Introduction to Astronomy
Stellar Evolution and Cosmology Quiz

Instructions:

- Answer all questions.
- For Questions 1–5, choose the best option.
- For Questions 6–8, mark True or False.
- For Questions 9–10, write detailed answers with scientific explanations.

1. The primary energy source for main-sequence stars like our Sun is:

(A) Gravitational contraction

(B) Nuclear fission

(C) Hydrogen fusion in the core

(D) Chemical combustion

2. A star's position on the Hertzsprung-Russell diagram is determined by its:

(A) Distance from Earth

(B) Age and composition

(C) Luminosity and surface temperature

(D) Mass and rotation rate

3. What is the ultimate fate of a star with approximately one solar mass?

(A) Supernova explosion

(B) Black hole

(C) White dwarf

(D) Neutron star

4. Hubble's Law states that:

(A) Galaxies rotate at constant velocity

(B) The universe is contracting

(C) Galaxies recede at velocities proportional to their distance

(D) Light bends around massive objects

5. The Cosmic Microwave Background radiation is evidence of:

(A) Stellar nucleosynthesis

(B) The early hot, dense universe

(C) Dark matter distribution

(D) Supernova remnants

6. Red giant stars are larger but cooler at the surface than main-sequence stars of the same mass. (True/False)

7. Black holes can be directly observed because they emit large amounts of light. (True/False)

8. The observable universe contains approximately the same number of stars as grains of sand on Earth. (True/False)

9. Describe the life cycle of a massive star (greater than 8 solar masses) from formation to its final state. What nuclear processes occur at each stage, and what determines the final outcome?

10. Explain the evidence supporting the Big Bang theory. Discuss at least three key observations and how they support the model of an expanding universe that began from a hot, dense state.