1. Please describe the enzymology of the origin, continuation, and termination of DNA replication in *E. coli*. (10 %)
2. What are the recognition signals within introns ? (4 %)
3. Please describe the relative position to transcription start site of (1) Pribnow box (2) TATA box (3) CAAT box (6 %)
4. Please explain the following terms: (20 %)

(1) Release factor　　(2) snoRNP
(3) Pre-initiation complex　　(4) Wobble rule
(5) cDNA　　(6) Chromosome jumping
(7) Lysogeny　　(8) Nucleosome
(9) Molecular imprinting　　(10) Apoptosis

5. Please describe the enzyme involved in following reactions: (10 %)

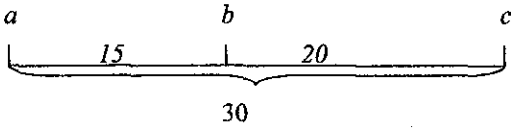
(1) Attachment of amino acid to transfer RNA
(2) Formation of peptide bond
(3) The enzyme splits lactose into glucose and galactose coded by a gene in the *lac* operon
(4) Formation of two individual plasmids from cointegrate in replicative transposition
(5) Addition of telomeric sequences to the ends of eukaryotic chromosomes

6. Mice with a single *X* chromosome and no *Y* chromosome (an *XO* sex-chromosome constitution) are fertile females. Assuming that at least one *X* chromosome is required for viability, what sex ratio is expected among surviving progeny from the mating *XO* ♀ x *XY* ♂ ? (10%)
7. In corn, the alleles *C* and *c* result in colored versus colorless seeds, *Wx* and *wx* in nonwaxy versus waxy endosperm, and *Sh* and *sh* in plump versus shrunken endosperm. When plants grown from seeds heterozygous for each of these pairs of alleles were testcrossed with plants from colorless, waxy, shrunken seeds, the progeny seeds as followed: (10%)

Colorless, nonwaxy, shrunken	84
Colorless, nonwaxy, plump	974
Colorless, waxy, shrunken	20
Colorless, waxy, plump	2349
Colored, waxy, shrunken	951
Colored, waxy, plump	99
Colored, nonwaxy, shrunken	2216
Colored, nonwaxy, plump	15
total	6708

Determine the order of the three genes, and construct a linkage map showing the genetic distances.

8. The accompanying diagram summarizes of the recombination frequencies observed in a large experiment to study three linked genes. What was the observed frequency of double crossing-over in this experiment. Calculate the interference.



(10%)

9. 有四個不同的果蠅地理小種(landrace)，比較牠們第二條染色體條帶（每個字母代表一個條帶），各小種順序如下：(1) m n r q p o s t u v　(2) m n o p q r s t u v　(3) m n r q t s u p o v (ancestral strain)　(4) m n r q t s o p u v　請問在演變的過程發生了什麼事？牠們出現的順序為何？(10%)
10. 某二倍體生物具有 3 對 metacentric 染色體及一對 telocentric 染色體，請畫出減數分裂的各個時期？（並註明各時期之代表特徵）(10%)

試題隨卷繳回