

M. Sc. DEGREE EXAMINATION, APRIL 2023
BIOINFORMATICS
SECOND SEMESTER

COURSE : CORE

PAPER : GENOMICS AND PROTEOMICS

TIME : 90 MINUTES

MAX. MARKS: 50

SECTION – A

ANSWER ALL THE QUESTIONS

(20 X 1 =20)

1. What is the consequence of a change in the genetic diversity
 - a) results in loss of biological diversity
 - b) leads to an increase in the population
 - c) results in loss of human species only
 - d) causes pollution
2. Which of the following statements are not true - Microarrays Are used for analysis of
 - i. transcriptomes
 - ii. Contain RNA sequences
 - iii. Contain DNA sequences
 - iv. Are smaller than DNA chips
 - a). i and ii correct
 - b) ii and iii correct
 - c) i and iii correct
 - d.) ii and iv correct
3. Which of the following statements are not true - ORF scanning
 - i. Is used to find exons
 - ii. Is used to find intergenic sequences
 - iii. Is used to find gene homologies
 - iv. Is used to find protein-coding genes
 - a) i correct
 - b) ii correct
 - c) iii correct
 - d) iv correct
4. Two more recent uses of phylogenetic analysis are to analyze _____ and to trace the evolutionary history of specific genes. Which of the following could not be the correct blank?
 - a) gene families
 - b) genomes
 - c) proteomes
 - d) physical separation methods
5. Phylogenetic hypotheses are strongest when
 - a) they are based on amino acid sequences from homologous proteins, as long as the genes that code for such proteins contain no introns.
 - b) each clade is defined by a single derived character.
 - c) they are supported by more than one kind of evidence, such as when fossil evidence corroborates molecular evidence.
 - d) they are accepted by the foremost authorities in the field, especially if they have won Nobel Prizes.
6. DNA sequencing followed by genome annotation are steps of
 - a) Comparative genomics
 - b) Structural genomics
 - c) Functional genomics
 - d) transcriptomics
7. Which out of the following statements is true about the regulation of metabolic pathway?
 - a) Most of the metabolic pathways are regulated
 - b) Most of the metabolic pathways are not regulated
 - c) Regulation of metabolic pathways always involves changing the amount of enzymes
 - d) Metabolic regulation always depends on control by hormones

8. To apply parsimony to constructing a phylogenetic tree,
- choose the tree that assumes all evolutionary changes are equally probable.
 - choose the tree in which the branch points are based on as many shared derived characters as possible.
 - base phylogenetic trees only on the fossil record, as this provides the simplest explanation for evolution.
 - choose the tree that represents the fewest evolutionary changes, either in DNA sequences or morphology.
9. rsID means
- Reference SNP cluster ID
 - Rapid Stain Identification Series
 - Resource Sequence International Design
 - SNP with random repeats
10. Which of these might be an advantage to genetic testing of individuals via microarrays?
- Many different potential mutations in a single gene could be tested at once.
 - Expression patterns of many different genes can be analyzed simultaneously.
 - Microarray analysis can provide relative levels of expression of particular genes.
 - All of these.
11. Who created meta-learning?
- Chelsea Finn
 - Peer Bork
 - Wolfgang Huber
 - Lior Pachter
12. In terms of understanding the pathways between genes and behaviour, it is fairly safe to say that
- we know more about the environment than the genes
 - we know more about the genes than the environment
 - the new field of molecular genetics is the best way to gain a full understanding of the gene/environment interactions in the pathways
 - QTL analysis has actually hindered the understanding of these pathways by suggesting so many separate gene contributions to basic behaviour processes
13. How many variants are there in dbSNP?
- 15 Millions
 - 1 million
 - 10 million
 - 10 billion
14. How is a microarray constructed? In each spot, there are:
- Copies of all the genes for an organism.
 - Multiple copies of one gene; each spot has copies for a different gene.
 - Multiple copies of intergenetic sequences, which bind to genes in the samples.
 - Copies of intergenetic sequences, which promote the replication of DNA in a sample.
15. Which of the four genes has the ability to act as a reliable molecular clock?
- Histone
 - Helicase
 - DNA polymerase
 - DNA ligase
16. Which of the following is incorrect regarding sequence homology?
- It is an important concept in sequence analysis
 - When two sequences are descended from a common evolutionary origin, they are said to share homology
 - Two sequences can homologous relationship even if have do not have common origin
 - When two sequences are descended from a common evolutionary origin, they are said to have a homologous relationship

17. The two most common processes that lead to production of multiple functional proteins from the same DNA sequence are:
- RNA editing and alternative splicing.
 - Protein folding and posttranslational covalent modifications.
 - Alternative splicing and posttranslational covalent modifications.
 - Posttranslational covalent modification and transcriptional regulation.
18. Which of these is the most important aspect of planning and designing a good proteomics experiment?
- Effective data analysis
 - Appropriate choice of samples and controls
 - Robust sample preparation methods
 - All of the above
19. The two most common processes that lead to production of multiple functional proteins from the same DNA sequence are:
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20. In an analysis of eukaryotic gene, you identify several non-overlapping open reading frames, but they are not all in the same frame. Which explanation makes the most sense?
- By random chance, a second reading frame within the gene also has an open reading frame.
 - This gene includes introns which are not multiples of three.
 - This is a mutant allele that has had several small insertions.
 - All of these.

SECTION – B

ANSWER ANY TWO OF THE FOLLOWING

(2 X 15 =30)

- Describe the experimental techniques for gene location and computer analysis of a gene function.
- Explain the following: a. Gene Prediction by ORF analysis; b. Genomes of Chimpanzees.
- Illustrate the working and applications of EST with a detailed note on Clustering and Assembly.
- Describe the importance of Protein Interaction Networks and Mapping Protein modifications.
