BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

AGC208

Department of Crop Science
BSc Agricultural Science (Honours) Part II Examination
Population and Quantitative Genetics

3 HOURS (100 Marks)

INSTRUCTIONS

Answer any ***FOUR*** questions. Each question carries **25 marks.**

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1. (a) Discuss the significance of the environmental variance to plant breeding. [15 marks]
   (b) Analyse the scheme for the maintenance and use of genetic male sterility. [10 marks]
2. (a) Discuss the significance of polyploids to crop production. [10 marks]
   (b) Discuss the significance of heritability to plant breeding. [9 marks]
   (c) Explain any three reasons why selection is important in plant breeding. [6 marks]
3. (a) State any four types of chromosomal mutations. [4 marks]
   (b) Explain the need for an infinitely large population in the Hardy-Weinberg equilibrium. [10 marks]
   (c) Outline Johannsen's experiments and their significance to plant breeding. [11 marks]
4. (a) Discuss the significance of heterosis and inbreeding to plant breeding. [10 marks]
   (b) Analyse the use of two methods used when selecting for more than one trait. [11 marks]
   (c) State any four types of natural selection. [4 marks]
5. Write notes under the following topics;
   a) Gametophyic self-incompatibility, [11 marks]
   b) Frameshifts, [10 marks]
   c) Differentiate between breeding value and genotypic value. [4 marks]
6. (a) Explain the effects of three physical mutagens on DNA. [9 marks]
   (b) If a population has 490 individuals of the RR type, 420 individuals of Rr type and 90 of the rr type. Calculate the frequency of R and r. [7 marks]
   c) Outline any three mechanisms of self-incompatibility. [9 marks]

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