

MASTER OF BIO-MEDICAL ENGINEERING FIRST YEAR FIRST SEMESTER - 2025

Subject : HUMAN BODY SYSTEMS

Time :3h

Full Marks : 100

Part-I (50 marks)

Instructions : Use Separate Answer scripts for each Part

Answer any ten questions

1. Explain the role of different potassium ion channels in neurotransmission. What is neuromuscular junction? 3+2
2. Discuss the terms short and long-distance gene regulations. Explain the term methylation in CpG islands. 4+1
3. Explain different mechanisms of post-transcription processing. What are circular RNAs? 3+2
4. Discuss the formation of ternary complex during the initiation of translation. 5
5. Explain the packaging of DNA into chromatin and chromosomes. Define origin of replication. 3+2
6. Discuss the semiconservative mode of DNA replication with experimental evidence. 5
7. Briefly discuss the types of DNA-dependent RNA polymerases. 5
8. What are the replication licensing events? Explain the importance of telomere maintenance in cancer. 2+3
9. Discuss the molecular mechanism of photoreactivation with diagram. 3+2
10. Discuss different classes of DNA damage. What is mismatch repair? 3+2
11. What are Holliday junctions? Discuss the role of BRCA1 and BRCA2 gene mutations in breast cancer. 2+3
12. Briefly discuss bacterial promoter structure with schematic diagram. 4+1
13. Write down the function of bacterial protein streptavidin. Experimentally prove that Lac repressor binds operator. 2.5+2.5
14. What are CAP-DNA complex and DNA looping in transcriptional regulation? 2+3
15. Define histone modification. Explain the mechanism of proofreading activity of RNA polymerase. 3+2

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Ref. No. : Ex/PG/BME/PE/T/114B/2025

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Part-II (50 marks)

Instructions : Use Separate Answer scripts for each Part

Answer any ten questions

1. Explain the double helical structure of DNA according to Watson Crick hypothesis. 5
2. Differentiate between nucleosides and nucleotides according to their structure and give examples. 2.5+2.5
3. Both deoxyribose and ribose sugars are present in nucleic acids-Justify this statement. Define motif and domain of a protein structure. 3+2
4. Define alpha helix and beta sheet structures of protein. 5
5. How two strands of DNA molecule wrap around to each other? Why these two strands are called in antiparallel orientation? 2+3
6. Distinguish between semiconservative, conservative and dispersive mode of DNA replication. 5
7. Compare and contrast between functions of DNA and RNA polymerase. 5
8. What is Okazaki fragment? Define 5'UTR and 3'UTR. 2+3
9. Define splicing of mRNA. Discuss the function of AUG codon. 3+2
10. Discuss the secondary structure of tRNA, mentioning the significance of anticodon loop in translation. 3+2
11. What is translation? Discuss the steps of translation. 2+3
12. Define mutation. Discuss four types of mutation. 1+4
13. Describe the role of molecular chaperons in protein folding. What are prion diseases? 2.5+2.5
14. Why innate immunity is called as natural immunity? Describe the main components of innate immunity. 2+3
15. Innate and adaptive immune systems are interlinked-explain with examples. Differentiate between the functions of B and T cells. 3+2