

考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一. 名詞解釋 (24%, 3 points per term)

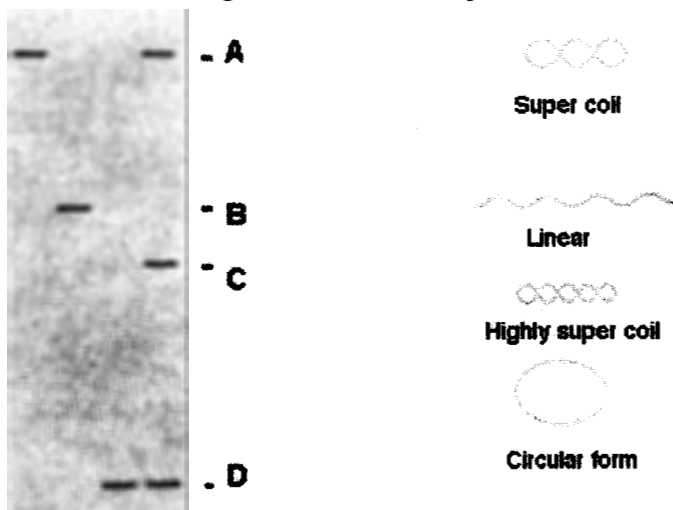
- (1). Totipotent (2). 3'UTR (3). Charged tRNA (4). Gene density (5). Telomerase (6). Lysogenic pathway (7). Wobble concept (8). Morphogen

二. 簡答題 (76%)

1. Please design an experiment to determine that RNA is synthesized in the nucleus and moves to the cytoplasm. (6%)
2. Please describe the importance of weak chemical interactions in life progression. (6%)
3. Please estimate the T_m of this DNA oligonucleotide listed here: (6%)

5'-ATCCGATTCGATC-3'
3'-TAGGCTAAGCTAG-5'

4. Please answer the exact DNA forms in the gel of DNA electrophoresis (A, B, C and D). (8%)



5. DNA packaged by histones is critical for cell cycle progression. Please answer the composition of a histone octamer. (8%)
6. How does the E. coli mismatch repair system know which of the two mismatched nucleotides to be replaced? If repair occurred randomly then half of the time the error would become permanently established in the DNA. (6%)
7. Please explain cap-dependent and cap-independent translational pathways. (6%)
8. Please describe the process of microRNA maturation. (8%)
9. Please describe the gene regulation of how Drosophila develops the Dorsal and Ventral. (8%)
10. Please explain the next terms: missense mutation, nonsense mutation, frameshift mutation. (6%)
11. Please compare the similarities and differences of the gene regulation in prokaryote and eukaryote. (8%)