

1. Regulation of gene expression can be regulated at four different levels. Describe what these four levels are and how they are regulated. (20%)
  
2. Why do eukaryotic cells require a nucleus as a separate compartment when prokaryotic cells can manage perfectly well without? (20%)
  
3. Professor Honesty says that ‘the shortest eukaryotic cell cycles of all, shorter even than those of many bacteria, occur in many early animal embryos. These divisions take place without any significant increase in the weight of the embryo.’ Is this possible? If it is not, why? If it is, how can it be and which phase of the cell cycle would you expect to be most reduced? (20%)
  
4. What is epigenetics? Can it be inherited from cell to cell like genetic information? Give two examples of epigenetic regulation of gene expression. (20%)
  
5. The ability of eukaryotic cells to organize the many compartments in their interior, to adopt a variety of shapes, and to carry out coordinated movements depends on the intricate network called cytoskeleton. Describe the three types of protein filaments that form the cytoskeleton and their signature properties. (20%)