



B.E. DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Second Semester

COMPUTER SCIENCE AND ENGINEERING

U18BTI2201: Computational Biology

COURSE OUTCOMES

- CO1:** Understand the fundamentals of evolution theory, and classify the type of organisms.
CO2: Draw and differentiate the type of cell organelles using functional characteristics.
CO3: Analyze and appraise the functional impact of biological macromolecules.
CO4: Understand the structural and functional characteristics of nucleic acids, differentiate the impact of biological information process, and evaluate the derangement of information flow due to mutation.
CO5: Apply the fundamental concepts of pattern matching methods and interpret the alignment of biological sequences.
CO6: Understand, apply and evaluate the molecular phylogeny of biological sequences.

Time: Three Hours

Maximum Marks: 100

**Answer all the Questions:-
 PART A (10 x 2 = 20 Marks)
 (Answer not more than 40 words)**

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|---|-----------------------|
| 1. Mention few characteristics of living organisms. | CO1 [K ₁] |
| 2. Differentiate between prokaryotes and eukaryotes. | CO1 [K ₄] |
| 3. Comment on different types of nucleic acids. | CO2 [K ₁] |
| 4. Draw the structure of mitochondria and explain its function. | CO2 [K ₂] |
| 5. Illustrate how DNA is packed inside the nucleus of eukaryotes. | CO3 [K ₂] |
| 6. What is heredity? Comment on the role of DNA in heredity. | CO3 [K ₂] |
| 7. Differentiate between mitosis and meiosis. | CO4 [K ₂] |
| 8. Comment on the applications of pairwise sequence alignment. | CO5 [K ₂] |
| 9. Outline the methods used for molecular phylogeny analysis. | CO6 [K ₁] |
| 10. Define transcription. Comment on its role. | CO3 [K ₁] |

Answer any FIVE Questions:-
PART B (5 x 4 = 20 Marks)
(Answer not more than 80 words)

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|--|-----|-------------------|
| 11. Describe the uniqueness of life survival on earth. | CO1 | [K ₂] |
| 12. Illustrate the structure and function of plasma membrane. | CO3 | [K ₂] |
| 13. Draw and explain the structure of different types of RNA. | CO2 | [K ₂] |
| 14. Explain the steps in process of transcription. | CO4 | [K ₂] |
| 15. Describe the terms-match, mismatch, E-value, gap in sequence analysis. | CO5 | [K ₂] |
| 16. Explain the significance of maximum likelihood method for phylogenetic analysis. | CO6 | [K ₃] |

Answer any FIVE Questions:-
PART C (5 x 12 = 60 Marks)
(Answer not more than 300 words)

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|--|---|-----|-------------------|
| 17. a) Explain at least two theories of evolution. | 8 | CO1 | [K ₃] |
| b) Explore few unique properties of archae bacteria. | 4 | CO1 | [K ₃] |
| 18. a) Explain the different class of carbohydrates and comment on its function. | 8 | CO2 | [K ₃] |
| b) Classify the different types of lipids. | 4 | CO2 | [K ₃] |
| 19. a) Highlight the role of mutation in causing cancer. | 4 | CO4 | [K ₂] |
| b) Elaborate the steps involved in protein synthesis. | 8 | CO4 | [K ₂] |
| 20. a) Illustrate the structure and function of golgi apparatus and nucleus. | 8 | CO3 | [K ₃] |
| b) Draw and explain the structure of prokaryotic cell. | 4 | CO3 | [K ₃] |
| 21. a) Explicate the steps involved in BLAST analysis and write its significance. | 8 | CO5 | [K ₂] |
| b) Describe the application of Multiple sequence alignment. | 4 | CO5 | [K ₂] |
| 22. a) Illustrate the methods useful for high throughput gene expression analysis. | 8 | CO6 | [K ₃] |
| b) Expound the UPGMA method for phylogeny analysis. | 4 | CO6 | [K ₃] |
