

There are five questions on this examination. The first question is compulsory, and is worth 50% of the marks for this examination. Attempt answers to two of questions 2-5, each of which is worth 25% of the marks for this examination. Present your arguments clearly and concisely.

1. This question is compulsory, and requires short answers.
 - a. Briefly define the concept of sustainable development. **[5 marks]**
 - b. Briefly discuss “the tragedy of the commons”. **[5 marks]**
 - c. What are the core aspects of “Design for Environment”? **[5 marks]**
 - d. What is causing global warming? **[5 marks]**
 - e. What does the Kyoto Protocol entail? **[5 marks]**
 - f. Briefly describe the methodology for a life cycle assessment of a product or process. **[5 marks]**
 - g. From an environmental perspective, discuss the relative merits of coal, natural gas and nuclear power as fuels for electricity generation. **[10 marks]**
 - h. From an environmental perspective, discuss the relative merits of vehicles powered by fuel cells, and “hybrid” systems. **[5 marks]**
 - i. Briefly discuss technologies that can reduce the energy requirements of buildings. **[5 marks]**

2. The concept of the “triple bottom line” is at the heart of sustainable industrial activity. Discuss the roles of technology, economics and government regulation in fostering a change from concern with economic growth alone to consideration of the three Es of the triple bottom line, which you should define carefully. **[25 marks]**
3. You work for a domestic automobile company that has recently been taken over by a foreign competitor that has a well-established corporate image as a “green”, environmentally friendly organization. Your first task after the takeover is to lead a team conducting a life cycle assessment comparing the environmental impact of one of your domestic, conventional cars with a proposed “parallel hybrid” vehicle that has been developed by your new corporate bosses. Discuss both how you might go about this assessment, and also the major areas of differing environmental impact that you might expect to identify. **[25 marks]**.
4. Discuss the following statement from The Economist:

“When it comes to clean technology, the most effective boost that bureaucrats can give to a sustainable energy future is to avoid picking winners. Instead, they would do better to provide a level playing field by scrapping the huge and usually hidden subsidies for fossil fuels, and by introducing measures such as carbon taxes so that the price of fossil fuels reflects the costs they impose on the environment and human health. Governments should also ensure that incumbents do not obstruct the entry of nimble newcomers, and keep open a range of options for producing energy, including running existing nuclear plants to the end of their useful life. They should provide strong incentives for firms to invest in today’s creaking electricity grids, but also remove barriers to the spread of distributed generation.”

Your answer should consider both renewable and non-renewable energy sources. **[25 marks]**

5. Identify a common product, process or industry where using the principles of Design for Environment (which you should discuss in some detail) could deliver both economic and environmental benefits. You should also consider mechanisms by which regulation could either help or hinder the changes required to deliver these benefits. **[25 marks]**