



RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES, MIHINTALE

B.Sc. (Special) Degree in Applied Biology
Fourth Year – Semester I Examination –April/May 2015

MIB 4204 – BIOINFORMATICS

Time: Two (02) hours

Answer all (4) questions.

1. Write short notes on;

- (a) rooted vs unrooted tree
- (b) PAM and BLOSSUM matrices
- (c) orthologous and paralogous genes
- (d) BLAST

(4 x 25 marks)

2. (a) I. What is meant by 'E value'?

II. In a databank search using an amino acid sequence as query, the only reported match has an E value of 10. What does this mean about the similarity and homology of the sequences?

(20 marks)

(b) 'Bioinformatics is an amalgamation of different fields of study'. Justify the statement.

(20 marks)

(c) I. Describe pairwise sequence alignment.

II. Differentiate between local and global alignments

(30 marks)

(d) Comment on the following.

- I. protein sequence is a better choice for similarity search than DNA.
- II. in a homology search it is better to filter low complexity regions.
- III. different results could be obtained in a similarity search for the same query if 'highly similar sequences' option is changed to 'somewhat similar sequences'.

(30 marks)

3. (a) Differentiate between an iterated blast (psi-blast) search and a simple blast search.

(20 marks)

(b) A group of researchers at the quarantine office, SLPA (Sri Lanka Ports Authority) asserts, that a recent batch of imported potatoes are transgenic. Write a logical stepwise approach to prove or disprove this claim.

(Hint: α and β cyclodextrins are produced by transgenic potatoes)

(80 marks)

4. Elephant Endotheliotropic Herpes Virus (EEHV) is a devastating infectious disease of both wild and captive Asian and African elephants. A group of Sri Lankan researchers claims, that the cause of the recent outbreak of elephant haemorrhagic disease is due to a new strain.

Write a logical proposal to investigate this claim.

(Please note that your proposal is expected to get through the ethical clearance committee)

(100 marks)