B.TECH/ AEIE / CHE /CSE/IT/8TH SEM/ BIOT 4281/2018

COMPUTATIONAL BIOLOGY
(BIOT 4281)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) FlyBase is a
(a) biodiversity database (b) model organism database
(c) literature database (d) biomolecular database.

(ii) Logarithms are commonly denoted as-x =
(a) lny/x10 (b) lnxy/ (c) lnay/x30 (d) lny30.

(iii) Growth process which is characterized by constant decrease in percentage of values is referred to as
(a) exponential infinite process (b) exponential decay process
(c) exponential growth process (d) exponential finite process.

(iv) In exponential function class $f(x) = bx$ where $0 < b < 1$, function between x and y is classified as x is
(a) increasing function of y/y (b) decreasing function of x/y
(c) increasing function of x/x (d) decreasing function of y.

(v) In exponential growth and decay processes, effect of increase and decrease in dependant variable is
(a) constant (b) variable (c) compound (d) principal.

(vi) Base-e exponential functions are best in mathematical modeling of
(a) bacteria growth (b) radioactive decay
(c) population growth (d) all of above.

(vii) A comprehensive database for the study of human genetics and molecular biology is
(a) PDB (b) STAG (c) OMIM (d) PSD.

(viii) DNA and RNA are examples of
(a) carbohydrates (b) proteins (c) nucleic acids (d) lipids.

(ix) Glycogen, starch, and cellulose are examples of
(a) proteins (b) nucleic acids
(c) polysaccharides (d) lipids.

(x) Adenosine Triphosphate (ATP) is formed by the
(a) ADP (b) phosphate
(c) monosaccharides (d) all of the above.

Group – B

2. (a) Classify carbohydrate according to the number of monomer present and explain their property. Give examples of each of them.

(b) What is the function of the carbohydrates in the body? What is glycosidic bond?

(c) What is the difference between starch and cellulose? Why human cannot digest cellulose?

6+ 3 + 3 = 12

3. (a) What are fats? What are saturated fatty acids and unsaturated fatty acids? Give examples of each of them.

(b) What are phospholipids? Write down the importance of phospholipid. What are steroids?

2+ 2+ 2+ 2+ 2+ 2 = 12

Group – C

4. (a) Write short notes on SRS and Entrez. How nucleotide sequence databases can be classified? Describe with proper example.

(b) What is a composite database? Discuss with proper examples.

2+ 2+ 6+ 2 = 12

5. (a) Write short notes on PDB.

(b) Describe in detail about SCOP and CATH.

(c) Mention two names of each of the following:
(i) Secondary database of nucleotide sequence
(ii) Secondary database of protein sequence

4+ 2 +2+ (2 + 2) = 12

Group – D

6. (a) What are the different type of sequence alignment? Briefly explain about them.

   (b) Define the followings in respect of proteins database
   (i) Pattern
   (ii) Motif
   (iii) Profile

   (c) What is a Hidden Markov Model (HMM)? Why it is called hidden?

4+ 2+ 2+ 2+ 2 = 12

7. (a) Mention the characteristics of Python.

   (b) Mention how Python can be used for parsing of biological data.

   (c) Mention with example how representation of sequences can be done using Biopython.

3+ 5+ 4=12

Group – E

8. (a) Describe receptor theory.

   (b) Define antagonist.

   (c) Briefly describe the types of antagonism.

   (d) Mention the fundamental forces involved in the interaction of ligand and receptor.

4+ 2+ 4+ 2=12

9. (a) Write the logistic model for microbial growth kinetics and mention the basic assumption of the model.

   (b) Write the Monad model for microbial growth kinetics and mention the basic assumption of the model.

6 + 6 =12