2018

ZOOLOGY

ZOO-104:

EVOLUTION AND BIOINFORMATICS

Full Marks:80

Time: 3 hours

The figures in the margin indicates full marks for the questions :

1. Answer the following multiple choice questions (any eight) ***(1 x 8 = 8)***

i) Migration leads to evolution and genetic variation in a population by --

a) increasing the bottleneck effect

b) increasing the gene pool of the population

c) changing the allele frequencies of the population

d) altering the mutational pressure in the population

ii) Which one of the following statements is INCORRECT?

a) Non-synonymous mutation is a frameshift mutation

b) The rate of synonymous mutation takes place faster than non-synonymous mutations

c) For similar protein type the rate of mutation is constant over millions of years

d) Non-synonymous mutation have negative effects

iii) Which one of the following support the existence of RNA world?

a) Presence of OH- group at 2'-position of ribose sugar in nucleotide

b) Higher folding flexibility of RNA over DNA

c) Catalyzing property of RNA

d) All of the above

iv) Which one of the following is the most important difference between new and old world monkeys?

a) Difference in the ancestors of both the monkeys

b) Difference in body sizes of both the monkeys
c) Nostril morphology of both the monkeys
d) Presence of long prehensile tail

v) Choose the incorrect matching -

Human ancestors		**Brain size**
a) *Homo habilis*	.....	*about 400-550 cc*
b) *Homo ergaster*	.....	*about 600-700 cc*
c) *Homo rudolfensis*	.....	*about 750 cc*
d) *Homo erectus*	.....	*about 1000 cc*

vi) Which one of the following character brings archaea close to eukaryotes?
a) Nature of metabolism
b) Translation mechanism
c) Both (a) & (b)
d) Neither (a) nor (b)

vii) Which one of the following is INCORRECT combination?
a) Bio-informatics---------- study of biological data using computer
b) In-silico study---------- study of anything using bio-informatics tools
c) PIR ---------- Protein Information Resources
d) EMBL, Barcelona ---------- study of tissue biology

viii) If a protein rotates in left-handed manner, which one of the following will be the favored dihedral angles?
a) Φ - positive & Ψ - positive
b) Φ - positive & Ψ - negative
c) Φ - negative & Ψ - positive
d) Φ - negative & Ψ - negative

ix) Which is NOT correct statement regarding protein modeling?
a) Ab-initio modeling requires no template
b) Threading depends upon sequence similarity
c) Homology modeling depends upon template and sequence similarly
d) Modeling gives 3D protein structures from sequences

2. Answer the following short questions (any five) ***(2 x 5 = 10)***

a) What are prebiotic molecules? Give Examples.
b) "Bottleneck effect of genetic drift leads to homozygocity in population?" Justify.
c) What do you mean by genomics of humanness?
d) What do you mean by loops and domains of a protein?
e) What are the fates of duplicated genes?
f) What do you mean by bioinformatics and computational biology?

3. Answer the following questions (any four) ***(5 x 4 = 20)***

a) Write the salient features of Neutral theory of Motoo Kimura.
b) Write the problems and issues of hominoid tree construction.
c) What are the major differences between bacteria and archaea?
d) Write short notes on NCBI.
e) "Docking is an in-silico method of new drug designing" Explain.

4. Answer the following long type question ***(9 x 2 = 18)***

a) Describe in detail about proteomics and genomics study. 9

Or

What is sequence submission and retrieval? How do you correlate nucleic acid sequences with biological functions? 4+5

b) Describe the evolution of Homo sapiens from hominid group. How is human evolution related to brain size? 7+2

Or

What do you mean by gene duplication and divergence? Explain molecular clock with example to describe molecular divergence. 4+5

5. Answer the following very long type questions ***12 x 2 = 24***

a) Describe the various types of nucleic acid and protein databases. Why do you think biological database is important in biological science? 10+2

Or

What is protein modeling? Write the various steps of homology protein modeling. Add note on model validation using Ramachandran plot. *2+8+2*

b) What do you mean by vertical and horizontal gene transfer? Describe how plasmid, transposable elements and integrons help in gene transfer. 3+9

Or

What do you mean by evolution? Describe the role of mutation, gene duplication, genetic drift and migration in evolution. 2+10

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