

Final

I. Fill in the blank (10 points).

1. The well-mixed portion of the upper ocean is called the _____.
2. During October, the concentration of _____ decreases in the stratosphere over the South Pole.
3. As atmospheric concentrations of CO₂ increase, gas concentrations of _____ decrease by a corresponding amount.
4. Chlorine _____ the destruction of ozone, meaning that the chlorine facilitates the chemical reaction but is not taken up in the reaction.
5. Deep ocean circulation depends on both temperature and salinity, and is therefore called _____.

II. Short answer (15 points each. Total 75 points). Answer these questions with a brief and carefully constructed paragraph. You may find it helpful to draw a diagram.

1. Why do ocean currents not move in exactly the same direction as the wind?

2. Briefly describe the component of the carbon cycle that involves plants. How does the residence time of carbon in plants compare with the residence time of carbon in oceans or in sedimentary limestone?

3. What methods do climate scientists use to forecast future climate change? What do they predict for the next hundred years?

4. What are the three categories of UV radiation? Which of these are considered to be biologically harmful, and why?

5. Consider the following quote from a student newspaper:

“But Americans love to burn fuel in large quantities. Whether we like stepping on the gas pedal as hard as we can or whether we like making unnecessary trips to the nearest 7-Eleven, it makes us all accomplices in the destruction of the ozone layer.” Luis Gomez, “The War Against SUVs”, *The Poly Post*, 14 January 2003.

On the basis of what we’ve discussed in this class, what (if any) aspects of the quote are factually correct? What (if any) aspects are erroneous?

III. Essay 1. (25 points).

The Climate Trust’s web site reports on a project that began a year ago, in March 2002:

Restoring Ecuadorian Rainforest to Capture Global Warming Pollution

With funding from The Climate Trust, the Jatun Sacha Foundation and Conservation International will reforest more than 680 acres of highly degraded pasture in northwest Ecuador.

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Write an essay commenting on the reforestation plan. How is it pertinent to topics that we discussed in ESYS10? What are the advantages of this plan? What potential pitfalls might the groups encounter?

IV. Essay 2. (25 points).

Stockholders in American corporations are asked to vote annually about company management. Ordinarily the corporate board of directors asks for votes on the selection of new board members. In recent years, activists for a number of causes have routinely offered shareholder proposals that attempt to reform corporate policies. This one was proposed to the ExxonMobil Corporation last spring:

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SHAREHOLDER PROPOSAL: RENEWABLE ENERGY SOURCES

This proposal was submitted by the Province of St. Joseph of the Capuchin Order, 1015 North Ninth Street, Milwaukee, Wisconsin 53233, as lead proponent of a filing group.

“WHEREAS:

- *Growing evidence points to global warming caused, in part, by fossil fuel burning. At the same time, in our opinion an increasing number of voices are calling for the development of alternative energy sources to reduce our nation’s over-dependence on fossil fuels for its energy supply;*
- *The European Union’s energy ministers are committed to doubling their use of renewable energy by 2010;*
- *The Intergovernmental Panel on Climate Change has found ‘new and stronger evidence that most of the warming observed over the last 50 years is attributed to human activity’ (IPCC, 2001: 10), and that ‘stabilization of the concentration of carbon dioxide at its present level could only be achieved through an immediate reduction in its emissions of 50-70% and further reductions thereafter.’ (IPCC, 1995)*
- *International energy companies will face unprecedented pressure to reduce emissions and meet clean energy demands, since 178 countries have signed onto the final emissions reductions rules for the Kyoto Protocol, even though the U.S. refused to do so (Financial Times, 07/24/01). Our company operates in many of these countries.*
- [additional omitted justifications]

RESOLVED: shareholders request the Board to prepare a report (at reasonable cost and omitting proprietary information) by September 1, 2002 outlining how it will promote renewable energy sources and develop strategic plans to help bring bioenergy and other renewable energy sources into ExxonMobil’s energy mix.

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As is normally the case with shareholder proposals, ExxonMobil’s board of directors recommended voting against this proposition, and the measure did not pass.

In a carefully constructed essay, explain the details of this proposal. What is the Intergovernmental Panel on Climate Change? What is the Kyoto Protocol and why might it matter to a multinational company? What might be meant by “bioenergy and other renewable energy”? What are the advantages and disadvantages of this proposal to ExxonMobil? If this measure were to be proposed again in 2003, how would you recommend that shareholders vote?