

系所組別：生理學研究所甲、乙組

考試科目：生物化學

考試日期：0308，節次：1

※ 考生請注意：本試題 可 不可 使用計算機

1. A major portion of most biochemical investigation involves the purification of tissue proteins under consideration because these substances must be relatively free of contamination. Based on the basic understanding of protein chemistry in Biochemistry, five common techniques (protein isolation, solubilities of proteins, chromatographic separation, electrophoresis, and ultracentrifugation) for protein purification have been well documented. Based on your background in Basic Biochemistry, please give an example for each technique and describe these five techniques. (20%)
2. Hemoglobin is not just a simple oxygen tank. Rather, it is a sophisticated oxygen delivery system that provides the proper amounts of oxygen to the tissues under a wide variety of circumstances. Based on the Hill equation, please describe the definition of non-cooperative, positively cooperative, and negatively cooperative binding and use the concept to explain hemoglobin-oxygen binding curve in arterial and venous blood. (20%)
3. It is well known that the fatty acid residues of fat cannot be metabolized anaerobically. Based on your understanding in lipid metabolism, please describe three major steps in lipolysis, illustrate the pathway of lipolysis, and explain why fat cannot be metabolized anaerobically. (20%)
4. Three major classes of RNA are responsible for protein synthesis: ribosomal RNA (rRNA), transfer RNA (tRNA), and messenger RNA (mRNA). All of these RNAs are synthesized under the direction of DNA templates. To date, it is well known that eukaryotic nuclei contain three distinct types of RNA polymerase that differ in the RNAs they synthesize. Please describe how each RNA is synthesized and compare their functional differences. (18%)
5. It is known that the binding of androgen to its nuclear receptor, norepinephrine to its seven-transmembrane receptor, and epidermal growth factor to its single transmembrane receptor result in cell growth. Please describe the concept: the mechanism of enzyme action, use the concept to explain how these three receptors trigger receptor-mediated signaling pathways and affect cell growth. (22%)