

Q. No. BTC - 401

75

ND/B.Tech./Even

Reg/2022-23

2022-23

**MOLECULAR BIOLOGY AND
RECOMBINANT DNA TECHNOLOGY**

BTC - 401

Full Marks : 25

Time : Ninety Minutes

The figures in the margin indicate full marks.

Question no. 1 is compulsory.

Answer any *three* from the rest of the questions (2-5)

1. (i) In eukaryotic replication; helicase loading in all replicators happen during phase

(a) G0

(b) G1

(c) S

(d) G2

(e) M

- (ii) In a strand of linear short double stranded DNA, there are 10 complete turns with 10.5 bp/turn. The ends of the DNA molecule are now sealed together to make a relaxed circle. The linking number of the circle will be _____ .

P.T.O.

- (iii) RNA is more/less stable than DNA under acidic condition; but more/less stable under alkaline condition.
- (iv) The two helix of a DNA is wound parallel/antiparallel around the same/opposite axis.
- (v) Which of the following is/are not a component of the nucleic acid backbone?
- (a) Nucleotide
 - (b) Phosphate group
 - (c) Pentose sugar
 - (d) Phosphodiesterase bond
- (vi) If you were to use *E.coli* DNA polymerase instead of Taq Polymerase in a classical PCR-reaction, you will have to
- (a) Add fresh enzyme after each denaturation step
 - (b) Carry out denaturation step at 50°C instead of 95°C
 - (c) Use different primers
 - (d) Use water bath instead of thermal block
- (vii) A DNA with the sequence
- 5'CGCATCGATCATGCCCTGA...AGTCCCATTAGA
TGCC3' needs to be PCR amplified. The reverse primer
will have the following sequence :
- (a) 5'GGCATCTA3'

(3)

(b) 5'TAGATGCC3'

(c) 5'GGACTCTA3'

(d) 5'CGCATCGA3'

(viii) Two plasmids are of the same compatibility group if they

(a) Can co-exist in the same bacterial cell

(b) Cannot co-exist in the same bacterial cell

(c) Carry the same antibiotic gene

(d) Carry the same toxin gene

(ix) Incompatibility is a result of

(i) _____

(ii) _____

(x) Original source of Tol is _____

10 [CO2]

2. The graph alongside represents change in absorbance when DNA denatures.

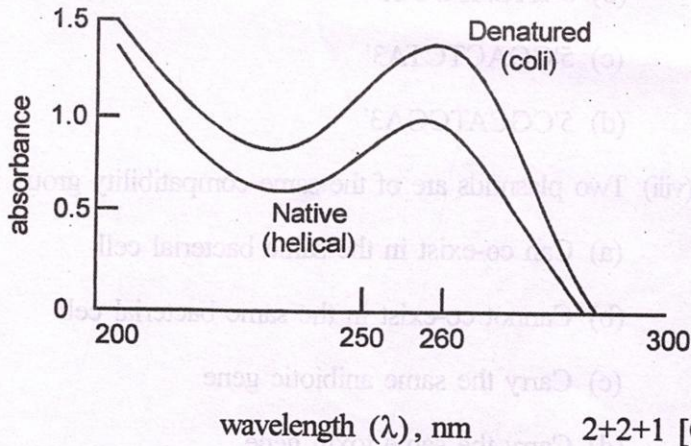
(a) What do you mean by the term denaturation of nucleic acid? Is it same as denaturation of protein?

(b) Why do you see the peak absorbance at 260nm in the graph? How does the absorbance value correspond to the amount of DNA and why?

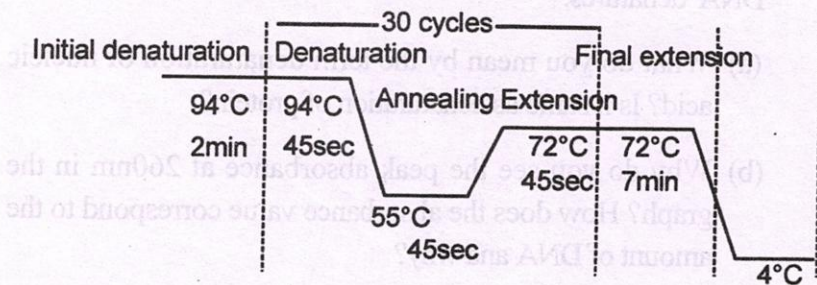
(c) Why there is a change in absorbance? What is this phenomenon called?

P.T.O.

(4)



3. (a) What is a primer in context of DNA replication? What is the requirement of a primer in DNA replication? What happens to the primer at the end of replication? 2+2+1 [CO1]
- (b) Could you elaborate on the semiconservative method of replication and state its benefits? 3+2 [CO1]
4. The image represents different steps of the PCR reaction to amplify X gene.



- (a) Why is it necessary to have Initial denaturation and final extension steps?

(5)

- (b) Why extension step exhibited at 72°C and annealing step at 55°C. 2½+2½ [CO3]

5. (a) How are participating for Stringent plasmids regulated?

- (b) How does Taq polymerase differ from Pfu polymerase? 2½+2½ [CO2]
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Course Outcomes :

- CO1 : To acquire basic understanding of the structure, organization and chemistry of nucleic acids and genome as well as understanding the fundamentals of the central dogma.
- CO2 : To acquire knowledge of recombinant DNA techniques and manipulation of nucleic acid and DNA sequence as well as analysis of genome sequence and variations.
- CO3 : To apply the basic understanding of molecular biology in analyzing and solving problems related to recombinant DNA technology.
- CO4 : To design strategies to solve problems related to recombinant DNA technology.

21.02.2023

Q. No. BTC - 402

0078

ND/B.Tech./Even

Reg./2022-23

2022-23

IMMUNOLOGY

BTC - 402

Full Marks : 25

Time : Ninety Minutes

The figures in the margin indicate full marks.

Answer all the questions.

1. Write True of False —

4 [CO1]

- (a) Antibody Fab portion is made up of heavy chain and light chain.
- (b) Paratope resides on antigen.
- (c) IgE is produced in allergic reaction.
- (d) Hybridoma technique is used in polyclonal antibody production.

2. Write the full form of TCR, MHC, CDR.

3 [CO2]

3. Differentiate in tabular form (any two) : A. Primary and Secondary immune response. B. Polyclonal and monoclonal antibody. C. Innate and adaptive Immune response.

5×2 [CO4]

4. Define (any two) : Epitope, MAC, Affinity maturation.

2½×2 [CO1]

P.T.O.

(2)

5. Mention the maturation site of T cell. What is the composition of HAT medium ? 1+2 [CO2]

Course Outcomes :

- CO1 : To understand the role of the components of the immune system and its classification.
- CO2 : To understand the role of the immune cells and their immunological response in the context of human diseases including infectious diseases, autoimmunity and cancer.
- CO3 : To learn the fundamentals and principles of immunological techniques and their application.
- CO4 : To understand methods of generations of Polyclonal and Monoclonal Antibody and the use of custom made genetically engineered antibodies.
- CO5 : To solve problems associated with drugs and their toxic response based on the knowledge of immunological response.

Q. No. BTC 601/ 68

B.TECH/EVEN

· REG/(22-23)

Even Semester Mid-term Examination, 2022-23

BIOINFORMATICS

BTC 601

Full Marks : 25

Time : 90 Minutes

The figures in the margin indicate full marks.

Graph paper shall be supplied, if required.

Answer *all* the questions.

Question No.	Body of the Question	Marks	Mapped CO
1.	Mention three applications of Bioinformatics towards modern science.	3	CO1
2.	What is a biological database and what are its applications?	2+3=5	CO2
3.	What is NCBI? Write about any two resources of NCBI.	2+2=4	CO2
4.	Match the most appropriate options of the following:	5	CO2
	• EBI -Bethesda		
	• NIG - Heidelberg		
	• NCBI - Hinxton		
	• Dayhoff- Japan		
	• EMBL headquarters - Comproteins		

5 Write the full forms of the following databases and the type of data they store: 5 CO1

- A. PDB
- B. KEGG
- C. ENA
- D. CATH
- E. UniPort

6 What is the purpose of aligning protein sequences? 3 CO1,CO3

COURSE OUTCOMES

- CO1: To learn how to integrate both biological and computer skills for addressing important biological questions.
 - CO2: To acquire knowledge of existing biological databases and understand the methods for storing, organizing, retrieving and analyzing biological data in an efficient way.
 - CO3: To learn and implement computational algorithms and tools (webservers and standalone programs) for processing biological data
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