

Last name _____ First name _____ SID _____

Essay questions (20 pts): pick **one** and only one to answer; **circle** the one you choose. 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, your roommate, or your parent, what that person needs to know. Clear, effective writing is important.

1. Magnets make nice toys, but magnetism is also indispensable for modern life. There are numerous uses of magnetism in applications where many people in the general public do not even know that it is involved. Describe several of these, and say a few words about each one to show what the magnetism does in each case.

2. Infrared radiation is also called IR. Describe how it is different from visible light. What emits IR? Can animals use it? Explain how emission of IR sometimes “wastes” energy. Give examples showing how IR is used in modern technology.

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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. Present-day spray cans are harmful to the environment because they release
 - chlorofluorcarbons
 - carbon dioxide
 - ozone
 - they are not harmful
2. The flying disks of Roswell were (according to Muller)
 - balloons
 - microphones
 - unmanned airplanes
 - nuclear explosions
3. A Richter 7 earthquake has more energy than a Richter 6 earthquake by a factor of (pick the closest)
 - 7/6
 - 7
 - 10
 - 1000
4. Earthquake waves are biggest
 - when they travel fastest
 - in solid rock
 - after long distances
 - in land fill
5. Fiber optics are used instead of electric wires because
 - light travels faster
 - light has a higher frequency
 - glass is cheaper than wire
 - light is cheaper than electricity
6. Ozone in the atmosphere
 - warms the stratosphere
 - absorbs IR radiation
 - reduced Freon
 - is the most important greenhouse gas
7. NMR makes use of
 - positrons
 - xrays
 - radioactivity
 - none of the above
8. Room temperature superconductors
 - are used in advanced computers
 - are used to carry electric power
 - are used for strong magnets
 - don't exist yet
9. Edison wanted
 - a power plant on every corner
 - high voltage DC
 - alternating current
 - to abolish the electric chair
10. Rail guns push the projectile using
 - high energy explosives
 - electric fields
 - magnetic fields
 - protons
11. For GPS to work, there must be a signal from
 - two GPS satellites
 - four GPS satellites
 - two SOSUS satellites
 - four SOSUS satellites
12. The first earthquake wave to arrive is
 - the P wave
 - the L wave
 - the S wave
 - the W wave
13. Stealth airplanes
 - absorb all the radar
 - let radar pass right through
 - reflect radar away from the transmitter
 - emit waves that cancel the radar

MORE QUESTIONS ON NEXT PAGE

14. Red eye results from light bouncing off the
- cornea
 - iris
 - lens
 - retina
15. Stinger missiles detect
- IR
 - UV
 - Visible
 - radar
16. "Global warming" refers to the earth warming by
- 1 C in 100 years
 - 1 C in 1000 years
 - 10 C in 100 years
 - 10 C in 1000 years
17. Bats navigate in caves by using
- ultrasound
 - IR
 - blacklight
 - radar
18. magnetic monopoles
- are found at the ends of magnets
 - are produced by cosmic rays
 - are found in the Earth's core
 - do not exist
19. lasers are useful because (check all that are correct):
- their light is single frequency
 - they can be well collimated
 - they can be made intense
 - they require no power.
20. Quantum computers are
- used mostly by the military
 - used by Google for searches
 - used in every day laptops
 - not yet very good at anything