



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
FOURTH YEAR SECOND SEMESTER**

**SCHOOL OF TOURISM AND NATURAL
RESOURCE MANAGEMENT
BACHELOR OF SCIENCE IN WILDLIFE
MANAGEMENT**

**COURSE CODE: WLM 466
COURSE TITLE: CONSERVATION GENETICS**

DATE: 17TH APRIL, 2018

TIME: 1100 - 1300HRS

INSTRUCTIONS TO CANDIDATES

- Section A is compulsory
- Answer any **THREE** questions in section B

This paper consists of 4 printed pages. Please turn over

SECTION A (25 MARKS)

Attempt ALL questions in this section.

1. What is an extinction vortex? How can inbreeding and genetic erosion contribute to an extinction vortex **(5 Marks)**
2. Explain the principle of polymerase chain reaction (PCR) **(5 marks)**
3. Give one example of how invasive species can help conservation effort and another example when invasive species threaten native populations **(5 Marks)**
4. Identify and explain any three applications of genetics knowledge in biodiversity conservation **(5 marks)**
5. Draw genetic drift in allele frequency for a small population and for a large population. In what 2 ways are the graphs different **(5 marks)**

SECTION B (45 MARKS)

Attempt ANY THREE questions.

6. In a population of green and brown stick insects, the frequency of the allele for green color is 0.7.
 - i. Calculate frequency for:
 - a) the brown allele **(1 mark)**
 - b) the frequency of the homozygous brown insect color in the population **(1 mark)**
 - c) the frequency of insects that are heterozygous at the stick insect color locus **(1 mark)**
 - d) the frequency of the homozygous green insect color in the population **(1 mark)**
 - ii. Is this population in Hardy-Weinberg equilibrium? **(7 marks)**

- iii. Explain 4 assumptions made about this population when determining if the population is in Hardy–Weinberg equilibrium
(4 marks)

7. 40 Rothschilds giraffes (*Giraffa camelopardalis rotschildi*) were translocated from Lake Nakuru National park to Lambwe valley game reserve in 1976 to start a new population as a measure to boost the wildlife species in Lambwe valley. Current estimates indicate that the giraffe population in Lambwe valley has grown to over 180 individuals. You are a conservation geneticist writing a proposal for funding to study the current Lake Nakuru and Lambwe valley populations.

- i. From your conservation genetics knowledge, identify and explain issues of genetic importance that the study will investigate and clearly state one hypothesis and 2 objectives of the study
(12 marks)

- ii. Explain one practical application of the results of such a study to management of the giraffe populations in both conservation areas
(3 marks)

8. i. Discuss 5 differences between mitochondrial and nuclear DNA
(5 marks)

ii. List the pros and cons for mitochondrial DNA markers
(5 marks)

iii. List the pros and cons for one of the nuclear markers discussed in class
(5 marks)

9. Populations of grizzly bear population at Yellowstone National Park were estimated for the following years:

Year	Number
1920	40
1930	150
1940	260
1950	200
1959	154
1966	202

1974	136
1984	200

- i. Calculate the effective population size (N_e) for the bear population and compare it with the mean census population size over 8 generations. Interpret your results. **(8 marks)**
- ii. List 3 assumptions made about the population when calculating the N_e . **(3 marks)**
- iii. Calculate the inbreeding coefficient for the population after 25 generations and interpret your results. **(4 marks)**

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