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(CBCS)

(6th Semester)

ZOOLOGY

TWELFTH (A) PAPER

(Biotechnology and Bioinformatics)

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. Primers used for PCR which are not fully complementary to the target sequences are known as

(a) gene-specific primers   (   )

(b) degenerate primers   (   )

(c) nested primers   (   )

(d) RACE primers   (   )

2. Which region of DNA sequences is/are utilized in the process of DNA fingerprinting?

(a) Intronic sequences   (   )

(b) Single nucleotide polymorphism   (   )

(c) Repetitive DNA   (   )

(d) Promoter sequences   (   )

3. Which of the following describes the function of DNA ligase enzyme?

(a) It cleaves a phosphodiester bond near a single-strand break in DNA, a reaction between a 3 -OH group and a 5 -monophosphate.   (   )

(b) It forms a glycosidic bond at a single-strand break in DNA, a reaction between a 5 -OH group and a 3 -monophosphate.   (   )

(c) It cleaves a glycosidic bond at a single-strand break in DNA, a reaction between a 3 -OH group and a 5 -monophosphate.   (   )

(d) It forms a phosphodiester bond at a single-strand break in DNA, a reaction between a 3 -OH group and a 5 -monophosphate.   (   )

4. S1 nuclease enzyme would cleave which of the following molecules?

(a) Double-stranded DNA only   (   )

(b) Single-stranded RNA only   (   )

(c) Both single-stranded DNA and RNA   (   )

(d) Both double-stranded DNA and RNA   (   )

5. Which of the following vectors can accommodate the largest insect size?

(a) Yeast artificial chromosome   (   )

(b) Bacterial artificial chromosome   (   )

(c) Bacteriophage P1   (   )

(d) Phage lambda ( )   (   )

6. Bt crops produce Cry toxins that are activated inside the target insects by

(a) low pH of the insect stomach   (   )

(b) temperature of the gut lining   (   )

(c) digestive enzymes of insect   (   )

(d) high pH of insect gut   (   )

7. Which of the following is not an online search engine?

(a) Alta Vista   (   )   *(b)* Solaris   (   )

(c) Lycos   (   )   *(d)* WebCrawler   (   )

8. Medline is the largest component of

(a) PubMed   (   )   *(b)* ExPASY   (   )

(c) DDBJ   (   )   *(d)* EMBL   (   )

9. A program that can be used to align multiple nucleotide and protein sequences is

(a) tBLASTx   (   )   *(b)* VecScreen   (   )

(c) ClustalW   (   )   *(d)* GenBank   (   )

10. Which of the following is not a common test in phylogenetic analysis?

(a) Bootstrap ( )   *(b)* Jackknife ( )

(c) Permutation ( )   *(d)* Caveats ( )

(SECTION : B—SHORT NOTE)

(*Marks* : 15)

Write short notes on the following :   3×5=15

UNIT—I

1. Components of PCR

OR

2. Applications of Western blotting

UNIT—II

3. Application of antibiotic resistance in gene cloning

OR

4. Recombinant DNA technology

UNIT—III

5. cDNA synthesis

OR

6. Genetically modified organisms

UNIT—IV

7. Search engines

OR

8. Basic operating systems

UNIT—V

9. BLAST(P)

OR

10. Phylogenetic tree

(SECTION : C—DESCRIPTIVE)

(*Marks* : 50)

Answer the following questions :   10×5=50

UNIT—I

1. Describe in detail the principles and applications of Southern blotting.

OR

2. What are the different steps involved in sequencing the entire genome of an organism?

UNIT—II

3. Explain the principle and applications of gene cloning.

OR

4. Write short notes on the following :   5+5=10
   (a) Bacterial transformation
   (b) Plasmid vectors

UNIT—III

5. What are gene libraries? How are they constructed?

OR

6. What is gene therapy? Discuss the concept in detail citing appropriate examples.

UNIT—IV

7. Discuss the various applications of bioinformatics in modern science.

OR

8. Explain how sequence similarity searches are performed using online databases.

UNIT—V

9. Elaborate on the various components and uses of BLAST.

OR

10. Give an account of online genome and proteome databases.

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