05

RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (Special) Degree in Applied Biology
Fourth Year Semester IIExamination – April/May 2016

ZOO 4203 – WILDLIFE MANAGEMENT & CONSERVATION

Time: Two (2) hours

Answer four (04) questions only. Question number 1 is compulsory.

1. (a) Below are the genotypes at three loci from a sample of ten individuals of *Semnopithecus vetulus*.

Individual	Locus		
	1	2	3
1	aa	BB	CC
2	aa	Bb	CC
3	Aa	BB	CC
4	aa	Bb	CC
5	Aa	BB	CC
6	AA	BB	CC
7	aa	BB	CC
8	AA	BB	CC
9	AA	BB	CC
10	Aa	BB	CC

(i) What are the frequencies of alleles and genotypes at each locus?

(ii) What is the polymorphism using the 95% criterion (the frequency of the most common allele <95%) and heterozygosity for this population?

(iii) If individuals 1–6 were females and individuals 7–10 were males, what would be the effective population size of this population?

(iv) What portion of the genetic variance of this population would be likely to remain after three generations of random genetic drift?

(v) Will random genetic drift have an equal effect on all the alleles listed above? Briefly explain your answer.

(b) The table below is a summary of genetic distance [$F_{st}/(1 - F_{st})$] and geographic distance between six populations of two sympatric primates, *Semnopithecus vetulus* and *Macaca sinica*. *S. vetulus* is extremely arboreal while *M.sinica* is capable of using both arboreal and terrestrial pathways. Typically, *S. vetulus* travels relatively short distanced during a given day (≅200 m) in comparison to *M. sinica* (≅2000m). In addition, *S. vetulus* is extremely folivorous and selective, while *M. sinica* is frugivorous and flexible in its dietary ecology.

	Genetic distance	
Geographic distance (km)	*M. sinica*	*S. vetulus*
14.91	1.03	2.5
15.72	0.05	4.1
9.43	0.07	1.3
2.88	1	2.4
12.48	0.46	2.5
12.51	1.31	2.4
10.49	1.21	1.8
11.66	0.93	2.5
5.3	1.24	0.42
7.66	0.47	1.5
5.48	1.03	0.54
9.14	0.87	1.5
2.65	0.53	0.35
2.92	0.8	0.42
4.94	0.32	0.7

(i) Plot genetic distance against geographic distance for the two species and using the information provided above and provide two biological plausible explanations for the observed relationships.

(ii) Based on genetic distances between populations of each species, provide recommendations on how populations of these two species should be conserved. Justify your recommendations.

2. Describe four factors or processes that might contribute to a population's extinction.

3. Using examples, succinctly discuss why some species are rarer and some more sensitive to human induced disturbances than others.

4. Write short notes on **four (04)** of the following:

a) Spatial scales of biodiversity
b) Metapopulation dynamics
c) Evolutionarily significant units (ESU)
d) Population viability analyses
e) Survivorship curves

5. Briefly discuss the causes and consequences of deforestation.

Useful formulae

$$\frac{1}{N_e} = \frac{1}{t}\left(\frac{1}{N_1} + \frac{1}{N_2} + \frac{1}{N_t}\right)$$

$$N = \frac{4N_f N_m}{N_f + N_m}$$

$1 - 1/(2N)$

$[1-1/(2N)]^t$