

27/01/23

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M.Sc. Biotechnology Sem I, Odd Semester-End Term Examination (2023)

Paper Name: **Molecular Biology**
Time: **3 Hrs**

Paper Code: **MBT-CC101**
Maximum Marks: **75**

Note: This paper has 3 sections A, B, and C, Attempt all the three sections

Section A: Answer all the questions; Section B: Answer any 2 out of 4; Section C: Answer all the questions, each question has an internal choice

Course Learning Outcomes

Successful completion of the Molecular Biology course will allow students to:

CLO101.1: Understand the chemical and molecular processes of life based on the genetic constituents of the cell. (Cognitive Level: Understand)

CLO101.2: Comprehend the properties of the heritable material along with all the enzymes involved for proper replication fidelity. (Cognitive Level: Understand)

CLO101.3: Appreciate the diversity of life and the changes occurring through mutations and the underlying molecular mechanism. (Cognitive Level: Evaluate)

CLO101.4: Illustrate the connectivity of living system and divergence through molecular evolution (Cognitive Level: Apply)

CLO101.5: Employ scientific methods and design the experiments along with interpreting biological data to communicate concepts of molecular biology to wider scientific community as well as general public. (Cognitive Level: Apply)

Abbreviations Used

CO- Course Outcome, PO- Program Outcome, BTL- Bloom's 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

Q. No.		COs	BTL
All Questions are Compulsory [Give 2-3 line responses]:		(10×1=10 Marks)	
1.	Origin of replication in Prokaryotes vs Eukaryotes	CO1	K2
2.	RNA-dependent RNA polymerase vs Reverse Transcriptase	CO1	K3
3.	dNTPs vs ddNTPs	CO2	K4
4.	Full form of IRES & PABPs	CO2	K1
5.	Role of sigma factor	CO1	K2
6.	Polarity effect	CO2	K5
7.	Example of a chemical mutagen and its effect	CO3	K4
8.	Theta Model	CO2	K1
9.	TERT and cancer	CO5	K6
10.	Alpha satellite DNA	CO4	K2

SECTION B

Q. No.		COs	BTL
Attempt any TWO of the following:		(2×15=30 Marks)	
11.	Give the detailed account of mechanism of DNA replication highlighting the role of polymerases and DNA modifying enzymes.	CO5	K2
12.	What is the mechanism / chemistry of splicing? Where and when does splicing occur/ What is the utility of splicing?	CO1	K1
13.	What is DNA damage? Describe the single strand damage repair mechanisms (BER & NER).	CO3	K3
14.	Discuss the transposable genetic elements in bacteria and eukaryotes. Classify the transposons based upon their mechanism of transposition.	CO2	K2

SECTION C

Q. No.		COs	BTL
Attempt all the questions:		(5×4=20 Marks)	
15.	What is the principle of pyrosequencing? Discuss its methodology. OR Give an account of the structure of nucleosome and its functions.	CO5	K5
16.	Discuss the role of transcription factors in transcription initiation in eukaryotes. OR What are the three enzymes responsible for 5' capping mechanism? How do they function. What is the significance of 5' capping?	CO1	K1
17.	Describe the transcription termination in prokaryotes. OR What is the concept of The Molecular Clock?	CO4	K4
18.	What do you mean by Beneficial Mutations? Explain by giving the suitable example. OR Give a brief account of CRISPR/ Cas9 as the genome editing tool.	CO3	K3
19.	What is Eugenics? Discuss the classification of Eugenics in the social perspective. OR Draw a well labelled diagram of tRNA. Explain the function of tRNA as an important molecule in Central Dogma of Molecular Biology.	CO4	K4

Table 1: Distribution of question & marks among the Units of syllabus

Unit	Questions Numbers	Total Marks
1	1, 2, 3, 4, 8, 11, 15	24
2	5, 6, 12, 16, 17	25
3	7, 13, 18	20
4	9, 10, 14, 19	21

Table 2: Mapping between COs and questions

COs	Knowledge level	Questions Numbers	Total Marks
CO1	K2, K3, K2, K1, K1	1, 2, 5, 12, 16	22
CO2	K4, K1, K5, K1, K2	3, 4, 6, 8, 14	19
CO3	K4, K3, K3	7, 13, 18	20
CO4	K2, K4, K4	10, 17, 19	9
CO5	K6, K5, K5	9, 11, 15	20