

Ref. No. : Ex/PG/BME/T/115A/2025

Name of the Examinations: MASTER OF BIO-MEDICAL ENGINEERING FIRST YEAR FIRST SEMESTER - 2023

Subject : HUMAN BODY SYSTEMS

Time : 3 Hours

Full Marks : 100

Part-I (50 marks)

Instructions : Use Separate Answer scripts for each Part

Answer any ten questions

1. Explain the event neurotransmission considering the role of different ion channels. 5
2. Differentiate between short and long-distance gene regulations. Explain the term epigenetic modification in gene regulation. 2.5+2.5
3. Both lncRNAs and microRNAs are involved in post-transcriptional gene regulations-Justify this statement. Define C-value paradox. 3+2
4. Discuss the role of aminoacyl-tRNA synthetase in tRNA charging event. 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 the terms of semiconservative, conservative and dispersive mode of DNA replication with experimental prove. 5
7. Compare and contrast between structures of prokaryotic and eukaryotic DNA polymerases. 5
8. What is rolling circle mode of replication? Explain telomere maintenance in aging process. 2+3
9. Define alternative splicing of mRNA. Discuss the term photoreactivation. 3+2
10. Discuss the secondary structure of tRNA, mentioning the significance of anticodon loop in translation. 3+2
11. What is translation toeprinting assay? Discuss the steps of ternary complex formation during initiation of translation. 2+3
12. Explain the terms- riboswitches, metabolite sensors. 2.5+2.5
13. Protein misfolding and neurodegenerative disorders are related to each other-explain why? Explain how histone protein modifications can regulate gene expression. 2.5+2.5
14. What are nuclear matrix and chromosomal territories? 2+3
15. Define photoreactivation. Explain the mechanism of nucleotide excision repair. 1+4

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HUMAN BODY SYSTEMS

Time : 3h

Part – II (50 Marks)

Full Marks : 100

Instructions : Use Separate Answer scripts for each part

Answer any five questions

1. Describe pathway of co-ordinated neuromuscular activity. Application of Biomedical Engineering concept for management of neuromuscular disorders. [5+5]
2. Give a schematic cross-sectional view of the spinal cord at the thoracic level. Role of Biomechanical Engineering in management of spinal injury. [5+5]
3. Describe typical synovial joint with special emphasis on stabilising factors. [6+4]
4. Describe long bone. Outline Biomechanical consideration of management of fractures of different parts of the long bone. [5+5]
5. Describe innervation of Urinary Bladder. Outline effects of spinal cord injury on functions of urinary bladder. [5+5]
6. Draw a schematic diagram of visual pathway. Enumerate causes of blindness. Role of Biomedical Engineering principles for management of corneal opacity. [4+3+3]
7. Describe coronary artery. Application of Biomedical Engineering concepts for management of coronary artery disorders. [5+5]
8. Outline anatomy of the digestive system. Role of Biomedical Engineering concepts in the management of Hepato-Biliary disorders. [5+5]