Sample ASTR100 Exam II Questions (Fall 2024)

Solutions available at the end of this document, but no **peeking**! Try to do these questions without the book or the internet, and without looking at the solutions. for the most realistic exam experience.

Multiple Choice Questions

1. The rings of Saturn are
   A. Made of many small orbiting objects
   B. Mostly ices and some dust
   C. A complex system of many smaller rings
   D. The most visible planetary rings in the solar system
   E. All of the other four answers are correct.

2. Which of the following is the best explanation for why Venus has so much more atmospheric gas than the Earth?
   A. Venus has gained much more gas through volcanic eruptions than the Earth.
   B. Because of its lack of magnetic field, Venus has been able to gain gas from the solar wind, while the Earth has not.
   C. Earth has lost much more atmospheric gas than Venus, primarily to condensation of water vapor into liquid water and to chemical reactions that make rocks out of carbon dioxide.
   D. Earth has lost much more gas to thermal escape than has Venus
   E. Venus just appears to have more gas in its atmosphere since it is covered by clouds.

3. Which initial property of a star determines whether it will ultimately end up as a white dwarf, neutron star, or black hole?
   A. Its composition.
   B. Its age.
   C. Its mass.
   D. Its location in the galaxy.
   E. Its color.

4. When the Sun becomes a red giant, its surface temperature will drop to approximately one-half of the Sun's current surface temperature. How will the wavelength of the peak of the Sun's thermal emission curve change?
   A. The peak wavelength will not change.
   B. It will be one-quarter as long as it is for the Sun currently.
   C. It will blueshift.
   D. It will be twice as long as it is for the Sun currently.
   E. It will only change after the red giant collapses.

5. Which of the following statements about electrons is NOT true?
   A. Within an atom, an electron can have only particular energies.
   B. Electrons can jump between energy levels in an atom only if they receive or give up an amount of energy equal to the difference in energy between the energy levels.
   C. Electrons follow well-defined orbits around the nucleus, like planets orbiting the Sun.
   D. An electron has a negative electrical charge.
   E. electrons can be ejected from atoms by high energy photons.

Short Answer Questions

6. Describe the distribution of asteroids in the Solar System and say something about their compositions.

7. Use the formula $F = L/(4 \pi d^2)$, with L = Luminosity, F =Flux, pi = 3.1415, and d= distance for the following question. Consider two identical stars, one of which is twice as far away as the other. Work out the ratio of brightnesses (or Fluxes) of light observed on Earth from the two stars.

Sample Exam II Answers

1. E

2. C

3. C

4. D

5. C

6. Most asteroids are located in a belt between Mars and Jupiter. A large minority of them actually share Jupiter's orbit, positioned either 60 degrees behind or 60 ahead of the giant planet. A tiny fraction of asteroids leak out of the main belt to cross the orbits of the inner planets – these are near-Earth asteroids. Asteroids are rocky in composition, with some ice mixed in for the more distant objects.

7. Write the equation twice, one for start 1 and once for star 2:
$F_1 = L_1 / 4 \text{ pi } d_1^2$ and $F_2 = L_2 / 4 \text{ pi } d_2^2$.
Form the ratio $F_1/F_2 = (L_1 / 4 \text{ pi } d_1^2) / (L_2 / 4 \text{ pi } d_2^2) = (L_1/d_1^2) / (L_2/d_2^2)$
Since the stars are the same, $L_1 = L_2 = L$.
$F_1/F_2 = (d_2^2/d_1^2)$
Now let star 2 be twice as far away as star1: $d_2 = 2d_1$.
Then $F_1/F_2 = ((2d_1)^2/d_1^2) = 4\ 2d_1^2/d_1^2 = 4$.
And so you get 4x as much light from the closer star (star 1).