

Part I: 50 %

- (1) How to control the septum formation and localization in bacteria, and describe the function of SlmA. (10%)
- (2) Please compare the components required for DNA replication in prokaryotic and eukaryotic cells, and address the essential $\phi\chi$ priming system for replication restart. (20%)
- (3) Describe the NER action of the best-known ABC excinuclease in E. coli, and XPs in eukaryotic cells. (20%)

Part II: 50%

- (4) Explain the specific features of promoters recognized by eukaryotic RNA polymerases (i.e. RNA polymerase I, II and III), and list the functions of these RNA polymerases in terms of the types of RNAs they produced. (12%)
- (5) After transcription in eukaryotic cells, the mRNAs have to be processed to become the mature RNAs. Describe the processing occurring at the 3' and 5' ends and the coding region of RNAs. (12%)
- (6) Signal transduction is an important regulation mechanism within cell. Describe the functions of these regulators in the signal transduction within cells. 1) calcium ion, 2) MAPK, 3) MAPKK, 4) tyrosine kinase receptor, 5) hydrogen peroxide, 6) cAMP. (12%)
- (7) Transcription proteins can bind DNA to regulate gene expression. The footprinting experiment and electrophoretic mobility shift assay (EMSA) are the two major methods to identify the DNA binding sites of transcription factor. Describe these two methods. (14%)