**INST 2403 STUDY GUIDE for Midterm 3 FALL 2017**

**Sample Questions**

1. Red Giants sit where in the Hertzsprung-Russell diagram?

a. upper left corner

b. lower left corner

c. upper right corner (Correct)

d. lower right corner

e. none of the above

2. Main-sequence stars with a mass smaller the sun …

* 1. …live longer (Correct)
  2. …have larger radii
  3. …have a larger luminosity
  4. …have a larger surface temperature
  5. …have a larger core temperature

3. Two stars have the same chemical composition, spectral type, and luminosity class, but one is 4 light years from the Earth and the other is 40 light years from the Earth. The farther star appears to be …

a) 100 times fainter.

(Correct)

b) 10,000 times fainter.

c) 100,000,000 times fainter.

d) the same brightness since the stars are identical

4. Stars in the lower right corner of a Hertzsprung-Russell diagram

1. have small radii, large luminosity
2. large mass and small luminosity
3. high temperature and small life expectancy
4. low temperature and high life expectancy(Correct)
5. none of the above

5. What is the single most important characteristic in determining the course of a star's evolution?

* 1. Absolute brightness
  2. Distance
  3. Surface temperature
  4. Mass(Correct)
  5. Radius

1. Consider two stars with 2 solar masses (star A) and 0.5 solar masses (star B). Which is a true statement?
   1. Star A will live longer because it has more hydrogen to fuse.
   2. Star A will live 2 times shorter than star B.
   3. Star A will live 2 times longer than star B.
   4. Star A will live more than 2 times longer than star B.
   5. None of the abo ve. (Correct)
2. How did Jupiter’s location in the solar system affect its composition?
   1. Jupiter is rich in metals because only metallic grains could survive the low temperatures far away from the sun
   2. Jupiter is poor in metals because metallic grains cannot withstand these low temperatures
   3. Because Jupiter is so far away from the sun, it could hold on to volatile substances, such as helium and hydrogen (Correct)
   4. None of the above
3. An ion tail of a comet always points
4. directly away from the sun. (Correct)
5. directly toward the sun.
6. at an angle of 90 degrees to the sun direction.
7. There is no preferred direction.

**Short Answer Questions [3 points each]**

***(Please use the back side of the computer sheet to record your answers)***

9. Why are main sequence stars the brighter the hotter they are, while, on the other hand, red giants are so bright even though they have a relatively cool surface?

Main sequence stars have very similar sizes. Therefore their luminosity differences can be explained mostly by their temperature difference, according to the Stefan-Boltzmann law: the hotter they are, the more they radiate. Red giants on the other hand are bright even though they are cool and therefore do not radiate much per surface area, because they are GIANT and therefore have a gigantic surface area through which they radiate a lot of energy in total.

10. How does the luminosity, radius, mass and temperature of a star change as it develops from a main sequence star into a red giant?

L & R increase (“giants”), T decreases (“redder”), M stays the same (same star).

11. Explain the greenhouse effect.

The atmospheric greenhouse effect is due to the absorption qualities of some gases in the atmosphere. Visible sunlight can pass through the atmosphere unhindered and warms the surface. The surface radiates according to its temperature (about 300 K) mostly infrafred (IR) light, which is absorbed and reemitted by the greenhouse gases. Part of this IR light is reabsorbed by the surface, making it warmer

Than it would be without an atmosphere.