

2 0 2 5

( CBCS )

( 6th Semester )

**BIOCHEMISTRY**

TWELFTH (A) PAPER

**( Genetic Engineering and Biotechnology )**

( Revised )

Full Marks : 75

Time : 3 hours

*The figures in the margin indicate full marks for the questions*

**( SECTION : A—OBJECTIVE )**

( Marks : 10 )

Tick (✓) the correct answer in the brackets provided :

1×10=10

1. Choose the incorrect pair from the following.

- (a) Methylase–Addition of methyl group ( )
- (b) Restriction enzyme–Exonuclease ( )
- (c) Hin–Haemophilus influenza ( )
- (d) Palindrome–Recognition site ( )

2. Restriction modification system explains

- (a) bacterial host defense mechanism through restriction enzyme and methylase activity ( )
- (b) recognition of mismatch pair in DNA replication ( )
- (c) generation of overhanged DNA by restriction endonuclease ( )
- (d) relaxation of overwind DNA by topoisomerase ( )

3. The first step in the process of gene cloning is

- (a) screening for recombinant clones ( )
- (b) ligation of DNA fragment ( )
- (c) transformation of host cells ( )
- (d) isolation of the gene of interest ( )

4. Plasmids are used as cloning vectors for which of the following reasons?
- (a) Can be multiplied in culture ( )
  - (b) Self-replication in bacterial cells ( )
  - (c) Can be multiplied in laboratories with the help of enzymes ( )
  - (d) Replicate freely outside bacterial cells ( )
5. Southern blotting is
- (a) attachment of probes to DNA fragments ( )
  - (b) transfer of DNA fragments from gel to membrane ( )
  - (c) comparison of DNA fragments to two sources ( )
  - (d) transfer of DNA fragments to gel from membrane ( )
6. Why is a probe labeled?
- (a) To improve stability ( )
  - (b) To improve location identification ( )
  - (c) To improve binding capability ( )
  - (d) None of the above ( )
7. RT-PCR (Reverse Transcription PCR) is PCR preceded with conversion of sample
- (a) RNA into cDNA ( )
  - (b) RNA into DNA ( )
  - (c) DNA into mRNA ( )
  - (d) DNA into rRNA ( )
8. What percentage of human genome codes for proteins?
- (a) 0.5 to 1% ( )
  - (b) 1.1 to 2.1% ( )
  - (c) 1.1 to 1.5% ( )
  - (d) 2% ( )
9. The A chain and the B chain of the insulin protein comprise respectively of how many amino acid chains?
- (a) 20 and 31 ( )
  - (b) 20 and 30 ( )
  - (c) 21 and 30 ( )
  - (d) 21 and 35 ( )
10. The first human protein to be synthesized in *E. coli* was
- (a) insulin ( )
  - (b) somatostatin ( )
  - (c) somatotrophin ( )
  - (d) human factor VIII ( )

**( SECTION : B—SHORT ANSWERS )**

( Marks : 15 )

Write short notes on/Answer the following :

3×5=15

UNIT—I

1. Restriction modification system

**OR**

2. Types of restriction endonuclease

UNIT—II

3. Properties of YAC vector

**OR**

4. Steps in rDNA technology

UNIT—III

5. Principle of nucleic acid hybridization

**OR**

6. Western blotting

UNIT—IV

7. Objectives of human genome project

**OR**

8. Discuss chain termination method of DNA sequencing.

UNIT—V

9. Ethical concern related to genetic engineering technology

**OR**

10. Golden rice

( SECTION : C—DESCRIPTIVE )

( Marks : 50 )

Answer the following :

10×5=50

UNIT—I

1. What is recombinant DNA technology? Write down the different enzymes used in manipulating DNA molecules. 1+9=10

**OR**

2. Write notes on the following : 5×2=10  
(a) Scope of rDNA technology  
(b) Differentiate between blunt end and sticky end cloning

UNIT—II

3. Elaborate on any one transfection method that you know. 10

**OR**

4. Describe in detail how genomic and cDNA libraries are made. 5+5=10

UNIT—III

5. Discuss the principle and procedure of Southern blotting. 5+5=10

**OR**

6. Write notes on the following : 5×2=10  
(a) Northern blotting  
(b) Microarray technology

UNIT—IV

7. Elaborate on Maxam-Gilbert method of DNA sequencing. 10

**OR**

8. Explain the principle and applications of polymerase chain reaction. 10

UNIT—V

9. Discuss the process of production of recombinant insulin. 10

**OR**

10. Write notes on the following : 5×2=10  
(a) Hybridoma technology  
(b) Bt crops

\*\*\*