



17974



BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Sc.(BT)-Hons-2024

Course Name – Molecular Biology

Course Code - BBT37104 (T)

(Semester III)

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Brainware University
Barasat, Kolkata -700125

Full Marks : 40

Time : 2:0 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 10=10

1. Choose the correct alternative from the following :

- (i) State the type of RNA involved in protein synthesis.
- | | |
|----------|----------|
| a) snRNA | b) rRNA |
| c) yRNA | d) dsRNA |
- (ii) Identify which of the following bonds are broken during DNA replication.
- | | |
|---------------------------------|---|
| a) Hydrogen bonds between bases | b) Phosphodiester bonds |
| c) covalent bonds between bases | d) Ionic bonds between bases and phosphate groups |
- (iii) Recall the enzyme used in the unwinding of DNA.
- | | |
|-------------|------------------|
| a) Ligase | b) Topoisomerase |
| c) Helicase | d) Exonuclease |
- (iv) Predict the function of β' subunit of DNA polymerase III.
- | | |
|---------------------|----------------|
| a) Promoter binding | b) Elongation |
| c) Cation binding | d) Termination |
- (v) Report the main function of DNA topoisomerases during DNA replication.
- | | |
|-----------------------------------|---|
| a) Synthesizing RNA primers | b) Proofreading newly synthesized DNA |
| c) Unwinding the DNA double helix | d) Relieving supercoiling ahead of the replication fork |
- (vi) Identify the main function of SOS repair in DNA damage situations.
- | | |
|--|--|
| a) To repair all types of DNA damage perfectly | b) To induce mutation intentionally for survival |
| c) To minimize mutation for survival in extreme conditions | d) To prevent DNA damage from occurring |
- (vii) Choose which of the following occurs after the formation of the RNA polymerase-promoter complex during prokaryotic transcription initiation.
- | | |
|---------------|----------------|
| a) Elongation | b) Termination |
|---------------|----------------|

- c) DNA unwinding
 (viii) Predict how the Wobble Hypothesis enhance the efficiency of translation.
 a) By reducing the number of tRNA molecules required for translation
 b) By increasing the accuracy of codon-anticodon recognition
 c) By allowing for flexibility in codon-anticodon pairing
 d) By accelerating the rate of peptide bond formation
 (ix) Interpret how does the redundancy of the genetic code facilitate adaptation in organisms.
 a) By ensuring that all mutations are detrimental
 b) By allowing for the possibility of alternative amino acid sequences without changing protein function
 c) By preventing mutations from occurring altogether
 d) By increasing the rate of mutation occurrence
 (x) Report the primary function of the initiator protein in rolling circle replication.
 a) Catalyzing the elongation of the leading strand
 b) Initiating the unwinding of DNA strands
 c) Nicking one strand of the circular DNA molecule
 d) Promoting the circularization of the displaced DNA

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Explain the reactions involved in the aminoacylation (charging) of tRNA molecule. (3)
 3. Ultraviolet light usually causes mutations by a particular mechanism. Explain this mechanism. (3)
 4. What are the different types of RNA polymerase in eukaryotic transcription? (3)
 5. Describe the key differences of exons and introns. (3)
 6. "The genetic code is unambiguous." Explain this statement. (3)

OR

"61 codons out of 64 codes for amino acids"- Analyze the fact. (3)

Group-C

(Long Answer Type Questions)

5 x 3=15

7. Describe an experimental approach used by scientists to demonstrate the existence of light-dependent (photoreactivation) and light-independent (dark) DNA repair systems in E. coli. Your answer should explain the use of wild-type, *phr*⁻ (photolyase-deficient), and *Bs*⁻ (nucleotide excision repair-deficient) mutants following UV irradiation, and interpret the results using survival response graphs. (5)
 8. Tabulate the name of the genes, enzymes produced and their functions with respect to Lac operon. (5)
 9. Explain Dicer and illustrate its role with respect to si-RNA. (5)

OR

Apply the concept of RNA interference with context to mi-RNA. (5)

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