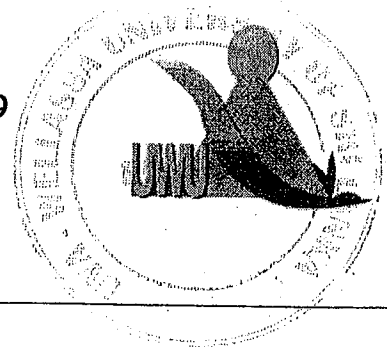


Uva Wellassa University, Sri Lanka
End Semester Examination – June 2009
SCT 214-1 Genetics



Time: One (01) hour

Total 06 Questions

Answer four(04) questions including question No.1

1. From the phenotype data are given below for two three point test crosses involving (1) a, b and c and (2) b,c and d, determine the sequence of the four genes a,b,c and d , and the three map distances between them. Recessive phenotypes are symbolized by lowercase letters and dominant phenotypes by plus.

(1)		(2)	
+++	669	bcd	8
ab+	139	b++	441
a++	3	b+d	90
++c	121	+cd	376
+bc	2	+++	14
a+c	2280	++d	153
abc	653	+c+	64
+b+	2215	bc+	141

(25 marks)

2. (a). Plasmids are said to be an important part of a bacterial cell. What is the importance of plasmid?

(2 marks)

- (b). Illustrate (using diagrams only) how RNA duplex is formed

(10 marks)

- (c). Briefly explain the major steps in translation process

(13 marks)

3. Certain genetic abnormality expresses by having x- linked dominant allele.

Abnormal woman get married to a man who is not abnormal and from that marriage they got two offsprings. The first offspring is a female who is not expressing abnormal condition. That normal female get married to a abnormal man and their first abnormal female offspring get married to a abnormal man and they got two female offspring both having abnormal condition.

(a) . Draw the pedigree and find the genotypes

(20 marks)

(b) . What is the probability of having normal male offspring in progeny three?

(3 marks)

(c) . What is the benefit of analyzing pedigree of an organism?

(2marks)

4. Following description is based on coat colour of mice.

Normal wild type coat colour is agouti, a grayish pattern is formed by alternating bands of pigment on each hair. Agouti is dominant to black (non agouti) hair, which is caused by a recessive mutation, **a**. Thus **A** results in agouti, while **aa** yields black coat colour. When it is homozygous, a recessive mutation, **b**, at a separate locus, eliminates pigmentation altogether, yielding albino mice (**bb**), regardless of the genotype at the other locus.

A cross is made between albino mice and black colour mice

F1 Phenotypic ratios are as follows

1/4 agouti, 1/4 black, 1/2 albino

Note: gene **A** represents the coat colour of mice

(a). What is the genetic basis of this incident

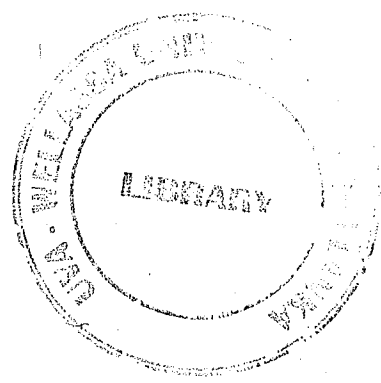
(2marks)

(b). Find the genotypes of F1 generation

(15 marks)

(c). A group of scientists wanted to design an experiment related to the inheritance of body colour of mammals. Therefore, the black colour mouse of F1 generation was crossed with albino mouse whose coat colour gene was heterozygous. Find the genotypic ratio of this cross.

(8 marks)



5. Write short notes on followings

- (a). Chromosomal mutations
(9marks)
- (b). Benefits of GM crops
(9marks)
- (c). Incomplete dominance
(7marks)

6. (a). What are stem cells?
(3 marks)

(b). Cereal grains are major food sources for humans and other animals in many regions of the world. However, most cereal grains contain low amount of certain of the amino acids (lysine, tryptophan) that are essential for monogastric animals such as humans. Thus, a major goal of plant breeders is to produce cereal varieties (for example corn) with increased kernel lysine content.

A research group in US is working on new corn variety (BN102) with low amounts of lysine and tryptophan. Assume that you are working as a member of research team studying the genome of corn variety BN102. Your research team wants to increase the kernel lysine content of that plant through indirect transformation technique. Design an experiment how you achieve your goal.

Note: you are provided with a wild type corn variety (C) which contains high amount of kernel lysine content.

(22 marks)