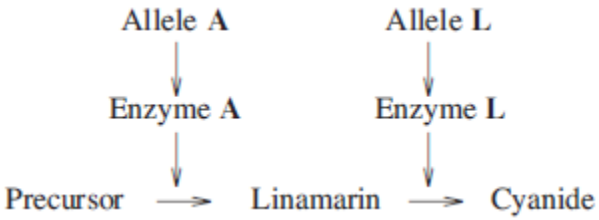
Name of the Student:_____
Max. Marks : 15 Marks **Time : 15 Minutes**

Q1.

Cyanide is a poisonous substance. Cyanogenic clover plants produce cyanide when their tissues are damaged. The ability to produce cyanide is controlled by genes at loci on two different chromosomes. The dominant allele, **A**, of one gene controls the production of an enzyme which converts a precursor to linamarin. The dominant allele, **L**, of the second gene controls the production of an enzyme which converts linamarin to cyanide. This is summarised in the diagram.



(a) Acyanogenic clover plants cannot produce cyanide. Explain why a plant with the genotype **aaLl** cannot produce cyanide.

_____

_____

(1)

(b) A clover plant has the genotype **AaLl**.

(i) Give the genotypes of the male gametes which this plant can produce.

_____

(1)

(ii) Explain how meiosis results in this plant producing gametes with these genotypes.

_____

_____

_____

_____

(2)

(c) Two plants, heterozygous for both of these pairs of alleles, were crossed. What proportion of the plants produced from this cross would you expect to be acyanogenic but able to produce linamarin? Use a genetic diagram to explain your answer.

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(3)

In an investigation, cyanogenic and acyanogenic plants were grown together in pots. Slugs were placed in each pot and records were kept of the number of leaves damaged by the feeding of the slugs over a period of 7 days. The results are shown in **Table 1**.

Table 1

	Undamaged	**Damaged**
Cyanogenic plants	160	120
Acyanogenic plants	88	192

(d) A x^2 test was carried out on the results.

(i) Suggest the null hypothesis that was tested.

_____

_____

(1)

(ii) x^2 was calculated. When this value was looked up in a table, it was found to correspond to a probability of less than 0.05. What conclusion can you draw from this?

_____

_____

_____

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_____

(3)

A second investigation was carried out in a field of grass which had been undisturbed for many years. **Table 2** shows the population density of slugs and the numbers of cyanogenic and acyanogenic clover plants at various places in the field.

Table 2

Population density of	**Number of acyanogenic clover**	**Number of cyanogenic clover**

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slugs	plants per m^2	plants per m^2
Very low	26	10
Low	17	26
High	0	10
Very high	0	5

(e) Explain the proportions of the two types of clover plant in different parts of the field.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 15 marks)

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