Cluster Innovation Centre
University of Delhi
End Semester Examination May 2025

Name of the Course: B.Tech (IT & MI)
Semester: IV
Paper Title: ***in silico* Biology**
Paper code: 3124002007
Maximum marks: 60 Time duration: 2 hours
Instructions: **Question 1 is compulsory. Attempt any three from the rest.**

---

1. You are part of an expedition to Drang-Drung glacier in Ladakh. Your team has taken permafrost samples and you want to detect pathogens (bacteria, virus) not encountered by modern humans. Design a set of *in silico* experiments that you can perform after a sequence/metagenome analysis of these samples. Give a detailed protocol and name the software that are going to be used for this design. (15)

2. Explain with examples/diagrams/flowcharts any three of the following: (5X3=15)

   Needleman-Wunsch, ClustalW, Chimera, Bootstrapping, PSI-BLAST

3. What is a scoring matrix in biology? Prepare a matrix for aligning 'BIOINFO CLASS' and 'BIOTECH SCHOOL'. Give your argument for a local or global alignment. (15)

4. Differentiate between the distance based and maximum likelihood models of phylogeny. Name three different types of phylogenetic tree representation. Explain in brief how phylogeny helps in understanding evolution (6+3+6=15)

5. What is protein-ligand interaction analysis? Define protein modelling. Name 5 protein modelling and/or docking software. (5+5+5=15)