

## Model Question Paper-1 with effect from 2022-23 (CBCS Scheme)

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**Sixth Semester B.E. Degree Examination****Subject Title: Molecular Biology & Genetic Engineering**

Time : 3 hours

Max marks: 100

Note : Answer any FIVE full questions, choosing ONE full questions from each module					
<b>Module-1</b>					
1	a.	What is the process of DNA replication in both prokaryotic and eukaryotic cells?	CO1	L1	10
	b.	Explain the operation of base excision repair and mismatch repair mechanisms in DNA damage and repair, detailing the specific enzymes, repair steps, and the pivotal role these pathways serve in maintaining genomic integrity.	CO1	L2	10
Or					
2	a.	Describe in thorough detail the process of transcription in both prokaryotic and eukaryotic cells, including the key players, regulatory elements, and differences between the two systems.	CO1	L2	10
	b.	How does the wobble hypothesis contribute to the understanding of genetic code translation, and what are the key post-translational modifications that proteins undergo, detailing their specific functions and significance?	CO1	L1	10
<b>Module-2</b>					
3	a.	How do prokaryotes regulate gene expression through the lac-operon and trp-operon systems, explaining the roles of regulatory elements, inducers, repressors, and why these pathways are significant?	CO2	L1	10
	b.	How do positive and negative gene regulation mechanisms control gene expression, including the molecular mechanisms and their impact on gene expression dynamics?	CO2	L2	10
Or					
4	a.	How do steroid hormones affect gene expression in eukaryotes, given their interaction with receptors, signaling pathways, transcriptional regulation, and physiological importance?	CO3	L1	10
	b.	How does the antisense technique lead to gene silencing, and what specific molecular mechanisms are involved in reducing gene expression?	CO3	L2	10
<b>Module-3</b>					
5	a.	How do vectors operate in gene cloning, particularly in cloning and expression vectors, elucidating their characteristics, operational mechanisms, and roles in molecular biology studies?	CO4	L2	10
	b.	What are restriction endonucleases and how do they contribute to molecular biology techniques such as DNA cloning and gene manipulation?	CO4	L3	10
Or					
6	a.	What are the roles and differences between DNA and RNA polymerases in cellular processes such as transcription and	CO4	L2	10

		replication?			
	b.	How does restriction digestion-based cloning method facilitate the insertion of DNA fragments into vectors for the purpose of genetic engineering and molecular biology research?	CO4	L3	10
<b>Module-4</b>					
7	a.	How is the screening process utilized to identify specific clones within genomic and cDNA libraries constructed for genetic studies and molecular biology research purposes?	CO5	L3	10
	b.	How does the process of transformation/transfection differ in plants and animals, and what are the key mechanisms underlying the introduction of foreign DNA into their respective cells for genetic modification studies?	CO5	L4	10
Or					
8	a.	What are the essential techniques and prerequisites for conducting the polymerase chain reaction (PCR), and how does this method amplify specific DNA sequences for various applications in molecular biology research?	CO5	L3	10
	b.	How do Southern, Northern, and Western blotting techniques differ in their respective applications for detecting and analyzing DNA, RNA, and proteins, and what are the key steps involved in each procedure?	CO5	L4	10
<b>Module-5</b>					
9	a.	How are microbes genetically engineered to synthesize antibiotics, and what are the key strategies and molecular tools employed in this process to enhance antibiotic production for medical and industrial purposes?	CO5	L3	10
	b.	How do molecular methods and genetic engineering techniques enable microbial production of monoclonal antibodies, and what are their contributions to biotechnology and medicine?	CO5	L4	10
Or					
10	a.	How are animals and plants utilized as bioreactors to produce recombinant proteins through bio pharming, and what are the implications of this approach for biotechnology and pharmaceutical industries?	CO5	L4	10
	b.	What are the diverse genome-editing technologies available, and how do they enable precise modifications of DNA sequences for various applications in research, medicine, and biotechnology?	CO5	L3	10