CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY
अमृतं तु विद्या

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY (CHARUSAT)

CHARUSAT Campus, Changa – 388 421.

M Sc (BIOCHEMISTRY)
SEMESTER III EXAMINATION (BACKLOG)
BC801: GENETIC ENGINEERING & BIOINFORMATICS

Date: 21.04.2011
Time: 10.00 a.m. to 1.00 p.m. **Total Marks: 70**

Instructions to the candidates:

1. Provide all necessary information as required in the answer sheet.
2. Attempt all questions.
3. Questions in **Part A** should be answered in the question paper itself. Please **do not write** your candidate ID number on the question paper for Part A.
4. Write answers for Section I and Section II of **Part B** in separate answer sheets.
5. Use of cell phones is strictly prohibited.
6. Use of non-programmable calculators may be allowed if needed.

PART A

Total marks: 20

Q1. Choose the correct option and put √ mark in front of it:

1. Which of the following can be used as a polymerase for PCR reaction?
(a) Taq DNA polymerase (b) Pfu DNA polymerase (c) None of the above (d) Both of the above

2. Which of the following activities is missing in *E coli* DNA polymerase Klenow fragment?
(a) 5'-3' exonuclease (b) 3'-5' exonuclease (c) 5'-3' polymerase (d) strand displacement

3. Which of the following is important for formation of cosmids?
(a) Restriction sites (b) Recognition site (c) Cos sites (d) Multiple cloning site

4. DNA ligase catalyses the formation of
(a) Hydrogen bond (b) Phosphodiester bond (c) Both of the above (d) None of the above

5. The terms 'Relaxed and Stringent' is used to classify which of the following?
(a) Phages (b) Phagemids (c) Plasmids (d) artificial chromosomes

6. Which of the following best describes GFP (Green Fluorescent Protein)?
(a) Reporter gene (b) Fluorescent expression tag (c) Both of the above (d) None of the above

7. Red-white selection strategy can be used for which of the following host systems?
(a) *Bacillus* (b) *Streptomyces* (c) *E. coli* (d) Yeast

8. A vector that can replicate in both *E. coli* and *Bacillus* can be best described as
(a) Expression vector (b) cloning vector (c) Shuttle vector (d) broad-host-range vector

9. Which of the following components of a gene is lost during construction of cDNA library?
(a) Exon (b) Promoter
(c) Terminator (d) Intron

10. A flat file can be divided into
    (a) Two categories (b) Three categories (c) Four categories (d) Five categories

11. SCOP
    (a) Compares and classify protein structures (b) Visualize protein structures
    (c) Determines protein Structure (d) None of the above

12. NCBI is located at
    (a) Chicago, USA (b) New York, USA (c) Texas, USA (d) Bethesda, USA

13. Which of the following is an important tool for mapping and analysis of complex eukaryotic genomes?
    (a) Cosmids (b) Artificial Chromosomes (c) Phasmids (d) Phagemids

14. Which of the following is **NOT** a component of yeast-two-hybrid-system?
    (a) Bait (b) Prey (c) Hook (4) None of the above

15. VAST stands for
    (a) Vector Alignment Search Tool (b) Vector Assigned Search Tool
    (c) Virus Aminoacid Sequence Tool (d) None of the above

Q2. Say True or False

1. Germline transformation is employed to generate transgenic bacteria. **[True] False]**
2. Plasmid is maintained as an extrachromosomal DNA. **[True] False]**
3. A good protein structure should have a high R-factor **[True] False]**
4. Autonomously replicating sequence (ARS) is a component of plasmids replicating in yeast. **[True] False]**
5. Vectors combining elements from both plasmids and phages are known as phagemids. **[True] False]**

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Part B **Total Marks: 50**

Section I

Q.1 (A) What are linkers and adapters? Explain their use in cloning of a DNA fragment. **(4)**

OR

Q.1 (A) Describe different forms of plasmid. Explain their differential electrophoretic mobilities on agarose gel. **(4)**

Q.1 (B) Write shortnote on **any two** of the following: **(4)**

(i) Alkaline phosphatase
(ii) Ideal features of a plasmid as cloning vector
(iii) Labeling nucleic acids using *E. coli* DNA polymerase Klenow fragment.
(iv) Replacement phage vectors

Q.1 (C) Enlist the main DNA modifying activities of *E. coli* DNA polymerase I **(2)**

Q.2 (A) Describe various types of biological databases **(4)**

OR

Q.2 (A) Describe the importance of developing various types of tools in bioinformatics **(4)**

Q.2 (B) Explain in brief about OMIM **(3)**

OR

Q.2 (B) Dissect GenBank flat file **(3)**

Q.2 (C) Describe in short various tools for sequence analysis **(3)**

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Section II

Q.3(A) What are broad host range plasmids? Explain their importance in genetic engineering. **(4)**

OR

Q.3(A) Explain the PCR based strategy for cloning a gene from genomic DNA **(4)**

Q.3(B) Write shortnotes on **any two** of the following: **(6)**
(i) Yeast artificial chromosomes (YACs)
(ii) Expression vectors
(iii) Methods to prevent formation of inclusion bodies
(iv) Shuttle vectors

Q.4(A) Explain **any two** of the following: **(6)**
(i) Use of Reporter genes in screening for recombinant clones
(ii) Yeast two hybrid system
(iii) Chromosome walking
(iv) Ti-plasmids

Q.4(B) Explain the spi+ phenotype based selection strategy for recombinant phage vectors **(4)**

OR

Explain the blue-white selection for screening recombinant plasmid vectors **(4)**

Q.5(A) Write a shortnote on **any two** of the following: **(6)**
(i) VADAR
(ii) CATH
(iii) Boot strapping

Q.5(B) List the characteristics required to generate acceptable protein structure **(4)**

OR

Which are the various steps involved in Phylogenetic tree constructions? Explain the importance of Phylogenetics at the molecular level. **(4)**