MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

II SEMESTER M.TECH (INDUSTRIAL BIOTECHNOLOGY)
END-SEMESTER EXAMINATION, June 2022 (02:00-05:00PM)
SUBJECT: Biomolecular Data Analytics (BIO 5002)
ANSWER ALL QUESTIONS

TIME: 3 HOURS **MAX. MARKS: 50**

Q. NO		MARKS	CO	BTL
1A	Assume that you are given a set of DNA sequence belonging to different species. What strategy has to be adopted to find a common pattern in such sequences?	**3**	4	2
1B	Brief about the challenges faced in assembling a genome	**3**	4	2
1C	Perform a pairwise alignment of the following sequences (seq1 & seq2) using dynamic programming. Calculate its score from the alignment and use the following scores **Seq 1**: T C G T A and **Seq 2**: T A C G A [Match =2, Mismatch =-1, and Gap=-2]	**4**	1	4
2A	Construct the overlap multigraph of the following fragment collection F={a,b,c,d}, where a= TACGA; b=ACCC; c=CTAAAG; d=GACA	**3**	1	3
2B	Differentiate local and global alignment algorithms	**3**	1	2
2C	Explain Sequencing by Hybridization (SBH). Also describe SBH as Hamiltonian as well as Eulerian path problems.	**4**	2	3
3A	Give a schematic representation of PDB flat file. Dissect and explain its components	**3**	3	2
3B	Describe about the receptor types and the signal transmission with an illustration	**3**	2	3
3C	The alpha fold server can predict protein structures automatically. Explain the conventional protein modeling methods	**4**	4	4
4A	Differentiate the types of feedback control systems in a branched pathway	**3**	3	3
4B	Schematically illustrate the open and closed metabolic networks. Also illustrate the partitioning of internal reactions (vi), the exchange reactions (bi), the internal compounds (xi), and the external compounds (ci) in the total stoichiometric matrix.	**3**	2	2
4C	Illustrate the FFL motifs of both coherent and incoherent classes	**4**	3	3

5A	Which of the following topological properties of a metabolic network is important? Why? a) degree distribution, b) shortest path, c) transitivity, d) centrality, and e) minimal cut set	**3**	2	4
5B	Represent a Boolean gene regulatory network for lactose utilization	**3**	3	4
5C	How would you use metabolic flux information to design drugs? Brief with examples	**4**	4	4
CO: Course Outcome; BLOOM TAXONOMY LEVEL: 1-Remember, 2-Understand, 3-Apply, 4-Analyze, 5-Evaluate, 6-Create				