

U.S.N.

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E.

Semester: III

Branch: Biotechnology

Duration: 3 hrs.

Course Code: 23BT3PCCMB / 22BT3PCCMB

Max Marks: 100

Course: Cell and Molecular Biology

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.			UNIT - I	CO	PO	Marks
	1	a)	How do prokaryotic and eukaryotic cells differ in terms of their cellular structure, and how do these differences support their respective roles in living organisms?	CO1	-	6
		b)	Explain the significance of the central dogma in understanding how genetic information is expressed in living organisms?	CO1	-	6
		c)	How is DNA organized into chromosomes in prokaryotic cells compared to eukaryotic cells, and what are the biological implications of these differences?	CO1	-	8
			OR			
	2	a)	What role does the nucleus play in transcription, and how is chromatin organization linked to the regulation of gene expression?	CO1	-	8
		b)	How does DNA replication differ between prokaryotic and eukaryotic cells in terms of origin of replication, process speed, and complexity?	CO1	-	6
		c)	What are the processes involved in post-translational modifications of proteins within the Golgi?	CO1	-	6
			UNIT - II			
	3	a)	What is the role of p53 in responding to DNA damage, and how does its mutation or loss contribute to tumorigenesis?	CO 2	PO 1	8
		b)	What are the different types of mutations, and how do they affect the genetic sequence and protein function?	CO 2	PO 1	8
		c)	What is nucleotide excision repair (NER), and how does it repair bulky DNA lesions caused by UV radiation?	CO 2	PO 1	4

		OR			
4	a)	How does the regulation of genetic recombination differ between eukaryotes and prokaryotes, particularly in relation to their respective reproductive strategies?	CO 2	PO1	8
	b)	What is the process of retroviral integration, and how do retroviruses incorporate their genetic material into the host genome?	CO 2	PO1	8
	c)	How do DNA transposons move within the genome, and what enzymes are involved in their cut-and-paste mechanism?	CO 2	PO1	4
		UNIT - III			
5	a)	What is the function of the mediator complex in eukaryotic transcription, and how does it differ from the simpler transcriptional regulation in prokaryotes?	CO3	PO1	8
	b)	How does RNA splicing contribute to the generation of diverse protein isoforms, and what are the mechanisms that regulate this process?	CO3	PO1	8
	c)	What is the role of the TATA box and other core promoter elements in the recruitment of general transcription factors?	CO3	PO1	4
		OR			
6	a)	Discuss the RNA processing mechanisms in eukaryotes. How does system handle mRNA maturation?	CO 3	PO 1	14
	b)	Explain how transcription inhibitors affect the process of RNA synthesis in a cell.	CO 3	PO 1	6
		UNIT - IV			
7	a)	Compare the structure of ribosomes in prokaryotic and eukaryotic cells. How do the differences in their structures contribute to their function in translation?	CO 4	PO 2	8
	b)	Explain how the translation initiation process differs between prokaryotic and eukaryotic cells.	CO 4	PO 2	8
	c)	What is the role of codons in the genetic code, and how do they correspond to specific amino acids during translation?	CO 4	PO 2	4
		OR			
8	a)	Analyze the differences in the initiation processes of translation in prokaryotes versus eukaryotes. How do these differences affect overall protein synthesis?	CO 4	PO2	8
	b)	Explain the difference between post-translational and co-translational modifications in terms of timing and processes involved.	CO4	PO2	8

		c)	What are protein misfolding disorders, and how do they occur at the molecular level?	CO4	PO 2	4
			UNIT - V			
	9	a)	What is the difference between constitutive and inducible gene expression, and how do cells control when and where genes are expressed?	CO5	PO2	10
		b)	What happens to the lac operon when glucose is present in the environment, and how does catabolite repression influence the operon's expression?	CO5	PO2	10
			OR			
	10	a)	Explain the process of gene expression regulation in eukaryotic cells. How do transcription factors influence gene activity?	CO5	PO2	10
		b)	Discuss the regulation of tryptophan synthesis through different mechanism.	CO5	PO2	10

B.M.S.C.E. - ODD SEM 2024-25