ASTRONOMY 1001.2 STARS AND GALAXIES

Mid-Term Test, March 2011. **Name** _____

Answer all questions on the test pages, using backs of pages for overflow. Duration 1½ hours.

1. Multiple choice. Circle the Roman numeral of the correct, or "most correct" answer.

a. Astronomers often refer to distances between objects in terms of the time it takes for light to travel between them. In such units the light travel time between Earth and the Sun is
i. instantaneous
ii. 1¼ light seconds
iii. 8⅓ light minutes
iv. 4 light hours
v. 2½ million light years

b. The point on the celestial sphere lying directly above Earth's North Pole is called the
i. north celestial pole
ii. zenith
iii. nadir
iv. vernal equinox
v. celestial equator

c. The path of one object in space (star, planet) gravitationally bound to another object (star, typically) and orbiting it is
i. always circular
ii. an ellipse
iii. a parabola
iv a hyperbola
v. an irregular three-dimensional curve

d. If a star is said to be "blue shifted," that means it is
i. very, very hot
ii. blue in colour
iii. on the left side of the Hertzsprung-Russell diagram
iv. moving away from us in space
v. moving towards us in space

e. Astronomical telescopes are used frequently by observational astronomers to
i. gather more light than does the human eye
ii. bring light to a focus
iii. focus light on a variety of detectors
iv. introduce close-up views of astronomical objects to astronomy students
v. all of the above

f. A star's parallax is
i. half the angular displacement it undergoes in the sky during the course of a year
ii. a very small angle less than 1 arcsecond across
iii. the parameter used by astronomers to measure distances to nearby stars
iv. impossible to detect by the human eye
v. all of the above

g. The difference between the red star Betelgeuse marking the right shoulder of Orion and the blue star Rigel marking his left foot is that
i. Rigel is larger in size than Betelgeuse
ii. Rigel is much brighter than Betelgeuse
iii. Betelgeuse is a dwarf star, Rigel is a giant
iv. Betelgeuse is much cooler than Rigel
v. only one of the stars is visible at night

h. Sunspots are
i. holes in the solar photosphere
ii. unrelated to the solar cycle
iii. cool regions of the photosphere where T = 4200 K rather than 5770 K
iv. the tops of solar prominences
v. clouds floating over the tops of industrial sites on the Sun

i. The red colour of H II regions originates from
i. emission from recombining hydrogen atoms in the ionized gas surrounding hot stars
ii. highly "doctored" telescope images
iii. the fact that they are speeding away from us
iv. reflection nebulosity
v. newly created stars

j. Planetary nebulae are
i. clouds of gas surrounding newly-formed stars composed of giant planets
ii. white dwarfs that have heated the surrounding gas and pushed it outwards
iii. the step before a star explodes as a supernova
iv expanding gas clouds surrounding dying stars
v. the envelopes surrounding supergiant stars

2. Short answer questions. Fill in the blanks:

   a. Astronomers place gamma-ray and X-ray telescopes on orbiting satellites because _____.

   b. Spectroscopic observations of a star indicate that its spectral lines are changing in periodic fashion, such that they are alternately red shifted for an interval of time and then blue shifted at later times. That is because the star is _____.

   c. Reflection nebulae illuminated by cool stars are yellow in colour while those illuminated by hot stars are _____.

   d. The term "helium flash" refers to the beginning of helium burning in a low-mass star when it becomes a _____.

   e. Stars that have just begun converting hydrogen to helium in their cores are referred to as _____.

   f. When a massive star has depleted all of the elements lighter than iron (Fe) in its core, its next stage of evolution will likely be a _____.

   g. If the central stars of planetary nebulae are the immediate predecessors of white dwarfs, what are the immediate predecessors of planetary nebulae?

   _____.

   h. The granulation (mottled appearance) of the solar photosphere is caused by _____.

   i. The lowest energy form of light (electromagnetic radiation) consists of _____.

   j. An evolutionary track for a star plotted in a Hertzsprung-Russell diagram represents _____.

3. What type of star do astronomers associate with pulsars?

4. In the Hertzsprung-Russell diagram below identify:

The type of star designated as **1**: _____

The type of star designated as **2**: _____

The type of star designated as **3**: _____

The type of star designated as **4**: _____

Also, label in the diagram **the location of the Sun** if it were placed there.