1. Define: (10 %)
   (a) eutrophication  (b) heterotroph  (c) biofilm  (d) bioremediation  (e) BOD

2. What are the fundamental differences between:
   (a) prokaryotic and eukaryotic cells  (b) fermentation and respiration
   (c) aerobic and anaerobic spiration

3. (15 %)
   (a) Describe the typical bacterial growth curve?
   (b) What is occurring during each of the growth phases?

4. Give the structural formula for each of the following: (10 %)
   (a) 2,4,6-Trinitrotoluene  (b) 1,2-Dichloroethene  (c) Pentachlorophenol
   (d) 2,3,7,8-TCDD (dioxin)  (e) Acrylonitrile

5. (10 %)
   (a) Will a precipitate form when 100 mL of 0.05 M BaCl₂ and 200 mL of 0.01 M Na₂SO₄ are mixed together?
      (BaSO₄ with Ksp = 1.5x10⁻⁹)
   (b) A solution contains 1x10⁻⁴ M Na₃PO₄. What is the minimum concentration of AgNO₃ that would cause precipitation of solid Ag₃PO₄ (Ksp = 1.8x10⁻¹⁸)?

6. The half-life of atrazine (a herbicide) is estimated to be approximately 30 days. What fraction of the initial atrazine will remain after 200 days? (Assume the decayed rate of atrazine followed first-order kinetics) (8 %)

7. Calculate the equivalence point pH for both ionizations in the titration of 500 mg/L of sodium carbonate with sulfuric acid? Assume a closed system. (H₂CO₃ with Kₐ₁ = 4.5x10⁻⁷ and Kₐ₂ = 5.5x10⁻¹¹) (16 %)

8. Calculate the pH of a buffer solution prepared with 200 mg/L acetic acid and 100 mg/L sodium acetate under each of following conditions: (16 %)
   (a) After 10 mg/L of HCl is added to the solution
   (b) After 10 mg/L of NaOH is added to the solution
      [MW (g/mole): C = 12, H = 1, O = 16, Cl = 35.5, Na = 23]