UvaWellassa University, Sri Lanka

Faculty of Science and Technology
Science and Technology Degree program
End Semester Examination – March/ April 2013
SCT 312-3 Breeding & Genetics

Instructions to candidates

Answer Four (04) questions only

Number of questions: Five (05)

Time allocation: Three (03) hours

Total marks allocated: 100

1.

(i) Write down the two principals of Mendelian inheritance (02 marks)

(ii) Briefly explain the following terms

a) Recessive genes
b) Monohybrid cross
c) Genetic code
d) Heterozygous (04 marks)

(iii) The F2 progeny was obtained for a cross between two *Pisumsativum* plants as follows.

05 tall plants with the genotype TT

12 tall plants with the genotype Tt

04 dwarf plants with the genotype tt

a) Find the genotypes of F1 parents and original parents (05 marks)

b) Calculate the genotypic ratio and phenotypic ratio of F2 generation

(04 marks)

(iv) There are 100 cats in a population. Among them, 84 cats are black and 16 cats are white.

a) Find out the genotypes according to the Hardy Weinberg equation. **(06 marks)**

b) Is this population in Hardy Weinberg equilibrium? Comment on your answer.

(04 marks)

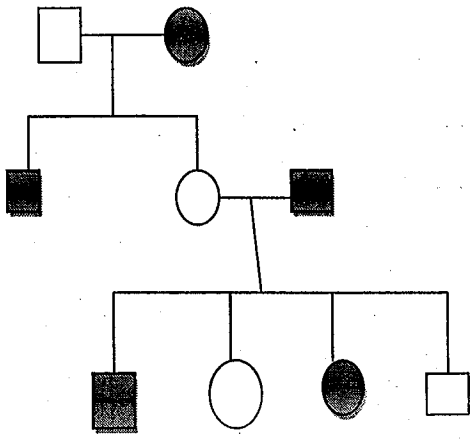
2.

(i) State the difference between a point mutation and a chromosomal mutation **(04 marks)**

(ii) Briefly explain the types of sexual aneuploidies **(06 marks)**

(iii) Write down the importance of pedigree analysis **(05 marks)**

(iv) The following pedigree follows the inheritance of a certain x linked recessive gene which causes a particular genetic disease.



a) Find out the relevant genotypes

b) What is the probability of the 1st child, having the disease in theprogeny III?

c) What is the probability of the 1st male child, having the disease in the progeny III?

d) What is the probability of the 1st female child, having the disease in the progeny II?

(10 marks)

3.

(i) List five main objectives of plant breeding? **(05 marks)**

(ii) What were the important plant characters/traits in early plant domestication? Name five and explain why those traits were important. **(10 marks)**

(iii) What do you mean by selection in plant breeding? Give three fundamental features of selection. **(05 marks)**

(iv) In in breeding program what is the best stage (generation) to apply selection for the interested trait? Explain your answer. **(05 marks)**

4.

(i) What is a land race and why they are considered to be very important sources in plant breeding? **(05 marks)**

(ii) A farmer in a rural area owns a traditional Bean variety (*Phaseolus vulgaris*) called 'Jasmine' which yields large seeds. This land race has not been subjected to any kind of selection for centuries. Describe the main steps in a suitable breeding method to isolate a pure line of large-seeded bean variety using a seed lot obtained from this farmer. **(15 marks)**

(iii) Assume that 'Jasmine' was originated from a single Bean plant which was heterozygous for four (05) loci governing seed weight. Calculate, using standard equations, how many pure lines could be isolated from it. **(10 marks)**

5. Write short notes on any two (02) of the following:

(i) Exploitation of the hybrid vigour (or heterosis) in plant breeding

(ii) Inbreeding depression and its consequences in plant breeding

(iii) Importance of polyploids in plant breeding?

(25 marks)

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