

Roll No: _____

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M.Sc. Biochemistry (Semester II) Examination, May 2024

Paper Title: Molecular Biology II
Paper Code: MBC 201

Time: 2½ Hours

Max Marks: 60

Note: This paper has 3 Sections, A, B, and C. Attempt all three sections. Section A: Answer all the questions; Section B: Answer any two; Section C: Answer all the questions, each question in this section has an internal choice.

Abbreviations Used: CLO- Course Learning Outcome, PLO- Program Learning Outcome, BTL- Bloom Taxonomy Level: BT level 1- Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create.

SECTION A: Attempt all questions.**(1x10=10 Marks)**

Q No.1	Questions (Fill in the blanks/True and False)	BTL	CLO	PLO
i.	Replication errors in DNA can lead to _____.	2	2	3
ii.	The editing unit of CRISPR-Cas system is Cas moiety. (True/False)	2	2	3
iii.	Missense mutations result in the premature termination of protein synthesis. (True/False)	4	5	2
iv.	Chromatin immunoprecipitation (ChIP) is a technique used to study _____.	4	4	3
v.	The two main classes of transposable elements are _____ and _____.	1	3	2
vi.	Histone modifications, such as acetylation and methylation, cannot regulate chromatin functions. (True/False)	4	4	3
vii.	During translation, IF2 binds to the small subunit and blocks it from reassociating with a large subunit. (True/False)	4	4	3
viii.	All class I Release factors share a conserved three amino-acid sequence. Mention the conserved sequence _____.	4	4	3
ix.	Dicer is the RNA-cleaving enzyme involved in both miRNA and siRNA production. (True/False)	2	2	3
x.	Lactose is the inducer of the <i>lac</i> operon. (True/False)	2	2	3

SECTION B: LONG TYPE QUESTIONSAttempt any **TWO** out of four questions

(2x12.5=25 Marks)

Q No. 2	Questions	BTL	CLO	PLO
(a)	Explain the concept of transposable elements, mechanisms of transposition, and importance in genome evolution.	3	2	3
(b)	Describe the various histone modifications and their effects on chromatin structure, gene expression, and disease.	4	3	2
(c)	Discuss different regulatory RNAs found in bacteria.	2	2	3
(d)	Discuss the initiation of translation in prokaryotes. Also mention the role of all initiation factors.	1	1	2

SECTION C: Short-type QuestionsAttempt **ALL** questions, each question has an internal choice

(5x5=25 Marks)

Q No. 3	Questions	BTL	CLO	PLO
(a)	Discuss the different types of DNA damages and their consequences on genomic stability. OR Analyze the importance of CpG islands in epigenetic regulation and their association with gene expression.	4	5	3
(b)	Explain the process of mismatch repair (MMR) in DNA and its significance in maintaining genetic integrity. OR Discuss the role of histone modifications in gene regulation, focusing on acetylation, methylation, and phosphorylation.	3	2	3
(c)	Discuss the CRISPR-Cas system, including its mechanism of action and applications. OR Discuss the role of epigenetic mechanisms in normal development and how their dysregulation can lead to oncogenesis.	4	3	2
(d)	Write a short note on Lactose Operon. OR Discuss the regulation of gene in eukaryotes as proposed by Bitten-Davidson Model.	2	2	3
(e)	Discuss the role of Aminoacyl-tRNA Synthetase in protein synthesis. OR Write a short note on Micronucleus assay used to screen genotoxic compounds.	4	2	3

END OF THE QUESTION PAPER