

ENVIRONMENTAL SCIENCE

SECTION II

Time—90 minutes

4 Questions

Directions: Answer all four questions, which are weighted equally; the suggested time is about 22 minutes for answering each question. Write all your answers on the pages following the questions in this book. Where calculations are required, clearly show how you arrived at your answer. Where explanation or discussion is required, support your answers with relevant information and/or specific examples.

1. Read the article below and answer the questions that follow.

The Floridian Daily

May 21, 2013

The small community located on the edge of the magnificent wetlands of Florida's Everglades was the site of a press conference today where Governor Gayle Moss announced that the restoration of the Everglades is successfully underway. She noted that the Everglades ecosystem has suffered threats to its water quality, water quantity, and habitats in recent decades. Moss noted that intensive urban and agricultural development in adjacent areas has diverted substantial amounts of freshwater resources and impaired water quality. Governor Moss then emphasized that the preservation and enhancement of the Everglades, key goals of the restoration program, are absolutely essential for the continued environmental and economic health of the state. She closed the press conference by saying, "The Everglades is a gem not only for Florida but for the entire world. Each of us has the responsibility to do our part to preserve this magnificent resource."

- (a) **Describe** how TWO human activities, other than those that result in anthropogenic climate change, have resulted in a decrease in the amount of freshwater flowing into the Everglades ecosystem.
- (b) In addition to water quantity problems, the Everglades is faced with a variety of water quality issues. For example, phosphorus concentrations in the Everglades have increased since the 1960s.
- (i) **Describe** how one specific human activity contributes to increased phosphorus levels in the Everglades.
- (ii) **Explain** one way in which an increase in phosphorus levels can adversely affect the Everglades ecosystem.
- (iii) **Describe** one step that could be taken to reduce phosphorus inputs from the activity you identified in part (i).
- (c) Climate change could have a variety of impacts on water quantity, water quality, and habitat. For EACH of these three factors, **identify and describe** one specific example of an impact on the Everglades likely to result from climate change.
- (d) The article states that Governor Moss believes that the "preservation and enhancement of the Everglades, key goals of the restoration program, are absolutely essential for the continued environmental and economic health of the state."
- (i) **Describe** one way that restoring water quantity and water quality in the Everglades is expected to improve the structure and function of the ecosystem.
- (ii) **Describe** one way that restoring the Everglades is expected to provide economic benefits to Florida.

4. Biogeochemical cycles describe the movement of certain elements (typically bound with other elements in compounds) through Earth's atmosphere, hydrosphere, biosphere, and lithosphere. These elements and their compounds are necessary components of all life, and because they cycle, they can be used repeatedly by new generations of organisms. Each biogeochemical cycle has different pathways with various reservoirs (sources and sinks) where elements may reside for days or millions of years.
- (a) The atmosphere is one important carbon reservoir.
- (i) **Describe** a biological process by which carbon is removed from the atmosphere and converted to organic molecules.
- (ii) **Describe** a biological process by which carbon is converted from organic molecules to a gas and returned to the atmosphere.
- (b) Oceans and terrestrial systems are also important carbon reservoirs.
- (i) **Explain** how atmospheric carbon is incorporated into two oceanic sinks.
- (ii) **Identify** one terrestrial sink, other than fossil fuels, that stores carbon for thousands to millions of years.
- (c) The burning of fossil fuels has been shown to increase the concentration of carbon in the atmosphere. **Discuss** TWO other human activities that increase the concentration of carbon in the atmosphere.
- (d) **Identify** an environmental problem that results from elevated atmospheric carbon concentrations. **Discuss** one consequence of the problem you identified.
- (e) Phosphorus is another element important to all organisms.
- (i) **Describe** one major way in which the phosphorus cycle differs from the carbon cycle.
- (ii) **Identify** one reason that phosphorus is necessary for organisms.

STOP

END OF EXAM