



BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – B.Sc.(BT)-Hons-2022

Course Name – Recombinant DNA Technology

Course Code - BBTC504

(Semester V)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Identify the scientist who developed the chemical techniques to synthesize polynucleotides?
 - a) Francis Crick
 - b) James Watson
 - c) Barbara Mc.Clintok
 - d) Har Gobind Khorana
- (ii) Identify the enzymes present in bacteria which are responsible for restricting the growth of viruses?
 - a) Restriction endonuclease
 - b) Gyrase
 - c) Lipase
 - d) Exonuclease
- (iii) Polymerase chain reaction (PCR) was invented by
 - a) Watson
 - b) Mullis
 - c) Crick
 - d) Franklin
- (iv) Taq polymerase is a----- polymerase.
 - a) Heat stable
 - b) Heat labile
 - c) Buffering
 - d) Large
- (v) Which indirect technique is used to insert genes in dicot plants?
 - a) Ti plasmid mediated
 - b) Microinjection
 - c) Electroporation
 - d) Particle acceleraeration
- (vi) What are the chances of having a particular four nucleotide long motif, if all the nucleotides are present with equal frequencies and at random?
 - a) 1 out of 256
 - b) 1out of 64
 - c) 1 out of 16
 - d) 1 out of 8
- (vii) Which enzyme is used in the unwinding of DNA?

- a) Ligase
c) Helicase
- b) Topoisomerase
d) Exonuclease
- (viii) The presence and distribution of specific mRNAs within the cell can be detected by
a) Northern blot analysis
c) In situ hybridisation
- b) RNAase protection assay
d) Real-time PCR
- (ix) Define Cre-Lox recombination.
a) site-specific recombination
c) knockdown process
- b) nonspecific recombination
d) none of these
- (x) Interpret the function of primers in PCR.
a) They provide nucleotides for DNA synthesis
c) They serve as starting points for DNA synthesis by binding to target DNA sequences
- b) They cut DNA at specific points
d) They break hydrogen bonds between DNA strands
- (xi) Discuss the key difference between a YAC (Yeast Artificial Chromosome) and a plasmid vector.
a) YACs can carry larger DNA inserts compared to plasmids
c) Plasmids are more stable than YACs
- b) YACs are used in bacterial systems
d) YACs are easier to manipulate than plasmids
- (xii) Determine which enzyme is primarily responsible for cutting DNA at specific sequences during restriction mapping.
a) Ligase
c) Endonuclease
- b) Polymerase
d) Helicase
- (xiii) Explain the purpose of a restriction map.
a) To identify RNA molecules
c) To describe the location of restriction sites within a DNA molecule
- b) To determine the sequence of amino acids
d) To analyze protein structures
- (xiv) Interpret how DNA fingerprinting is used in forensic science.
a) To sequence unknown proteins
c) To replicate a suspect's RNA
- b) To identify individuals by comparing unique patterns in their DNA
d) To create genetic mutations
- (xv) Identify a therapeutic product produced by genetic engineering for blood-related disorders:
a) Insulin
c) Growth hormone
- b) Erythropoietin
d) Interleukin

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Describe the function of polymerases in DNA replication and PCR. (3)
3. Illustrate the steps of primer designing. (3)
4. Apply the principle of RT-PCR to detect gene expression in cancer cells. (3)
5. What are the key components of the T-DNA region of the Ti plasmid that are essential for the gene transfer process by Agrobacterium? (3)
6. Classify the steps involved in preparing a genomic library and compare it with a cDNA library. (3)

OR

Deduce why reverse transcription is a critical step in cDNA library preparation. (3)

Group-C

7. Infer how the development of transgenic mice has advanced the understanding of human diseases. (5)
8. Describe the correct steps of primer design. (5)
9. Summarize how the Agrobacterium system is modified for transferring gene of our interest? (5)
10. Summarize the principle of determining a child's identity through molecular markers? (5)
11. What are restriction enzymes, and how do they function in molecular biology? (5)
12. Explain the method of screening recombinants using blue-white screening. (5)

OR

Classify the steps involved in Southern blotting and discuss its applications in molecular diagnostics. (5)

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