Pay adequate attention to spelling, punctuation and grammar, so that your answers can be readily understood.
Question 1.

a. Describe the different biological and chemical processes that can be used to treat a substance. You should include a discussion of the properties of the substances and the environment that might affect the performance of different treatment options. (25)

b. You are working for a company that has developed a new detergent for use in cleaning fluids. What approach would you use to determine the potential risk of the substance to the aquatic environment? (25)

Question 2.

a. Describe the different options for treatment of solid waste. You should use chemical equations where appropriate (20)

b. What are the potential by-products from these processes? How can these be controlled or treated? (15)

c. What are the advantages and limitations of the different treatment approaches and how can they fit into integrated waste management systems? (15)

Question 3.

a. What are the principal forms of ionising radiation? Give specific examples of radionuclides responsible for each of these different types of emission. (6)

b. Describe the effects of ionising radiation at the molecular level and discuss the chronic effects of radiation exposure. (22)

c. Describe the different management options for waste products arising from nuclear power generation. (22)

Question 4.

a. A polycyclic aromatic hydrocarbon has a half-life in soil of 5 years. If 1 kg is applied to the top 5 cm of the soil, what will be the concentration in the soil 3 years later? Describe the assumptions you have made (10)

b. How would you determine whether the soil is classed as contaminated land? (15)

c. Assuming the land is classed as contaminated, what are the options that are available for treatment and how would you go about selecting the most appropriate method. (25)