light waves
- flow of electrons
- flow of protons
- the energy of electrons

15. Electrons can NOT flow through (mark all that apply):

- semiconductors
- superconductors
- insulators
- metals

16. Which of the following depend on an energy gap for their value? (Mark all that apply).

- semiconductors
- superconductors
- lasers
- gas spectrum analysis

17. The hottest stars and flames will have the color

- red
- yellow
- white
- blue

18. Muller says that cubic zirconia are considered less desirable than diamonds because

- they have less dispersion
- they are not as hard
- they have a lower index of refraction
- they are less expensive

19. Magnetic monopoles

- are used in transformers
- are present in permanent magnets
- do not exist, as far as we know
- are present in superconductors

20. Carbon dioxide can warm the earth by

- creating an ozone hole
 - trapping infrared radiation
 - increasing UV radiation
 - reducing UV radiation
-