

School of Chemical and Life Sciences
Ph.D. Course Work Examinations (October 2023)

Title and Code: PHBT101-Elective Paper: Molecular Basis of Life

Time: Three Hours**Maximum Marks: 100**

(Write your Roll No. at the top immediately on receipt of this question paper)

Answer ALL questions. All parts of a question must be answered in continuation. Start answering each question on a new page. Cite examples and draw labeled diagrams.

Q1. Short Answer Type; attempt any 10 (not more than half a page) 10×2=20

- i. Nucleosome
- ii. RNA polymerase in prokaryotes vs eukaryotes
- iii. dNTPs vs ddNTPs
- iv. Types of DNA
- v. What is the significance of TATA box binding protein (TBP) in TFIID?
- vi. Clover Leaf Model
- vii. What is a Klenow's fragment?
- viii. What are the different components of the Eukaryotic Transcription Pre-initiation Complex?
- ix. Central Dogma of Molecular Biology
- x. Inverted Repeat sequences
- xi. Why do telomeres get shortened after every cell division?
- xii. Theta Model of Replication
- xiii. Primosome
- xiv. Conserved promoter sequences
- xv. Chargaff's Rule

Q2. Short note type; Attempt any 04 (not more than two pages) 4×10=40

- i. Discuss the concept, degeneracy, triple nature, and deviation from the universality of genetic code. Explain the wobble hypothesis.
- ii. Describe Meselson and Stahl's experiment to prove that DNA replication is semi-conservative.
- iii. Give an account of enzymes involved in DNA replication and their specific roles.
- iv. How the termination of transcription happens in prokaryotes.
- v. Discuss the DNA Repair by Photoreactivation.
- vi. Discuss the Dissociation Reassociation kinetics.

Q3. Long note type (no limit of pages). Attempt any 02 2×20=40

1. Give a detailed account of the post-transcriptional modifications in eukaryotes.
2. Discuss physical and chemical mutagens and their effects on DNA. Give suitable examples.
3. Explain the DNA repair mechanism. A) Base Excision Repair B) Mismatch Repair
4. C) Nucleotide Excision Repair D) Direct Repair
5. What do you mean by Beneficial Mutations? Explain by giving a suitable example.
6. Discuss the transposable genetic elements in bacteria and eukaryotes. Classify the transposons based on their mechanism of transposition.
