THE OPEN UNIVERSITY OF SRI LANKA
B. Sc. DEGREE PROGRAMME – LEVEL 04 – 2005/2006
Botany – BTU 2102/ BTE 4102 – Genetics, Evolution & Introductory Molecular Biology

ASSESSMENT TEST II – NO BOOK TEST (NBT)

Reg. No. ----------

DATE : 18.08.2006 DURATION : ONE HOUR (3.30-4.30.p.m.)

This paper contains four (04) questions in Part A and three (03) questions in Part B.
There are eight (08) pages in the question paper.

Answer all questions.
Answers should be written in the space provided in the question paper.

PART A (50 marks)

1. (a) What is stated by the Hardy-Weinberg law?

(b) What are the assumptions of the above law?

2. Differentiate between the following

(a) Pseudo-coelomates and coelomates

Pseudo-coelomates	**Coelomates**

(b) Schizocoely and enterocoely

Schizocoely **Enterocoely**

(c) Protostomia and Deuterostomia

Protostomia **Deuterostomia**

3. (a) Describe the process of adaptive radiation.

(b) "Adaptive radiation has occurred often on islands". Briefly comment on this.

(c) What is character displacement?

4. Briefly compare the Old world monkey with New world monkey.

Old world monkey	**New world monkey**

PART B (50 marks)

1.

a) What is the meaning of genetic code ?

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b) The following sequence is found in a DNA polymer 20 bases long :

3'–C A C G T C A T T A T T C C A G C T TA–5'

i) What would be the first 10 bases of 3' end of the complementary strand ?

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ii) What would be the first 10 bases of the 5' end of the complementary strand ?

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c) In the presence of complementary strands, what is the % composition of the polymer, with respect to A-T base pairs and G-C pairs ?

2.

a) What is a nucleotide ?

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b) What is the composition of a single nucleotide ?

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c) The size of a hemoglobin gene in man is estimated to consist of approximately 450 nucleotide pairs. The protein product of the gene is estimated to consist of about 150 amino acid residues.

Estimate the size of the codone.

3.

a) The thymine analog 5-bromouracil is a chemical mutagen that induces single base-pair substitutions in DNA called transitions (substitutions of one purine for another purine and one pyrimidine for another pyrimidine).

Using the known nature of the genetic code (Table 1), which of the following amino acid substitutions should you expect to be induced by 5-bromouracil with the highest frequency ?

i) Met ⟶ Val
ii) Met ⟶ Leu
iii) Lys ⟶ Thr

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b) Using the information given in section (a), would you expect 5-bromouracil to induce a higher frequency of His ⟶ Arg or His ⟶ Pro substitutions ?

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c) With the help of the genetic code (Table 1) translate the following nucleotide sequence

5' – AUG AAG GGC UUU GGC CAU GGG GAU AAG UAC - 3'

Table 1

	AGA								UUA					AGC						
	AGG								UUG					AGU						
GCA	CGA						GGA		CUA				CCA	UCA	ACA			GUA		
GCC	CGC						GGC	AUA	CUC				CCC	UCC	ACC			GUC	UAA	
GCG	CGG	GAC	AAC	UGC	GAA	CAA	GGG	CAC	AUC	CUG	AAA	UUC	CCG	UCG	ACG		UAC	GUG	UGA	
GCU	CGU	GAU	AAU	UGU	GAG	CAG	GGU	CAU	AUU	CUU	AAG	AUG	UUU	CCU	UCU	ACU	UGG	UAU	GUU	UGA
Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Thr	Trp	Tyr	Val	Stop
A	R	D	N	C	E	Q	G	H	I	L	K	M	F	P	S	T	W	Y	V	

The genetic code. The standard one-letter abbreviation for each amino acid is presented bellow three-letter abbreviation. Codons are written with the 5'-terminal nucleotide on the left. Note that most amino acids are represented by more than one codon and that variation is common at the third nucleotide.