EASTERN UNIVERSITY, SRI LANKA
FACULTY OF AGRICULTURE
SECOND YEAR, SECOND SEMESTER EXAMINATION IN AGRICULTURE-2005/2006
AGB 2202: PRINCIPLES OF GENETICS

Answer ALL the questions   Time: 03 hours

1) Describe the following with suitable example

   a) Dominance and receiveness
   b) Codominance
   c) Epistasis

2) a) Explain chi-square test of significance in a biological experiment
   b) Hydrocephalous is a disease found in mouse. It is expected that it is inherited in the ratio of 3:1. From the number of litters the following data were obtained.

	Observed	Expected
Normal	4138	3711
Hydrocephalous	810	1237

In another experiment the results are as follows:

	Observed	Expected
Normal	560	583.5
Hydrocephalous	218	194.5

   i.   Find the chi-square values for the above data in the two experiments.
   ii. Find the goodness of fit of observed data to expected values.
   iii. What is the probable reason for the difference between the two experiments?

3) a) What do understand by the term "Linkage and Crossing over"?
   b) Give the aspects to be considered in genetic mapping.
   c) Describe the procedure to determine the linkage relationship of genes in a trihybrid parent.

4) a) What are polygenes and give their characteristics.
   b) Discuss the inheritance of quantitative genes with a suitable example.

5) a) Describe a Mendelian population.
   b) Prove the Hardy-Weinberg equilibrium by finding the frequencies of all kinds of possible matings and from these generating the frequencies of genotypes among the progeny using symbols given below.

	Alleles		Genotypes		
	A	a	AA	Aa	aa
Frequencies	p	q	p^2	2pq	q^2

6) Write short notes on
   a) Tetraploidy
   b) Interference and coincidence
   c) Translocation in chromosome

TABLE A.6.
Distribution of χ^2 (Chi-Square).[a]

Degrees of Freedom	Probability of Obtaining a Value as Large or Larger							
	.99	.95	.90	.50	.10	.05	.01	.001
1	.0002	.00393	.0158	.455	2.706	3.841	6.635	10.827
2	.0201	.103	.211	1.386	4.605	5.991	9.210	13.815
3	.115	.352	.584	2.366	6.251	7.815	11.345	16.268
4	.297	.711	1.064	3.357	7.779	9.488	13.277	18.465
5	.554	1.145	1.610	4.351	9.236	11.070	15.086	20.517
6	.872	1.635	2.204	5.348	10.645	12.592	16.812	22.457
7	1.239	2.167	2.833	6.346	12.017	14.067	18.475	24.322
8	1.646	2.733	3.490	7.344	13.362	15.507	20.090	26.125
9	2.088	3.325	4.168	8.343	14.684	16.919	21.666	27.877
10	2.558	3.940	4.865	9.342	15.987	18.307	23.209	29.588
11	3.053	4.575	5.578	10.341	17.275	19.675	24.725	31.264
12	3.571	5.226	6.304	11.340	18.549	21.026	26.217	32.909
13	4.107	5.892	7.042	12.340	19.812	22.362	27.688	34.528
14	4.660	6.571	7.790	13.339	21.064	23.685	29.141	36.123
15	5.229	7.261	8.547	14.339	22.307	24.996	30.578	37.697
16	5.812	7.962	9.312	15.338	23.542	26.296	32.000	39.252
17	6.408	8.672	10.085	16.338	24.769	27.587	33.409	40.790
18	7.015	9.390	10.865	17.338	25.989	28.869	34.805	42.312
19	7.633	10.117	11.651	18.338	27.204	30.144	36.191	43.820
20	8.260	10.851	12.443	19.337	28.412	31.410	37.566	45.315
21	8.897	11.591	13.240	20.337	29.615	32.671	38.932	46.797
22	9.542	12.338	14.041	21.337	30.813	33.924	40.289	48.268
23	10.196	13.091	14.848	22.337	32.007	35.172	41.638	49.728
24	10.856	13.848	15.659	23.337	33.196	36.415	42.980	51.179
25	11.524	14.611	16.473	24.337	34.382	37.652	44.314	52.620
26	12.198	15.379	17.292	25.336	35.563	38.885	45.642	54.052
27	12.879	16.151	18.114	26.336	36.741	40.113	46.963	55.476
28	13.565	16.928	18.939	27.336	37.916	41.337	48.278	56.893
29	14.256	17.708	19.768	28.336	39.087	42.557	49.588	58.302
30	14.953	18.493	20.599	29.336	40.256	43.773	50.892	59.703

[a]Table A.6 is abridged from Table IV of Fisher and Yates: *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd., London (previously published by Oliver and Boyd, Edinburgh), by permission of the authors and publishers.