SEMESTER S4

MOLECULAR BIOLOGY

Course Code	**PCBBT402**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3:1:0:0	**ESE Marks**	60
Credits	4	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To understand the overall structure and functions of DNA
2. To understand and evaluate the synthesis of protein and its structural modification
3. To study various types of mutations and its biological importance

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Concept of structure and function of DNA**. Identification of the genetic material – classical experiments, Griffiths, Avery, McLeod, Hershey and Chase. Central Dogma, Gene organization and distribution, Multi-gene families, Repetitive sequences with two examples, exon shuffling, Replication- Models of DNA Replication, enzymes involved in replication	11
2	**Transcription in prokaryotes and eukaryotes**: role of enzymes in transcription, major steps. Transcription initiation complex in prokaryotes and eukaryotes and its regulation. Post transcriptional processing of prokaryotic and eukaryotic transcripts.	11
3	**Outline the processes of prokaryotic and eukaryotic translation processes**. List out the basic components and steps needed to successful translation. Post translational modifications. Protein folding, HTH, HLH, Zinc finger motif. Molecular mechanism of gene regulation in prokaryotes- Transcriptional regulation in prokaryotes; Inducible & repressible system, positive & negative regulation; Operon concept, structure of operon, Lac, Trp, Catabolic repression, Atteunation, Multiple levels of eukaryotic gene regulation	11

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4	**Overview of Mutation**, Types of Mutations mechanisms of mutation, DNA repair and types of repair DNA mismatches repair, direct and reversal. Nucleotide excision repair, double strand break repair and diseases arising from their defect. Recombination-molecular mechanisms of homologous recombination and non-homologous end joining in DNA. Alternative splicing, RNA editing, messenger nuclear exportation and coherence control, RNA interference, microRNA and regulation of mRNA stability.	**11**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Micro project	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

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Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Remember the basic structure and biochemistry of nucleic acid discrimination between them	**K1**
CO2	Understand the relation between DNA replication, transcription and post transcriptional modifications	**K2**
CO3	Apply the the processes of prokaryotic and eukaryotic translation processes including the gene expression level	**K3**
CO4	Analyze the role of mutations and evaluate the effect of mutation in various human disorders	**K4**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2	2		2		2				2
CO2	3	2	2	3		2		2				2
CO3	2	3	2	2		2		2				2
CO4	3	2	3	3		2		2				2

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Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Cell and Molecular Biology	Wallace Marshall, Janet Iwasa, Gerald Karp		9th Edition
2	Essentials of Molecular Biology	Friefelder, David.	Panama Publishing 1993	2nd Edition
3	Molecular Cell Biolog	Lodysh H	Springer/Macmillan	9th Edition (2021)
4	Principles of Molecular Biology	Veer Bala Rastogi		

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Lewin's GENES XI		Jones & Bartlett Learning	11th Edition
2	Molecular Biology genes to Proteins	Tropp, Burton	Jones and Bartlett 2008	3rd Edition

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	Molecular Biology - Course (nptel.ac.in)
2	NPTEL :: Biotechnology - Molecular Cell Biology
3	Cell Biology: Cellular organization, division and processes - Course (nptel.ac.in)
4	NPTEL :: Biotechnology - Molecular Cell Biology

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