

**B.Sc. BIOTECHNOLOGY**  
**Fifth Semester**  
**GENETIC ENGINEERING**  
**(BBT - 21)**

**Duration: 3Hrs.**

**Full Marks: 70**

Part-A (Objective) =20  
Part-B (Descriptive) =50

**(PART-B: Descriptive)**

**Duration: 2 hrs. 40 mins.**

**Marks: 50**

**Answer any four from Question no. 2 to 8**  
**Question no. 1 is compulsory.**

1. Writes short notes on: (2×5=10)
  - a) YAC
  - b) Cosmids
  - c) Salient features of human genome.
  - d) pBR<sub>322</sub>
  - e) Ligase
2. What is bacteriophage? How does it act as a cloning vector? Describe the lytic cycle of virus replication. (2+3+5=10)
3. What is the function of MgCl<sub>2</sub> and dNTPs in polymerase chain reaction (PCR)? Describe the three major steps of PCR. Describe the strategies involved in developing a hot start PCR. (2+3+5=10)
4. What are molecular probes? What are the detection systems commonly used in preparing nucleic acid probes? Describe the three important techniques used for probe labeling. (2+3+5=10)
5. What is a gene library? How will you create a genomic DNA library? Describe two major methods for screening a genomic library. (2+3+5=10)

6. Describe the enzymatic method of DNA sequencing. How will you sequence the following sequence based on the above method. (5+5=10)  
5'- GAATTCGTCCTATTCTCTACGCC -3'
7. Write short notes on: (5+5=10)  
a) Transfection technique in animals.  
b) Direct transfer method of gene transfer.
8. How will you ligate a sticky ended vector to a blunt ended target DNA? Describe the methods with the detailed mechanism. (10)

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**Duration: 20 minutes**

**Marks – 20**

**(PART A - Objective Type)**

**I. Choose the correct answer:**

**1×20=20**

1. Some of the steps involved in Gene Cloning are given below:

- i) Insertion of isolated gene to the vector
- ii) Introduction of recombinant vector to the host
- iii) Isolation of desired gene
- iv) Expression of recombinant gene in host
- v) Extraction of recombinant gene product

The correct sequences of steps involved are:

- (a) iii, i, iv, ii, v
- (b) iii, i, ii, iv, v
- (c) i, ii, iii, iv, v
- (d) ii, i, iii, iv, v

2. Exonuclease are a group of enzyme which cleaves

- (a) Externally
- (b) Internally
- (c) Hydrogen bond
- (d) Both a and b

3. Which of the following statements is true?

- (a) A vector must have origin of replication.
- (b) A vector must replicate autonomously.
- (c) A vector must have unique restriction sites.
- (d) All of these.

4. The use of alkaline phosphatase is to

- (a) remove terminal phosphate from 5' end
- (b) remove terminal phosphate from 3' end
- (c) remove terminal phosphate from both end
- (d) all of these

5. Vector commonly used for sequencing human genome

- (a) Plasmid
- (b) Phagemid
- (c) BAC
- (d) M13

6. Lysogenic strains are also called as

- (a) Virulent phage
- (b) Temperate phage
- (c) Both (a) and (b)
- (d) None of these

7. Restriction enzymes are also called

- (a) molecular knives
- (b) molecular scalpels
- (c) molecular scissors
- (d) all of these

8. The size of DNA of human genome is  
(a)  $3.2 \times 10^6$  bp                      (b)  $3.4 \times 10^6$  bp  
(c)  $4.3 \times 10^6$  bp                      (d)  $3.2 \times 10^9$  bp
9. Which statement about Klenow fragment is FALSE?  
(a) It has no nuclease activity.  
(b) It cannot continue the synthesis once the nick is filled in.  
(c) It has nuclease activity.  
(d) Synthesize a complementary DNA strand.
10. Which of the following ions are required for the activity of Type II restriction enzyme?  
(a)  $\text{Ca}^{2+}$                       (b)  $\text{Mg}^{2+}$                       (c)  $\text{Mn}^{2+}$                       (d)  $\text{Cl}^{2+}$
11. Which of the following virus is used as vector for transduction in animals?  
(a) Adeno virus                      (b) Retro virus  
(c) Adeno associated virus                      (d) All of the above
12. In transgenic rabbits, recombinant proteins can be extracted from  
(a) meat                      (b) milk  
(c) urine                      (d) none of the above
13. Electroporation is a  
(a) transfection technique                      (b) direct transfer method  
(c) viral transduction                      (d) none of the above
14. During a PCR reaction the dNTPs are generally added at the  
(a) 3'-OH end of primers                      (b) 5'-OH end of primers  
(c) 3'-OH end of template                      (d) 5'-OH end of template
15. Western blotting are commonly use for the identification of desired  
(a) proteins                      (b) amino-acids  
(c) DNA                      (d) RNA
16. Multiplex PCR generally gives  
(a) single amplicon  
(b) multiple amplicons of similar sizes  
(c) multiple amplicons of different sizes  
(d) None of the above
17. The DNA fingerprinting pattern of a child is  
(a) Exactly similar to both the parents.  
(b) 100% similar to the father's DNA print.  
(c) 100% similar to the mother's DNA print.  
(d) 50% bands similar to father and rest similar to mother.
18. For protein detection, most commonly used probe is  
(a) antibody                      (b) antigens  
(c) lectins                      (d) interferons

19. Dideoxynucleotide is used in which of the sequencing method

- (a) Pyrosequencing
- (b) Chemical Sequencing
- (c) Enzymatic Sequencing
- (d) All of the above

20. Nucleic Acid probes are not used for hybridization in

- (a) Southern Blotting
- (b) Northern Blotting
- (c) Screening of gene library
- (d) Western blotting

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