1. What are Watson-Crick base pairs? Why are they important (10%)?

2. The three-dimensional structure of a protein is determined by its *primary*, *secondary*, and *tertiary* structures. What are some of the common *secondary* structures? What are the forces that hold together the *secondary* and *tertiary* structures (15%)?

3. The blood proteins transferring (MW 76 kDa) and lysozyme (MW 15 kDa) can be separated by rate-zonal centrifugation or SDS-polyacrylamide gel electrophoresis. Which of the two proteins will sediment faster during centrifugation? Which will migrate faster during electrophoresis (15%)?

4. What are the major differences in the synthesis and structure of prokaryotic and eukaryotic mRNAs (15%)?

5. The function of proteins can be regulated in a number of ways. How does allostery influence protein function? How protein phosphorylation and proteolytic cleavage can modulate protein function (15%)?

6. Enzyme can catalyze chemical reactions. How do enzymes increase the rate of a reaction? For an enzyme-catalyzed reaction, what are Km and Vmax? For enzyme X, the Km for substrate A is 0.4 mM and for substrate B is 0.01 mM. Which substrate has a higher affinity for enzyme X (15%)?

7. According to health experts, saturated fatty acids, which come from animal fats, are a major factor contributing to coronary heart disease. What distinguishes a saturated fatty acid from an unsaturated fatty acid, and to what does the term saturated refer? Recently, trans unsaturated fatty acids, or trans fats, which raise total cholesterol levels in the body, have also been implicated in heart disease. How does the cis stereoisomer differ from the trans configuration, and what effect does the cis configuration have on the structure of the fatty acid chain (15%)?