※ 考生請注意：本試題不可使用計算機

1. You suspect that a gene you have cloned is a proto-oncogene. Describe how you would test your hypothesis experimentally. Predict the results. (5%)
2. You have purified a protein. When you subject it to SDS-PAGE, two bands are seen. Provide a possible explanation and describe how you could test your hypothesis.(5%)
3. Describe the differences between exonucleases and endonucleases? (5%)
4. Describe the similarities and differences between RAPD (randomly amplified polymorphic DNA) analysis and RFLP (Restriction fragment length polymorphism) analysis.(5%)
5. What is phage display? What is the mechanism of phage display? (10%)
6. Compare primer extension and S1 nuclease methods for determining the transcriptional start site. Describe the advantages of each method and the disadvantages.(10%)
7. RNA polymerase I, II, III have varying levels of sensitivity to the poison called -amanitin which is from the mushroom Amanita phalloides. RNA polymerase II is completely sensitive to the poison, RNA polymerase III have intermediates sensitivity, and RNA polymerase I is insensitive to the poison. What would happen to transcription of the rRNA genes, tRNA genes and the genes for the glucose transporter if an eukaryote was poisoned with -amanitin? (10%)
8. 2012 Nobel Prize in Chemistry was awarded to Robert J. Lefkowitz and Brian K. Kobilka for their research on an important type of receptors on cells. Describe briefly their important discoveries. What are their significance and impact on biomedical research? (8%)
9. Describe the following stress and stress-related molecules produced. Discuss what actions cells/tissues may produce or respond to protect against each stress.
   (1) Hypoxia (7%)
   (2) ER stress (7%)
   (3) Autophagy (7%)
   (4) Oxidative stress (7%)
   (5) Inflammasome (7%)
   (6) Senescence (7%)